To Love And Regenerate The Earth:

Further Perspectives On

The Survival of Civilization

Written and Compiled by
Don Weaver, Co-Author of
The Survival of Civilization

FERTILE GROUND by Rob Schouten ã 1995

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The purpose of this book is to offer the world's responsible people a non-commercial gift of potentially world-transforming information, ideas, and insights on the social, ecological and climatic problems now threatening the future of humanity and the whole Biosphere. Also, to offer potential solutions which respond to the causes of these problems, and which might empower us to wisely regenerate the Biosphere and restore health and balance to the sociosphere.

The author/editor is an independent (and interdependent) volunteer researcher hoping to encourage humanity's continued awakening, as well as "the progress of Science and useful Arts," one of the Constitutionally stated purposes of copyright law. In quoting from a broad spectrum of journals, websites, and books, I did not intend to substitute for them nor discourage careful, open-minded study of the entirety of them, nor do I in any way discourage their purchase if for sale.

I found very helpful, as you may, the information and guidelines on the Fair Use privilege in books and websites on the topic. Especially comprehensive is the Fifth Edition (Feb. 2000) of ***The Copyright Handbook*** by attorney Stephen Fishman, published by Nolo Press. Its section 11/3 on Fair Use includes a Codification of Fair Use Privilege and quotes Section 107 of the 1976 Copyright Act which provides that: "The fair use of a copyrighted work ... for purposes such as criticism, comment, news reporting, teaching ... scholarship, or research, is not an infringement of copyright." The entire section

107 may be studied at the website:
www4.law.cornell.edu/uscode/17/107.html.

The Chicago Manual of Style (14th Edition, 1993) says: "The right of fair use is a valuable one to scholarship, and it should not be allowed to decay through the failure of scholars to employ it boldly." (p. 148)

The Copyright Primer (2nd Edition, 1995) by Janis Bruwelheide says: "Without this privilege to use copyrighted materials, copyright would not serve its constitutional purpose to 'promote the progress of Science and useful Arts.' Fair use thus limits the copyright owner's monopoly by reserving to others the right to make reasonable uses of copyrighted materials without the specific consent of the author. The doctrine is of extreme importance to teachers, librarians, researchers, and scholars as well as to the public generally." (p. 11)

Also noteworthy from this book's Appendix F: "The Association of Research Libraries affirms the following intellectual property principles as they apply to librarians, teachers, researchers, and other information mediators and consumers....

Statement of Principles

1) Copyright exists for the public good....

Fair use and other public rights to utilize copyrighted works, specifically and intentionally included in the 1976 revision of the law, provide the essential balance between the rights of authors, publishers and copyright owners, and society's interest in the free exchange of ideas.

2) Fair use, the library, and other relevant provisions of the Copyright Act of 1976 must be preserved in the development of the emerging information infrastructure.

Fair use and other relevant provisions are the essential means by which teachers teach, students learn, and researchers advance knowledge...." (p. 113; 5 more Principles follow)

One more quote from ***The Copyright Handbook***:

"Pursuant to the fair use rule, an author is permitted to make ***limited*** use of a prior author's work without asking permission. All authors and other copyright owners are deemed to give their automatic consent to the fair use of their work by others. The fair use privilege is perhaps the most significant limitation on a copyright owner's exclusive rights." (Section 11/3)

I hope this serves as a good introduction to the topic of fair use. A study of the resources mentioned can provide a fuller understanding. I ask that you respect the intent and purpose of ***To Love And Regenerate The Earth*** and its non-commercial, educational nature, as you put it to wise and fair use. As for making copies for personal study and use, that would seem natural to me, and a relevant note on this is found in ***How To Register Your Own Copyright*** (1998) by attorney Mark Warda:

"There is no specific exemption in the law for personal use. But because the constitutional purpose of copyright law is to promote the 'progress of Science and useful Arts,' courts have ruled that making copies for personal use is a kind of fair use." (p. 33)

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POB 882, Freeland WA 98249, 1-800-858-5063, or Victory@greatpath.com.

Thank you for carefully considering all of this.

Perhaps you, too, may find the following quotes inspirational.

"I am not bound to win, but I am bound to be true. I am not bound to succeed, but I am bound to live up to the light I have."

-- Abraham Lincoln

"I am only one, but still I am one. I cannot do everything, but still I can do something. I will not refuse to do the something I can do."

-- Helen Keller

"It is not because things are difficult that we do not dare; it is because we do not dare that they are difficult."

-- Seneca

"Past the seeker as he prayed, came the crippled and the beggar and the beaten. And seeing them, the holy one went down into deep prayer and cried, 'Great God, how is it that a loving Creator can see such things and yet do nothing about them?' And out of the long silence, God said, 'I did do something. I made you.' "

-- Unknown

Dedication

A researcher named Herbert Bailey wrote a dedication to his book which I find moving and inspiring and, if I had no other words to offer, think these would fit here well:

> "This book is dedicated to those rare persons who honestly seek the truth in all of man's endeavors on this planet and will not allow egotism, personal gain, or seemingly insurmountable obstacles . . . to deter them in the slightest from their quest."
>
> (from ***Vitamin E: Your Key To A Healthy Heart***, 1971)

Let us hope that, 30 years later, those guided by foremost concern for truth can no longer be classed "rare persons," because the human quest to create a sane and healthy world has never known greater need for caring, committed participants.

My own simple words of dedication are these:

> To all children and other innocent creatures whose beauty, goodness, quality of health and future survival depends upon our rapid awakening to an enlightened responsibility to heal and transform the world.
>
> **Don Weaver**

Acknowledgements of Gratitude

I wish first to give thanks for the evidently magnificent, marvelous, and miraculous Creative-Regenerative-Intelligent Life Force which fashions our bodies from the "dust of the ground," and is always ready and available to help an intelligent, cooperative, co-creative human race - and to revitalize the Biosphere of which we're a key, conscious, and very powerful part.

Thank you for so much, Anita Hamaker, who supported me and others and this work in countless (usually "anonymous") ways. Without her over 50 years of dedicated partnership with John Hamaker, it is likely neither John nor I would be offering you anything here. (My thanks to John is in the separate "A Tribute To John D. Hamaker (1914-1994)") Thanks also to Maralyn Hamaker, for helping us edit and publish ***The Survival of Civilization***, and overall caring support.

Endless thanks to my parents, Adrian and Marie Weaver, who gave me truthful guidance, love and freedom to follow my heart and conscience - even when they disagreed with me. Without their nurturance and encouragement to read and develop my mind along with my jump shot, and without their generous provisions of "famine relief funds" when needed, you might (for better or worse) have heard nothing from me beyond "swish." As you can glimpse in the photo I took of them, we always did agree that kindness, laughter and plenty of mineralized lettuce are good to share! I also thank my brother and sister for all they shared and taught me as the youngest of our family.

Adrian and Marie Weaver

Thanks to all my teachers and coaches, in and out of school, who were called to service to enrich the understanding and experience of others, to create a wiser and happier world. Special thanks to Bill Smith, my high school basketball coach, who showed us the joy and greatness of real teamwork, and that it really is about "how you play the game." Also for getting everyone off the bench and ***into the game***.

Thanks to co-workers Joanna Campe, Betsan Coats, Alden Bryant, Fred Wood, Fred Scott, Sister Miriam MacGillis, Larry Ephron, Don Hunter, Vernon Lawrence, and far too many more to name. I hope your numbers will grow into the billions as the inspiration to Regenerate the Earth becomes a new "common sense" - a sensibility you've each helped reveal to be natural to human beings, once lifted up from dormancy and encouraged to grow and flower.

Thanks to many dear friends for all your kindness and inspiration. I know you'll forgive me for the times I seemed to choose "the Work" over "the friendship," and will understand I was simply trying to fulfill my responsibilities as a "Friend of the Earth" - and help create a world of infinite future friendships (including ours).

I'm also very grateful to my patient and persistent co-workers in bringing ***The Survival of Civilization*** and ***To Love And Regenerate the Earth*** to the World Wide Web:

First, to Susana Mazzocco for her generous volunteer donation of extensive computer work and helpful ideas over many months. Thank you, again, for all your contributions.

"Invisible Gardener" Andy Lopez, our volunteer webmaster and generous friend whose urge to help springs naturally from his work as an eco-agriculture educator around the U.S. and via www.invisiblegardener.com. Andy is maintaining the www.remineralize.org website until we find another experienced webmaster with time to both maintain and expand the site to provide you all the remaining info and resources appropriate to it. (If interested, please e-mail Joanna Campe: reminearth@aol.com.)

Tim Talbot of Redwood City, CA, whose professional skills in desktop publishing and general computer consulting and assistance helped

buoy up and guide this project when it was most needed. Tim's concern for the project and people involved - I'd say that's all of us - made it a privilege working with him. (If anyone else needs Tim's assistance, you may e-mail him at his website: tt@timtalbot.com, or call 650-369-0368.

Thanks also to my friends Rob and Victory Schouten for loaning me the use of their beautiful "Fertile Ground" artwork on the cover page. Rob is an amazing painter whose art always seems to convey a sublime sense of the Sacredness of Life while pointing to its higher potentials - such as the potential of Paradise to generate or regenerate from the Earth's rocky parent-matrix! (To see more of Rob's art you may visit www.greatpath.com, or call 1-800-858-5063 for a catalog.)

Heartfelt thanks as well to all the great librarians everywhere who are dedicated to advancing human knowledge and wisdom, and who understand H.G. Wells' observation that "Human history becomes more and more a race between education and catastrophe." So many of you have helped me to research and learn over the years, especially in the U.C. Berkeley and San Mateo County libraries. A grateful bookworm's hug to: Catia, Esther, Patty, Sue, Pat, Mary Beth, Al, Tracy, Barry, Linda, Lisa, Dan, Connie, Vicky, Eric, Karen, Jerilynn, Brenda, Mary, Roz, Jeff, Geri, Jeannine, Sherry, Sandra, Chris, Ashley, Katherine, Tom, Peggy, Julie and many others!

And lastly, thank you to all those throughout history who've tried to create countries and a world where people are free to speak their minds and hearts for the greater understanding and growth of the human being and the healthy diversity of our social and natural environment. In America, my country of birth and nurturance, Katherine Lee Bates was inspired to write a poem and song to remind us of the gifts and responsibilities we've inherited. "America the Beautiful" became the song, and its third and final version of 1913 emerged as eight powerful stanzas. Only the first of these is usually sung, as my classmates and I learned to do in grammar school, with barely dawning consciousness of the meaning of the words, yet a capacity to feel the joy of our sounds as we sang out:

O beautiful for spacious skies
For amber waves of grain,
For purple mountain majesties
Above the fruited plain!
America! America!
God shed his grace on thee
And crown thy good with brotherhood
From sea to shining sea!

I know nothing of Katherine Lee Bates' views on the rest of the world, yet doubt that she believed Divine Grace and brotherhood-sisterhood was to be limited to America alone. In any case, I'm very impressed by her entire poem, including the following seldom-sung third stanza. Perhaps you'd like to join me in giving (or singing) thanks for her inspirational vision and call to create a country - and perhaps a world - of goodness, nobleness, health, beauty, and freedom:

O beautiful for heroes proved in liberating strife,
Who more than self their country loved
And mercy more than life
America! America!
May God thy gold refine
Till all success be nobleness
And every gain divine!

Postscript: Now that I've read Lynn Sherr's 2001 book, ***America the Beautiful: The Stirring True Story Behind Our Nation's Favorite Song***, I've learned that Katherine Lee Bates did say, "I long for world brotherhood," and suggested that "when you sing the first stanza, you think of 'From sea to shining sea' as applying from the Pacific to the Atlantic, around the other way, and all the states in between, and that will include all the nations and all the people from sea to shining sea." (***America the Beautiful***, p. 97)

In Tribute To John D. Hamaker (1914-1994)

Don Weaver and others

The Summer 1995 ***Remineralize the Earth*** (Double Issue 7-8) featured a series of tributes and thanks to John Hamaker, and some of these are excerpted here. Charles Walters tribute to John was first published in the August 1994 ***Acres, USA***. ***Remineralize the Earth*** editor Joanna Campe prefaces her reprint by saying:

> "Probably the greatest supporter of John's work in the earlier years, the seventies, and until now has been Charles Walters, publisher and editor of ***Acres, USA,*** a fiercely independent newspaper that is a pioneer publication for writers and thinkers of ecological and economically sustainable farming. Through that paper and its many readers, John gained a wider audience."

Here then are my excerpts of Charles Walters':

John Hamaker - One Who Will Be Missed

"John Hamaker, a long-time contributor to ***Acres, USA***, and a modern voice for mineralization of farm acres, passed from the scene June 30. He had hoped to live to age 80 (***and he did, J.C.***), but his goal was cut short by exposure to chemicals of organic synthesis, an assault from which he never fully recovered.

"John Hamaker, in the ***Acres, USA*** index of materials, took up almost a full column of eight-point type, starting in 1973 and going up to the present. A student of geology, history, and a half-dozen other disciplines, Hamaker discerned that when the glaciers marched across the landscape, glacial gravel remained to provide the proper mix of essential nutrients. Unfortunately, killer agriculture had been imposed on the nation's acres to accommodate the needs of the fossil fuel people for a dumping ground. . . .

"John Hamaker's in-depth reports in ***Acres, USA*** told readers about mineralization. He looked down the road, outlining in understandable terms the shape of the future if technology did not mend its ways. In time he enlisted Don Weaver in co-authoring ***The Survival of Civilization***, a text that gained international attention and ultimately

backgrounded a video presentation [Larry Ephron's ***Stopping the Coming Ice Age***] and publication, ***Remineralize the Earth***. Finally, Hamaker's two-decade-long fight for the saving action of remineralization reached Beltsville, where a conference styled "***Soil Remineralization and Sustainable Agriculture***" was held shortly before Hamaker's death.

"Given the Hamaker push, the concept has achieved a following not seen since Julius Hensel wrote ***Bread From Stones***. . . . The world cannot live well at the level of its great men. John Hamaker was one of them."

Does Charles Walters mean that the world in its present condition cannot live "comfortably" at the level of its great men and women—or "efficiently" in terms of rapaciousness toward the natural world? My suggested alternative conclusion would be along the lines of: "Sadly, the world has yet to heed the call to wake up and move up to the level of its great men and women. After all, the seeds of greatness are present in the many, not just the few. In the right soil, these seeds cannot help but to sprout."

Joanna Campe's longer personal tribute included these words:

"He was a genius and an independent thinker, the realization of whose vision could contribute to the health of the Earth and all life. John had an extraordinary, uncompromising character, and tenacity to continue to urge others on to the task ahead. . . . I don't really like to speak of John in the past tense. I think his presence is still with us and urges us on to fulfill our potential in restoring and regenerating Earth.

"Whether you are dedicated to a healthier garden, more productive and fertile farm, want to save the dying forests or involve yourself in the larger vision of climate, if you are pragmatic or idealistic or both, I'd like to ask you to acknowledge John Hamaker, who has changed the course of more than one person's life, and who points the way toward life at its most fruitful and truly sustainable for all Earth."

Next followed the section, "Remembering John - letters from friends and admirers," including these thoughts:

“He fought a long and courageous battle for life and health and common sense. His insightful analysis, experimental investigations and dogged determination nurtured an idea that has engaged the consciousness and enlisted the efforts of people around the planet. He will be sorely missed.”

— V. and F. G.

“He made a very deep impression on the organic movement by his strong emphasis on the value of minerals, and will always be remembered for that. Every time I see references to rock dust, I always think of him. . . . The new big conferences on remineralizing soil are a tribute to his efforts.”

— B. C.

“He did indeed keep this person steady on the path of truth, for which I will always remember and honor him. He has helped, perhaps more than anyone else, to lay the ground work for the real and spiritual civilization of tomorrow.”

— H. L.

“What I always remember first. . . is the way his twinkling gaze and encasing smile always called me forth to be fully alive in the moment.”

— J.M.

“There are many of us who move differently through life because of John.”

— Y.M.R.

I provided a concluding tribute of personal gratitude which may give further insight into who John was and why we who knew him grew so much more respectful of the Biosphere and the potential of humankind to play the key role in its Regeneration. My tribute was titled, “With Thanks to John Donald Hamaker,” and follows here.

Thanks, John, for:

Giving the last 30 or more years of your life to the restoration of our personal, societal, economic, and planetary Health.

Doing what you saw to be right, honest, and true to the natural laws of Life, regardless of its 'popularity.'

Speaking out for the Earth and humanity, and questioning, questioning, going beyond 'easy answers' and 'the conventional wisdom' into the deeper causes, the long-term effects - looking toward the 'seventh generation' and beyond. . . .

Respecting and responding to every person who came to you with questions, ideas, problems. You gave yourself unstintingly to any sincere person or important problem. That is why you were so valuable to your engineering companies, and so invaluable to the world after your work became solving "the problems that afflict humanity" and the Earth.

Being my true friend, great mentor, partner in trying "the impossible" (are the Marines helping yet?), and an inspiration as unfailing as your own devotion to "the Cause." You showed me the deeper respect and love of Nature's beauty and wisdom, offering complete health and abundance to all when given the chance. Your generous spirit could see the Generous Spirit in Nature.

Your deep seriousness and your ability to sense humor and express your own special healing laughter.

Embracing the responsibilities Life gave you with your amazing intelligence and insights. As well as a real "Friend of the Earth" you were, from all reports, a great husband and father. When I heard that your last words were "I love you," as you squeezed Anita's hand, I realized it was the verbal expression of what your life was about. I don't think anyone who was privileged to know you well had any doubt. Thanks, John."

The photo used on the cover of the Summer 1995 ***Remineralize the Earth***:

John Hamaker and Family member
Seymour, Missouri

"A human being is a part of the whole, called by us 'Universe,' a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest—a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole Nature in its beauty."—Albert Einstein

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Historical/Contextual Introduction to *To Love And Regenerate the Earth: Further Perspectives on The Survival of Civilization (TLARTE)*

Written and Compiled by Don Weaver
(whose "voice" appears in green)

Thank you for your interest and concern in visiting this website started by a great friend of humanity and Earth, Joanna Campe of Northampton, MA. Since reading ***The Survival of Civilization*** in 1984, Joanna has been inspired to help the world see the positive solutions we can apply now to meet the immensely dangerous and still growing challenges of ecological degeneration and climate change.

Prior to shifting her energies to this website for the non-profit Remineralize the Earth, Inc., Joanna published many invaluable issues of ***Soil Remineralization: A Network Newsletter***, and then ***Remineralize the Earth*** magazine. Joanna has brought great love and care and the noble spirit of Goodness on behalf of all of us, always believing we could awaken to the joyful task of replenishing and regenerating the Earth so it could even regain its past "Garden of Eden" (or Interglacial Climatic Optimum) vitality and beauty. So I wish to honor her work and spirit here, if only so briefly.

I often share quotes I find interesting and inspiring. The three I'll share here remind me strongly of Joanna Campe; I also see that many of us are realizing the truth in these quotes and in ourselves, thus providing real hope for a healthy living future. Thank you, Joanna, and everyone working to embrace truthful lives and our shared responsibilities.

"*Beauty will save the World*"

—Fyodor Dostoyevsky

"Integrity is wholeness,
the greatest beauty is Organic wholeness,
the wholeness of life and things, the divine beauty of the universe.
Love that, not man apart from that, or else you will share man's pitiful confusions; or drown in despair when his days darken."

—Robinson Jeffers

"Be such a person and live such a life, that
if every person were such as you, and every life such as yours,
this Earth would be God's paradise."

—Phillip Brooks

I hope you will consider helping Joanna Campe and co-workers build the Remineralize the Earth website with your own information, inspiration and participation. She needs our help in many ways, including completion of basic website information such as a current Resources listing of rock dust sources, active groups and projects, valuable articles from ***Remineralize the Earth*** magazine archives, other relevant publications, and more. Your own remineralization and Earth Regeneration stories, and photos of results, would be more great ways to contribute. What else would you like to see on the website?

Also, please consider how you might help us maximize the number of people invited to study the website and read ***The Survival of Civilization (TSOC)*** and ***To Love And Regenerate The Earth: Further Perspectives on The Survival of Civilization*** (***TLARTE***). If you have your own website, perhaps you'd like to provide a link to **www.remineralize.org**, or suggest an exchange of links if you have a complementary site? Thanks for considering the possibilities!

I think some biographical perspective could possibly be helpful. As mentioned above, my name is Don Weaver. I was born in San Francisco in 1955 and grew up in the Bay Area. The youngest of three children, I received plenty of attention, learning experiences and love to keep me growing in positive directions despite losing my share of life energy to junk food, junk television and excessive 'recreation.' A love of playing basketball and growth to 6'6" brought me ***Most Valuable Player*** awards and a

scholarship to U. C. Berkeley. My dream of a pro basketball career seemed on track—until the “Dream of the Earth” (Thomas Berry) inspired my heart in new directions! That heart had begun to seriously expand in high school when I “rose in love” with the angelic kind-hearted Lynn who inspired me to overcome my unnatural “girl shyness” and joined me on my only extra-basketball high school date—the last Bay Area visit of her (therefore my) favorite singer, a fellow named Elvis.

In college, further openings in my heart became evident when, in addition to school studies and basketball, I immersed myself in studying the deep wealth of the world's philosophical/spiritual/religious wisdom literature, plus simultaneous study of great books and journals revealing the interrelationships of pure fresh natural foods, healthful living, soil fertility, agriculture, and the great, all-encompassing science of Ecology (“the study of the relations of living things to their environment”). While studying and working hard to become a healthier and better athlete and person, I grew increasingly aware of how unhealthy and unhappy were so many of my professors and coaches, my 30,000 fellow students, and the many more-or-less destitute beggars and seemingly deranged “street people.”

The deeper I studied the ecological trends of soil erosion/depletion, deforestation, loss of farmlands, wetlands, wilderness, aquifers, etc. plus air-water-soil-human body pollution and worsening degenerative disease, the deeper grew my concern for Earth's future. I also accepted my responsibility to educate myself about “Nuclear Madness” (thanks Helen Caldicott–without whom our ***still possible*** extinction might already have occurred) and the psychological, spiritual, political, and economic causes of excessive tribalism, violence and war. Basketball, although I was increasingly appreciating the arena it offered to experience friendship, teamwork and fun exercise, grew less important. When our highly pressured and high-pressuring coach encouraged us to drive our knees into our opponent's noses if they tried to draw a charge, I realized there must be other ways I might be “valuable” and I soon thanked coach (a very kind man at heart) goodbye and continued my broader education. Coach's other players, and family, also said goodbye to him within a few years when, still in his 50s, a “heart attack” killed him. I reflect on the contrast with the legendary UCLA coach and life philosopher whose many championship teams never heard him speak of “winning” or “beating the opponent” but rather of “playing your best.” Coach John Wooden is still going strong at

age 91, sharing his philosophies on true sportsmanship and “success,” and encouraging all of us to: “Make this day your masterpiece.”

The inspiring power of Franco Zefferelli's film ***Brother Sun, Sister Moon***, portraying the life of St. Francis of Assisi, the “patron saint” of animals and Nature, effectively finished off my heart's resistance to devote itself to ways in which to know and express compassion for the global pain and plight of humanity, animals and our whole endangered natural world. This 1972 film is still available on video and I wish everyone would appreciate its “timeless” and actually quite relevant messages for our world with its modern ideas of “progress” and “success.” The actress portraying St. Claire may be the most beautiful human being I have ever been privileged to see. Since then, I've noticed this same radiant innocence, health and purity in well-nourished and well-loved children, proving it is simply natural to the human race. Could we not live our whole lives with the fully-nourished glow of health, goodness and friendliness? Of course we can, and also recover it should we happen to lose it along the way!

I share this little story or outline of my life, the opening up and factual transformation of my mind and heart, and the potential of children and adults to realize lives of love, health, wisdom, intelligence and goodness for two simple reasons. The first is that, after studying, observing and being part of the realities of this small planet Earth with over 6 billion human souls and rapidly shrinking numbers of other species, I see no intelligent reason we can expect to survive (much less thrive in health) if we neglect to deeply explore these topics and carry through the inner work upon which depends the quality of all our outer interrelationships. Thomas Berry calls this becoming “The Viable Human” and it enables us, in natural humility, to “re-apply for membership in the Biosphere.” Berry’s 1999 book, ***The Great Work***, along with his 1988 ***The Dream of the Earth***, I am placing right up near the top of a list of about 85 books which I've found to be among the most inspiring, informative and relevant to the urgent challenge of human-and-planetary transformation and regeneration, among the 1500 or so I've read. I'll put this short booklist at the end of this Introduction. They are, overall, not in any order of the value I found in them. Consider a small sampling of Thomas Berry, first from ***The Dream of the Earth***:

“Yet the psychic energies sustaining the industrial illusion are now dissolving in confrontation with the problems of water for drinking, air for

breathing, nontoxic soil for food production. A new energy is beginning to appear. Already a pervasive influence throughout the North American continent, this energy is finding expression in more than ten thousand ecologically oriented action groups on this continent; it is distributed through all the professions and through all the various forms of economic, political, educational, religious, literary, and media enterprise." (p. 31)

"What is clear is that the earth is mandating that the human community assume a responsibility never assigned to any previous generation." (p. 47)

"Industrial agriculture is no longer the participation in the productive cycles of the natural world; it is the extinction of the very conditions on which these productive cycles depend." (p. 73)

"The primary objective of economic science, of the engineering profession, of technological invention, of industrial processing, of financial investment, and of corporation management must be the integration of human well-being within the context of the well-being of the natural world. Only within the ever-renewing processes of nature is there any future for the human community. Not to recognize this is to make economics a deadly affair." (p.74-75)

"None of our major newspapers or newsweeklies considers having an ecological section equivalent to the sports section or the financial section or the arts section or the comic section or the entertainment section, although ecological issues are more important than any of those, even more important than the daily national and international political news." (p. 76)

"The most difficult transition to make is from an anthropocentric to a biocentric norm of progress. If there is to be any true progress, then the entire life community must progress. Any progress of the human at the expense of the larger life community must ultimately lead to a diminishment of human life itself. A degraded habitat will produce degraded humans. An enhanced habitat supports an elevated mode of the human. This is evident not only in the economic order, but also throughout the entire range of human affairs." (p. 165)

"E.O. Wilson from Harvard indicated that we are losing ten thousand species each year and that this rate of loss is increasing. Norman Myers, a specialist in the rain forests and vegetation of the world, said that the '***impending extinction spasm' is likely to produce the 'greatest single setback to life's abundance and diversity since the first flickerings of life almost four billion years ago***.' " (p.207)

"In our present context, failure in creativity would be an absolute failure. A present failure at this order of magnitude cannot be remedied later by a larger success. In this context a completely new type of creativity is needed. This creativity must have as its primary concern the survival of the earth in its functional integrity. Concern for the well-being of the planet is the one concern that, it is hoped, will bring the nations of the world into an international community. Since the earth functions as an absolute unity, any dysfunctioning of the planet imperils every nation on the planet." (p. 218)

And more Thomas Berry, this time from ***The Great Work***:

"We might begin to think about our present life-situation by reflecting for a moment on the wonder of Earth, how it came to be the garden planet of the universe and what might be our human role in this context." (p. ix)

"Media attention to the disturbed life systems of the Earth is considered as threatening or limiting to the industrial enterprise. In this situation the commercial-industrial control of the media can be considered among the most effective forces thwarting any remedial action to save the disintegrating planet." (p. 68)

"The planet cannot support its human presence unless there is a reciprocal human support for the life systems of the planet. This more comprehensive perspective we might identify as macrophase ethics. . . . Yet we experience a kind of paralysis in our critical judgment of what is happening and what we need to do at this time to avoid an extensive crash of the biosystems of the planet." (p. 100-101)

“The medical profession is only beginning to recognize that no amount of medical technology will enable us to have healthy humans on a sick planet.” (p. 113)

“The next generations need a truly inspiring vision of the wonder and grandeur of life, along with the beginnings of the new technologies they will need. . . . When the proposal is made that we must continue what we are doing in ‘order to provide jobs’ it must be considered as an unacceptable solution when a much greater abundance of jobs is available for repairing the already damaged environment. In all of these instances we can see a disposition toward biocide, the destruction of the life-systems of the planet, and geocide, the devastation of the planet itself, not only in its living creatures but in the integrity of the nonliving processes on which the living world depends.” (p. 115-116)

“As we enter the twenty-first century we observe a widespread awakening to the wonder of the Earth. . . .The human venture depends absolutely on this quality of awe and reverence and joy in the Earth and all that lives and grows upon the Earth. . . . None of our machine-made products, none of our computer-based achievements can evoke that total commitment to life from the subconscious regions of our being that is needed to sustain the Earth and carry both ourselves and the integral Earth community into the hazardous future.” (p. 166-67)

“We are now experiencing a moment of significance far beyond what any of us can imagine. What can be said is that the foundations of a new historical period, the Ecozoic Era, have been established in every realm of human affairs. The mythic vision has been set into place. The distorted dream of an industrial technological paradise is being replaced by the more viable dream of a mutually enhancing human presence within an ever-renewing organic-based Earth community. The dream drives the action. . . . But even as we make our transition into this new century we must note that moments of grace are transient moments. The transformation must take place within a brief period. Otherwise it is gone forever. In the immense story of the universe, that so many of these dangerous moments have been navigated successfully is some indication that the universe is for us rather than against us. We need only summon these forces to our support in order to succeed.” (p. 201)

Now the second reason why I outline my life story and awakening to Whole Earth concerns, is so that you might understand that I am an essentially sane and well-meaning person who loves Life and people and our potential to create a healthy, Earth-regenerative civilization – rather than the self-destruction now looking increasingly likely. When I first read the writings of, then met the remarkable Whole Earth Systems thinker John Hamaker, who combined his warnings of danger with down-to-Earth, practical solutions born of his ecologist-engineer's mind, I was excited that there ***were*** such solutions! ***Remineralization of soils with mixed gravel dust*** was especially a revelation: immediate insight that we could duplicate Nature's fertility-creation process — starting with rock minerals feeding microorganisms — ***and more generously co-create with Nature*** in starting and restoring healthy abundant gardens, farms, forests and all life-supporting ecosystems comprising our planet.

I was amazed to realize that most of the professors of agriculture and forestry and related disciplines had overlooked this most foundational, natural, and (to some) most obvious material and method of "fertilization" (a commercially distorted term since sometime in the 20th century) and soil rejuvenation. The philosopher Elbert Hubbard may have had it right when he said:

"It is always the nearest, plainest
and
simplest principles
that learned men see last."

Of course we've all had experience overlooking things and qualities of great value and meaning, so let's not pick on "learned men," whose own educations tend to lead them to specialization or over-specialization. I say we'd all be wise to forgive each other our "trespasses" and other errors and move forward with cooperative solutions. If we don't, Gov. Bob Kerrey's quote will be all too relevant:

"If you run out of water, you pray for rain.
If you run out of soil, you pray for forgiveness."

As will Albert Schweitzer's:

"Man has lost the capacity to foresee and to forestall.
He will end by destroying the Earth."

I grew convinced that John Hamaker's insights and recommendations could be saving gifts for an increasingly infertile, toxified and eroding planetary soil base, and thus for an increasingly malnourished and sick human race. I'd been studying with the great horticultural teacher Alan Chadwick and his disciples, and studying as well all the primary proponents of ecological agriculture in my year at Farallones Institute. I saw that not only did Hamaker's practice and advocacy of generous, thorough and global soil remineralization complement all the other proponents, it could empower a generous humanity to fulfill its most fervent wishes for a healthy, conscious marriage of Man (female and male) and Nature. The intensely passionate genius Chadwick implored his students:

"There is one rule in the garden that is above all others.
You must give to Nature more than you take.
Obey it, and the Earth will provide you in glorious abundance."

Similarly, J.I. Rodale, one of the pioneers of the organic agriculture movement, reminded us what happens when Chadwick's, or Nature's, primary rule is disobeyed:

"The most basic law of nature is the law of return.
Wherever a nation has adhered to this principle,
the people have survived and flourished.
Where it has been violated and abused,
whether through ignorance or mistaken custom,
the violators have perished, their cities lie in ruins,
and their soils have withered and blown to sterile desert."

How fascinating it was to study Hamaker's many articles written from 1968-1977, after I discovered him in ***Acres USA*** in 1977, then to visit him in 1978. John was then synthesizing and clarifying his thesis of global climate change, and so my mind had to face the basic challenge which the complete Hamaker Thesis presents to everyone: Are you truly interested and concerned enough to consider it with open mind and heart, like a true scientist and human being and student of Life would logically want to do?

Yes was the natural answer for me. It seemed not to be so for the majority of others with whom I shared John's papers in early widespread mailings. It has remained difficult to find fellow open-minded people (including many scientists who I'd assumed were open-minded "by definition"!) since the early 1980s, when the climate change paradigm usually called "Global Warming" achieved foremost ascendance throughout the world.

John Hamaker departed on June 30, 1994 at age 80. From 1979 until his passing, I don't think anyone had a stronger conviction that the true "greenhouse effect," at this time of natural interglacial phase-out and termination (within the ongoing 3-million-year-old glacial-interglacial cycle), is to intensify or "rev-up" Earth's "weather machine" which evaporates water and carries it everywhere, ***including the higher latitudes where it nourishes the snow and ice fields and glaciers***. I found Hamaker's thinking very plausible, and respected his conviction and dedication to our survival enough to circulate his papers worldwide from 1978-1982, along with related efforts such as visits to members of Congress, USDA, EPA and others in Washington, DC. When progress seemed minimal, John suggested we quickly put out a book that could present the Thesis more comprehensively. When I took two years to broadly research the interrelated disciplines of science which his Thesis draws upon, he did not like it, but realized the book was much more credible with the additional documentation and ***Perspectives*** I provided. From 1982 to 1997, John and Anita Hamaker and I sold and gave away 14,000 copies of ***The Survival of Civilization***.

I'd asked John if we could try simply giving the book away to all "key" people (potentially anyone) we could and, after stating the book's printing and mailing costs, encourage them to consider donating what they wanted to enable ongoing distribution as a public non-commercial service to humanity, or return the book. John thought the response might be inadequate and I might get too generous, and the book would then become unavailable. He also thought it might go out of our control and have a short life, as do many good and sometimes controversial books. So we decided to create Hamaker-Weaver Publishers and publish it ourselves. Using John's update papers and additional news and information, I also published and circulated 11 issues of an update ranging from 16 to 360 pages called ***Solar Age or Ice Age? Bulletin***. This was sent out as a gift by the thousands, helping grow and strengthen the worldwide network of concern, and inspiring individuals such as Betsan Coats of Australia and Nesta

Obermer, O.B.E. of Switzerland to give ***The Survival of Civilization*** to many Heads of State in Europe and beyond, and to many others.

Larry Ephron of Berkeley became aware of the growing volume of evidence supporting the Hamaker Thesis and was moved to create his excellent film, ***Stopping the Coming Ice Age***, and his book ***The End: the imminent ice age and how we can stop it!*** published by Celestial Arts, but out of print since Larry's sudden death in the early 1990s. About 6,000 of each were distributed, with the video at last word still being available from Larry's sister: Lynne Sarafian at (650) 323-4034.

Many more people made noble efforts to help others learn of the growing danger to all, and of the positive opportunity to act to regenerate our soil, ourselves, and our Earth, reversing the growing CO_2 buildup and the threat —if Hamaker is correct—of an imminent new glacial period.

If the Hamaker Thesis is somehow incorrect, and we were instead to see the projections of "Global Warming" come true: general climatic deterioration with chaotic, harsh and destructive conditions leading to famine and socio-ecological breakdown a bit further down the road (though it is ***current*** reality in many countries), ***then it would still be extremely wise*** to adopt the recommendations to remineralize, replant, regenerate and reverse the CO_2 buildup and "grow it down" to ***normal stable interglacial levels of about 280 ppm***.

Might the various differing climate change viewpoints all be able to agree on the wisdom of this course of action?!

In 1997, with our copies of ***The Survival of Civilization*** running low, Anita Hamaker and I agreed we should try to keep the book available, and a publisher of health books agreed to re-publish it if I could limit an update Appendix to about 10 pages. I set out to do this and felt compelled to attempt a reasonably thorough self-updating study of the state of climate science and the Earth. This involved reading many books and many hundreds of articles as well as speaking and corresponding with scientists around the country and world. This study reinforced my earlier realization that a large volume of evidence supports the fact that this interglacial period is in its latter phases, according to what is known of the ecology of

the Quaternary (last 3 million years), and it reinforced my perception that Hamaker's thinking is still logical and his predictions may still generally be right on course. Considering all that is at stake, I felt responsible to attempt a longer, more comprehensive presentation of supportive evidence I've found from 1978 to 2001, so that "the weight of evidence" might even persuade the commonly skeptical "scientific community" and each of us to give Hamaker's whole thesis a fair and thorough investigation. Ultimately, I reasoned, the world is unlikely to undertake the great task of Biosphere Regeneration until enough of the world's scientists and scientific organizations say it needs to be done – "or else." Or else here are very good reasons why it is the scientifically and ethically wise thing to do, and why civilization and humanity may die if we don't cooperate and do the right things!

Some of what I wrote to Al Gore, published in **"An Open Letter To Vice President Al Gore On A Strangely Unopen Topic"** in the ***Florida Eco Report*** (April/May 1998), may be fitting here:

"Dear Mr. Gore, I just read the Dec. 8, 1997 ***Fortune*** magazine articles on the "warming" including "A Cloud on Gore's Horizon." It reminds readers of your book quote regarding "rescue of the environment (should be) the central organizing principle for civilization." I am writing to remind you that there is a wholistic/ecological explanation of global climate change that goes beyond the "global warming" concepts offered by the computer modelers with their well-meaning but overly simplistic mathematical computer models. The Hamaker Thesis of John Hamaker is that explanation and I presume that you have made yourself at least somewhat familiar with it through our book, ***The Survival of Civilization***, and the later works by Larry Ephron: ***The End: the imminent ice age and how we can stop it!***, and his video ***Stopping the Coming Ice Age***. . . .

"They may not have been invited to Kyoto, but a growing number of scientists are aware of and are even warning of this danger. Like me and many co-workers, they would like for you and President Clinton to bring it into the public debate on the future of the Earth and humanity's role here at this critical time of choice.

"To choose politically and economically expedient measures which compromise with what Nature may be demanding of us in terms of Earth

regeneration and re-balancing could prove to be our worst mistake. It may be the last compromise possible with a planetary environment which we're capable of taking care of so beautifully. My paper enclosed, 'Global Warming Triggers New Ice Age!' refers to some of those scientists. Would you speak with them? I also enclose the latest ***Solar Age or Ice Age? Bulletin 11***. For Life and Regeneration, Don Weaver"

So, the intended short appendix has grown like mineralized vegetables into a large, new volume, ***To Love And Regenerate The Earth: Further Perspectives on The Survival of Civilization***. Will these ***Perspectives I-VIII*** convince scientists and the 'ecological thinker' in each of us that NOW is the critical time to restore great fertility, food quality, health, abundant forests and vegetation comparable to that of the interglacial climatic optimum, plus sufficient quantity to enable a solar biomass energy transition, resulting in adequate CO_2 reduction and interglacial climate stabilization? Even though they were compiled by an amateur ecologist without, as in the case of professional scientists, extensive academic training in one particular discipline, I think the overall presentation is very convincing. I think a fair and thorough study and evaluation is obviously needed.

I'd like to know what ***you*** think.

Let me note here that I need to abide by the wishes of Anita Hamaker to keep the Web edition of ***The Survival of Civilization*** nearly identical in length and content to the original. Therefore I am placing the three Appendices I'd proposed to add there at the end of this volume (in black text) instead. Appendix I concerns gravel grinder technology, Appendix II and III add key information to my ***TSOC*** Perspectives of Chapters 3 and 5. The references therein are listed in the ***TSOC*** Bibliography.

There is nothing wrong with having a "healthy skepticism"—and much right with having an open mind concerned with discovery and understanding of truth. Hamaker always welcomed correction, if he could be shown to be in error, and I certainly do, too. Hamaker once said this in correspondence: "I am a mechanical engineer whose only guidance is proven facts and principles. Show me where I am wrong in fact or principle and I'll change

my position to suit the correct facts. What any of us may want by reason of greed or sentiment is of no importance." I'd be especially grateful if someone can show us all that the Hamaker Thesis is untrue – something I've encouraged for over 20 years!

I find it interesting, in the ***U.S. Government Manual*****,** that the listing for the National Science Foundation, a major funder of climate research, says: "Its major emphasis is on high-quality, merit-selected research – the search for improved understanding of the fundamental laws of nature upon which our future well-being as a nation depends." I find it strange that engineer-ecologist Hamaker could devote 30 years of his life to such understanding and that his insights, discoveries and explanations could be, in general, so superficially addressed or ignored. ***American Laboratory*** editor Frederick I. Scott's perspective in an October 1983 review of ***The Survival of Civilization*** may give some insight as to why:

"Hamaker is angry, justifiably so I think, that scientists and economic interests have created structures which ***by their nature*** conspire to preclude the detection and implementation of whole truths about the operation of planet earth and its inhabitants. The science community fails to require that facilities be provided for exploring relationships which may challenge concepts on which commercial enterprises are based. The medical business plunges deeper into its dark ages on promises to fix all of nature's 'mistakes,' given enough obeisance and money. The educational system as constituted dulls individual ability to observe phenomena as a basis for thought and synthesis, paving the way for uncritical acceptance of 'expert' analyses. Soil fertility, the most essential ingredient in the sustenance of the species, is allowed to become the pawn of narrow economic and political interests. Its guardians, the farmers, become the economic scapegoat of public policy.

"But in his anger, Hamaker is abrasively intemperate. His vociferous challenges will alienate many potential supporters. They may possibly ensure a negative outcome for the urgent consideration he entreats.

"Whether the timetable or specific mechanisms offered by the authors are accurate in every detail and, irrespective of the authors' rhetorical skill in presenting their case, the subject is of vital and immediate concern. It is the consensus of many researchers that the present interglacial period is

nearing its end ('The End of the Present Interglacial,' guest editorial, ***Quaternary Research*** 2, 261-269, 1972). Fink and Kukla document 17 major cycles of glacial loess deposition and subsequent interglacial soil demineralization (***Quaternary Research*** 7, 363-71, 1977). Pollen studies show that interglacials end abruptly (<20 years) and that we may be in that phase (G. Woillard, 'Abrupt End of the Last Interglacial s.s. in Northeast France,' **Nature** 281, 558-562, 18 October 1979). The possibility that glaciation can be averted must not be dismissed without intensive consideration."

I still agree with that conclusion! While Hamaker may have shown some anger and been experienced by some readers as "abrasively intemperate," I think Fred Scott's example of not letting that deter him from a serious investigation and honest discussion is a good one. He has continued to see great importance in the Hamaker messages and complementary evidence, and has explored the topic a number of times further in his ***American Laboratory*** and ***International Laboratory*** editorials and other writings.

Some may dismiss Hamaker entirely because of the fact that we are (as of this writing) still here and (most of us) eating crops and able to read and study and communicate and debate these problems—and our most intelligent responses as Homo sapiens, or "wise man." As noted repeatedly in ***The Survival of Civilization***, based largely on the G. Woillard study referred to in Fred Scott's comments above, John reasoned that we are in a short interglacial-to-glacial transition phase where increasing forest fires and volcanism are insuring CO_2 levels high enough to **re-energize** the glacial process of intensified evaporation, high-latitude cloud transfer and snow/ice/albedo buildup. He thought it logical that the 1975-1995 period would be analogous to the approximately 20-year termination phase found by Woillard in pollen studies of the last interglacial's end. The work of the late Dr. Woillard, as you can see in the large ***Perspective VIII*** on Climate Change, is still considered as valid by the current director of the university research lab where she worked, according to correspondence I received from him. I think it is only intelligent to assume Hamaker's Thesis and predictions may also be valid and ***generally on the ecological course he described***, even if Nature's processes, influenced somewhat unpredictably by over 6 billion people, are allowing us some longer amount of time than he estimated to understand what is happening and to respond. John's warning from the early 1980s, when he expected civilization to be "crippled" or "dead" by around 1990, ***may still be timely to heed now***.

"The time to stop the glaciation is before it starts, because it starts with the destruction of agriculture. Before this decade is over, the evidence shows that our technological capacity to remineralize the soil will have been lost in the chaos of a world of starving and dying nations." (***TSOC***, p. 155)

I invite you to read the new ***Perspective VI***, "More on the Critical State of the Forests and Biosphere," and ***Perspective VII***, "The Growing Threat of Worldwide Starvation," in considering how close we may now be to his obviously frightening—or we could say courage-demanding—vision. If you persevere through a reading of all eight Perspectives of ***To Love And Regenerate The Earth: Further Perspectives on The Survival of Civilization***, I give you my deep thanks for ***your*** courage and concern. I think it is all helpful and complementary to gaining an empowering understanding of "the Big Picture." If you feel it includes too much of "the bad news," I'd just ask you to consider Thomas Hardy's quote: "If a path to the better there be, it lies in taking a full look at the worst." Or, "***Unite a tough skin with an open mind and heart if you wish to understand the world deeply***," as I would suggest.

Anita Hamaker and I agreed that ***The Survival of Civilization (TSOC)*** ought to be made a non-commercial gift to the world. I felt the same about ***To Love And Regenerate The Earth (TLARTE)***, and we're both grateful to Joanna Campe and Remineralize the Earth, Inc. (a non-profit educational organization) for being willing to contribute them to the World Wide Web through the www.remineralize.org website.

Again, for easier readability and to distinguish my "voice" as editor and presenter from the statements, quotes and excerpts of many others, we have put my words in the Perspectives, ***as here, in green text*** and those of others in ***blue***. (The three Appendices at the end, which I originally prepared for ***TSOC,*** appear in all black text.)

Some of the information and excerpts came from the ***Solar Age or Ice Age? Bulletins***, most of which were first published in the 1980s.

Although I think I have succeeded here in more thoroughly validating the logic and 'extreme plausibility' of the Hamaker Thesis of a Greenhouse-Glaciation Effect, in part by accumulating evidence on the growth of world

albedo (reflectivity) from greater cloud production and consequent snow and ice growth, I am well aware there is other evidence showing trends of shrinking and thinning ice in some areas, and these are highly publicized as part of the "Global Warming" paradigm. Some of this shrinkage is in higher latitudes, some in low latitudes where Hamaker successfully predicted growing heat and drought—the ideal combination for melting snow and ice. I would like ***all*** the evidence to be considered simultaneously, without too many pre-conceptions or paradigm blinders. I am only one person who has made an effort to gather information bearing on the validity or invalidity of the Hamaker Thesis, but I could not gather all the relevant information, and whether I will be able to contribute anything further of value to our future chances remains to be seen. As they say in the sports world, I think all the scientists and major agencies like NASA need to "step up" and devote all available funds, energies, satellites and other monitoring technologies to the intense pursuit of the truth of where Earth's climate is going, how quickly, and what we as a potentially cooperative and generous human race need to do to help restore the Balance of Nature and a long-term interglacial climate. ***If that is what we want, and can agree that we want it!*** Consider these excerpts from a recent special publication from NASA on "MODIS - Moderate Resolution Imaging Spectroradiometer" which is a new and improved part of their current Earth Observing System:

"With the inception of the U.S. Global Change Research Program, NASA, along with several other scientific institutions, has been charged with the task of developing a detailed understanding of the Earth and the dynamics of global climate change. Subsequently, work is underway to develop a Moderate Resolution Imaging Spectroradiometer (MODIS) - the flagship in a fleet of instruments that will monitor our planet from space.

"Is the Earth in trouble? This is a widely asked question; unfortunately, too few data exist today to provide an adequate answer. . . . MODIS' objective is to provide a comprehensive series of global observations of the Earth's land, oceans, and atmosphere in the visible and infrared regions of the spectrum in such a way as to view the entire surface of the Earth every two days. . . . We need better global data on surface climate variables, such as temperature and humidity, as well as more accurate measurements of snow and ice cover. . . . By globally monitoring subtle vegetation responses to stress in the biosphere—such as ozone—scientists can learn about both the nature and severity of the stress. They may, for example, derive

information on the extent of freeze or drought damage to cropland. . . . No one knows with certainty whether the amount of snow and sea ice in the world is growing or diminishing as a result of global warming. We do know that snow and sea ice have major impacts on the Earth's 'hydrologic' (water) cycle and albedo, or reflected sunlight. MODIS will measure the snow and sea ice cover and help calculate its effect on global albedo. . . . MODIS data will assist policymakers worldwide in making sound decisions concerning protection and management of our environment and resources."

So, will you many professional or amateur scientists (students of Nature) please read or re-read ***The Survival of Civilization*** and its new companion volume, ***To Love And Regenerate The Earth***, and help verify or refute the Hamaker Thesis? And if you can further verify, or can in fact refute it, please see the importance of contributing whatever you can to our collective growth in understanding, conscience and responsibility. The latter word is sometimes especially valuable seen as "Response-ability." I thank you! Anyone with further information or comments to share with me is invited to do so via my mail or e-mail addresses:

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I gave ***TSOC*** to M.I.T. climatology professor Hurd Willett, a long-time student of climate change. Although well along in years at the time (1982), I note his response was especially youthful and healthy:

"I appreciate the copy of Hamaker's remarkable book, ***The Survival of Civilization*** which was sent to me under your name, to the extent that I am ordering five more to be placed where I believe they will be appreciated. I find Hamaker's remineralization and economic proposals compelling essentially as they stand. In fact the demineralization bit and effects of chemical and organic fertilization give obvious answers to my gardening experiences of the past thirty years (in the same garden plot) which had puzzled me considerably." And in a 1984 letter he too agreed that "Your

CO_2 hypothesis of an imminent ice age certainly demands close scrutiny and factual climatic observation. . . .”

Some of us may believe it is necessary, or would be nice, to leave the full responsibility for the challenge of global climate change and multiple related socio-ecological problems in the hands of the professional scientists, the policy and law makers, and other "experts." But history has proven repeatedly that those seen as "leaders" and "experts" are not always fully up to the task and that it is wiser for each individual to more fully engage their own mind, heart, ethics and voice to responsibly embrace the problems of humanity and the living/dying Earth, and be involved with the decisions and actions that can truly resolve the problems. Consider these words from “**Introduction to Quaternary Earth System Changes**” by Hugues Faure, Liliane Faure-Denard and Tungshen Liu (***Global and Planetary Change***, 7(1993) VII-IX):

“An increasing number of people do not feel confident leaving it up to fortunetellers or diviners to predict the Future, and feel that Science should contribute to finding the “clue.” However, when they speak honestly, scientists admit to doubting that our present state of knowledge—with our still primitive modeling capacity—can really contribute yet to solving global environmental problems. We cannot answer many of the questions raised by the general public, nor can we help decision makers in their difficult task of preparing an acceptable future.

“To state the problem in another way, amongst scientists there remains a real ignorance of Earth System Science. Whilst we know a lot about particular parts of the global system, we lack understanding of the many interactions and feedbacks which occur between different components. Consequently our models are too simple to explain the complex system of which life and mankind are parts. . . .

"In contrast the global mechanisms that rule the Planet as a whole are much less well-understood. From plate tectonics theory, we know something about geodynamic mechanisms acting over millions of years. We can perhaps now foresee the time when most earthquakes or volcanic eruptions will be predictable. We know that glacials have alternated with interglacials since 3 million years, and maybe we will be able to predict the

next glaciation in advance. These broad-scale processes seem to fit more readily identifiable patterns."

We must realize that the process of **Interglacial Soil Demineralization and Retrogressive Vegetational Succession**, explained in ***TSOC*** and further elucidated here in ***TLARTE,*** by showing us **the identifiable patterns of interglacial ecological-and-climatic change** and thus **the counter-balancing keys to regenerate and sustain interglacial vitality**, are clearly as important as any! And here is one more paragraph from these deeply-inquiring scientists from France and China, as it is so relevant to the need to listen to the all-too-rare Whole Systems thinkers like John Hamaker:

"What we must do is to improve the efficacy of our knowledge, and to promote a revolution in science education, so that scientists begin to think in terms of broad integrated systems and not just narrow specialties. The real mentality of a new global Science (Roederer, 1985), in which each part of the system is to be studied both for itself and for its interactions with all other parts has still to appear amongst most scientists and scientific establishments. We need a respect for the non-specialised approach that is able to benefit from the accumulated knowledge of specialties, without encountering the 'closed' character and arrogance that presently prevails. New Science, new teaching, a new mentality and a new approach is desperately needed. The stakes are higher now than they have ever been before, and if the necessary change in mentalities does not come about, we may all lose out in solving global problems of fundamental importance for human survival."

As you may also note in ***Perspective VIII***, there are a growing number of such scientists increasingly concerned with global problems and human survival. ***The Heat Is On*** author Ross Gelbspan also has a website focusing on the worsening climatic imbalances from "Global Warming" (www.heatisonline.org) — yes, I sent him one of the last printed copies of ***TSOC*** and will invite him to read this volume, too — and on 3/13/2000 his site carried "**Climate chiefs issue severe weather warning**" from the 12/23/99 ***London Independent***, and "**US, British specialists call on business to join fight against global warming**" from ***The Boston Globe***, 12/24/99. Quoting from the latter:

"US and British experts, adding a sense of urgency to warnings of global warming, said yesterday that humans have triggered rapid climate change and must act fast to help prevent environmental turmoil. 'It's important we take action now,' said James Baker, undersecretary of the US National Oceanic and Atmospheric Administration. He urged businesses to boost energy efficiency and increase their use of renewable power sources. 'Ignoring climate change will surely be the most costly of all possible choices, for us and our children,' said Baker and Peter Ewins, head of the British meteorological office, in a joint letter to London's ***Independent*** newspaper. 'Our climate is now changing rapidly,' they wrote. 'Our new data and understanding now point to a critical situation we face.' The letter warned of extreme weather like floods happening more frequently as the planet warms; greenhouse gas emissions have to be curbed to prevent catastrophes, the letter said. . . . Experts say 1998 was the costliest year ever for insured losses from weather-related catastrophes. The storms, floods, droughts and fires around the world in 1998 exceeded all the weather-related losses of the 1980s."

Also in 1999 we saw in ***Nature*** (2/4/99) the article "**Geophysicists call for action on global warming**" which said:

"The American Geophysical Union (AGU), one of the leading scientific organizations in the United States, came out last week after months of internal debate in favor of action to counter global warming. In a cautious statement, the council of the union recommended 'the development and evaluation of strategies such as emissions reduction, carbon sequestration, and adaptation to the impacts of climate change. The present level of scientific uncertainty, said the AGU, 'does not justify inaction in the mitigation of human-induced climate change.' . . . Because uncertainty about the causes and effects of climate change 'will never be completely eliminated, science cannot be the sole source of guidance on how society should respond to climate issues,' it said."

Prime Minister Tony Blair of England says he too is very concerned, as we read in ***The London Times*** article (11/4/2000), "**Warming up for the Ice Age**":

"The Gulf Stream has not always flowed. As far as scientists can tell, it has stopped quite abruptly in the past—and in as little as a couple of years.

Now it seems that global warming is recreating the very same conditions which caused it to stall before, with the potential to plunge the whole of northern Europe into another Ice Age. . . . In Britain, Tony Blair has pledged an extra 100 million pounds towards recycling schemes and the development of 'green power' sources such as wind farms. But is this all too little, too late?

" 'We have to face a stark fact,' says Blair. 'Neither we here in Britain, nor our partners abroad, have succeeded in reversing the overall destructive trend. The truth is, these problems are more urgent and more pressing than they have ever been and the solutions at the moment do not measure up to the scale of the problem. It is a very big issue for us.' "

Here is some more recent support for the Hamaker Thesis:

"Major climate changes seen in the Northern Hemisphere over the past half century have been driven by a progressive warming of tropical oceans probably caused by the man-made buildup of greenhouse gases in the atmosphere, scientists said yesterday." (from 6/29/01 ***Reuters News Service*** article on www.planetark.org website)

Also:

"Weather researchers think the evidence is now clear: A major shift in the climate has taken place that has brought about an increase in major hurricanes. The period of heightened activity could last for decades, and unleash a catastrophic storm on the United States, according to meteorologists.

"Since the climate shift began six years ago, when the Atlantic Ocean began looking like a hurricane freeway, the number of hurricanes that have formed in the Atlantic basin has doubled, said scientists at the U.S. Hurricane Research Division.

"The number of major hurricanes, which produce winds in excess of 110 miles an hour, has also increased during the period by 250 percent, they said. The increased activity will continue for the next ten to 40 years, which

could mean trouble for the United States." (CNN Miami Bureau Chief John Zarrella in "**Scientists: Monster hurricanes could hit U.S.**", 7/19/01 at www.cnn.com/2001/WEATHER/07/19/hurricanes/index.html)

Also:

"Much of the Earth has warmed over the last half-century, but the eastern half of the United States has shown a cooling trend. NASA-funded research indicates cooler temperatures in the eastern U.S. are caused by an increase in sun shielding clouds produced by warmer ocean temperatures in the Pacific." (From **"The Eastern U.S. Keeps Its Cool"** on NASA website, http://science.nasa.gov/headlines/y2001/ast18jan_1.htm?list445334)

And more 'clues' from paleoclimatologist Richard Alley's 2000 book, ***The Two-Mile Time Machine***:

"Human-induced greenhouse warming appears capable of triggering a conveyor shutdown, by increasing precipitation in the far north and by melting some of the remaining ice sheet on Greenland. Strange as it seems, 'global warming' may actually freeze some regions! But, if we slow down the warming, it is just possible that we can avoid an abrupt change and even help stabilize the climate." (p. 5)

"We naturally should be near the start of the next long, slow, bumpy slide into an ice age." (p. 104) [apparently overlooking the evidence of Woillard and others for rapid interglacial termination]

"The modern scientific consensus is that positive feedbacks will amplify global warming. This is reflected in the Intergovernmental Panel on Climate Change (IPCC) reports, which are produced ultimately under the auspices of the United Nations and which represent the painfully forged results of discussions by thousands of scientists, government officials, interest groups, and private citizens. A word on 'scientific consensus' may be useful here. ***All*** scientific ideas are subject to revision; we should never be absolutely sure that the truth has been reached. Old ideas should be tested continually, in an effort to tear them down and replace them with better ones. . . .Because there is honor in tearing down old ideas to replace them

with something better, science wants and needs contrarians who hammer away at the old ideas. So 'scientific consensus' is not the same as 100 percent agreement, and never should be." (p. 173-74)

I think another expression of climate change concern is good to note here, as published in ***Time***, April 9, 2001 as "**A Letter To President Bush**":

"Dear Mr. President,

No challenge we face is more momentous than the threat of global climate change. The current provisions of the Kyoto Protocol are a matter of legitimate debate. But the situation is becoming urgent, and it is time for consensus and action. There are many strategies for curbing greenhouse-gas emissions without slowing economic growth. In fact, the spread of advanced, cleaner technology is more of an economic opportunity than a peril. We urge you to develop a plan to reduce U.S. production of greenhouse gases. The future of our children—and their children—depends on the resolve that you and other world leaders show. Respectfully. . . ."

Then come names and signatures of Jimmy Carter, Mikhail Gorbachev, John Glenn, Walter Cronkite, George Soros, J. Craig Venter, Jane Goodall, Edward O. Wilson, Harrison Ford, plus the name and fingerprint of Stephen Hawking.

At the very least, we seem to have reached the stage of worldwide awareness that there ***is*** a critical climate change threat at hand and that the weight of responsibility for intelligent response presses clearly into the hands of "the crown of Creation." How fortunate our hands are capable of such strength, skillful dexterity and constructive ability along with such givingness, generosity or "applied love." Shall we recall the worthwhile words of Wordsworth:

"Nature never did betray the heart that loved her."

Or these words of wisdom from the 2/20/87 ***Christian Science Monitor*** editorial, 'From phlogiston to ozone':

"This can be said at the outset: No physical, social, or other law declares that human use of the earth must inevitably lead to the earth's deterioration. Given an understanding of what effect their manufacturing, recreation, urbanization, and agricultural practices have on the earth's ecology, humans can do differently. The standard for human use of the earth should be to demonstrate how it can bear abundantly. Pure water, clean air, and unspoiled land should be the expectation. Putting limits on contaminants is but a first step. The more advanced nations should show the way in the proper treatment of the planet, even while much of today's deterioration is in nations that are trying to 'catch up' or are burdened by over population and poor land use. . . . No challenge is more serious than restoring full livability to Earth." [2 copies of ***TSOC*** were sent to C.S.M.]

To what extent does President Bush include Nature when he recently told us on television, "I'm a loving guy"? Since, like it or not, we are each and all part of and unique expressions of Nature, it would only seem "natural" to love Nature as we do ourselves and our smaller families. I wonder why I never learned that obvious fact in any of the schools I attended? And how would the world, now sowing and reaping more warfare, be different if we'd listened to Emerson in the 1800s saying, **"*Love lights up the world. . . with its generous flames*."** Would we now have such extremes of poverty, physical and mental illness, "religious" extremism and violence, soil and Earth degeneration? How poignant are the words I read in one of Walter Russell's books, suggested as the words (and they are only words) of Nature/Life/Love/God:

"All people come to Me in time,
Theirs is the agony of waiting"

As I count the 15 remaining piles of materials I had organized for possible use in this Introduction, I realize that addressing their topics in depth would provide more important recent evidence and support of the Hamaker Thesis and the need for Earth Regeneration. Yet I'm concerned with making it too long and possibly redundant, especially in light of the wealth of information and examples following this Introduction. So I'll again review the materials and try to share only what seems most relevant and important, such as ***the following examples of positive actions*** some of us are taking to try to turn the tide of Earth and climate destruction:

♦ The Winter 1999/2000 ***YES! A Journal of Positive Futures*** carries one of Donella Meadows last articles on "**A Zero-Emissions Family**": "At the University of Wisconsin's program on climate, people, and environment, Jonathan Foley makes computer models to study what might happen if the human economy continues to emit greenhouse gases. Like hundreds of other scientists, he's deeply worried about global warming. Unlike most scientists I know, he takes that worry into his personal life. . . . Foley figures he's already cut his family's emissions in half and can get down considerably further, to a point where he can pull off the necessary planting. Living in southern Wisconsin, he intends to plant not just trees, but prairie. Prairie restoration is a popular community activity around Madison, so the Foley's will help do the work and also will contribute money to prairie and tree planting groups.

" 'It's not that hard,' Foley says. 'Our quality of life has improved. We're saving time and money, though some things, like wind electricity, are more expensive. Zero carbon emissions is something anybody can achieve by making a few simple choices. People choose to spend tens of thousands of dollars for a sports utility vehicle; they can just as easily choose to buy better insulation, an efficient refrigerator, or a solar water heater. Helping to prevent climate change isn't a matter of our ability, just our choice.

" 'I know my personal actions are only a drop in the bucket (or, in this case, the atmosphere). But as a scientist and teacher, I feel I have a moral obligation to show that you can achieve a zero net carbon budget and still live comfortably and productively. It's about putting your emissions where your mouth is.' "

♦ From "**Religions starting to go green**" (***S. F. Chronicle***, 2/6/2000) we read that: "Over the past decade, religion and environmentalism have quietly discovered each other, and the planet may never be the same. . . . Sometimes called 'creation care,' 'earth stewardship' or 'green spirituality,' religious environmentalism has taken hold with surprising swiftness, catching both traditional environmentalists and their political adversaries off-guard. The movement is based on the theological view that God not only created the world, but expects man to care for it, not abuse it. 'We're about the moral urgency of environmental issues as fundamental concerns of religious faith,' said Paul Gorman, executive director of the National Religious Partnership for the Environment in New York City. . . . 'We don't

believe we are going to reverse the environmental crisis by simply passing laws. We have to change the human understanding of its place and purpose in creation . . . . Unless you have that fundamental change in values, many of us believe environmental degradation will be irreversible.'

"Each denomination is giving the movement its own special emphasis. Jewish congregations have taken up the cause of forest preservation. The National Council of Churches has made global warming its priority."

♦ "**Operation Appleseed: Groups reach out to North Korea**" (***San Mateo Times***, 3/15/2000) "A humanitarian group on Tuesday sent 10,000 apple trees and other relief supplies to flood and famine victims in North Korea. Donated by Oregon businesses and organized by the Oregon Dept. of Agriculture and Mercy Corps International . . . the trees . . . arrive . . . this afternoon. . . . 'This is an unusual project to say the least,' said Dave Johnson, senior vice president for Evergreen Aviation, which offered to fly the trees—and a small delegation to help plant them—to North Korea. 'We're going over political boundaries,' Johnson said. 'We're going to show people that we care about them, and that we have an interest in serving mankind.'

" 'Operation Appleseed' came about after North Korean officials approached Mercy Corps about a joint-effort agricultural project to recultivate land in the country, which has been damaged alternately by floods and droughts for the last several years. The trees will be planted in a 480-acre orchard donated by the North Korean government and should produce about 40 pounds of apples per tree during the first harvest. 'This kind of donation shows the good face of the American people,' said Mercy Corps senior vice president Ellsworth Culver. 'It's been a project of love for an area where an estimated 3 million people have died because of famine and famine-related diseases.' Mercy Corps' project manager Clair Sneed said the organization's long-term goal is to help with reconstruction of the land in North Korea."

♦ Jane Goodall is attempting to show that deforestation and soil erosion across Africa and the world can be reversed, as can the wiping out of the wildlife such as chimpanzees, down from about 2 million to 220,000 across 21 nations. This is increasingly due to their wholesale hunting and slaughter to meet a market demand for "bush meat." Jane is also teaching

people they can plant and eat from their own fruit and nut trees and gardens, and create sustainable villages which are healthful for people and (the rest of) Nature! Jane says, "There are more and more people who feel it in their hearts and are trying to take action to make a difference." (from interview in ***New Dimensions*** magazine, Sept.-Oct. 1999)

♦ "**India saves forests**" according to ***New Scientist*** (11/11/97): "Commercial logging in India's natural forests has been banned by the country's Supreme Court. . . . Logging will be allowed only in private plantations, or where the felling has been explicitly approved by the government. . . . 'Given the way our forests are being ravaged, something drastic had to be done,' says Rajiv Dhawan, a lawyer who acted for the state government of Arunachal Pradesh during the case."

♦ Imagine how much tree planting and soil regeneration could be done if groups of us would get together to organize the work—or "planting party." Having gone to a Giants baseball game with over 50,000 people present, I'm now sowing the idea that such crowds could be invited to participate in "Greening America" or "Greening India" or "Greening the Globe" pre-game planting parties where waves of participants could dig holes, plant trees, spread rock dust, spread compost (local municipal, e.g.), spread mulch, all in just a short time. Then wouldn't participants go into and right through the game feeling glad to have helped such a great cause and having "scored points" in the greater game of Earth Health Regeneration? Native plants, wildflowers, orchards and high-quality mineralized organic food gardens and parks could also be almost "instantaneously" co-created in such a way, with some skilled pre-event planning and coordination. Total potential participants just from annual sporting events worldwide would easily be up into the billions. Here is a small example of what a group has done from "**Ready, Set, Plant!**" (Winter 2001, ***Rails to Trails*** magazine):

"It took exactly 3 hours and 5 minutes for 2,800-plus volunteers to plant 4,433 trees along 7.7 miles of rail-trails in the neighboring towns of Clovis and Fresno, Calif., last May 6. The big, speedy landscaping job set a new Guinness World Record, not to mention setting a standard for community participation. More than 90 groups, from scout troops to government agencies, businesses, churches and families, pitched in to plant trees at 10-foot intervals along segments of the new 13-mile Sugar Pine Trail in Fresno and Clovis Old Town Trail. The 32 varieties of deciduous and

evergreen trees were selected to provide beauty, color and shade along the old Union Pacific Railroad corridor."

♦ ***Organic Gardening***, April 2001, carries an encouraging example of change: " 'Our customers want an organic alternative to everything,' says Gary Jones, owner of Hortus, a southern California nursery in Pasadena. Jones says the demand for chemical products has dropped dramatically, and so on Earth Day this April, Hortus will officially become 100 percent organic. Jones says the Hortus staffers are confident they can guide customers to a healthier and equally successful gardening experience using organic products. And we say, 'Hooray for Hortus and amen to that!' "

♦ The following is reprinted from the January 2000 issue of ***Acres, USA***

Nation of Cook Islands Declares Organic Aspirations

Several top ministers of the Cook Islands Parliament have issued a statement declaring their intent to become the first nation to completely convert to organic farming. Island plantations have in the past been accused of chemical abuses, and it is little surprise that the ambitious charge is coming on the heels of an extensive workshop sponsored by the Cook Islands Organics Association. We congratulate these Parliament members and their supporters and wish them luck in attaining nationwide organic certification.

On this day, the 9th of September 1999, in the Nation of the Cook Islands, as Prime Minister, former Prime Minister, Deputy Prime Minister and members of Parliament, we declare our support to be the first Nation in the world to go totally organic. Since it takes three years to become certified, our aim is to reach this goal three years from this date.

This is a win, win for everyone because worldwide statistics on the growth of organic products and in eco-tourism clearly show that this is what consumers want. We ***can*** be successful and globally competitive! The more pristine our environment is, the more attractive the Cook Islands will be to tourists. The higher quality our products are, the more in demand they will be to consumers.

Time has a way of revealing the truth, and time has shown that pesticides, herbicides and chemical fertilizers have played a deleterious role in their effect on the soil, the environment, the quality of our agricultural produce and the health and well-being of our people. It is time to break the vicious cycle of chemicals depleting our soil, water, air and health. Stop the short-term gain and the long-term loss. It's time we all work together to find solutions for the long-term gain.

Sustainable agriculture is based on Natural Law and will ensure and provide a healthy environment and food supply, along with economic prosperity for each future generation.

Therefore, we declare that we support this goal and will assist in any way possible for the Cook Islands to become a fully organic growing country which we believe will restore the natural fertility of our soil, improve the quality of our produce and the health and well-being of our people.

Dr. Joe Williams, Prime Minister
Norman George, Deputy Prime Minister
A. Wigmore Heath, Minister of Parliament
Sir Thomas Davis, M.D., K.B.E., (Former Prime Minister)
Dr. Robert Woonton, Minister of Parliament
P. Nobati, Minister of Parliament
Faireka, Minister of Parliament
And Other Members of Parliament

♦ Jennifer McCullough reports on "**Organic Schools**" in ***YES! A Journal of Positive Futures*** (Winter 1999/2000):

"Students returning to Berkeley public schools this fall may have noticed a change—they now have organic options in the lunchroom. The Berkeley school district decided late this summer to use as much organic food as possible in its schools' cafeterias. The district also plans to completely remove irradiated and genetically altered foods, as well as milk containing bovine growth hormone. The decision is part of a new school program aimed at teaching students where food comes from, as well as emphasizing healthy eating habits. Berkeley schools plan to grow 25 percent of the organic food on school property and will purchase the remainder from nearby farms."

♦ And in ***California Agriculture*** (Sept.-Oct. 2000) the article "**School gardens produce food and lessons**" notes that, by 2000, 15 of 17 Berkeley schools had started gardens, and reprints the Berkeley Unified School District's long-awaited breakthrough Food Policy:

"The BUSD Board of Education recognizes the important connections between a healthy diet and a student's ability to learn effectively and achieve high standards in school. The Board also recognizes the school's role, as part of the larger community, to promote family health, sustainable agriculture and environmental restoration. BUSD's educational mission is to improve the health of the entire community by teaching students and families ways to establish and maintain lifelong healthy eating habits through nutrition education, experiences in the garden and the food served in schools."

♦ A valuable example of people working to create a framework of broad understanding and cooperation needed to implement socio-ecological regeneration solutions is seen in "**The Earth Charter Initiative: Promoting Change For A Sustainable Future**" available at www.earthcharter.org. "**The Earth Charter**" (I read the March 2000 draft) may be educational for all.

♦ While no single program now going appears adequate to meet the urgent challenge of global climate change and Earth restoration, more than 370 municipalities worldwide have joined the International Council for Local Environmental Initiatives (ICLEI) which includes a Cities for Climate Protection (CCP) campaign. Details may be found at www.iclei.org/co2/. Can you help engage your city or town in a wholistic program that is up to the challenge?

♦ While it doesn't currently include the essential needs for combined soil remineralization, reforestation and a general "Greening of the Globe" to restore normal interglacial CO_2 levels, Ross Gelbspan's ideas for industrial transformation to produce "climate-friendly" technologies and to help workers transition out of the fossil fuel industries should be considered. His "World Energy Modernization Plan" (with some revision) could help bring into production the large numbers of gravel grinders and related solar and biomass energy technologies needed for Earth Regeneration and interglacial climate stabilization. I'll encourage Ross to consider this soon; you may consider the current version of his “Plan” at his www.heatisonline.org website.

♦ The National Aggregates Association and the International Center for Aggregates Research have continued exploring how they can help remineralize the soils, and at their April 2001 9th Annual Symposium featured a talk on “Further Investigation of Soil Remineralization Using Quarry Fines in Australia” by Ion Dumitru of Boral Construction Materials. The Task Force on Remineralization had a meeting as well. When the demand for mixed rock or gravel dust becomes more realistic, these people and companies are available to supply “waste fines” right now, and (perhaps subject to grinder technology/capacity upgrading) to produce whatever quantities of “fresh ground” gravel dust needed to remineralize the farms, forests, energy plantations, and gardens of the world. David Jahn of the Remineralization Task Force and Development Manager at one of the very largest aggregate companies, Martin Marietta Aggregates, of Xenia, Ohio, has set an example of one man in one large industrial company seeing to it that his company produces an ecologically beneficial product, a rock dust they market as “Eco-Min.”

♦ Thank you to Martha Stewart for recommending remineralization in her 2000 book, ***Gardening 101*** and for telling people that "Gardens nourished with rock powders have also been shown to produce sweeter, more flavorful fruits and vegetables," among other benefits.

♦ The excellent ***Living Nutrition*** magazine (Vol. 11, Sept. 2001) can further show Martha and all of us why mineralized produce is sweeter and more flavorful. In "**Nutrition and Soil Regeneration**," researcher Chris Alenson of the Organic Retailers & Growers Assoc. of Australia describes a remineralization trial on poor Australian soil, "a degraded volcanic soil, pH of 4.5, low in nutrient elements such as calcium, magnesium, potassium and trace elements." Following addition of rock dusts and compost, the crops of beans, tomatoes, peppers, and chard were analyzed and compared to local supermarket beans, tomatoes, peppers and chard. As shown in the dramatic comparative mineral levels chart, in Chris Alenson's words: "When we compared the analytical results from the vegetables grown on the revitalised soils to the supermarket items, mineral levels were often ten times higher on the revitalised soil." Chris recognizes this first trial study has limits, but suggests some 'infinite potential' for soil-food-health transformation—so in conclusion he says, "We hope this limited study will stimulate further research." See ***Perspectives III*** for more on the "Good News" of soil remineralization. With that I'll stop pointing out examples of people choosing to employ ***"the angels of our better nature,"*** to use Abraham Lincoln's phrase, and encourage us all to work towards such a world of "full employment!"

While relatively rapid growth of organic farms and organic food production continues, at least in North America and Europe, there seems to be a strange lagging behind by the University land-grant schools, at least in the U.S. "**Most Land-Grant Schools Slight Organics**" is an ***Omaha World-Herald*** article (4/22/2001) which says, "A new report criticizes the nation's 67 land-grant institutions for not paying more attention to organic research. The report was done by the California-based Organic Farming Research Foundation. . . . In fact, the report said that out of nearly 886,000 acres of research land in the land-grant system, only 151 acres were set aside for organic research. . . . The report said land-grant universities have spent a lot of time and money working on chemical and large-scale production that marginalized many other areas of inquiry, including smaller-scale and more environmentally appropriate farming techniques." It is helpful to recognize

that we have such vast room for improvement, requiring only our commitment to constructive, Earth-replenishing work with the facts and laws of Nature, the intellectual study of which we call Science.

Former chemical fertilizer salesman K. Chandler, now with the Texas Plant and Soil Lab in the Rio Grande Valley, made his commitment after realizing that these concentrated, imbalanced "fertilizers" were serving to force out crops by mining the soil's fertility and life. In the Nov. 2000 ***Acres USA*** interview, he is asked, "Now after 50 years of these chemical approaches, is the worm turning?" Chandler replies, "Absolutely. We have hit this yield curve and no matter what we throw on this land we cannot improve the fertility. This is the reason we are seeing a lot more biological agents that are being tested by both the chemical companies and the universities. We have to go back to the basics. Here in the valley, looking at the data that we have been collecting here for some 60-odd years, we saw a decline in the organic matter, the humus fraction, that we were running. When I took over the lab in 1980, they had abandoned running the organic matter test. They said it was not important because nitrogen was so cheap. I reinstalled the test, and looking at the history of that, we can see a constant downward fall of the humus fraction of organic matter. It just keeps falling, now it is hard to get a half a percent of humus in our soil."

A further "reality check" is found in a letter to then U. S. Secretary of Agriculture Dan Glickman by Senior Editor Cheryl Long of ***Organic Gardening*** in the Nov./Dec. 1999 issue [see my letter to Glickman in Perspective V]. Long points out that: "American agriculture's continuing overapplication of nitrogen fertilizers is causing irreparable damage to our soils, soil scientists concluded in their 1999 report on the University of Wisconsin-Madison's ongoing 37-year project monitoring the effects of nitrogen fertilizers. . . . Three decades of such over-use of nitrogen has destroyed much of the soil's fertility, the scientists found, causing it to age the equivalent of 5,000 years." As you now know, or I hope soon will, that is about half the length of a typical interglacial period! Editor Long also gives examples of more studies showing declining mineral and total nutrient levels in our food crops (see more evidence of serious mineral/quality decline in ***Perspective V***), and she asks the Secretary why we're allowing this depletion of our food source. She says:

"The vitamin and mineral content of American and British food supplies appears to be declining, according to analysis of official government reports. The Kushi Institute of Becket, Massachusetts, has studied USDA nutrient data from 1975 and 1997 and uncovered a disturbing trend: Average calcium levels in 12 fresh vegetables have declined 27%; iron levels have dropped 37%; vitamin A levels, 21%; and vitamin C levels 30%. We spoke with one of your scientists, David Haytowitz, head of the USDA nutrient data lab that published both the 1975 and 1997 government data, and he told us that he does not know the cause of this apparent decline and that his office does not have the responsibility to investigate this issue. He was not aware of anyone else in the USDA who might be able to provide an explanation, so we decided to go right to the top."

I haven't heard that Cheryl and ***Organic Gardening*** received any response; Secretary Glickman's response to my own letter was "conspicuous by its absence."

Neal Kinsey works as a soil fertility specialist at Kinsey Agricultural Services in Missouri, and in writing about his soil tests for just one essential trace element, copper, he writes (Aug. 2001 ***Acres USA***, p. 22): "Since 1993, we have worked with soils in all 50 states and at least 50 other countries. Using the Albrecht model to test soils for copper, less than 2 ppm in the soil is considered as deficient. Most soils fall 25-50% short of that, with many at 10-15% of that level, especially in parts of the western U.S. and Canada."

We need to understand and always remember that soils of perpetually renewed, full-spectrum mineral content and abundant fertility as produced by the vital proliferation of diverse microorganism species and earthworms are of paramount importance to human nutrition, health and planetary regeneration! Anyone who is skeptical of the crucial role of the soil (and other) microbes and ***the critical requirement of feeding them generously of their complete natural diet*** (as all organisms need to thrive), may have their skepticism alleviated by the following three notations.

• ***Scientific American*** Editor-in-Chief John Rennie, in his March 2000 editorial, notes that ***"microorganisms are the real masters of any planet."*** (I assume he means any planet containing life as we know it.)

• The 2000 ***Earth Almanac: An Annual Geophysical Review of the State of the Planet*** by Natalie Goldstein, says on p. xx of the ***Preface*** under "Bacteria Biomass-ive": "The world is awash in bacteria, which are found everywhere from deep soils and deep ocean to 40 miles (64 km) up in the atmosphere. U.S. scientists measured the number of bacteria in various habitats and then extrapolated these figures to the entire planet. They estimate that about 5 million trillion trillion (a 5 with 30 zeroes after it) bacteria live on Earth, mostly in the oceans and the soil. Previously, scientists believed that bacteria made up half the living mass (biomass) of Earth; that estimate will now have to be revised upward. The research also has implications for climate models, which must now include the carbon in this greater number of bacteria in their estimates of the amount of carbon stored in Earth's organisms."

• A public television series on Earth's microbes called **"Intimate Strangers; Unseen Life on Earth"** was made in 1999 by the A & E Television Networks in association with The National Science Foundation, U.S. Dept. of Energy, American Society for Microbiology, the Annenberg/CPB Project and others. It is now out on four videotapes which I asked my local library to order. Vol. II, "**Keepers of the Biosphere**," validates Hamaker's central message to feed the microbes to feed the plants! It says: "Today all across the world, from Central America to Ireland and Indonesia, all plants and trees depend on the microbial world to feed them nutrients. In turn, plants and trees supply 50% of the oxygen we breathe. The rest comes from marine microbes, especially algae and bacteria." Elsewhere it re-states the obvious?: "It is microbes that enable every morsel we eat, every breath we take." It also spotlights the famous restoration-oriented ecologist Daniel Jantzen who says that not only are microorganisms ***the foundation*** of the Biosphere but are like a glue holding it all together!

At hand is another pile of information further documenting topics covered in ***TSOC*** and here in ***TLARTE*** such as worsening rates of cancer, obesity, diabetes, chemical and pesticide poisoning of children, adults and the

Biosphere, growth of prison populations, growth in “health care” (mainly cause-avoiding “disease treatment”) costs to about 1 trillion dollars in the U.S., and more. I'll assume most readers don't need me to review this information for you in detail. If you'll read ***TSOC*** and ***TLARTE***, I think you'll know enough of this information and the operating cause and effect principles to understand where we're rushing headlong on destructive paths and where to apply the brakes and reverse direction—or take the higher road! I was also going to quote from my friend John Robbins’ new book ***The Food Revolution***, but I'll simply refer you to it as another wealth of information on the diet-health-environment connection, as was his earlier ***Diet For A New America***. (I sadly regret that the torturous abuse of animals by “animal husbandry” has grown more widespread!) I am only surprised that John could have neglected to recommend the soil remineralization solution to “problems like erosion and nutrient depletion. . . raising doubts about its [agriculture’s] ability to produce food in the future.” (p. 283) Yes, John, please have serious doubts, and consider some revision of your next edition to bring out even more solutions to the many intertwined problems you so deeply research and eloquently bring to light! I do wish to borrow one more quote John Robbins uses in his chapter, “Reversing the Spread of Hunger,” and I know John Hamaker would also feel its poignancy:

“The law, in its majestic equality,
forbids the rich as well as the poor to sleep under bridges,
to beg in the streets, and to steal bread.”
— Anatole France

From poignant quote to stark and poignant facts from Gary Gardner and Brian Halweil of Worldwatch Institute in the ***S. F. Chronicle*** article (4/23/2000), “**Bodily Harm**”: “Today, roughly 1.1 billion people in the world are hungry. And for the first time in history, an equal number are overweight. Indeed, overweight people are the fastest growing segment of the malnourished. Several billion more—some hungry, some overfed—suffer from debilitating deficiencies of essential vitamins and minerals. Widespread and official neglect of nutrition underlies these diverse forms of poor eating.” As we've seen too often and for too long, this neglect applies as well to the foundational nutrition of the soil via agriculture. It is statistics such as these, combined with his awareness of the extensive demineralization of soils from 10 interglacial millennia, and the last century

of mechanized and chemicalized soil "mining," which prompted John Hamaker to title his paper for Chapter 1 of ***TSOC***: **"Our 100% Junk Food Supply Is Destroying Us."**

Thom Hartmann's valuable book, ***The Last Hours Of Ancient Sunlight***, includes a chapter called "How Can Things Look So Good Yet Be So Bad?" which says:

"At a meeting of worldwide central bankers in Hong Kong on September 1997, World Bank president James D. Wolfensohn pointed out that over three billion people—more than half of all humans on the planet, and fully three times the entire human population of the planet in 1800—struggle today to live on less than two dollars a day. 'We are living in a time bomb, and unless we take action now, it could explode in our children's faces,' Wolfensohn said. About that same time, the Washington-based Population Institute issued a report documenting that 82 nations (more than half the world's countries) have now reached the critical state where they cannot grow enough food nor do they have the resources to pay to import enough food to adequately feed their populations." (p. 23)

Consider these words from Pete Wilkinson's commentary (***Nature***, 12/10/98), "**The world needs more than protests**":

"Over the last three decades, Green protest groups and organizations have legitimized the concept of environmentalism. Initially ridiculed and dismissed, they have stamped their mark on the international scene, bringing environmentalism into the common lexicon—and even making it fashionable. At the same time, however, the problems highlighted by these groups have been getting worse. In October, for example, the ***Living Planet*** report, produced by the World Wide Fund for Nature International and the World Conservation Monitoring Centre, claimed that in the past 30 years we have destroyed 30 per cent of the natural world, with crippling impacts on forests, freshwater and marine ecosystems. . . . Today we should not be continuing merely to point accusing fingers at wrong-doers, but expediting solutions collectively and cooperatively. . . . We must demonstrate that it is possible, desirable, and profitable to beat the sword of traditional green protest into the ploughshare of sustainable lifestyles." (p. 511-12)

Now I do have another quote from John Robbins' ***The Food Revolution***:

“My complaint is not with people who act in accord with what they've been told. My criticism is with the industries that are damaging our planet and our future, while telling us how wonderful they are. And also with the media, which has a responsibility to tell us what's really going on, but too often doesn't.

“In 1992, 1,600 senior scientists from 71 countries, including over half of all living Nobel Prize winners, signed and released a document titled ‘World Scientists’ Warning to Humanity.’ It began with the words, ‘Human beings and the natural world are on a collision course,’ and then continued,
“ ‘Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about. . . .

“ ‘No more than one or a few decades remain before the chance to avert the threats we now confront will be lost and the prospects for humanity immeasurably diminished. We the undersigned, senior members of the world's scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship for the Earth and life on it is required, if vast human misery is to be avoided and our global home is not to be irretrievably mutilated.’

“You or I might think the release of such a powerful and historic statement would have been front-page news. But when the ‘World Scientists’ Warning to Humanity’ was released to the press, virtually ever major newspaper in the United States and Canada deemed it ‘not newsworthy.’ That day, the ***New York Times*** did, however, find space on the front page for a story about the origin of rock and roll, while the front page of one of Canada's major newspapers, the ***Globe and Mail***, included a large photograph of cars forming an image of Mickey Mouse.”

"This is the kind of thing that gets me quite upset." (p. 273-74)

I tried to inspire David Brower, at different times a leader of the Sierra Club, Friends of the Earth, and Earth Island Institute, to see the value of global Earth Regeneration/Restoration starting at the end of the 1970s after I met John Hamaker. Like other leaders of large environmental groups, he seemed to have missed the suggested value. Yet before his recent death, he wrote ***Let the Mountains Talk, Let the Rivers Run***, in which he finally began to encourage Restoration as part of planetary "CPR." How many other environmental leaders and workers will advocate and practice Restoration or Regeneration while life provides the opportunity? A few words from this good book by David Brower, which he dedicated: "To those already committed to healing the Earth and to those about to be."

"The Earth is a living throbbing organism. It needs CPR — Conservation-Preservation-Restoration — on a regular basis:

> **Conservation**: We've got to use our resources rationally. We haven't been all that rational these last brief millennia.
>
> **Preservation**: We've got to preserve what we can never replace. That's what wilderness is. That's what biodiversity is, and we're getting rid of both faster than anybody has ever done.
>
> **Restoration**: We're bright enough to build back, to restore the rivers we've dammed, the forests we've clearcut, the seas we've bloodied, polluted, and strip-mined with drift nets; the mountains we've bolted and bulldozed, the deserts we've spoiled or mistakenly created; the ozone layer we've punctured. We can't restore a lot of things that are gone, but we can certainly restore human integrity." (p. 4-5)

"One of the biggest disappointments of my life is that the movement to conserve, preserve, and restore the Earth is so absent from the legislative and political arena, which is like trying to walk in a wheelchair. The speed with which we are losing the Earth is devastating, and must be reversed, fast. We supporters of the environmental movement need to support the U-turn." (p. 6)

"I am old enough to remember another corps: the Civilian Conservation Corps (CCC), under Franklin Roosevelt, during the Great Depression. It was particularly ***un***-depressing to camp in the woods, shore up overgrazed stream banks, replant the prairies, and sleep around a campfire under a full moon (think of it: a full moon every twenty-eight days), or listen to the goose music overhead as you worked hard to save the geese. The CCC created forty-four wildlife refuges in this country and set 2 billion trees in the ground. Three million Americans were given jobs.

"There should be an 'Earth Corps' or perhaps a 'CPR Corps' that would take up where the Peace Corps left off, and be fully concerned with endangered species and the endangered Earth." (p. 113-114) Elsewhere he points out, as did John Hamaker, the need to enlist the huge resources of the world's military services for the cause of planetary CPR. In his concluding thoughts, Brower says: "I've had some big ideas in my life. I've made some things happen. I've stopped some misguided people from trashing the Earth. But the idea I believe I will be checking out on is restoration, although I have no intention of checking out any sooner than necessary. I've grown very fond of this planet. I want to help save a taste of paradise for our children."(p. 195) Thanks, David, and I hope we'll all realize that it needs to be much more than a "taste" for the Earth to make that U-turn from its current downward degenerative cycle.

It is very relevant to note that ***Let the Mountains Talk, Let the Rivers Run*** was printed on non-tree paper made from the fiber of the kenaf plant, Harper Collins West being the publisher helping pioneer the trend toward non-tree alternatives. According to kenaf paper supply company Vision Paper, in their January 2001 ***Vision Paper News***: "After evaluating over 500 plants, the USDA deemed kenaf the most viable replacement for trees for commercial pulp and paper making in the United States." I recently informed Vision Paper of the inherent potential in combining soil remineralization and kenaf production, and also responded to their request of newsletter readers to send in a haiku-like poem related to the benefits of kenaf growing:

Grinding rocks like glaciers do
we make soil, crops rich and true

Earth restored with trees and kenaf
Children smile, sing and laugh

In light of David Brower's comment on the lack of legislative support for Ecological Regeneration, I want to acknowledge the work of another elder, Alden Bryant, who co-founded the Earth Regeneration Society, Inc., in the early 1980s after reading ***TSOC***. In some biographical background information he prepared recently, Alden says:

"In 1992, I was the main author of the first bill in any government putting forth a comprehensive soil, forest and energy program to reduce atmospheric carbon dioxide and work to stabilize the climate extremes facing us. Representative Ron Dellums placed the bill in Congress on Feb. 4, 1992: 'Emergency Climate Stabilization and Earth Regeneration Act of 1992,' H.R. 4154. It went to nine committees, and did not get acted on at that time. The situation now may be sufficiently different to get action on this or a similar bill." You may read this bill in ***Perspective VIII***.

Both in my past ***Solar Age or Ice Age? Bulletins*** and in this volume's ***Perspectives***, I've felt it important to offer some constructive criticism of the writings of Worldwatch Institute former President (now Chairman of the Board) Lester Brown. This criticism is mainly in response to what I think is an ecologically unrealistic insistence on promoting an outmoded and false paradigm of chemical agriculture with its constrictive views of soil fertility and "fertilizers." Lester seems to have generally ignored both the soil remineralization movement and the larger organic/ecological agriculture movement now growing rapidly worldwide. Aside from this, much of what he and Worldwatch offers is valuable and sensible, and increasingly in agreement with John Hamaker's call for economic and ecological transformation. Note these comments of Lester Brown in Ch. 1 of Worldwatch Institute's ***State of the World 2000***, "Challenges of the New Century":

"The overriding challenges facing our global civilization as the new century begins are to stabilize climate and stabilize population. [Two of Hamaker's three primary problems, along with the unsustainable economy, depicted on the ***TSOC*** cover; soil depletion and malnutrition being seen as part of the overall Biospheric degeneration rushing us towards catastrophic

climatic change.] Success on these two fronts would make other challenges, such as reversing the deforestation of Earth, stabilizing water tables, and protecting plant and animal diversity, much more manageable. If we cannot stabilize climate and we cannot stabilize population, there is not an ecosystem on Earth that we can save." (p. 16)

I appreciate these comments from Lester from the last two pages of this chapter:

"In stabilizing climate and stabilizing population, there is no substitute for leadership. Examples of this abound in both initiatives. Denmark, for instance, has simply banned the construction of coal-fired power plants. Meanwhile, it has adopted a series of economic incentives for investment in wind power that has fostered the development of the world's largest wind turbine manufacturing industry. As a result, in 1998 wind turbines of Danish design accounted for half of all turbines installed worldwide. . . .

"Leadership and time are the scarce resources. The world desperately needs more of both. Saving the planet, including the stabilization of climate and the stabilization of population, is a massive undertaking by any historical yardstick. This is not a spectator sport. It is something everyone can participate in. Few activities offer more satisfaction. . . .

"There is no middle path. The challenge is either to build an economy that is sustainable or to stay with our unsustainable economy until it declines. It is not a goal that can be compromised. One way or another, the choice will be made by our generation, but it will affect life on Earth for all generations to come."

In reading the next edition, ***State of the World 2001***, I am again amazed to read in Lester Brown's chapter, "Eradicating Hunger: A Growing Challenge," that he still seems to rigidly maintain the belief that the world's topsoils, developed from the Earth's rock crust containing 92 or more mineral elements, only require three of those elements to produce the fertility to support an extractive agriculture for over 6 billion people. I for one encourage him to re-think this long-untenable belief, which he expresses again on p. 50: "African farmers can do much more with nitrogen-fixing

green manure crops, which will help improve the structure of their soils while providing nitrogen, one of the key nutrients (along with phosphate and potash) needed to restore soil fertility." The fact that he does mention the organic farming practice of green manuring seems to me something of a breakthrough, and gives hope that he may yet one day join the effort to implement 21st Century non-toxic, soil-health-and-Earth Regenerative ecological agriculture based on soil remineralization ***and*** organic matter replenishment. I thank him here for providing recent figures to help update the NPK chemical fertilizer use chart in ***TSOC***. Giving figures in millions of tons, he notes that "world fertilizer use climbed from 14 million tons in 1950 to 134 million tons in 2000."

I do not mean to question Lester Brown's conscience or sincerity. I learned via the Climate Action NOW! e-mail list (climate@efmedia.org) on 5/11/2001 that he has started a new Earth Policy Institute, according to a Worldwatch news release. Brown is quoted in the release: "During the year since I moved from President to Chairman of the Board at Worldwatch, I've had more time to think," said Brown. "Three things have become much more apparent. First, we are losing the war to save the planet. Many battles have been won, but the gap between what we need to do to arrest the environmental deterioration of Earth and what we are doing continues to widen. Somehow we have to turn the tide.

"Second, we need a vision of what an environmentally sustainable economy—an eco-economy—would look like, a roadmap of how to get from here to there, and a continual assessment of progress in this effort. Our goal is to help develop a shared vision of the eco-economy. Unless we have a common goal of where we want to go, we are not likely to get there."

His third thing is the need for an Earth Policy Institute to research, document, and publicize this necessarily global shift to a new Eco-Economy with Earth Policy Alerts, an Eco-Economy book, and Eco-Economy Updates. "By definition, an eco-economy is designed to mesh with Earth's ecosystem instead of disrupting and destroying it," he says. A $500,000 Summit Foundation start-up grant is gratefully acknowledged, and the e-mail address is given for those wanting to subscribe to Earth

Policy Institute's Eco-Economy Updates and Earth Policy Alerts: epi@earth-policy.org, or visit their website: www.earth-policy.org.

I wish Lester Brown and Earth Policy Institute all the best – including the best regenerative agricultural and forestry practices, foundational to an Eco-Economy – in this new noble effort! I hope a serious study of what we're offering in ***TSOC*** and ***TLARTE*** will be part of that effort.

Also, consider in this light what Buckminster Fuller, like Hamaker a unique genius amongst 20th Century minds, offered through his legacy in attempting:

"To make the world work
In the shortest possible time
Through spontaneous cooperation
Without ecological offense
Or the disadvantage of anyone."

This quote is part of the Dedication to the 1996 book by J. Baldwin, ***Buckyworks: Buckminster Fuller's Ideas For Today***. On p. 201 of this book, in summarizing data from the World Game Institute as "What the World Wants and How to Pay for it Using Military Expenditures," we read an interesting estimate: "The total annual cost of global programs for solving the major human needs and environmental problems facing humanity would be approximately 25% of the annual world military budget. If asked by a child, how would you explain our failure to act on this information?" And from the 2001 book, ***Buckminster Fuller: Anthology For The New Millennium*** edited by Thomas T.K. Zung, these words from "The Path of Social Evolution" by Barbara Marx Hubbard: "Buckminster Fuller revealed to us the potential of humanity for an ever-evolving, regenerative future. He made it clear that 'our minds are designed to know the design,' and that we have the resources, technology and know-how to make of this world a 100 percent physical success. The design science revolution which he called for is still emerging among us in countless innovations in all fields. I believe that we are approaching the natural connectedness and synergy among positive innovations, which together can build a 'win-win' world—a world that can work for everyone. This is the crucial choice point for humanity, as he pointed out. Our 'final exam' is

going on a bit longer than he predicted. . . . He could see that the design of creation is that everyone can have life, and life more abundant. Everyone can be fed and healed. We are citizens of local universe, four and a half billion [at that time] billionaires, with wealth greater than any king of the past, if only we would understand the invisible design of nature and cooperate consciously with it. . . . [W]hat we must do is comprehend the exquisite laws of nature and work with them for an ever-regenerating future for all humanity. 'The world will be saved,' he told us, 'by individuals of integrity freely joining.' "

John Hamaker, along with many others, expressed his concern that individuals of integrity were too few in government, and that the influence of corporations with narrow vested interests and ecologically harmful products and practices has been and continues to be far too powerful. Below is a listing from ***Sierra*** magazine, March/April 2001, p. 19, which is somewhat informative in relation to industry "financing" of government.

"Contributions From Selected Industries to Federal Candidates and Parties, 1990-2000" in the U.S.:
$117,711,747 - Oil and Gas
$ 58,426,889 - Automotive
$ 51,070,027 - Electric Utilities
$ 35,242,032 - Chemical and Related Manufacturing
$ 24,756,971 - Forestry and Forestry Products
$ 17,945,784 - Mining
$ 6,950,843 - Total Environmental Contributions

Sierra attributes the source of this info as the Center for Responsive Politics. One of many articles at hand gives some indication of the situation in the U.S., for those who missed the widespread publicity about the interesting backgrounds of many current government representatives of "We the People." Excerpts from "Corporate people get environmental posts." (***San Mateo Times***, 6/25/2001):

"President Bush's roster of nominees for key environmental policy jobs within the new administration is brimming with lawyers and lobbyists for the very industries these officials will oversee in their government jobs. . . . The deputy administrator for the EPA, Linda Fisher, was a chief lobbyist and

political fundraising coordinator for Monsanto, a biochemical and pesticide producer.

“The nominee for assistant secretary of Agriculture with responsibility for national forests, Mark Rey, was a top timber industry lobbyist. The nominee for deputy Interior secretary, Steven Griles, is a leading lobbyist for oil, gas, coal and other industries that want increased access to resources on public lands. The Interior secretary's two newly named envoys to Alaska are the top lobbyist for drilling in the Arctic National Wildlife Refuge and a former state lawmaker who has championed the same cause. And the nominee for the Justice Department's top job enforcing environmental and natural resource laws, Tom Sansonetti, is a Republican conservative activist and Wyoming lawyer who has lobbied in Washington on behalf of coal mining operations and other industries seeking access to public lands.”

My next stack of information I titled “Corporate Responsibility, Corporate Potentials, Corporate Change” from which I will only extract a few examples to point out the changes underway in the relationships between corporations, politics, economics and ecologics. In former President Clinton's final State of the Union speech (1/27/00) he claimed: “We will reverse the course of climate change” but not this year or even this decade. And he said efficient production of biofuels will soon give us cars which obtain from 75 mpg up to much higher figures. A government-industry effort to produce high-mileage vehicles began in 1993 and the “Big Three” automakers, Ford, General Motors and DaimlerChrysler AG are key players in this “Partnership for a New Generation of Vehicles.” All three have already come close to meeting the Clinton Administration challenge to develop a family-size sedan that gets at least 80 mpg, according to “**Gore pushes for high-mileage cars**” (***San Mateo Times***, 3/30/00).

Biofuels are becoming available ***now*** in the San Francisco Bay Area as noted in "**Green fuel may fill Peninsula pumps**" (***The Burlingame Independent***, 6/5/01):

“Massachusetts-based World Energy Alternatives, having established a West Coast hub in Half Moon Bay six months ago, is offering California diesel users a fuel made of 100 percent Midwestern soybeans. Not only does the fuel mean putting farmers to work instead of foreign and offshore

drills, the biodiesel alternative emits less carbon monoxide, hydrocarbons, and particulate matter—all documented health hazards. . . . Already, a handful of Bay Area companies have begun using or considering biodiesel for their vehicle fleets, including the San Francisco International Airport. . . . Though new to California, biodiesel has been around more than 100 years. Rudolph Diesel presented an engine that ran off peanut oil at the 1900 World Exhibition."

In "**Ford seeks to boost fuel economy, fight global warming**," (***S.F. Chronicle***, 5/4/01) we read: "In a letter included in its second corporate citizenship report, Ford Chairman William Clay Ford, Jr. wrote that climate change 'stands out from other environmental issues because of its potentially serious consequences and its direct relationship to our industry.' Jacques Nasser, Ford's president and chief executive, wrote 'there's no doubt that sufficient evidence exists to move from argument to action.' "

In "**Global Warming: Look Who Disagrees With Bush**," (***Business Week***, 4/23/01) it begins: "When President Bush discarded the Kyoto Protocol—an international agreement to cut emissions of carbon dioxide and other global-warming gases—he blamed the decision on a slowing U.S. economy and an energy crisis. 'The idea of placing caps on CO_2 does not make economic sense for America,' Bush said on Mar. 29. Some of the world's largest companies disagree. DuPont, for example, has already made substantial cuts in its greenhouse-gas emissions - and says it will continue to do so despite the Administration's reluctance. . . . On Apr. 4, the Business Roundtable proposed various solutions to the global warming problem in a report titled, 'Unleashing Innovation: The Right Approach to Global Climate Change.' Earnest W. Deavenport, chairman and chief executive of Eastman Chemical Co., who chaired the Business Roundtable's environment task force, said the report 'represents the business community's interest in being part of the solution to concerns about global climate change.'

"Increasingly, corporations are deciding to join efforts to curb global warming because the strategy makes good business sense. Others include BP Amoco, Royal Dutch/Shell, Ford, and General Motors—all companies that would be expected to fight limits on greenhouse-gas emissions. Until recently, these four companies were members of the Global Climate

Coalition, a group formed to oppose mandatory limits on greenhouse emissions. All have pulled out.

"BP and Shell aren't stopping with that gesture. They have joined two dozen other companies—including Alcoa, Enron, Georgia-Pacific, and Toyota—in a new group called the Pew Center on Global Climate Change. The center brings companies together to search for solutions to the global warming problem. . . . The pro-business Bush Administration should listen a little more closely to what some business are actually saying."

Amory Lovins, long-time proponent of "soft energy paths" and conservation, co-founded the Rocky Mountain Institute in Snowmass, CO and co-authored the recent book, ***Natural Capitalism***. In the Fall/Winter 2000 **RMI Solutions Newsletter** is the article by Brent Gardner-Smith, "**Canadian Strategic Influence: Changing the Rules By Changing Minds**." Of note here:

"Lovins and other RMItes are finding that the concept of Natural Capitalism is politically effective because it speaks to a wide range of conditions and experiences. Here's an example from Canada, where Lovins has been working on energy issues for three decades. On a recent visit, Lovins dined with Finance Minister Paul Martin and Environment Minister David Anderson. 'They seemed taken with the ideas of Natural Capitalism,' he says. . . . The next day, Martin gave a speech that caught the attention of many for its emphasis on environmental themes.

"A newspaper story in the June 19 ***Ottawa Citizen*** on Anderson's policies reported that Anderson has a powerful ally in Finance Minister Paul Martin, the one-time opposition environment critic. 'Mr. Anderson and Mr. Martin recently had dinner with Amory Lovins, co-author of ***Natural Capitalism***, a book that describes the "new industrialism" that is more efficient, profitable and environmentally friendly. Mr. Martin, in a recent speech, picked up on the book's theme: 'If we are to move forward toward our goal of sustainable communities, we must be willing to accept a new approach, one in which economic and environmental considerations are no longer viewed as separate entities.' Mr. Martin says Canada needs to use renewable energy like biomass fuels, solar and wind power on an industrial scale while abandoning "the very concept of waste. The traditional model takes in

virgin materials at one end, creates waste and emissions during production, and throws away potentially valuable materials after consumer use," he says, sounding more like an environmentalist than a finance minister.' "

Here I'll add a few words from David Korten, author of the books ***When Corporations Rule the World*** and ***The Post-Corporate World***. He is also a founding member of The Positive Futures Network, "an independent, nonprofit organization that supports people's active engagement in creating a more just, sustainable, and compassionate world." This Network (www.Futurenet.org) published the 2000 book ***Saying yes!: Conversations on a World that Works for All***. One chapter on "Corporate Futures" is a conversation between Korten; ***Natural Capitalism*** co-author Paul Hawken, and Sarah van Gelder, Editor of ***YES! A Journal of Positive Futures***. David Korten:

"With regard to your question, Sarah [Do you see ways to go beyond making some modifications at the edges to a shift in the entire dynamic?], until we have a reasonable idea of where we want to go, we are unlikely to get there. I believe we need to move toward a mindful market economy - one that is self-organizing, democratically accountable to all people, rewards productive behavior, provides a decent means of livelihood for every person, encourages ethical behavior, and functions in a balanced and sustainable relationship with the other living systems of our planet. In short, it is an economy that is nearly the mirror opposite of a global economy centrally managed by global corporations larger than most states in response to the demands of financial speculators who make no contribution to productive output.

"So far as I can see a mindful market economy has no need for institutions created for the sole purpose of enriching the already wealthy and concentrating economic power without democratic accountability. The problems arise from a combination of size, ownership, and accountability and are best resolved by replacing the global publicly traded, limited liability corporation with human-scale, stakeholder-owner enterprises that are accountable to the communities in which they are located. Nor is there any place in such an economy for financial speculation.

“Eliminating financial speculation and the corporation as we know it will not solve all our problems, but it would be a good start. Unfortunately, such an agenda seems rather fanciful given current power realities. On the other hand, given the rate at which our existing economic institutions are destroying life to make money, our very existence depends on turning a seemingly impossible agenda into a feasible and obvious choice.” (p. 29-30)

Korten gives us some complementary words to these near the conclusion of ***The Post-Corporate World***:

“The gift of self-reflective intelligence gives our species a capacity for mindful choice well beyond that of any other. Yet we have avoided the responsibility that inevitably goes with freedom by assuming it is not within our means. We have further diminished ourselves by developing elegant ideological arguments to rationalize our irresponsibility.

“Thus, we have approached democracy as though it were a license for each individual to do as he or she wishes when in truth it is about acting on the faith that each individual has the capacity for full and equal participation in making responsible choices mindful of the needs of all. We have approached the market as though it were a license to amass unlimited individual wealth without individual responsibility, when in truth it is about meeting basic needs through the mindful participation of everyone in the equitable and efficient allocation of society's resources. We have treated the good life as a process of material acquisition and consumption without limit, when in truth it is about living fully and well in service to life's continued unfolding.

“Whatever the barriers to our taking the step to species maturity, our era of adolescent irresponsibility is ending for the very reason that we have reached the limits of the planet's tolerance for our recklessness. It is now our time to accept responsibility for our freedom or perish as a species that failed to find its place of service in the web of life.” (p. 275)

About 180 countries have more or less agreed to a treaty to reduce greenhouse gas emission a few percentage points by about 2012,

according to reports of the meetings in Brussels in July 2001 intended to resolve terms of how to implement the 1997 Kyoto Protocol. Neither the U.S., with 4 percent of global population producing 25% of greenhouse gases, nor China and India with their billion+ populations, felt responsible even for the minor and (from the evidence we're offering) evidently most inadequate, uninspired reductions requested in Kyoto. What would be the global effect on greenhouse gases and climate if these 183 or more countries would return home from the climate conferences and commit themselves to replenish soil minerals and organic matter, establish extensive new forests and green cover, regenerate old and dying forests, create a regenerative ecological agriculture dedicated to optimum food quality, and employ any or all who need work to create the solar and biomass energy plantations needed for a quantum leap into a future "beyond petroleum"—as the BP (British Petroleum) Co. claims is the sane future course?

How many companies and countries may now be ready and willing to cooperate in such a quantum leap? After summarizing some of his strategy for promoting renewable energy and phasing out fossil fuel dependency until a 70% emissions reduction is achieved, Ross Gelbspan helps provide insight into where things currently stand politically and economically—even as they "fall" ecologically:

"If our political leaders are not yet ready for this kind of approach, growing numbers of corporate leaders are. In February, the CEOs of the world's 1,000 largest corporations at the World Economic Forum voted climate change the most urgent problem facing humanity." (from "**U.S. Scuttles Latest Chance to Avert Global Warming Catastrophe**" on the Foreign Policy in Focus website http://fpif.org/commentary/0102warming_body.html, 4/17/01) How many of these CEOs, as well as Heads of State, are now aware that the feared climate catastrophe may prove to be in reality initiating a new glacial period?

"Global warming is something of a misnomer. Rising temperatures produce all sorts of extreme conditions." This from the ***U.S. News & World Report*** article, "**The Weather Turns Wild**," (2/5/01) which also says in regard to mathematical computer models, and what is already happening: "Doubters

remain. Some argue that climate is too chaotic and complex to trust to any computerized prediction. . . . Weather would become more unpredictable and violent, with thunderstorms sparking increased tornadoes and lightning, a major cause of fires. . . . Natural disasters already cost plenty; in the 1990s the tab was $608 billion, more than the four previous decades combined, according to Worldwatch Institute." And in ***Time*** magazine's Special Report on Global Warming issue (4/9/01), "**Feeling the Heat**," it is well noted that:

"The models still aren't perfect. One major flaw, agree critics and champions alike, is that they don't adequately account for clouds. In a warmer world, more water will evaporate from the oceans and presumably form more clouds. . . . More snowfall reflecting more sunlight back into space could actually cause a net cooling. Global warming could, paradoxically, throw the planet into another ice age." (p. 28-29)

Authors Bjerklie, Boyle, Dorfman and Thompson conclude the article: "Humanity embarked unknowingly on the dangerous experiment of tinkering with the climate of our planet. Now that we know what we're doing [more or less!], it would be utterly foolish to continue." (p. 29)

Three more notes about the still simplistic computer models of the Biosphere's climate. The ***Science*** article, "**Rising Global Temperature, Rising Uncertainty**," (4/13/01) says: "Climate forecasting, after all, is still in its infancy, and the models rely on a sparse database: a mere 100 years of global temperatures. . . . 'It's extremely hard to tell whether the models have improved' in the past 5 years, says climatologist Gerald North of Texas A&M University in College Station; 'the uncertainties are large.' Climate modeler Peter Stone of the Massachusetts Institute of Technology says, 'The major [climate prediction] uncertainties have not been reduced at all.' And cloud physicist Robert Charlson, professor emeritus at the University of Washington, Seattle, adds: 'To make it sound like we understand climate is not right.' "

Climate Change editor and now Stanford professor Stephen Schneider was lecturing on the Stanford Channel (Cable 25, 4/12/01) and told his students and viewers that global climate modelers are still just subjectively modeling sub-systems and not whole Earth systems. And from ***N.Y. Times***

science writer William K. Stevens' 1999 book, ***The Change In The Weather:*** "But the fastest computer imaginable cannot overcome another deficiency: incomplete knowledge about the workings of the atmosphere. This [or, more comprehensively, the workings of the whole Biosphere Earth] more than anything is what ultimately limits the models' realism. 'How the natural world works—that's always going to be our problem,' says W. Lawrence Gates, a climatologist at the Lawrence Livermore National Laboratory in California." (p. 210)

Perspective VI upcoming is "More on the Critical State of the Forests and Biosphere," yet here, as part of this introductory call for soil and forest and Earth Health Regeneration, I want to add a few facts and ideas. Although it has drawn most of its climate change perspectives from the standard "global warming" paradigm, there is a new book of potential value called ***Stormy Weather: 101 Solutions to Global Climate Change*** by Guy Dauncey with Patrick Mazza (2001 New Society Publishers). "**Stop Global Deforestation**" is solution No. 97, and I quote:

"As planetary citizens, we are making a terrible mess of our forests, and we're still at it. . . . 8,000 years ago, the world had around 43 billion acres of forests. By 2000, a UN forest assessment showed that we were down to 9.5 billion acres. The World Resources Institute estimates that we are losing natural forest in the tropics at the rate of 40 million acres a year. That's 110,000 acres per day, or 76 acres a minute. [I've seen other estimates as high as 78 million acres/year and 214,000 acres/day!] If an acre has 200 trees, the loss is an astonishing 2 million trees a day, every day of the year. [Sensing that the 2 million trees was much too low, I calculated 110,000 acres x 200 trees = 22,000,000 trees – or 42,800,000 trees if the 214,000 acres/day figure is correct.] Europe, India, Bangladesh, and Sri Lanka have already lost their rainforests; the Ivory Coast's forests are nearly gone; the Philippines, Thailand, and Indonesia have lost almost half of their forests in the last 25 years." Among others worth considering, note Solutions 98-101: "Build a Global Movement," "Form a Global Ecological Alliance," "Declare a Century of Ecological Restoration," and "Now, Think!" The book is also loaded with websites and resources valuable to all of us concerned with cooperating to Regenerate the Earth.

Among the latest casualties of general ecosystem demineralization, acidification, toxification, and over-exploitation are the following. While extensive tree dieback has been plaguing trees in Western Australia for years, we now see similar trends in the East, such as "**Mysterious Tree Disease**" (in Earthweek, ***S.F. Chronicle,*** 8/15/00): "Australian forests near Sydney Harbor have been stricken by an illness that has killed as much as 70 percent of the city's lofty angophora, Sydney's 'quintessential' tree. ***Angophora costata***, distinguished by its smooth salmon-colored bark, is suffering from a widespread and previously unknown form of dieback. The illness attacks the root systems. . . ." Then we read of crisis in Florida, such as "**Floridians livid over removal of trees**" (10/20/00, ***S. F. Chronicle***):

"Enraging homeowners, Florida agriculture officials are going into back yards and cutting down people's beloved citrus trees in an effort to stamp out a crop-destroying strain of bacteria." They're calling this one "citrus canker" and the fear is it could wipe out the state's $8.5 billion citrus industry because "there is no chemical that will kill canker in plant tissue." Rather than remineralizing and composting to regenerate soil and thus tree health, "more than 750,000 trees have been cut down and burned since 1995 in residential areas of three Miami-area counties." State rules allow the destruction of trees within 1,900 feet of an infected tree, even if healthy, so one can understand why armed stand-offs and human chains around treasured trees are seen in response. A wiser course would be to build citrus tree health with rock dust as did Prof. Childs to reverse the similarly thought "incurable" disease of "citrus blight," as documented in ***Perspective III***. Perhaps we can share this information with the people of Florida and the government officials in their employ, and help re-direct effort and materials ***to address primary causes rather than the virtually infinite pathological effects***.

Now in California we see another "plague" upon us, descriptively named "sudden oak death" and suddenly manifesting in other members of the ailing ecosystem. Let us not forget we live in a "cause and effect" world, and as Dr. Carey Reams titled one of his writings on soil and health, "the curse causeless shall not come." (a quote from the Bible?) A review of nine articles from 2000-2001 shows this one, "**Oak plague spreading - state's forests in peril**," to summarize the current situation as publicly perceived:

"The disease ravaging the state's oak trees has spread to bay and madrone trees, placing California's entire forest ecosystem in danger and raising the stakes in an increasingly ugly biological war. [More "fighting" disease rather than building health.] The discovery by a team of University of California scientists means that the contagion known as sudden oak death is becoming more widespread than even the most pessimistic observers had originally feared. . . . Sudden oak death has killed tens of thousands of coast live oak, black oak and tan oak trees in seven counties along a 190-mile range of coastline from Monterey to Sonoma Counties."

Other articles say it is now manifesting as far east as Napa county and as far north as southern Oregon, and the symptom-associated phytophthora fungus, considered by most to be the "the cause," is the same said to be "devastating" the Western Australia ecosystem. Like limestone and other single rock dusts, phosphate rock can help nourish soil and plant health, although naturally not as well as the broad spectrum rock or gravel mixes. This article mentions a "phosphonate" compound seems to help "stimulate the tree's defenses against fungus" and enable it to eliminate the lesions that characterize sudden oak death.

I spoke today (11/11/01) with Ralph Zingaro, a Cornell University graduate, who says he initiated this approach and who is now working on a 500-acre demonstration project in Marin County to show that broad-spectrum rock dusts are the most logical solution to building tree and total-ecosystem health again.

Ralph's tree care company, Bioscape, Inc. (www.bioscape.com), offers a 2001 Winter Season "Update on the Tree Decline Complex in California" from which I quote: "Our lab tests, taken at our 500-acre research site for the past 2 years, indicate extremely acidic soils and elevated toxic aluminum levels in soils and trees. What this means to trees is sudden root death. Also, excessive nitrate deposition has affected the mycorrhizae in the soil that oak trees depend on for their ability to absorb water and nutrients. There is also a dysfunction called aluminum toxicity that is affecting roots. Aluminum is normally unavailable to roots, but becomes available and toxic at low pH. Our program has now evolved into a nutritional program whereby the nutritional needs of oaks is met first, then a soil-rebuilding program using rock dust and humates are utilized to replace

valuable nutrients in the soil. The addition of this rock dust remineralizes the soil and corrects decades of mineral depletion in soils." Generously applied, it can even correct centuries or millennia of depletion! Ralph Zingaro is cooperating with U.C. Berkeley researchers, such as leading sudden oak death research Matteo Garbelotto, with whom he co-authored "Report on the Efficacy of an Astro Treatment on Coast Live Oaks in a Marin County Ranch" that showed an inefficacy of the toxic chemical "cure" approach. Among their conclusions: "Insecticide application did not significantly protect trees. Similar number of trees died in either group." This helped convince Ralph of the wisdom of pursuing a course of addressing primary causes and a return to the essential foundation of soil-health-building.

Other phone calls led me to discover that at least one tree company is trying remineralization, and that the University of California may be getting involved in another test. To my knowledge, this would be a breakthrough within this network of universities. I will see if I can initiate further demonstrations of the remineralization option. One large vineyard in Sonoma County, a center for the proliferation of both wine grapes and sudden oak death, is I'm told using hundreds of tons of rock dust since learning of its value from organic farmer Bob Cannard. I hope farmers growing food and consumers eating it will soon value ***food quality*** so highly that such generous remineralization will become the high standard of regenerative sustainable agriculture.

Just as the Hamaker Thesis predicts the spreading dieback of trees and life unable to cope with increasingly demineralized-acidified-toxified soils, along with air pollution and acid precipitation, it also predicts that the weakened, malnourished, shrinking forest cover will increasingly go up in flames and smoke and greenhouse effect gases as part of the whole process of interglacial-to-glacial period transition. This has been shown to occur quickly in the past and appears to be doing so now. Along with what we present in ***TSOC*** and here in ***TLARTE***, consider the following recent information on the death and burning of the trees which may well be warning us that our own death may follow in logical sequence—unless we find it logical to regenerate the soil-Biosphere life-support and climatic system.

The California Dept. of Forestry, using over 10,000 people with ground and air equipment, spent $145 million fighting fires in 1999, the most expensive year in their history, reports **“Forestry department expects hot fire season"** (***San Mateo Times***, 5/18/00). Two other “unprecedented” conflagrations are detailed in **“Giant brush fire burns near nuclear waste; 180,000 acres gone**” (***San Mateo Times***, 6/29/00): “A wildfire roaring across the Hanford nuclear reservation in south-central Washington burned out of control Thursday within miles of areas contaminated by radioactivity. . . . It was the second time in two months that wildfire threatened a U.S. nuclear site. In May, a fire set to clear brush near the Los Alamos National Laboratory in New Mexico raged out of control, forcing evacuation of more than 20,000 people and destroying more than 200 homes in Los Alamos and nearly 40 temporary buildings at the laboratory.”

These fires were part of a much larger picture: “**Amid Worst Fire Season, Answers Sought**” (***S.F. Chronicle***, 9/22/00): “All through Montana, the signs, posted on mailboxes, storefronts and telephone poles, are the same: ‘God bless you, firefighters.’ ‘Thank you, firefighters.’. . . These sentiments were recapitulated time and again this year throughout the United States, where the worst wildfire season in history has burned 6.9 million acres as of yesterday, compared with an annual average of 3.1 million. . . . Larger forces were also at play in creating this year's fires. The weather, specifically. The past two years have been marked by drought in many parts of the intermountain West, and forests were thoroughly desiccated by midsummer.”

And a larger picture still, as ***S.F. Chronicle*** science writer Keay Davidson reveals in “**Cold Northern Forests Face Burning Threat; Global Warming blamed for huge fires**" (12/18/00): “Environmentalists wail as tropical rainforests go up in smoke, while largely ignoring another blazing ecosystem: the ‘boreal’ forests of cold northern lands. The caribou-haunted forests of Canada, Alaska and the former Soviet Union including Siberia are apparently burning like never before, experts said at the American Geophysical Union conference in San Francisco yesterday. . . . In Alaska and Canada's boreal forests, fire consumed an average of more than 7 million acres a year in the 1990s. That's a sharp rise from the average of 3 million acres per year in the 1960s, scientists said. . . . Such fires are so gigantic, and in such unsettled terrains, that firefighters can do little if anything to control them. Some of the worst fires devour boreal forests of

the former Soviet Union." A joint NASA-Russian Academy of Sciences study is trying to determine the extent of the recent fires there. The boreal forests are thought to store about 30 percent of the carbon in the terrestrial ecosystem, hence the obvious importance to global climate.

The crisis of dying and burning forests has reached the pages of ***The Wall Street Journal*** in the article by assistant editor Kimberley Strassel, "**Losing the Forest for the Trees.**" After noting the 2000 U.S. total of 7.4 million acres burned, Ms. Strassel delivers this blockbuster: "The General Accounting Office conservatively estimates that 65 million acres of national forest are currently at high risk of catastrophic fires; one in three acres is either dead or dying." Yes, it may be true that the "wailing" of "environmentalists" (as opposed to those who consider the environment irrelevant?) about forests dying and burning in the tropics has been geographically limited, but the growing body of facts shows that concern more than valid. ***Perspective VI*** shows this to be true, as does the valuable new article by Mark Cochrane in ***Environment*** (Oct. 2001), "**In the Line of Fire - Understanding the Impacts of Tropical Forest Fires.**" Just his opening paragraph:

"In 1998, out-of-control fires burned 8 million hectares of land in Indonesia and at least 9.2 million hectares throughout tropical Latin America. Much of the area that burned was tropical rainforest. A full accounting of the damage caused by these fires may never be possible, but the economic costs have been estimated at between $8.8 billion and $9.7 billion in Indonesia and between $10 billion and $15 billion in Latin America." He goes on to show how worsening heat and drought in these regions, along with the destructive aspects of exploitative human consciousness, have combined to set loose these worsening tropical hells-on-Earth. (The 17.2 million hectares mentioned above equals about 41 million acres!) While he doesn't go into the factors of soil demineralization and acid rain, he does note that: "When tropical forests suffer successive fires, they become more fire prone, experience increasing fire damage, and are at risk of total destruction." And while he does not call for a true sustainable or regenerative agriculture and forestry based on soil remineralization and complementary ecological practices such as Permaculture, tree crop-based agriculture, etc., he at least suggests that: "Wherever possible, the use of fire-free alternatives to slash-and-burn activities for land maintenance

should be encouraged and assisted." (The author is senior research scientist at Michigan State University.)

Lastly, we come to my recent collection of weather and climate change articles which were not used in the Perspectives. If it were not for the fact that I think these articles provide us with additional strong warning signs that we may be well into an interglacial-to-glacial transition, I would not ask for the space and your time to consider brief summaries or excerpts here. Yet this is my responsibility, and perhaps it is equally yours?

Found on Ross Gelbspan's www.heatisonline.org website, 3/13/00 is ***The New York Times*** article, "**Red Cross: Climate Change Hits Poor Countries Hardest**." (6/24/99) It says: "The annual World Disasters Report said that in six years, the number of people who needed aid after disasters like floods and earthquakes had risen, from fewer than 500,000 a year to more than 5.5 million. . . . 'We used to look at these natural disasters as blips on the screen of a country's development,' the director of disaster policy at the Red Cross, Peter Walker, said. 'But now they really change the development future of a country.' "

Two related articles follow, first "**Red Cross predicts climatic super disasters**" from ***Agence France-Presse*** (6/24/99): "The world is heading for a spate of 'super' disasters sparked by a mix of climate change, environmental damage and population pressures, a Red Cross report said. . . . The forecast was contained in the World Disasters Report 1999. . . . In 1998, natural disasters created more 'refugees' than wars and conflict as declining soil fertility, drought, flooding and deforestation drove 25 million people from their land into packed city slums." And from the original Red Cross press release, "**Red Cross Predicts a Decade of Super-Disasters**": "In Russia, the extreme winter weather turned into a disaster when it struck a society where 44 million people are living in poverty, one million children are homeless, and tuberculosis rates are skyrocketing."

"**Planet Watch**" - "A week of incessant rain caused the worst flooding in Vietnam's history. The late fall storm left more than 500 dead and 500,000 homeless. . . . Packing winds greater than 160 mph, the worst cyclone in nearly a century devastated the poor Orissa state of India." (***Popular Mechanics***, Feb. 2000)

Since “everything is connected to everything else” (also called “the first law of Ecology”), consider information from two articles on the thinning ozone layer:

“Ozone Hole Over Arctic Surprises Research Team” - “Clouds of ice and acid high in the stratosphere disrupted the Northern Hemisphere's protective ozone layer this past winter. . . . ‘Ozone levels over the Arctic have been dropping for the past four to five years,' said Brian Toon, an atmospheric scientist at the University of Colorado. . . .’ As a result the stratosphere over the Arctic is beginning to look a lot like the Antarctic. This is the first time, in fact, that we've seen the polar clouds lasting long enough to affect the ozone layer significantly,’ he said. . . . The arctic atmosphere is not nearly as cold as it is over Antarctica, but it has been growing colder over the past 20 years by more than four degrees per decade. . . .” (***S.F. Chronicle***, 5/31/00)

“Ozone Hole Bigger Than Ever, NASA Says” - “The familiar and much-feared hole in the Earth's protective ozone layer has widened over Antarctica regions to record levels this year, extending over more than 11 million square miles, a NASA satellite has discovered. . . . The size of this year's Antarctic ozone hole is due to an unusually intense stratospheric air current known as the Antarctic vortex that sweeps around the continent of Antarctica and normally confines the ozone hole. This year, despite its intensity, the path of the vortex was wider than normal and allowed the hole to grow larger.” ***(S. F. Chronicle,*** 9/8/00)

"Devastating Drought of 2000 breaking records - Many of season's crops already lost in Midwest, Southeast” - “In Texas, goat and sheep producers are selling off their herds and state agriculture officials say wheat production is down 42 percent. . . . Since 1996, droughts have cost Texas about $4.2 billion in agricultural losses, and that doesn't include the $361 million already racked up this year. . . .” (***S.F. Examiner***, 6/25/00)

“Weather worries divide nation” - "Forget revenue sharing. What America needs is weather sharing. While fires devour Western forests at a record pace, and the South endures devastating drought and deadly heat waves, the Northeast muddles through one of the coolest, soggiest

summers in memory. Fourteen inches of rain fell on a New Jersey township in a half-day last weekend." (***San Mateo Times***, 8/17/00)

"A Coffee Quandary in Brazil" - "Depending on who does the talking, Wanderlino Medeiros Bastos is either the Atlantic rain forest's worst nightmare or its last, best hope. A coffee grower from Espirito Santo state, Bastos moved to this densely forested region [Camaca, Brazil] five years ago, intent on converting its failing cocoa plantations to coffee. . . . Bastos said his presence is inevitable, part of coffee's natural migration north, away from the cyclical frosts that may have claimed as much as 90 percent of next year's coffee crop in southern Brazil. . . . It is an idea Bastos finds appealing, although he has some concerns about whether the region's soil can support that kind of coffee." [Might we all be wise to eliminate the demand for the variety of drug crops?] (***S. F. Chronicle***, 1/2/01)

"Gulf turtles suffering hypothermia" - "Marine researchers along the Texas Gulf say they have rescued a dozen sea turtles suffering from hypothermia caused by waters chilled by colder and more frequent cold snaps than past years." (***S.F. Examiner***, 12/17/00)

"Wet autumn leaves Britons damp" - "The crowd greeting Prince Andrew in the village of Yalding was enthusiastic, despite the heaviest rainfall in more than 200 years. . . . By the start of this week, England and Wales had received an average of 18.46 inches of rain since Sept. 1—the highest total since record-keeping began in 1766. . . . Fall storms have felled hundreds of trees in London's parks. . . . 'It's not possible, of course, to be sure these storms are the result of climate change,' Prime Minister Tony Blair said in an Internet broadcast earlier this month. 'But the increasing frequency of such extreme weather here, in the rest of Europe and around the world, does lend support to those who say that global warming is no longer a theory but is a daily fact of life." (***San Mateo Times***, 11/30/00)

Some interesting thoughts on "global warming" from ***Acres USA*** editor Charles Walters from his "Newsletter" in the October 2001 issue: "Other factors must be considered . . . hence also a fuller examination of the global warming-thesis now cemented into place as an absolute by the corporate owners of science and the yammering of the public priests of economics. . . . What science and computer models say is not necessarily

what nature says. . . . Recent and available geological data reveal that glaciers are growing in Norway, Sweden, Switzerland, Ecuador, Canada and the United States. ***Time*** and other media talk about rising sea levels, and this has scared the devil out of island nations in the Pacific. An article in the ***London Daily Telegraph***, never cited in any global warming report, tells about Tuvalu, a nine-island nation with a high point of only 12 feet. Tuvalu almost panicked over the prospect of the ocean reclaiming the land, and started measuring in 1991. In August 2000 they were forced to announce that sea levels have gone down a few inches over 10 years. [Others claim it is rising. What is the truth?] Similar declines have shown up in the Solomon Islands. Is moisture lost at sea being tied up on land as glaciers? The CO_2 people are not answering. . . . details have been made a matter of record in ***Washington Geology***, August 2000, published by the state of Washington. In this report it was announced that the Nisqually Glacier was growing thicker at the rate of 18 feet a year. Glaciers on Mount Shuksan, northern Washington, also are growing. . . . Vermont had the most snow and the longest winter in recorded history last year. . . . The same thing happened at Mount Baker in Washington a couple of years ago - 100 feet of snow impeding full runs. The United States had the coldest November and December on record in 43 states last year. Inner Mongolia had 10 times the normal amount of snow last winter. More than 2 million animals perished, many found frozen in a standing position. . . . Signs of cooling, all due at this time, endure."

This second "catastrophic" winter in succession in Siberia and Mongolia is reported in numerous articles and websites including www.heatisonline.org and weather.com of 1/16/01 which says: "Mongolia, a nation sandwiched between Russia and China, has been caught for weeks in a severe winter blitz. Snowstorms with temperatures as low as minus 50 degrees C. have swept across the region's vast grassland plains, threatening the survival of hundreds of thousands of nomadic herders and some 12 million animals. International relief agencies are trying to reach remote populations with food for both people and animals. Supplies have run dangerously low following a harsh 1999-2000 winter season, a summer drought and current severe conditions."

Siberia's increasingly rare Amur tiger is also moving toward extinction, as noted in **"Winter's Victims":** "Nearly 80 percent of cubs born to Siberia's rare Amur tigers have perished recently because their parents were left too

weak to hunt after the past winter's severe cold. Wildlife experts said the loss will seriously threaten the status of the already endangered populations of tigers. The unusually frigid winter also killed many of Siberia's deer, depriving the nearly extinct tigers of yet another food source. Only about 300 of the Amur are believed to still be alive." (***S.F. Chronicle***, 3/24/01)

"Southerners Reeling From Rare Cold, Snow!" - "Florida fruit and vegetable growers braced for another night of freezing temperatures. . . ." (***S. F. Chronicle***, 1/2/01)

"Farmers uprooting from Midwest" - "Census figures released this month paint a bleak picture across the nation's rural breadbasket: Young people moved away in droves during the 1990s, but so did many farmers, worn down by low prices, high costs and drought. . . . The cost of fossil fuel used in tractors, combines, and irrigation equipment jumped 31 percent last year. Prices may drop slightly in coming months, but farmers are expected to be hit this year with a 33 percent increase in [chemical] fertilizer costs, a government-funded report said. Nitrogen fertilizer is made from natural gas. . . . Earlier this month, the government began paying $1.1 billion to 160,000 farmers who lost crops to drought and other weather-related disasters last year. Net farm income is expected to fall 20 percent over next two years unless there is a fresh outpouring of federal aid - which has been the only savior for farmers lately." (***San Mateo Times***, 3/31/01)

"North Korean drought" - "The official Korean Central News Agency reported that nearly 60 days of drought has caused 'huge damage' to fields across the country. International aid agencies previously had warned that new food shortages were likely to occur this year in the disaster-plagued country. Crops planted during the spring are reported to have withered, which will soon leave the nation entirely dependent on international relief. Most of the country's 22 million people are surviving on a ration of 7 ounces of dried rice or cereal each day—about as much food as can be held in a single hand." (***S. F. Chronicle***, 5 /12 /01 from "Earthweek - A diary of a planet")

"Tens of millions in Asia threatened by record droughts" - "From the Korean peninsula through northern China and on to Afghanistan, record

droughts have destroyed crops and plunged tens of millions of people deeper into poverty. The United Nations says 5 million face starvation in Afghanistan and neighboring Tajikistan alone. . . . Afghanistan is suffering its worst drought on record. Desperate residents in the capital, Kabul, dug more than 166 new wells last year. Each must be deeper than the last as the water table drops at a rate of 16 feet a year. . . . In Mongolia, 5 million cattle, sheep and horses have died from two straight years of summer drought and harsh winters. Their herds wiped out, nomadic families are migrating to cities where tent slums have sprung up. The dry spell threatens North Korea with its sixth straight year of famine." (***S.F. Chronicle***, 7/13/01)

"Korean tempest" - "At least 53 people in central South Korea were killed or left missing in violent storms that drenched the region with the heaviest rainfall in 37 years. The storms followed the country's worst drought in nearly 90 years. Government meteorologists reported that more than 12 inches of rain had fallen within an eight-hour period in the capital Seoul and surrounding Kyonggi province." (***S.F. Chronicle***, 7/21/01 from "Earthweek")

"The World Drought" - "Depending on the area, Africa is in its second or third year of drought. . . . More than 18 million people in East Africa face severe food shortages. The greatest need will be in the Horn of Africa where 16 million people face starvation brought on by conflict and drought. . . . As severe as the situation is in Africa, problems are much worse in Asia." (***Browning Newsletter***, 7/22/01)

It is important to be aware that the more depleted is the land of minerals, life and vegetation, the faster and more serious is the appearance of drought, flood and manifold damaging weather extremes.

"Desperation sweeps across Central America after a drought devastates the lives of more than a million people" - "A months-long drought that has ravaged Central America and destroyed this season's harvest has left more than a million people facing hunger and economic ruin." (***S. F. Chronicle***, 8/18/01)

With so many droughts, one might think that less moisture is being evaporated from the warm-latitude oceans, but as you can see in ***Perspectives VIII*** of ***TLARTE***, these latitudes have been growing hotter coincident with higher precipitation totals in many regions of the higher, colder latitudes. ***This is what John Hamaker predicted would occur with an intensifying "hot and cold differential Greenhouse Effect."***

"Earthweek - A diary of a planet" - "One of the deadliest typhoon seasons in memory for Taiwan produced yet another storm, Typhoon Lekima, that drenched the island with more than 49 inches of rainfall. . . . The first drought in a half century has hit Sri Lanka, causing crops to wither and livestock to perish. Fields have become barren in the wake of no appreciable rain for the past 22 months." (***S. F. Chronicle***, 9/29/01)

"Glaciers discovered on Continental Divide" - "ROCKY MOUNTAIN NATIONAL PARK, Colo. - Geologists exploring the rugged Continental Divide say they discovered more than 100 additional glaciers here in a single summer, a surprising find because glaciers [***some***, primarily in the overheating lower and middle latitudes, it appears] around the world are shrinking in warmer temperatures." (***S.F. Chronicle***, 10/5/01)

"Disastrous floods in Buenos Aires" - "About 8.6 million acres of prime farmland were declared a national disaster after the heavy rainfall." (***S.F. Chronicle***, 10/20/01)

"Early blizzard hits Midwest, killing 6; Violent winds topple trees - record snow strands motorists" - "The surprisingly early blizzard began to move out after leaving nearly 11 inches of snow in Grand Forks [ND] and parts of Minnesota. . . ." (***S.F. Chronicle***, 10/26/01)

I hope you realize, when you read about the weather and climate changes in the weeks and months ahead, that we are observing aspects of planetary-scale change and not merely "isolated" and "local" phenomena.

The First International Conference on Global Warming and The Next Ice Age was held at Dalhousie University in Halifax, Nova Scotia, Aug. 20-24, 2001. From the website www.mscs.dal.ca/Halifax Climate Conference,

summary info, we read confirmation that "While the mid-latitude and tropical glaciers have been melting, some of the Scandinavian glaciers [among others] are growing. There is no clear evidence of a rapid thinning of the Arctic ice or Greenland and Antarctic ice sheets." Apparently none of the more than 100 scientists from 13 countries were willing to publicly state that we may be close to or transitioning into the next glacial period, perhaps preferring the soothing belief that "due to the increased levels of carbon dioxide and other greenhouse gases, the next ice age may never come (a blessing for Canada)." I ordered and studied the $25 Conference Extended Abstracts and read that:

Greenland temperature trends from 1950-2000 are "generally decreasing at the rate of about 2 to 3K/100 years." (p. 77)

In Antarctica, "we find that, except for the Peninsula, Antarctica is currently cooling rather than warming. The temperature at the South Pole has cooled by a greater amount than the rest of the world has warmed over the last half century. So, what's wrong,? The theory ["global warming"] and the models or the thermometers?"(p. 82)

"Did the Last Interglacial End with Global Warming?" - This is the paper of veteran paleoclimatologist and Quaternary researcher George Kukla (one of the first scientists to order ***TSOC***) of Lamont-Doherty Geological Observatory, Palisades, New York. It seems fitting that the one-page abstract to this presentation is placed on p. 257, the very last page of this volume, since this most important of questions has a decades-long tradition of being avoided, ignored, dismissed as too improbable, or, as here, placed 'last on the agenda.' However, the fact that it was included and that a Conference on **"Global Warming and the Next Ice Age"** was held at all, shows that the minds of at least some scientists are beginning to look more fully and openly at the whole topic. (See ***Perspective VIII*** as well.) I shall attempt to learn how many of them are now open to a first or second look at the whole Hamaker Thesis as offered in ***TSOC*** and ***TLARTE***. Here, consider this excerpt from the short abstract of "**Did the Last Interglacial End with Global Warming?**":

"This provocative question has no clear answer. However the correlation of paleoclimatic record with the changes of orbital configuration and the

analysis of the past ENSO [El Nino/Southern Oscillation] variability by Zebiak-Cane model indicates that a warming, not a cooling of tropical oceans resulted in the growth of early glacial ice. Since the belt between the latitudes 30 North and 30 South occupies one half of the globe, it is not inconceivable that the areally weighted annual global mean temperature increased during the transition from the last interglacial into the early glacial [Much more evidence for this is in ***Perspectives VIII***] . . . .

"Climate models built on the concept of an overall temperature reduction were unable to explain how the glaciations started. A hypothesis proposed already in 1872 by Tyndall explains the glaciations not by the decrease, but rather by the increase of insolation to the oceans. This provided energy for extra evaporation and transfer of water to cold subpolar belts. Paleoclimatic records of the last interglacial and early glacial are in closer agreement with Tyndall's concept than with the conventional one. . . . The increasing temperature gradient between the high and the low latitudes, the large difference between the spring and the fall temperature trends and the increasing precipitation during the cold season in the high latitudes, all observed during the last several decades, point to the presence of orbital component with long term trend in the currently ongoing climate change." Although elsewhere (as shown in ***Perspective VIII***) George Kukla has acknowledged the great work of Quaternary researcher Genevieve Woillard who showed that previous interglacial-glacial transitions may have taken only about 20 years, he doesn't address this here for some reason. ***Perspectives VIII*** on global climate change, including views on the "politics" (sometimes called "the art of compromise") thereof, ought to shed more light on this question.

An internet search of George Kukla's work brought me to an article published on the Future Frame Science website (www.futureframe.de/science) titled "**The Ice Age Cometh**" (5/15/00) by Joachim Schüring. His sub-heading reads, "The Greenhouse Effect is warming the Earth. But rising temperatures may lead to a new ice age." Excerpts I wish to note here: "Given the ongoing debate on human contributions to the global warming in process, it may at first seem paradoxical for a scientist to predict a new ice age for the future. But according to George Kukla, it is precisely this rise in temperature that may trigger a climate reversal. . . . The current warming trend is more noticeable over the large land masses than over the polar regions, which are mostly

covered by water. As a result, says Kukla, [again, as Hamaker warned] a growing temperature and pressure differential is emerging between the equatorial latitudes and the polar regions. Subsequently, higher temperatures in near-equatorial regions lead to intensified water transport into the Polar regions, which causes the polar glaciers to grow - and presto! The Albedo Effect leads to a new ice age!

"George Kukla is convinced that this is how it happened in the past - and thus he sees no reason why it should not happen this way again in the future. With the difference, this time . . . humans will be quickening the process via the Greenhouse Effect."

There is your Historical/Contextual introduction to ***To Love And Regenerate The Earth: Further Perspectives on The Survival of Civilization (TLARTE)***. Before providing you the booklist I promised, I'll add some final quotes which I feel are both deeply relevant and inspiring to our greater understanding and collective human responsibility- that crucial ability to respond.

The first comes from Rudolph Steiner, the initiator of the Biodynamic agriculture movement, who as long ago as 1924 recognized declining quality of soil and food, and warned:

"Nutrition as it is today does not supply the strength necessary for manifesting the spirit in physical life. A bridge can no longer be built from thinking to will and action. Food plants no longer contain the forces people need for this. . . . The time will come when the people of the Earth will starve in the midst of plenty."

John Hamaker once made a similar statement expressing his disbelief over a world increasingly full of malnourished and starving people ***unaware of the fertility potential in the rocks lying in great abundance at their feet.***

Could the chain of protoplasmic life and the feeding of the soil microorganisms, which Hamaker affirmed as "the legitimate purpose of agriculture," be what Goethe was leading us to see when he wrote in Faust; 1,1:

"That I may detect the inmost force
Which binds the world, and guides its course:
Its germs, productive powers explore,
And rummage in empty words no more."

The great forester and re-forester and Men of the Trees founder Richard St. Barbe-Baker makes very clear his meaning in the following quote which he asked us all to speak with him:

"I will have nothing to do with this destruction of life, I will play no part in this devastation of the land, I am determined to live and work for peaceful construction for I am morally responsible for the world of today and the generations of tomorrow."

Buckminster Fuller was widely considered one of the most brilliant minds of the 20th Century, and was the first "famous" person to read and strongly endorse ***The Survival of Civilization***. Since he wrote so many books and could lecture non-stop for 18 hours and more, let's let him give us two quotes to contemplate:

"If humanity does not opt for integrity, we are through completely. The odds are so close, it is absolutely touch and go. Each one of us could make the difference. That's why I do what I do."

"Maybe each of us should be looking around and asking, 'What does my experience teach me needs to be attended to on our planet, in relation to all human beings, which, if attended to satisfactorily, could bring great satisfaction and happiness in the support of humanity – things which, if left unattended to, might place humanity at a very great, perhaps lethal, disadvantage?' "

The next quote is from French author and world traveler Bernard Moitessier:

"It is impossible for man to evolve mentally unless he participates in the creation of the world. This is a very simple way to participate. Fruit trees

and nut trees marry the earth and sky. They give shade and food. They are a powerful symbol. To plant a tree along a public road, that is an act of generosity. Lack of heart, lack of generosity, is the real disease of the world."

And how could I not include a Native American perspective? I used the following quote in "***Solar Age or Ice Age? – Which Will You Work For?***," an article I wrote for the 1986 issue of ***The International Permaculture Species Yearbook***. I found it in the Native American journal ***Akwesasne Notes***, Winter 1983, and it shows that awareness of the great climate and Earth changes was widespread amongst Native Americans by then:

"The Elders' Circle in session at Santa Clara Pueblo, Rio Grande Lifeline, is alarmed and dismayed at traditional people's reports from the Four Corners of the Great Turtle Island. The prophecies and visions of our grandfathers are upon us. The Chief of Trees, the Maple, is dying from the top down as we were told would happen. . . .

"These are just a few of the devastations reported to the Elders' Circle. Our people have reported that our grandfathers, the Winds, have continued to increase in force and destruction, and tornadoes have multiplied and visited the four directions now occupied by our white brothers. Etenohah, the Earth we call Mother, has tears running down her face; great floods and rains are everywhere, and people are running about in fear and confusion. The Earth has shaken herself, rumbling in the Four Corners of the Great Turtle Island, and mountains are stirring, smoking, sailing their powers over the lands and its inhabitants. These are warnings clear and direct. These are the powers the Great Spirit has put here to work in harmony with people through prayer, ceremony and respect in how we live. We have failed, and we are being warned.

"We must heed the warnings being visited upon the Earth. The drumbeats of our hearts will cease and we shall have destroyed what we are sworn to protect, and there will be no life or future for our children."

A friend in the Religious Studies program at Stanford University loaned me a book used in one of her courses, ***Earth Community, Earth Ethics*** by

Larry Rasmussen. While I found the whole book worth reading, it is the story introducing the section “Earth Faith” (p. 177) and the quote it offers that I share with you:

“On a chance visit to the little village of Sdeh-Boker (‘Herder's Field’) in the Negev Desert, David Ben-Gurion, a founder and the first president of Israel, made a sudden, astonishing decision. A leader at the peak of his power, he resigned from government and took up residence in this desert village in order to do land reclamation. He lived out his days in Sdeh-Boker and is buried in the Negev. He also enunciated his credo in that reclaimed place:

‘The energy contained in nature—in the earth and its waters, in the atom, in sunshine—will not avail us if we fail to activate the most precious vital energy; the moral-spiritual energy inherent in man; in the inner recesses of his being; in his mysterious, uncompromising, unfathomably, and divinely inspired soul.’ ”

The next quote is from a current member of the U.S. Congress, Rep. Dennis Kucinich of Ohio, whose website details his ongoing effort to pass legislation—H.R. 2459—“to create a cabinet level agency dedicated to peacemaking and the study of conditions that are conducive to peace.” I recommend you visit the website of this unusual visionary Congressman at www.house.gov/kucinich and consider supporting his efforts, as well as informing him of the need to make Peace with the Biosphere and climate systems. Note that his proposed Department of Peace would include amongst its principal officers at least two who could help initiate and coordinate international Earth Regeneration efforts: an Assistant Secretary for International Peace Activities, and an Assistant Secretary for Technology for Peace. Consider what Rep. Kucinich said on July 11, 2001, when he first introduced his legislation:

“The time for peace is now. At the dawn of a new millennium, there is no better time to review age old challenges with new thinking that peace is not only the absence of violence, but the presence of a higher evolution of human awareness with respect, trust and integrity toward humankind. Our founding fathers recognized that peace was one of the highest duties of the newly organized free and independent states. But too often, we have overlooked the long-term solution of peace for instant gratification of war.

This continued downward spiral of violence must stop to ensure that future generations will live in peace and harmony."

And consider what he said to the Congress on June 9, 1999 in his **"Reflections On The War In The Balkans"**:

"We come here from many Nations. We share a common destiny as brothers and sisters of a common planet. What kind of a world do we want? Only through the application of higher principles can we hope to have our systems of government forsake war and destruction and to make the survival of each person a sacred commitment.

"In this world of strife and war, we are called upon to be channels of peace. In this world of darkness, we are called upon to bring light. In this world of fear, we are called upon to bring courage. In this world of despair, we are called upon to bring hope. In this world of poverty, much poverty, let us bring forth plenty. In this world of ignorance, let the light of knowledge light the world. In this world of sorrow, let us use our spiritual principles to bring forth joy. In this world of judgment, certainly we are asked to bring forth mercy. It is through the heart that we connect with all humanity. It is through the heart that we connect with the infinite."

And next an old and well-known quote from Victor Hugo, again bringing up the critical question: Has the time come for we, Humanity, to fully accept responsibility for Earth's Regeneration? Daniel Quinn's ***Ishmael*** divided past humanity into the "Takers" and "Leavers." Are we not now called upon to be "Givers" and "Regenerators"? An estimated 106 billion people have come, and gone, without saying yes to that question. What do ***you*** say? ***What will you be?***

"***There is nothing so powerful as an idea whose time has come***."

The following is a list of 85 books which I'm grateful to have discovered or had recommended to me because they've helped inform and inspire me to understand and love Life on Earth. I'm not saying you necessarily need to read these books or even that we have time for "further studies" when such an obvious compelling need for positive change and action TODAY exists.

Yet I think such information and inspiration beautifully complements the pro-Earth Regeneration messages of ***TSOC*** and ***TLARTE*** and might provide some of you additional help in the very challenging but not impossible work of human-and-planetary health restoration.

There are also an abundance of related books (and other info) on Health “from soil to psyche,” eco-gardening/orcharding/farming, tree planting, appropriate technology, solar/biomass energy, simpler ecological living, etc. available through libraries, bookstores, catalogs and the Internet, as needed. To simplify my list of 85 I'll just give the title and author. Publisher, date, etc. is easily found at the library or on the Internet, if wanted.

"Properly, we should read for power.
Man reading should be man intensely alive.
The book should be a ball of light in one's hand."

—Ezra Pound

Don Weaver's Complementary List of Books To Encourage Human Evolution, Survival, Health, Sanity, Wisdom, Happiness, and to *Simultaneously* Enable Planetary Regeneration and Universal Significance for Humanity on Earth

1)	The Great Work	Thomas Berry
2)	The Dream of the Earth	Thomas Berry
3)	Critical Path	Buckminster Fuller
4)	Grunch of Giants	Buckminster Fuller
5)	The Aquarian Gospel of Jesus the Christ	Levi
6)	The Complete Sayings of Jesus	Arthur Hinds, arranger
7)	Healing the Soul of America	Marianne Williamson
8)	A Woman's Worth	Marianne Williamson
9)	When Corporations Rule The World	David Korten
10)	The Post-Corporate World	David Korten

11) Essays	Ralph Waldo Emerson
12) Voluntary Simplicity	Duane Elgin
13) The Cultural Creatives: How 50 Million People Are Changing the World	Paul Ray and Sherry Ruth Anderson
14) The Media Monopoly	Ben Bagdikian
15) When Society Becomes An Addict	Anne Wilson Schaef
16) Diet For A New America	John Robbins
17) The Food Revolution	John Robbins
18) Toxic Sludge Is Good For You	John Stauber and Sheldon Rampton
19) Trust Us, We're Experts	John Stauber and Sheldon Rampton
20) The Paradigm Conspiracy	Denise Breton and Christopher Largent
21) Think On These Things	J. Krishnamurti
22) Commentaries On Living, Vol. III	J. Krishnamurti
23) The Man Who Planted Trees	Jean Giono
24) The Forsaken Garden	Nancy Ryley
25) The 22 (Non Negotiable) Laws of Wellness	Greg Anderson

26) Tree Crops: A Permanent Agriculture	J. Russell Smith
27) Permaculture: A Practical Guide To A Sustainable Future	Bill Mollison
28) Health For The Millions	Herbert Shelton
29) Natural Hygiene: Man's Pristine Way of Life	Herbert Shelton
30) The Myth of Medicine	Herbert Shelton
31) Conscious Loving	Gay and Kathlyn Hendricks
32) Clear Your Clutter With Feng Shui	Karen Kingston
33) The One Straw Revolution	Masanobu Fukuoka
34) The Road Back To Nature	Masanobu Fukuoka
35) Kinship With All Life	J. Allen Boone
36) Letters To Strongheart	J. Allen Boone
37) And There Was Light	Jacques Lusseyran
38) The Recovery of Culture	Henry Bailey Stevens
39) The War Against The Greens	David Helvarg
40) Global Spin: The Corporate Assault on Environmentalism	Sharon Beder

41) The Future of Mankind	Tara Singh
42) Love: The Fulfillment of the Law	Kenneth and Beatrice Hunt
43) The Ecology of Commerce	Paul Hawken
44) Natural Capitalism	Paul Hawken, Amory Lovins, L. Hunter Lovins
45) The House of Fulfillment	Lily Adams Beck
46) Earth Community, Earth Ethics	Larry Rasmussen
47) In The Absence of the Sacred	Jerry Mander
48) Peace Pilgrim: Her Life and Work In Her Own Words	Friends of Peace Pilgrim, eds.
49) Magical Child	Joseph Chilton Pearce
50) Evolution's End	Joseph Chilton Pearce
51) Living the Good Life	Scott and Helen Nearing
52) Loving and Leaving The Good Life	Helen Nearing
53) Lost Horizon	James Hilton
54) Shangri La: Return To The World of Lost Horizon	Elizabeth Cooney and Daniel Altieri

55) The Global Brain	Peter Russell
56) The Man Who Tapped The Secrets of the Universe	Glenn Clark
57) The Divine Iliad	Walter Russell
58) Soul Without Shame	Byron Brown
59) Small Is Beautiful	E. F. Schumacher
60) Mr. God, This Is Anna	Fynn
61) Joshua	Joseph Girzone
62) Joshua and the Children	Joseph Girzone
63) Radical Honesty	Brad Blanton
64) Practicing Radical Honesty	Brad Blanton
65) Nuclear Madness	Helen Caldicott
66) Missile Envy	Helen Caldicott
67) A Desperate Passion	Helen Caldicott
68) The Legacy of Luna	Julia Butterfly Hill
69) The Continuum Concept	Jean Liedloff
70) The Power of Now	Eckhart Tolle
71) The 7 Habits of Highly Effective People	Stephen Covey

72) The Four Agreements	Don Miguel Ruiz
73) Beyond Belief	Lord Exeter
74) The Prophet	Kahlil Gibran
75) The Celestine Prophecy	James Redfield
76) The Story of B	Daniel Quinn
77) Closer To The Light	Melvin Morse
78) Only Love Is Real	Brian Weiss
79) The Forbidden Tower	Marion Zimmer Bradley
80) Seventeen Ways To Eat A Mango	Joshua Kadison
81) The Love You Deserve: Ten Keys To Perfect Love	Scott Peck
82) Liberating Your Magnificence	Shannon and Scott Peck
83) The Three Candles of Little Veronica	Manfred Kyber
84) New Dimensions In Health: From Soil to Psyche	David Phillips
85) A Walk Through Time: From Stardust To Us	Sidney Liebes, Elisabet Sahtouris, and Brian Swimme

On Chapter 7 and John Hamaker's call for political and economic transformation

"Economies should be used as tools for maintaining the health and beauty of the ecosphere. "

– Dr. S. Rowe, Saskatchewan, Environmental Society

"Money lost, little lost
Health lost, much is lost
Courage lost, all is lost!"

– attributed to Goethe

From the proclaimed "land of the free and home of the brave", John D. Hamaker was free enough and brave enough to think through and write down an outline of the political and economic changes he thought essential to create wholly free, just, peaceful and ecologically intelligent societies. He thought the need for such changes was as tremendously urgent as the need for worldwide human response to the dangers of ecological degeneration and glacial climate change – and was convinced these economic, political and, of course, psychological changes were required for the human response to be successful.

Many readers have praised John Hamaker's views and courage while others said Chapter 7 was "too radical" and should be changed or deleted. John was all for constructive change and improving on the way things have been. That was the nature of his professional work as a mechanical engineer and machinery designer, and the nature of his thinking as one dedicated to the health and survival of humanity and our natural environment. Whether you've exercised your freedom to praise or to criticize Chapter 7 and/or other parts of ***The Survival of Civilization***, I encourage you to think through Hamaker's recommendations with fair and open mind. If you have what you think better recommendations, let us give them the same consideration.

Let us consider some views and research of others which relate to the topics of social-economic – political – ecological justice on which

Hamaker spoke out so strongly. Abraham Lincoln seemed to have similar concerns when he said:

"I see in the future a crisis approaching that unnerves me… And causes me to tremble for the safety of my country… Corporations have been enthroned. An era of corruption in high places will follow and the money power of the country will endeavor to prolong its reign by working on the prejudices of the people … Until the wealth is aggregated in a few hands … and the Republic is destroyed.

Also from Mr. Lincoln, and I'm sorry I don't have the specific reference dates, etc:

"The money power preys upon the nation in times of peace, and conspires against it in times of adversity. It is more despotic than monarchy, more insolent than autocracy, more selfish than bureacracy. It denounces, as public enemies, all who question its methods or throw light upon its crimes."

A related quote attributed to Mayer Anselm Rothschild of the Rothschild banking "empire":

"Permit me to issue and control the money of a nation, and I care not who makes its laws."

And from "The Grab Bag" in the ***S.F. Chronicle*** (4/18/93): "It was Baron de Rothschild who said the eighth wonder of the world is compound interest."

From ***Geodata*** (Winter 1988) we read:

"Census figures show that the gap between rich and poor has widened steadily since 1969 but has been accelerating rapidly during the 1980s. … The top 10% owns 86% of all net financial assets – The bottom 55% has zero or negative financial assets." … The bottom 50% has 4.5% of the total net worth. About half of the country's top wealth holders got there by inheriting their holdings and half through their own efforts. The $10 billion plus Rockefeller family fortune is more than the net worth of all minority and poor white families combined. The richest 1% of Americans possess greater wealth than

the bottom 90%." From the ***S.F. Chronicle*** article by Douglas Mattern (1/5/98), "The Poverty Amid Riches":

"After the recent stock market slump and recovery, President Clinton sermonized on the glory of new deregulated free-market policies and how we are becoming richer all the time. This message was dutifully echoed by the corporate-dominated media. There are, however, questions that need asking: In this richest country in the world, that is becoming richer day by day, why are 36 million citizens living in poverty? …

"The United States has 170 billionaires, while 21 percent of American children live in poverty. The new riches are so inadequately distributed that respected economist Lester Thurow reports that only 1 percent of American families own 42 percent of the national wealth. Economist Edward Wolff computes that the top 5 percent of Americans hold about 60 percent of all national net worth. …

"The 1996 U.N. Human Development Report showed that only 358 billionaires had as much wealth as 45 percent of humanity. Now the Economic Policy Institute reports that in 1997 the number of billionaires has risen to 477, and they have a combined wealth equal to 52 percent of humankind.

"Now compare this undemocratic and vile wealth accumulation to recent figures from the United Nations that show more than half of humanity exists on less than $2 a day, that 1.3 billion people are so poor they live in shanty towns and garbage dumps, that 40,000 people die every day from preventable disease and malnutrition and that 20 percent of the world's population own 83 percent of the world's wealth. Not surprisingly, 70 percent of the world's poor are the most defenseless: women and children. …

"Nevertheless, the power of corporations continues to rise. As David Korten, author of ***When Corporations Rule the World***, states: 'Together the processes of deregulation and globalization have effectively removed governments and labor unions as effective restraints. Meanwhile, day by day the largest corporations continue to consolidate their power through mergers, acquisitions and strategic alliances.'

"Korten provides the following statistics to prove his point: Of the world's 100 largest economies, 51 are corporations. Only 49 are countries. The economy of Mitsubishi is larger than that of Indonesia, the world's fourth most populous country and a land of enormous natural wealth. …

"Korten adds: 'The primary accountability of these corporations is to the global financial markets in which each day $1.4 trillion in foreign exchange changes hands in the search for speculative profits wholly unrelated to any exchange of real goods or services.'

"Time is of the essence, for as academician Bernard Poirot–Delpech wrote in the French newspaper ***Le Monde***, 'The temptation is to shut ourselves off, cover our eyes and applaud the use of force, but the tide of the poor keeps coming, wave after wave, each time stronger and stronger. The Third World War has begun, waged by the rich against all the others.

"This new deregulated free–market globalization system is the foundation for that war. This system is taking us back to early industrial times. It's unjust, undemocratic, self–destructive, and an environmental nightmare due to its dependency on mass consumption and waste.

"We can, and we must create new economic models that are not based on arcane and failed dogmas. We need economics that do not rape the environment for profit, or turn our planet into a marketplace where the only thing that counts is what sells, or that guarantee a deep division between rich and poor. In short, a system with a human face. A democratic and stable future depends on it."

A higher figure on U.S. poverty is given in "Economy Grows: So Does Poverty" (***Earth Island Journal***, Spring ***'98***):

"Despite Washington's cheery pronouncements, poverty is growing. After seven years of nearly unbroken economic growth, the poverty rate in 1996 was 13.7 percent higher than in 1989. 'Approximately 50 million Americans – 19 percent of the population – live below the national poverty line', ***The Nation*** reports.

For additional global perspective, consider these final notes concerning:

"Who Really 'Runs the World'?" is another Spring '98 ***Earth Island Journal*** article summary saying: "On February 3, the World Economic Forum (WEF), a band of the planet's 1,000 most powerful multinationals, concluded a week–long meeting in Davos, Switzerland designed to set 'Priorities for the 21st Century.' The WEF describes itself as 'the world's global business summit,' the place where 1,000 top business leaders, 250 political leaders, 250 foremost academic experts … and some 250 media leaders come together to shape the global agenda.' The WEF boasts of its leadership in pushing 'the economic globalization process.' ***The Economist*** put it more simply: It described the WEF as 'the people who run the world.'

"The meeting was picketed by People's Global Action Against 'Free' Trade (PGA), which complained that globalization's concentration of economic power in 'unaccountable institutions' like the World Trade Organization (WTO)' only benefits multinational business elites, while increasing numbers of people are going hungry, unable to afford basic health care and education, and forced to cope with environmental destruction.'

"The PGA includes 600 representatives of peoples' movements from around the world, ranging from Brazil, Mexico, Nigeria, India, Nicaragua and North America to the Philippines and Ukraine. PGA (Play Fair Europe, Turmstr. 3, 52072 Aachen, Germany) is planning 'a wave of decentralized protests', to coincide with the WTO ministerial conference in May."

From ***Worldwatch Paper 140***, "Taking a Stand: Cultivating a New Relationship with the World's Forests" by Janet Abramovitz:

"Little of the economic gains from forest exploitation return to the communities who have lost access to forest resources. In fact, their standard of living has declined. Most of the profits benefit a few powerful industries or families (many of whom helped bring President Suharto to power and were granted generous concessions as reward). Similarly, the liquidation of 90 percent of the Philippines'

primary forest during the Marcos regime made a few hundred families $42 billion richer, but impoverished 18 million forest dwellers."

From the ***S.F. Examiner*** (6/3/99) article, "Spreading global poverty pinches financial rescues":

"In its first detailed look at the impact of the Asian financial crisis on global poverty, the World Bank estimates the world has 200 million 'newly poor' inhabitants and recommends urgent changes in financial rescue programs to protect people, not just economies. …

"The bank is responding to data showing poverty rising again in India, continuing to increase in Africa and sharply worsening across Eastern Europe and Central Asia. Indonesia, hit early in the crisis, is among the worst hit, with 30 million more people earning less than $1 a day than it had before the financial collapse.

"Worldwide, the number of people below that income – considered the benchmark for abject poverty – is estimated at 1.5 billion, up 200 million from 1993. "

Lastly, consider the words of Alanna Hartzok, U.N. NGO representative working for the convening of a new U.N. Second Assembly, and author of the booklet "Financing Planet Management: Sovereignty, World Order and the Earth Rights Imperative" (International Union for Land Value Taxation, POB 328, Scotland, PA 17254):

"A U.N. study of 83 countries showed that less than 5% of rural landowners control three–quarters of the land. … At best, a generous interpretation would suggest that about 3% of the population owns 95% of the privately held land in the U.S. …

"The importance of connecting public finance policy with the problem of the inequitable control of our earth's resources cannot be overemphasized at this time. Author Susan George in her book ***How the Other Half Dies*** writes that: 'The most pressing cause of the abject poverty which millions of people in this world endure is that a mere 2.5% of landowners with more than 100 hectares control nearly

three quarters of all the land in the world – with the top 0.23% controlling over half.'

"How we hold the earth is how we hold each other. The needs of the person and the needs of the planet are one and the same. If this is true, as increasing numbers of us believe it to be, then building the Second Assembly on the firm foundation of fairly sharing the earth will result in a great healing of both planet and people. "

A late addition of relevant interest is the 1/15/2000 ***San Mateo Times*** article, "Still in the News; When media merge, people call Ben Bagdikian." Excerpts:

"Bagdikian's 1983 book ***The Media Monopoly*** is considered a seminal text on the subject of centralized ownership of the media. In March, Beacon Press will publish the sixth edition of the book – a testament to its continuing relevance. …

"Bagdikian says so much has been happening in recent months, in terms of big media corporations getting even bigger and acquiring more companies, that he was constantly revising the preface even as he was writing it. 'There's been a phenomenal pace of change,' he said.

"When he penned ***The Media Monopoly*** in 1983, Bagdikian wrote that only 50 corporations controlled most of the business in daily newspapers, magazines, television, books and film, and he warned of the dangers surrounding this growing concentration of media power. One reviewer labeled him an 'alarmist.' But in each subsequent edition of the book, the author identified a smaller number of big companies dominating the mass–media world.

"Today the number of corporations dominating the mass–media world is down to six, says Bagdikian: Time Warner (now with AOL), the Walt Disney Co., Viacom Inc., General Electric, Bertelsmann (a German publisher), and the Rupert Murdoch–owned News Corp.

And he expects more big mergers to follow.

“Each of the six titans today is infinitely more powerful than any one of the 50 corporations – or even any combination of them – that he wrote about originally, he says.

“Bagdikian, who will turn 80 at the end of this month, continues to express strong concerns about the kind of media oligarchy that has emerged in this country, where a few gargantuan companies are making the decisions about what Americans read, watch and listen to.

“ ‘The power of the media companies has intimidated Congress and the regulatory agencies,’ he says, ‘and the first thing I said in the first edition (of ***The Media Monopoly***) – that media power is political power – is to me perhaps the most troublesome thing.’

“He worries about journalism itself increasingly taking a back seat to corporate priorities.”

Later John D. Hamaker Writings

As he did before ***The Survival of Civilization*** was first published in 1982, John Hamaker wrote many articles and countless letters between 1982 and 1994, the year of his passing. Perhaps one day a comprehensive collection will be published.

I've reviewed his post-1982 articles and many of his letters to see what excerpts could be helpful to offer in this section to more fully represent John and his messages for the world. His further thinking and elaboration on what we call the Hamaker Thesis, as well as the later re-expression of his passionate warning to the world, may prove valuable to those wanting to more fully consider and understand this brilliant man and his concern for you and the Earth.

Some of the following appeared in the ***Solar Age or Ice Age? Bulletin*** from 1983 on, in ***Remineralize the Earth*** magazine, and elsewhere.

We sent the book to many science magazines soon after publication in April 1982. Here is John's May 5, 1982 letter to ***Science News*** editor Joel Greenberg:

Mr. Greenberg:

"No, folks, the ice age isn't upon us," (***Science News***, 5/1/82, p. 301). Upon what scientific basis does ***Science News*** presume to lull everyone to sleep and thus render us vulnerable to destruction by the effects of the onset of glaciation?

The hodge podge of subsidized specialists we euphemistically call "science" is more responsible for the impending destruction of civilization than any other group in the country. It's about time "science" joined the rest of humanity in an effort to effect our survival."

John D. Hamaker

Encl. ***The Survival of Civilization***

Along with those sent to members of the U.S. Congress, many heads of state around the world were given copies of ***The Survival of Civilization*** in the 1980s. Betsan Coats of Australia and her friend Nesta Obermer, O.B.E. in Europe helped greatly in this, often by personal delivery or prior explanation of the book's importance and that it was on the way. Tim Binder of the World Crises Solutions Foundation was able to personally present it to the Gorbachevs in Moscow. Before his murder, Rajiv Gandhi, Prime Minister of India, exchanged some correspondence with John Hamaker and seemed very interested in what John had to say. It also appears, however, that he may have relied on chemical agriculture-oriented advisors who lacked the desire to demonstrate the value of remineralization and organic growing practices.

Here are excerpts from John's letter to Rajiv Gandhi on December 26, 1985:

Rajiv,

I am informed in the enclosed copy of a letter from N.S. Randhawa that this "greenhorn" does not know what he is talking about. His "specialists" in common with all other specialists have no perception of the fact that we must restore the balance of nature or die.

"Insufficient supporting scientific data" – to support what? Surely these specialists know that every square foot of soil on earth is developed from the mixed rocks of the crust of the earth. The only other thing I have said is that if you grind the gravels, you make the minerals highly available to the soil microorganisms upon whose protoplasm the plant roots feed. … A fool can do a pot test on radishes or any other fast-growing vegetable in a few weeks time and know that it works. What do they want, something which works to grow top quality food in abundance, or "scientific data"? ... It is irrelevant how the plant gets its nutritional supply. You can have the product of a mineralized pot test analyzed and find that it has much higher mineral content than food grown commercially with agricultural chemicals.

The only other thing mentioned is "economic and logistic considerations." Those are answered by the establishment of the

continuous production of a low cost efficient and durable grinder for farm use. Gravel dust must be produced and distributed on the land locally for maximum economy. Local production and use takes care of the logistics.

The Randhawa letter is like dozens of letters I have received. I call them “brush-off” letters. Invariably they come from people in the existing establishment whose job it is to maintain things as they are. … Not far from here in a United States forest the oak trees are dying so fast that they are clearcutting some areas to save the lumber. I understand that the Austrian forest department has stated that the trees are dying of malnutrition (mineral shortage). Still no action from Congress.

I read in the November 29th issue of ***Science***, “Gandhi Shakes up Indian Science.” You are obviously going to have plenty of opposition in your effort to concentrate science and industry to work for what the people of India need and to eliminate what is not needed. The Bhopal tragedy was shocking. The chemical companies in the United States have managed to control accidental leakage to a level which has not alerted people to the danger of synthetic chemicals. Yet millions of people in this country have died from the chemicals without knowing what destroyed them. They sold the toxic chemicals on the basis of a “tolerance level.” Of course the stuff has been loading up the environment for decades. Now half to two-thirds of both urban and rural water wells are contaminated. Whatever the cost of getting rid of the non-biodegradable organic chemicals, the cost of failing to do so is far greater.

If you make the effort, you are going to need the full support of the majority of people. When they all understand that the basic resource for food, clothing, fuel and housing is the soil organisms, and that they can have huge quantities of the basic resource by feeding those organisms, you will quickly silence the opposition to your survival program.

I would suggest two things. One is to put any cement mills or mining mills available to grinding gravel. Put the dust on some black soil on which you have yield and crop mineral analysis figures. Apply the gravel dust at 20 tons per acre. That’s a large initial application

because you will be trying to show potential yield and quality. Distribute the dust wet so it will not blow away and then plow in about 8 inches deep.

The grinders you will be using will have only 10 to 15% efficiency. The grinder I have proposed will have 80% or greater efficiency, and it will have a high enough operating pressure for effective grinding. The establishment people argue that the cost of grinding with conventional equipment is too high to be practical. However, they do not take into account the fact that the remineralization is not again necessary for approximately the same number of years as the number of tons per acre applied thus eliminating the annual work required with NPK. Nor do they figure on a cost per yield of food. There are no accurate figures available, but I doubt that the cost of food grown even with available grinding equipment would be half the cost of NPK agriculture which in the end will leave a sterile soil. …

In this country the tight control of the financial sector over all our institutions has probably doomed this nation. It seems to me that India might survive. The Himalayas form a barrier against the most vigorous blizzards and the Ganges will pick up the minerals ground by the many glaciers. A standby gravity flow irrigation system could protect against severe drought. Remineralization can increase yields in the Ganges Valley by 3 or 4 times. Maintenance of the basic industries required for remineralization is essential as is population control. If India and a few other nations can survive, it may be possible in 500 to 2500 years to abort the 90,000 year glaciation. Then an enlightened civilization might spread over the earth. …

My advice is to show the great potential for survival to the people and you will have the power to do what must be done if India is to survive.

John D. Hamaker

A letter representative of a great many John sent to members of Congress is this one to Michigan Senator Riegle dated February 26, 1987:

Senator Riegle,

When I lived in Michigan and you were still a representative, we had a little correspondence on soil remineralization and the problems which stem from soil demineralization. Since then the predictions I made at the time have been largely proven correct . The “warming” theory has been rejected by the international science organizations as too simplistic. So a new research program has been put in place to study the things omitted from the “warming” theory but included in ***The Survival of Civilization –*** further elaborated in ***Solar Age or Ice Age?*** updating bulletins. What most scientists have not comprehended is how fast the changing climate can destroy food crops. Last year’s drought in the southeast, not to mention Michigan and Ohio’s late June apple crop loss along with the crops left to rot in the mud in the Saginaw area, ought to be telling the scientists and the Congress that we are heading into starvation.

Thus far the Congress has seen fit to take the advice of scientists who have taken establishment grant money to say things which are not offensive to the establishment. There are, however, a few scientists and a lot of intelligent, well-educated people who refuse to accept bribes to corrupt the truth. The enclosed papers are self-explanatory.

You are now chairman of the key Senate subcommittee for sciences. The number one item on your agenda must be response to the CO_2 problem with its many ramifications.

From the Congress which turned over the duty of controlling the coinage of money to the tender mercies of the bankers to whom we are all indebted beyond our ability to pay, to the Congresses which stood by during the poisoning of America, and those which permitted the destruction of the soils and the loss of much of our manufacturing capacity, and most of our farmers and farm communities, they have all been guilty of misfeasance, malfeasance, and nonfeasance. Yet Wright and Byrd had the gall to ask us to trust the Democrats in their reply to the state of the union propaganda. Not one word was said about the true state of the union. Apparently the leaders of both parties think that politics as usual is still acceptable. It isn’t. Nature is now making the rules.

John D. Hamaker

Parts of a long response to comments made by Australian scientist Barrie Pittock which John wrote June 20, 1988:

In a recent agriculture committee hearing, Hansen from the NASA Goddard Space Center testified that the record temperatures being set this year mean that the “warming” has arrived. Don’t the NASA people know that the temperate zone was temperate In the summer because of evaporative cooling? We have cut down and allowed to burn down most of the trees that were a part of that cooling system. Now with the Mississippi River turning into a mudhole, clearly indicating the loss of evaporative cooling from the dry land, record high temperatures are inevitable. There is also an annual rise due to the increase in greenhouse gasses which increase the temperature differential between the upper latitudes and the lower middle and low latitudes thus moving the clouds farther north. Of course we have higher summer temperatures. The drought Is characteristic of glacial conditions – not “warming”.

At both the Arctic and Antarctic, glaciers are calving Icebergs. The “warming” crowd says that means the ice is melting and raising the sea level. If they did a little homework on how glaciers work they wouldn’t be caught with such silly statements. Glaciers don’t move until they have at least 50 feet depth of ice. As the depth increases the pressure at the bottom lowers the melting point and water accumulates making a slush which lowers the friction of sliding. When the downhill component of the weight of ice exceeds the frictional resistance to flow, the glacier surges downhill until it loses its “lubricant” and stops. After a number of surges it reaches the sea and breaks off to become icebergs. Obviously surging can not take place unless the rate of snowfall exceeds the rate of meltwater. Glaciation is now an ongoing process – not “warming”.

A melting of the ice sheet can occur only if enough warm clouds come into the upper latitudes in the wintertime to permit the clouds to precipitate as rain. At least one study has shown that in the past when there has been no glacial epoch the CO_2 was above twice the interglacial level – above 600 ppm. Civilization will collapse in the chaotic conditions of the die-off before the CO_2 rises that high thus ending the exploitation of fossil fuels.

Pittock says it is not known what causes the dying of forests. That is not even a half-truth. Experiments in Germany and Austria have shown that on patches of remineralized soil in dying forests the trees are thriving. The underlying reason is that minerals are a part of the food of microorganisms. By making the minerals highly available in the form of ground gravel dust a balance is re-established in plant life between the products of photosynthesis and the protoplasm compounds of the microorganisms.

As one who was for 30 years a Registered Professional Engineer and machinery designer with a mind disciplined by that experience to accept only correct principles and facts let me assure you that nothing I have written has been written to frighten anybody into doing anything. If the above argument and estimate of our situation frightens you, you are not alone. The developing crisis has scared the hell out of me for about 18 years."

The following is John's October 28, 1988 letter to ***Science*** magazine's Letters department in response to an article ***Science*** published. Letters Editor Christine Gilbert wrote back to John and said, "I regret to say that we are not able to publish it. Space restrictions limit the number of letters we can publish and so we must reject many fine contributions."

The William Booth article "Johnny Appleseed and the Greenhouse, (***Science***, 10/7/88, pg. 19) is an accurate reflection of the fatal lack of understanding of the present climate crisis. Hall's, "I don't know if we're going to be able to significantly alter atmospheric carbon by planting trees, but so what? You haven't hurt anybody by planting trees on marginal lands," pretty well expresses the general misconception.

It is useless to plant anything on marginal soils unless first remineralized. As recently reported on TV news, it takes 10 years to get a 3-ft. tall tree in Yellowstone National Park. In sharp contrast the slopes of Mt. St. Helens (remineralized by the dust of the explosion) have a vigorous growth of trees and wildlife. Crop soils, which also received a remineralization from the dust of the explosive eruption, have doubled their yields, You couldn't ask for a better demonstration

of the fact that the soils have become demineralized in the 10,800 years since glaciers last remineralized the soils by their massive grinding action. If anyone has any doubt, all he needs to do is put about an eighth-inch layer of ground gravel dust all around that 3-ft. tall tree in Yellowstone National Park. In less than six months of growing season that tree will be seen to have greatly increased its growth rate.

Grinding the mixed rocks of the earth as they occur in the gravels makes a large quantity of minerals available to soil microorganisms. At this time the soils are largely depleted of minerals which means that microorganisms are dying out from starvation. The microorganism protoplasm compounds are the food of plants which in turn are the food of all living organisms above the ground. As the microorganisms die back, all other life must die. So even without the destructive weather (caused by the climate change toward glaciation) humanity must die back.

Demineralization of the soil is the basic cause of the present climate change. As the forests die out, and burn for lack of a deep enough topsoil to hold adequate water for the trees, they lose their collective ability to control the CO_2 and related gasses in the atmosphere thus setting off the chain of reactions which bring about glaciation.

We are well into the period of the death of living organisms. We lost 20% of world food stocks in the last crop year, and we will lose more this year. It can only be a few years until food supplies run short. The lead time for getting a worldwide effort underway is such that many nations will suffer chaotic conditions of mass starvation before an effective effort can be mounted.

The future of civilization now rests on the ability of the less populated industrial nations to mount and maintain a program of remineralization, reforestation and biomass forests to replace the environment-contaminating fuels. In about four decades we might be able to restore and improve the interglacial conditions which make life possible by getting the “greenhouse gases” back into standing forests and greatly deepened topsoils. Our only chance of success rests on a subordination of everything else to the survival effort.

Talk of reforestation without remineralization is useless. Calculation of the carbon sink capacity of standing forests is of no value because we must grow forests such as those of the climatic optimum which would dwarf present forests. To do that we must feed enough soil organisms to deepen our topsoils in excess of three feet. Talk of reducing fossil fuel use is just wishful thinking. We have to ***eliminate*** fossil fuels.

Lovejoy says reforestation will buy time. Unfortunately when the soil organisms are dying out, there is no time to buy. Nature has given us a dictum: Feed the soil organisms or die.

John D. Hamaker, BSME
(Author of ***The Survival of Civilization***)

The following are taken mainly from John's ***Comments*** papers of the mid to late 1980s.

I recently received a letter stating that information on the cost of remineralizing all over the world was needed in order to initiate action. That question disturbs me because it shows a very common underestimation of the crises we face. To whom would we submit the bill? If we are serious about survival, from 1/2 to 2/3 of existing industries must be abandoned. No more fossil fuels, no more synthetic organic chemicals – we must have automobiles run by alcohol-fired steam engines, new automobiles limited to one per 10 years (steam engines don't wear out) – no luxury goods – we must pare the use of energy to the bone – food, clothing, shelter plus the new industries based on bio-energy. We must cut out things we don't need in order to get the things we do need. Soil remineralization is an absolute necessity for survival. A figure on the cost is meaningless. The present economic structures will collapse. What we must have is a united resolve by people and their governments to undertake the maximum effort of which they are capable. Then and only then will we have any chance of survival if indeed it is not already too late for a total effort to succeed.

Einstein said the bomb changed everything but the way we think . I see it in the mail I get. People still orient to the way things are. The change in the climate makes the seeming permanence of the way

things are a transitory illusion. If we do not re-orient our thinking, it's a toss-up whether one dies of starvation or nuclear war or both.

The question is sometimes asked: Won't wood burning or other processing put carbon into the air and accelerate the glacial process?"

If we have the previously discussed energy plantations in place by mid-1984 they will have a minimum of four years growth before the first tree trunks are removed from the plantations. This constitutes an immediate storage of atmospheric carbon in the trees and four years of leaf growth most of which will be in the ground by then. Since we plant about 25% more trees than needed, we will be taking in 25% more than fossil fuels will be emitting by the time the trees are ready for use in displacing fossil fuels. The growth of plantations is very important to balance the loss of forests which will occur before the first remineralization is completed. At the same time, those forests which have been mineralized will be changing from a net loss of carbon to a net gain.

After we have converted to wood energy and have eliminated fossil fuels, we will be using only 1/6th to 1/8th of the tree trunks annually. All the light branches from 1/8th and all the leaves from 8/8ths of the forest will go into the soil each year. The trees are harvested in late fall and the ashes or other residues from a year's processing are returned to the soil because they contain the minerals. The only remineralizing required would be to make up for small losses or to increase growth rate.

Wood must be the prime energy source because it is the only fuel which can utilize the sun's energy to remove the CO_2 from the atmosphere. The CO_2 is the thing that is about to destroy us. If we get the CO_2 out of the air we will also capture the other greenhouse effect gases since they all come down with the rain as acids, are neutralized by the minerals, and are ultimately used by the microorganisms.

I have been told by a government bureaucrat that grinding the gravel takes so much energy that it would increase the amount of CO_2 in the atmosphere.

The energy required to grind 10 tons of gravel and spread it on one acre with almost any sort of equipment would not exceed that in 50 gallons of alcohol. In the first year with about 80 bushels of corn per acre on poor land a yield of 200 gallons of alcohol can be obtained. The stalks can go back into the soil. The carbon in them is carbon removed from the atmosphere. The 200 gallons of alcohol replaces 100 gallons of fossil fuel gasoline and is non-polluting.

The annual yield of trees, hence alcohol, is substantially more than for corn. It is therefore the fuel we must use. Here again it is the energy of the sun which is used to provide a fuel while at the same time it is withdrawing more carbon from the air than is being put into the air by the use of the fuel. The more dust and carbon we get into the soil the more effective will be the process of photosynthesis by which the sun's energy fixes the atmospheric carbon in the plant life.

Biogas production has the same advantages. The present pipelines from natural gas wells are in place. It is only necessary to cap the wells and connect into biogas plants for a clean city fuel supply.

The use of aircraft to distribute the gravel dust has been criticized as requiring a large energy expenditure. That is, of course, correct, but it will be no more than is presently expended by the airlines. We can't start now to build a fleet of new aircraft to carry dusts but we can modify the existing planes to carry dust in a relatively short period of time. Even the inefficient jet engines will expend very much less energy in spreading the gravel dust than a year's growth in the forest that the plane covers with dust will produce.

Ground-based efforts should certainly be used wherever practical but covering all the world's forests in the required period of time by any other method than air delivery is impossible. We simply must use our technology to save our lives. In time the whole operation can be run on alcohol fuel and be made much more efficient as existing equipment is worn out; but we must start with what we have.

SEWAGE TREATMENT

Streams, rivers, lakes, estuaries, and underground water supplies are contaminated with untreated sewage and synthetic chemicals. As stated above the manufacture of the nonbiodegradable chemicals must be outlawed.

Sewage plant designers are not aware of the fact that digestive systems remove from food the compounds containing the minerals. What is left is mostly a carbonaceous residue which can not support a good growth of microorganisms in the aeration tank without the addition of minerals. I did a “bucket test” on first stage effluent. After 24 hours in my aerated fish tank, a sample of this second stage effluent was tested by a sewage plant chemist. He reported that it was the clearest he had ever seen and that the phosphate removal was 97%. In a fully developed process it could be close to perfect.

Next is a John D. Hamaker ***Comment*** paper from June 1989 in its entirety:

In ***Environment*** (Jan./Feb. 89) is an article by Roger A. Sedjo, Director of the Forest Economics and Policy Program at Resources for the Future in Washington, D.C.

Sedjo is a specialist so he does not know that in the past when CO_2 has risen as high as 300 ppm it has signaled a move into glaciation. He does not know the crucial role of microorganisms in the cycling of greenhouse gases.

Sedjo puts together Lovelock’s idea that the environment can adapt to some degree to the changing stress upon the system with the warming theorists’ idea that the upper latitudes will warm up to project the idea that forests in the upper latitudes would expand and maybe grow faster in the presence of high CO_2. All properly documented in the bibliography and all wrong.

Sedjo puts together a lot of figures based on past forest yields and concludes that it would take more land in canopied forests than is available to just stop the increase of CO_2 in the atmosphere. He includes 465 million hectares (an area equal to about 2/3 of the U.S.) of fast growing plantation trees in his estimate. He suggests that substituting wood energy for some of the fossil fuel energy would be

helpful in holding the increase of CO_2 until we can determine whether or not the warming is going to occur since there has as yet been no identifiable signal. He states that currently wood energy does not appear to be economically practical. His final position is “The global community is faced not only with the possibility of failing to act when it should act but also the possibility of acting when it need not. Because many of the proposed actions are very costly, prudence must be exercised.”

Based on what he knows and what his 22 bibliographical references know the conclusion is easily drawn. I agree with that conclusion. It is a waste of effort to attempt to reforest the Earth in its present condition. The trees planted won’t grow in most parts of the Earth.

Sedjo’s article is a “doom and gloom” article of a sort to which I wouldn’t ordinarily pay any attention. However it is billed under the heading of policy options. The title is “Forests – A tool to moderate global warming?” In a time of crisis, moderation has no value. The disturbing thing is that it has the backing of Resources for the Future and a magazine which calls itself ***Environment***. The Congress pays attention to such organizations. The article does serve one purpose. It shows that without soil remineralization we can not hope to restore the interglacial climate. The bills in Congress calling for reforestation without both remineralization and abandonment of fossil fuels are worthless.

With remineralization the picture changes radically. Sedjo supplies a few figures to work with.

There are 4 billion hectares (ha) [1 ha = 2.47 acres] of existing forests. There are 2.9 billion tons of carbon which accumulates in the atmosphere each year.

With a strong remineralization program we can deepen topsoils by 1/2 “/year. We can raise the organic content of the soil to a conservative 5%, a minimum of 1/3 of which will be stored carbon. The 1/2” of topsoil weighs 70 tons/acre or 170 tons/ha. The carbon stored is 170 x 5% x 33% = 2.85 tons/ha: 2.85 x $4(10)^9$ ha of forest = 11.4 $(10)^9$ which compares with 2.9 $(10)^9$ tons annual increase in atmospheric C [carbon].

It is obvious that the soil at about 7” average depth and less than 2% organic matter is a massive sink for carbon. If we also remineralize the inland and coastal waters, increase the growth rate of forests by a minimum factor of 2, and switch from fossil fuels to biomass, we can get the atmospheric CO_2 down to 270-280 ppm much faster than it built up in the atmosphere.

The question is can we do it before the growth of ice fields becomes self-sustaining – the point of no return? The other part of the question is, can we do it before the world’s nations are so weakened by food shortages that they cannot maintain a remineralization program.

Moderation is very definitely NOT a policy option in this time of the ultimate human crisis.

Another 1980s excerpt on “The State of Science”:

The science establishment is composed of specialists. What they do they do well; but nowhere in the establishment is there a person or group of people with a broad enough background of education and experience to put the thousands of pieces of scientific data together and come up with a rational explanation of the climate cycle and what the present climate change means to civilization. Science today is the product of industry pressure on the schools for specialists most capable of using scientific information to exploit the biosphere for profit. The State of Science is such that it is incapable of turning its attention to rebuilding what it has destroyed.

And from other Comments of February 15, 1986:

No one with anything more than sawdust between his ears would choose greed over life. Ten years ago there were things that the scientists did not know. Not knowing, they propagated the simplistic “warming” theory. Their ignorance, imposed on the world, has made humanity a species threatened with extinction.

What they did not know:

1. They had no knowledge of soil and its life system and the role of the living organisms in climate control. This is the fault of the agricultural chemicals complex which for profit substituted propaganda for truth. Such corruption of truth could happen only in nations whose laws permit the centralization of wealth.

2. They had no knowledge of the tectonic system and its role in climate control. That happened because no mechanical engineers with proven ability to analyze and synthesize were brought into the climate study. To this day, what the scientists say about how the system works can only be classed as mythology.

3. They did not have any perception of the CO_2 causing a temperature differential and increased cloud production which would raise world albedo and provide snow to the ice fields thus further raising the albedo.

4. They did not understand that to get to the “warming” from the interglacial they must first pass through glaciation. They still point to a few degrees F. warming in Alaska as indicating a “warming.”. Those clouds giving up heat over Alaska are the ones that further inland are expanding the ice fields. To remove the ice and bring about a warming takes sufficient warm air and rain clouds to wash away the ice sheets from coast to coast at the upper latitudes. Such cloud production and heated air requires upwards of double the present CO_2 in the atmosphere. Where will the carbon come from when civilization is dead and the forests have burned? The CO_2 will peak between 450 and 550 ppm. With that much energy running wild in the atmosphere the resulting glaciation will be brutal. The unattended atomic installations will certainly blow up which could mean the extinction of our species.

5. They failed to perceive that the CO_2 level would rise exponentially indicating a rapid change from an interglacial to a glacial regime.

6. They didn’t know how much they did not know. As specialists they could do the detailed research for which they were trained, but they were unaware of many things outside their own discipline. That is the fault of the science politicians. There simply was no unit set up to collect the information and come up with a rational synthesis.

At this date no nation in the world has or is committed to a serious effort to get the CO_2 out of the atmosphere let alone the establishment of just law so there can be peace within nations and between nations. Establishment scientists are still running the climate show and calling for more research and more money. Ultimately it will be events which bring action. The dying forests and the established fact that remineralization will stop the dying will probably get some response in 1986. Unfortunately the lead time required for effective response is gone. For that reason many many millions of acres of forest are doomed. Many many people will die.

The people who have tried so hard to propagate the TSOC thesis against the opposition of the establishment have succeeded in planting it in most of the governments of the world. Sadly it is not a matter of where the truth lies. I have never seen a point by point refutation of the TSOC thesis. In fact there has been no public discussion at all. The very effective technique of ignoring the TSOC thesis has prevented a significant number of people from knowing about it. Greed at the top, supported by corrupt and incompetent officials and scientists, and millions of people who prefer “go along to get along” to the turmoil of change constitute the opposition to a reformation for survival. Only the fear of death can change a world state of mind. We have, in our effort, discovered that the intelligence and perception to know that fear is lacking.

From the August 1988 ***World Crisis Foundation Newsletter*** in which editor Tim Binder introduces John’s reply to two common questions:

I also asked John what he thought a person could do from a selfish point of view to prepare for the coming climatic turbulence and from an altruistic view what can one do to help. I told him I would like to print his reply in the newsletter. I figured his answer would underscore that there is no separation between doing what is in self interest and what is in the interest of others and the world. Here is his reply:

Tim: you ask of me, “what do you think people can and should do for themselves first of all (as this is a selfish question or one limited to

maximizing self survival, etc.) and secondly what should they do to help the world and the rest of humanity at this late date?”

For me those questions are inseparable. The job the world faces is to save enough of civilization to rebuild on what we have learned. A world of people in the same starved condition as the people in sections of Africa can’t rebuild anything. So it is imperative that people who can start the remineralization should do so. For example, we have 50 million gardens in the country.

If all of those gardens were remineralized, at least a million adults would be greatly energized. If the farm lands were all remineralized, this nation would have the vigor necessary to carry on a massive remineralization effort here and to assist other nations. Self sufficiency is the key in a 20 or 30 year effort to effect our survival by turning back from the ongoing glaciation and restoring interglacial conditions. Self sufficiency first by the individual, then by community, region, state, and nation. The more self sufficient we become the more energy will be saved by the elimination of fuel used in transportation industries.

For survival most of what must be done requires national initiative and action. As individuals we can demonstrate the value of remineralization. We can write and talk about the developing crisis until it becomes common knowledge. Above all we can start being realistic. Does it make sense for young people to keep on having babies when there is a strong chance that they will die of malnutrition and famine before they reach maturity? They are all suffering from some degree of malnutrition and their bodies are carrying a wide range of nonbiodegradable synthetic organic chemicals which do great damage to the genes. Does it make sense to inflict this damage on the newborn? Does it make sense to tiptoe around the issue of wealth accumulation in the hands of a few people when that mindless economic system has brought us prematurely into a glacial climate change and now holds us there by means of the inherent power of wealth to control all of us? The earth is undergoing a radical change. If we are to survive, we, too, must make radical changes in what we do and the way we do it.

More from John on whether the Glacial Process is underway from his

Comment of August 15, 1989:

There still seems to be a question in the minds of some advocates of soil remineralization as to whether or not glaciation is taking place right now. The answer is “yes,” in spite of arguments to the contrary.

Supporting evidence comes from NOAA Technical Report NESS 87, 1981, as follows: “The strength of the zonal circulation reached a relative maximum during the early half of this century, accompanied by warm temperatures, a contracted arctic ice pack and reduced winter snow cover on land. Since the 1940’s, however, the zonal circulation has been weakening, with the circulation pattern becoming more meridional and associated with an expanded northern polar-cap regime.” In the same study, an increase of sea ice area between 1966 and 1980 is reported.

The change around 1940 is generally accepted. It is well known that the open water between the land masses and the North Pole has now largely closed over with ice.

The NOAA Atlas of Satellite-Derived Northern Hemispheric Snow Cover Frequency, March, 1986, shows the permanent ice extending out to almost 70º latitude. Unfortunately, there were not satellite studies before 1940, so it is not possible to make a good comparison of how much the ice has expanded. However, the Atlas shows charts of snow cover from 1966 to 1981. During that period, an expansion trend is shown for both North America and Eurasia. Statistics from 1981 to 1988 show that the expansion of snow cover is continuing.

As CO_2, desertification and deforestation increase, more clouds are produced. The temperature differential is increased and the clouds get more concentrated over the upper latitudes. The cooling effect of the clouds carries over later into the spring and begins the winter snow cover earlier in the fall. Our growing seasons become shorter, posing problems at planting time and harvest time.

The present meltback of the winter snowfall is the most outstanding feature of the Atlas. The meltback is not completed until August, so all summer crops are damaged by violent storms caused by the large volumes of refrigerated cold air off the snow fields running into large

volumes of hot, humid air off the lower latitudes. In September, when the sun is over the southern hemisphere, the winter snowfall starts building up again. The growing season is being squeezed at both ends by the elimination of the temperate-zone spring and fall. The squeeze on the growing season can only get worse as the factors causing it increase.

For the Fall 1988 ***Soil Remineralization Network Newsletter***, the predecessor of ***Remineralize the Earth*** magazine, John addressed the question of:

Glaciation or warming? That is a question which many people are asking. That question has not been asked by me because the factors which initiate glaciation are all in place and increasing geometrically, i.e. at an accelerating rate.

A study of satellite pictures from 1967 to 1987 has been made by NOAA. They averaged total snow-covered area on the same fall day for the four years 1967-70 and 1984-87. They used the average of two four year periods because the year-by-year snow cover varies substantially. They found an increase of 1.5 million square kilometers in snow cover equivalent to a strip one mile wide and 5000 miles long. That is a significant glacial advance for a period of only 16 years. This report squares with the reports of advancing mountain glaciers and deepening snow cover in many parts of the world.

Glaciation is proceeding right on schedule. The same can not be said of the warming. The predicted early warming of the upper latitudes has not occurred. Its advocates claim a warming worldwide of 1/2 degree Celsius. That may well be since it takes a source of heat to evaporate the water for glaciation and an increase in temperature differential between the equator and the poles to move the evaporated water to fall as snow on the glaciated upper latitudes. However, it is world ***albedo*** (reflection back into space of solar energy), which in the long run determines the climate. A definite average temperature change is unlikely to occur for many decades. The albedo is definitely increasing. The snow cover and increasing cloud cover and desertification and deforestation are all rapidly increasing the world albedo. When the albedo is sufficiently high, the average temperature will indicate cooling in spite of the greenhouse

gas concentration of heat in the latitudes on both sides of the equator. The assumption that a slight rise in average world temperature indicates a warming climate is false because it can not stop the advance of glaciation. On the contrary it assists the glacial process***. ...***

The warming has no more basis than agricultural chemicals. Scientists all over the world have rebelled against such a simplistic hypothesis and initiated a study of the many facts involved in climate.

The ongoing glacial advance, the demineralized soil, and the increasing violence of glacial weather which are destroying crops all over the world and rapidly reaching a crisis stage for all of us is a threat to the establishment. This massive environmental change requires an equally massive change in the economic system. Maintaining the status quo is no longer possible.

Disinformation is probably the best possible way to keep the population from coming to a common understanding of our problems and their solutions. How long can a massive disinformation affect the thinking of the people? The fabrications of the agricultural chemicals industry have lasted for about 150 years. It is endangered now only because it is failing.

The warming will not last that long because it has failed to show up and the rapidity of the onset of glacial weather violence is precipitating a food crisis. The financial establishment doesn't have 50 years to handle this problem. It will be interesting to see what happens if anything. So far the financial establishment has given grant money to genetic engineers to develop plants that will grow food on demineralized soil. What next?

Whether we call it glaciation or warming, the only answer to the food crisis is to get the greenhouse gases out of the atmosphere and restore the interglacial climate.

Throughout the 1980s and up until his passing on June 30, 1994, John warned us of the danger of allowing world albedo, or reflectivity, to grow too large. Here is one short but powerful reminder about this

and the role of CO_2 as “initiator,” then another summary of the Hamaker explanation of the glacial-interglacial cycle:

Carbon dioxide has its primary importance as the initiator of glaciation. Once an extensive ice field is established its cooling effect maintains the temperature differential which keeps glaciation going. Variations in the amount of carbon dioxide simply cause variations in the world albedo* but they do not stop or start glaciation. The world is committed to glaciation when the ice fields alone reflect enough sunlight to ensure cooling.

*Albedo: “The reflecting power of a planet, expressed as a ratio of reflected light to the total amount falling on the surface.” (***New World Dictionary***)

Concise summary of the glacial-to-interglacial process

The glaciation ends when:

a.) the land has been well mineralized
b.) the ice sheets move so far south that melt exceeds accumulation resulting in collapse of tectonic activity and CO_2 emissions.
c.) the sea life (primarily) brings CO_2 levels down below interglacial levels, thus reducing the greenhouse effect heating of oceans, thus (in conjunction with cold glacial meltwater flowing into the oceans) reducing cloud production. This decreases albedo which speeds melting of the glaciers.
d.) the plant and forest life spreads rapidly, with glacial melting and warming temperatures, on the remineralized soils. CO_2 recovers to normal interglacial levels, producing normal interglacial temperature and precipitation patterns.

Deglaciation takes about 8000 years. In the next 10,000 years the minerals on the land and in the oceans will support sufficient life to keep CO_2 at the interglacial level. But when the minerals are too few to support enough life to hold down the CO_2 level, it begins to rise. Increasing cloud cover brings growth to upper latitude ice fields, the weight of which in turn forces a heavy flow of melt into the tectonic system thus forcing this release of CO_2 (and related greenhouse gases). The death of the temperate and tropical zone forests swiftly

initiates the air flow pattern which brings glaciation to polar latitudes, sub-polar cold to temperate zones, and extreme, killing heat and drought to tropic and sub-tropic zones.

Glaciation is caused by increasing world albedo, due primarily to increasing ice and cloud cover. Glacial collapse is caused by decreasing world albedo due primarily to decreasing ice and cloud cover.

Variations in albedo are caused by variations in the food supply (carbon and minerals) of living organisms or by catastrophic events in the tectonic system.

I'll conclude these few excerpts with John's final paper in which he again called for a revolution in human thinking and response to the eco-climatic crisis and opportunity we face – or, disempowering ourselves, avoid facing. The following is from his paper of December 21, 1992 entitled "Climate Change Versus Thought Change." Thanks for trying to inform, encourage and empower us all, John D. Hamaker.

When, in the mid 70's politics dictated that grant money should go only to those science specialists who forecast a "warming" of the world, it gave an incorrect basis for public policy. The result may be our extinction.

Newsweek (11/23/92) has an article by Gregg Easterbrook titled, "Return of the Glaciers." Under the title in bold print it says "Scientists think the next ice age will begin within the next 2000 years." On pg. 63 I read, " ... several centuries might pass between the onset of advancing glaciation and the first evacuation of what are now habitable regions."

A reader must get the impression that glaciation is not an immediate problem. The fact is that the earth has been trying to move into 90,000 years of glaciation since The Little Ice Age began about 400 years ago. Still fertile soils, much more forested land, and far less people exploiting forests and soils are the principle factors which until now held off the start of glaciation. Now all the factors are in place and glaciation has already begun.

As long ago as June 9, 1986 ***U.S. News and World Report*** carried a report on a meeting of the American Association for the Advancement of Science. One of the things discussed was the ostensible contradiction between increasing depth of snow and ice at Antarctica and the rising sea level as measured on shore lines. They failed to understand that the increasing weight of ice forces the crust under the ice to sink thereby squeezing the molten rock between the crust and the mantle. This causes the molten rock to flow toward the lower latitudes thus raising the land. The sea floor being less than half the weight of continents is first to respond. When it rises, it takes the ocean level with it. The thin California crust is subject to the same thing, which makes the predictions from seismic studies just about useless.

The ability of the melt to flow compensates for any build-up of weight of ice. It prevents an imbalance of centrifugal force which might otherwise be very destructive to the whole crust . …

Gregg Easterbrook describes Hamaker as an 'amateur scientist' and 'professional prophet of doom.' That is not the usual description of one who was for about 30 years described as a 'registered professional engineer,' the requirements for which are technical competence and responsibility.

If ***Newsweek*** or any other magazine wants to level with its readers on what the climate is really doing, all it has to do is establish that the glaciers in the upper latitudes are advancing. They will be advancing only if the weight of snow is increased. ***That deepening snow and ice is glaciation***. It won't stop because the factors which caused it are getting worse day by day.

Senator Gore held hearings on the climate change. He and Easterbrook apparently relied on the same people. Gore says in his book unequivocally that there will be a warming. If the new administration waits around for a warming, we are all dead.

Governor Clinton's economics are not derived in concert with the knowledge of impending environmental disaster. Nothing he has said will provide this nation with the strength required to effect our survival.

As the situation exists today, ***I think we have no better than a 50-50 chance of returning to interglacial conditions and that only if the new administration can get its thinking up to date and make a 'no-holds-barred' attack on the problems***. It will take 15 or 20 years to get an effective program going. During most of that time the glaciation will be establishing its grip on the world. We have already lost thirty days of growing season.

More on the "Good News": Soil Remineralization and Earth Regeneration

"We must recognize that our bank account in soil fertility is heavily overdrawn, and only some form of repayment stands between us and bankruptcy. It is a debt that has been incurred for us by many previous generations, but if we wish to preserve the land, let alone use it, we must make some effort to discharge the debt."

– G.W. Dimbleby in
The Development of British Heathlands and Their Soils (1962)

"At a certain stage in the evolution of human society soil becomes a means of production. From then on man as a user of land has for his main task the world-wide enhancing of soil fertility.

– Prof. A.A. Rode in ***Soil Science*** (1955)

In July 1995 the amazingly persistent ***Acres, USA*** published its large "Celebrating 25 Years of Eco-Agriculture" issue. As it looks back to summarize each of those years, these words jump out to receive further acknowledgment:

"In 1974, John Hamaker came on the scene with the first of his reports on rock powders. He was to pass from the scene 20 years later, having placed in escrow knowledge the republics of learning may not discover for another 20 years." ***…***

"In November 1977, ***Acres, USA*** said farewell to Albert Carter Savage, the man Winston Churchill credited with providing the mineralization key to endurance that saved England during WWII."

I've so far been unable to learn more about this fascinating Savage-Churchill connection – can anyone provide further details? Oh, I see that Savage's book on remineralization was published near the beginning of WWII so perhaps Savage sent Churchill a copy and he actually read it? ! Did Churchill, as well as Savage, forcefully repeat: "A great power lies within our grasp"? At least one great quote of Churchill's leads me to think he might have embraced the remineralization message. Here it is:

"Most people stumble across the truth at some time in their lives. Most people then pick themselves up and go on about their business as if nothing had happened."

– Winston Churchill

Now from the book, ***Mineralization (A new basis for proper nutrition): Will It Reach You In Time?*** by Albert Carter Savage, (1941):

"All this can be worked out to fine points, but the greatest achievement of these mineralized foods, that which makes them ***immediately interesting*** to everyone, be it busy housewife, or gourmet, the steel worker or the professor, is that merely substituting these vitalized, upstanding foods for the ordinary comparatively wan, pale specimens, will reap a harvest of improved health and mental energy that would astonish everyone if it were only possible to have a universal demonstration of such a test. A program of country-wide mineralization could and would create, within a generation, a new type of human being. And this new kind of human being will be right here, among us, of us, it will be you yourself, living with such intenseness, and aliveness, such as even our daydreams have not held forth. There will develop an abundant life, in a richly spiritual sense, an abundancy of spirit and energy and mental clarity and vision, added to a vigorous physical strength that will bear any burden the will may put upon it. ... A great power lies within our grasp."

Letter from *RE* Editor to the *Newsweek* Editor

Thank you for your breakthrough article on climate, "The Return of the Glaciers." It's about time John Hamaker's work received national attention. The magazine ***Remineralize the Earth*** has been advocating remineralization for six years.

Hamaker estimates that on fully remineralized soil, American agriculture could grow four times as much food as it is capable of growing now – or the same amount of food at about one-fourth the cost.

The Hunza people in the Himalayas irrigate their fields with glacial till and have been the healthiest people in the world. Recycling the minerals and trace elements back into our soils and food with finely

ground glacial gravel (or similar mixture) would cut health care costs dramatically.

One forestry study showed four times the timber volume on remineralized soil than in the untreated area. The military could remineralize our forests and many jobs could be created.

Remineralization could return us to early interglacial conditions, a time of great abundance. Without it, the earth's soil mantle is so demineralized, it is losing its ability to support productive life and we'll be leaving the task of remineralization to the glaciers. Eden or Ice Age – which will we choose?

Joanna Campe, Editor
Remineralize the Earth magazine
Northampton, Mass.
November 23,1992

(Published almost in full by ***Newsweek***)

A call went out to the conscience and intelligence of the Aggregate Industry when Bob Able, Sales Manager of Dan Gernatt Gravel Products (Collins, NY) and founder of the Task Force on Remineralization (National Aggregate Assoc.) released a very special Presentation and Proposal in May 1992. Its title is "Classifier Tailings [a general name for rock dust and fines] for Soil Remineralization: Aggregate Industry Contribution to the Creation of New Topsoil." Perhaps the following gives the best short summary of what one man's awakened conscience led him to propose to a vast industry in a unique position to meet the critical need for soil-and-Earth Regeneration. Proposing an "Industry Strategy," Bob Able says:

"Soil remineralization isn't a ready-made market for classifier tailings, but an opportunity with considerable promise which – like good topsoil – must be cultivated, nurtured and developed. Creating fertile, healthy topsoil is necessary and essential for the survival of our society and species. Without topsoil we can't grow food, and we are currently losing topsoil at astonishing rates.

"The aggregate industry can take various positions on this issue of remineralization with fines. The most passive and conventional is to simply offer a product and let others perform the extensive and expensive testing and test marketing – and its widespread use to rescue our farmlands and forests. The most responsible role for our industry is to make a full commitment to regenerating America's worn out and used up topsoils. This includes active support to develop effective community-scale composting technologies.

"In view of our global ecological crisis, it is in the best and highest interests of the aggregate industry to assume leadership responsibility for Earth regeneration and eco-repair by large scale soil remineralization and topsoil production. In the past, the aggregate industry has pursued a commitment to roads, structures and infrastructures. The question of global ecological survival requires us to turn our waste fines into new topsoil. "

As noted in ***Remineralize the Earth*** (Spring 1993):

"Don Weaver was a speaker at the National Aggregate Association Annual Convention held in San Antonio, Texas, February 21-25, 1993."

Immediate response was very warm and positive. Sustained response and follow-up actions by many appear lacking but some like David Jahn of Martin Marietta Co. (2nd largest aggregate company in US) are giving soil remineralization some priority. How many others will step up to the plate in what could become the next American (and world) "pastime," Earth Regeneration? Imagine if the vast crowds daily attending sporting events would join together for some remineralization and reforestation – before or after the game? (David Jahn and Martin Marietta's "Eco Min" product should be listed at the www.remineralize-the-earth.org website.)

Since bulk grinding and distribution of gravel dust has not yet begun on a widely decentralized scale, persons wanting to immediately begin the essential work of soil remineralization may do so as follows.

Contact your local gravel pit operations (usually in yellow pages under Sand and Gravel) and find out if "gravel crusher screenings" or

"gravel crusher fines" or "crusher dust" or "gravel powder" are available or can be produced. Also, what is the cost per ton, picked up or delivered, and is there a minimum purchase. Cost per ton may range from $2 to $10 or more. A glacial or river gravel deposit of a good variety of stones will prove excellent when crushed or ground into the fine dust size ranges such as "passing 200 mesh" or the finer 400 mesh screen size. 2 tons of dust per acre is an approximate minimum to produce observable 1st-year results. 5-20 tons per acre is more in line with ***the needs of our dying Earth***. 20 tons per acre is about 1 lb. per sq. ft.

Crusher screenings with larger particles will still be effective in fertility-building if sufficient fine dust is present in the mix. Soil organisms can thrive on the dust (assuming their needs for organic matter, water, air, and warmth are also met)! Plants and trees thrive in mineralized, organism-rich soil!

See the ***Remineralize the Earth*** website (www.remineralize.org) for additional gravel dust sources.

"In the Spring of 1938 I was able to secure granite from the Cascade Mountains processed by a firm in Seattle to a fineness such that 98 per cent of the material filters through a two hundred mesh to the inch sieve, with addition of lime and gypsum as recommended by Hensel. Assays of the finished product are almost identical with those of Hensel's. During the last three seasons I have used this material exclusively in my gardens and orchards, applying straw and other vegetable matter as needed for humus, with the results so far largely verifying Hensel's claims. Hitherto I fertilized almost altogether with stable manure. My ranch is situated on upland, with top soil from three to four inches deep, the subsoil consisting of coarse sand and gravel. Production in both my gardens and orchards has steadily increased in quantity and quality. Vegetables hitherto so badly infested with parasitic growths that to preserve them from destruction by these pests it was necessary to dust and spray them with insecticides frequently are now singularly free of these growths; no spraying or dusting has been done on any vegetables during the last two seasons.

"The increased sugar content in carrots and sweet corn, and in apples, in particular, has been unmistakably marked. The firm, fine texture of the apples, together with abundance of juice, has been particularly noticeable. Noticeable, too, is a most agreeable aroma. Root systems on sweet corn and cabbage, in particular, are so densely matted with fine feeder lateral rootlets as to constitute a mass two or three times that of roots formerly produced. In the handling of these root systems, wonder as to the marked superiority of the apples, for instance, is lessened materially. With lungs (roots) on these trees comparable to those on vegetables, little less could reasonably be expected." (an unreferenced excerpt sent by a ***retired*** USDA agronomist)

Has anyone in the current USDA "leadership" read "Conquest of the Land Through 7,000 Years" by former Assistant Chief of its Soil Conservation Service, W.C. Lowdermilk? It was ***USDA Information Bulletin No. 99*** published in 1953 and 1975, and in it Dr. Lowdermilk tried to show how the short-sighted exploitive relationship of 'Man vs. Soil' inevitably leads to degeneration and catastrophe as witnessed in his worldwide travels. Its conclusion explains how he came to offer the world an "Eleventh Commandment".

"When in Palestine in 1939, I pondered the problems of the use of the land through the ages. I wondered if Moses, when he was inspired to deliver the Ten Commandments to the Israelites in the Desert to establish man's relationship to his Creator and his fellow men – if Moses had foreseen what was to become of the Promised Land after 3,000 years and what was to become of hundreds of millions of acres of once good lands such as I have seen in China, Korea, North Africa, the Near East, and in our own fair land of America – if Moses had foreseen what suicidal agriculture would do to the land of the holy earth – might not have been inspired to deliver another Commandment to establish man's relationship to the earth and to complete man's trinity of responsibilities to his Creator, to his fellow men, and to the holy earth.

"When invited to broadcast a talk on soil conservation in Jerusalem in June 1939, I gave for the first time what has been called an "Eleventh Commandment," as follows:

“Thou shalt inherit the Holy Earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, that thy descendants may have abundance forever. If any shall fail in this stewardship of the land thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth.”

“It may be as shocking financially [actually mixed rock dust should be cheaper than most if not all present “fertilization” practices – plus the savings from not “needing” the biocides] as the appearance of new taxes to press the point and insist on hauling tons of rock onto the soil, but, when we face squarely and quantitatively the measure of soil fertility (mineral nutrients), we know that every pound of mineral matter hauled off the land in crops is extracted from the soil, and that it can be replaced in only two ways: from the subsoil or subjacent rock, or by being carried in. Either we extractively mine the soil, or we replace what we take out. If we maintain or restore our soil mineral heritage, we must haul back pounds of rock (soil mineral builders) for pounds of crops hauled away to urban districts. We cannot thrive on carbohydrates alone, plant-synthesized air, water, and sunshine, whether or not we like the idea of carrying rock back to the soil. The inescapable fact is that we will be forced to replenish soil minerals. Logically, geologically, and pedologically, and from the standpoint of quantitative adequacy of reserves, eventually the native rocks must be utilized to furnish most of our mineral fertilizers. (Prof. Walter D. Keller in ***The Scientific Monthly***, Vol. 66, No. 2, February, 1948)

A simple message from biodynamic farmer Harvey Lisle in his book, ***The Enlivened Rock Powders*** (***Acres, USA***, 1994):

“When I think of sustainable farming I think of the Egyptians whose lifeline was the Nile River. Up to the construction of the High Aswan Dam, Egypt logged in over 6,000 years of sustainable farming, and if properly analyzed, this record has to contain valid lessons. Much like our own, their farming methods are suspect, but the fortuitous circumstances under which they farmed merit attention. Their Egyptian gods smiled upon them.

“The Nile River has two main tributaries, the White Nile, which has its source in the lowlands of Sudan, with its wealth of paramagnetic stone dusts, and the Blue Nile, which has its source at Lake Victoria in Ethiopia, which always furnishes a flush of organic matter. Each year the Nile River flooded the Delta, depositing sediments rich in organic matter and enlivened rock powders. It may be an oversimplification to say an annual application of organic matter and rock powders is the answer to sustainable agriculture but, basically, that is the answer. We must keep a high level of organic matter in our soils along with a good balance of enlivened rock powders. With this combination we should be able to carry on our agriculture for 6,000 years, or at least until the next ice age arrives.”

Consider what Phil Callahan says in his book, ***Paramagnetism*** (***Acres, USA***, 1995):

“A few years after the eruption of Mount St. Helens, articles began to appear, most written in adjectives of great surprise, detailing how fast the forests were returning, the plants popping up, the streams revitalized and even nearby farmers delighted with their crop output. Apparently modern man and agribusiness had forgotten that good soil comes from volcanic rock and not the chemical industry. Mount St. Helens demonstrated that God knows what He is doing and corporate America only believes it does. It is not that I believe corporate agriculture is evil, only misguided. Perhaps they can learn from God’s volcanoes. “

Complementing this thought, he gives us another from John Milton, most fittingly, from ***Paradise Lost*** :

“Accuse not Nature, she has done her part
Do thou but thine, and be not diffident
of wisdom, she deserts thee not, if thou
Dismiss not her.“

“Agricultural Alchemy: Stones Into Bread” by geochemistry professor Dr. Ward Chesworth, one of the new ‘agrogeologists,’ from Univ. of Guelph, Ontario, Canada, reminds us that:

"It is noteworthy that the continents with the most extensive areas of highly productive and inherently fertile soils are the ones like North America and Eurasia, that have had their land surfaces renewed in one or another of the above ways in the geologically recent past. [He refers to glaciation, volcanism, etc.] Where such processes have not been lately active on a large scale (e.g. in most of Africa and Australia, and much of South America east of the Andes) the landscape has achieved the third stage of weathering and is inherently of low fertility. All this suggests that a possible strategy for maintaining the fertility of the land artificially would be to use common and readily available rocks as fertilizers." (***Episodes***, Vol. 1983, No. 1)

In a related article, "Late Cenozoic Geology and the Second Oldest Profession," Dr. Chesworth states the case for remineralization in stronger terms:

"It is perhaps overstating the point to say that when farming became agribusiness, soil husbandry became soil exploitation; but there is a real element of rapaciousness about much of modern agriculture. When soil fertility is thought of as something to be bought in bags at the farmer's co-op (see Stewart, 1979, for his interesting comments on this attitude of mind), it is easy to treat the inherent fertility of soil as a negligible factor in feeding people. This makes no sense on a finite planet. All our best soils are found where the fertility of the land surface has been refreshed by geological processes operating in late Cenozoic times. … The slowness with which this renewal goes on makes it imperative that we reconsider many of our current soil-management practices. " (***Geoscience Canada***, Vol. 9, No. 1)

"The Amazon Jungle Tells Its Story" is an interview with eco-agriculture researcher and author Phil Callahan. We're again privileged to have a glimpse into natural agriculture potentials even in this great region known for its generally demineralized soils:

"Now down along the Amazon where they were just throwing bean seeds in the ground and growing the beans in the volcanic ash, it is like the Nile. Remember the Nile? ... and all the floods in Peru leave a volcanic material from the Andes. It comes down the Andes. There are hundreds of acres of bean fields down there in the middle of jungles with no insect damage, no disease, growing right in the

volcanic sand along the river. You passed it. Remember when you went to Iquitos, you could see the beans growing in the sand along the river? No insect damage, no nothing. The corn, no insect damage at all, this in the middle of the jungles." (***Acres, USA***, Oct. '93)

Joanna Campe gave us a fine article on "Remineralizing Our Soils – A Broad Perspective" in the April '95 ***Acres, USA***. One excerpt may help alleviate the fear many "chemically dependent" growers have about losing yield and money in a transition towards a mineralized organic agriculture:

"An example of exciting and valuable research is the cost-benefit analysis for bananas done with Min Plus (volcanic basalt rock dust), the product of Sam Catalano in Queensland, Australia. The study was done by T.D. Edwards. The Harding Brothers plantation in Queensland, Australia has been doing trials with rock dust since mid-1985. Their fertilizer applications have been reduced by 80%, saving in fertilizer costs and minimizing environmental damage caused by runoff contamination. Dolomite application was reduced by 50%, and at 16 months there was no sign of magnesium deficiency. This deficiency was a problem prior to using Min Plus. The banana plants are more healthy with vigorous root systems and had 25% heavier yields and a 20% increase in growth rate resulting in a faster turnover of fruit. The sum of these benefits resulted in an incredible 80% increase in production with a substantial decrease in fertilizer. The savings in fertilizer costs per year were $3,647 per hectare; increased crop value per year was $53,125 per hectare; and total cost benefit per year was $56,772 per hectare."

Organic Gardening magazine gives better-late-than-never coverage of the remineralization movement in its 7-pg. article of May/June 1992, "Now You Need Rocks In Your Bed!" The "secret" continues getting out (and increasingly now via the Internet) to the millions or billions of "local" people needed to make a "global" difference! Author Carol Keough:

"Pssst! Wanna know how to grow the most beautiful, flavorful vegetables? It's a secret revealed to us by the guy who grows specialty produce for top-of-the-line eateries like Alice Waters' Chez Panisse and Wolfgang Puck's Postrio.

What our gourmet grower – and other like-minded gardeners – does is to apply ground-up rocks to the soil. That's right – rocks; specifically the dust of many types of crushed stone. These growers believe that by adding rock dust (just minerals in bulk form, after all) you can replace key elements that have been depleted from the soil over the years.

Replacing these missing minerals makes the soil healthier, which makes the plants bigger and tastier, which in turn makes ***you*** healthier (and maybe even tastier), too.

What's more, some growers insist that rock dust keeps their vegetables free from insects. 'Plants need a full spectrum of raw mineral nutrients in order to form and function well,' says Bob Cannard of Santa Rosa, whose mixed lettuces, carrots, torpedo onions, herbs, pak choi and rappini feed the Bay Area's elite. [Yes, "elite" would seem a questionable word to employ here.] 'I use finely crushed local basaltic rock, which provides all the elements that plants need and costs just $10 per ton.' "

Local friend Dorleen Tong, founder of the San Francisco Living Foods Enthusiasts (SF LiFE), was inspired to write me a long-distance report she knew I'd appreciate, while on her Silk Road Tour in Summer '97:

"Here I am in the famous Hunza Valley. It's all that they say it is – magnificent!! ... The air is so clean and fresh! ! It's apricot and cherry season and watermelons are abundant. The fruit here tastes ***wonderful***! The glacial dust, I'm sure. I haven't seen any of the 100+ year old people. I've heard that since the opening of the Karakoram Highway in 1982-86 the locals have been introduced to processed foods, hence decreased longevity. But the children here look extremely healthy and ***everyone*** has ***beautiful*** teeth. … The people here, especially in Hunza, have been kind, friendly and deeply generous!"

The International Karakoram Project (Vol. 2), published by Cambridge University Press in 1984, includes the results of some more recent studies of "the Healthy Hunzas" as they were commonly

known by those who studied them from about 1920-1970. A note on the Hunza geologic inheritance is of special interest as it confirms the principle emphasized by Hamaker that rock dust from mixed rock types logically provides the broadest spectrum of elements to the soil organisms, hence the highest quality food and health benefits for plants and people:

"Gansser divides the Karakoram as a whole into a northern sedimentary zone, a central metamorphic zone with a plutonic core, and a southern volcanic schist zone. In the Hunza Karakoram, which includes elements of all three zones, a more detailed subdivision has been proposed by Desio as follows … 1) Northern sedimentary zone, 2) Axial granite zone, 3) Central metamorphic zone, 4) Chalt green schist zone, 5) Basic intrusive zone, 6) Gilgit zone.

While I'd heard stories that Hunza health, along with their pristine environment, had been undergoing the typical rapid degeneration such as Weston Price had documented following introduction of junk "food" and junk "culture" elsewhere, I hadn't seen confirmation of it until reading this book. This brief excerpt gives a sad glimpse of the new "modern-day" Hunza – will they, and we, learn from our shared modern mistakes ?:

"Cardio-vascular disease, with or without hypertension, was seen surprisingly often and was infinitely more common than had ever previously been described. In fact, our information prior to arrival in Hunza was that disease of any kind was extremely rare. This certainly has not proved to be the case***. ...***

"It was unexpected that psychiatric disease would be found. In fact we discovered that neurosis, both depression and anxiety neurosis, were extremely common. We feel that the sudden change of life style from an entirely traditional Hunza style to a partially Western-influenced style due to the opening of the Karakoram Highway, together with the increased pressure on land due to a greatly enlarged population trying to live a mostly subsistent agricultural life, are responsible for these surprising figures."

Apparently no modern-day Weston Price was present to do an in-depth study of diet changes, dental and facial degeneration, etc.

"At the Crossroads of Kathmandu" is a July 1987 ***National Geographic*** article on Nepal's Kathmandu Valley. As in Hunza Valley, the towering peaks of Himalayan mountains surround the valley, and like Hunza it is blessed with perennial fertility renewal from mountain rock to valley soil organisms. Many of the fields are shown by aerial photo – again the terrace style seen in Hunza is common, with mineralized meltwater for irrigation – and on p. 49 the caption reads: "Fields never lie fallow where immensely rich soil yields three harvests annually." How long will our Western Agricultural Experts allow such sorrowful and backward conditions to prevail? (Yes, I am being facetious in the last question.)

My Spring 1990 letter to U.S. Secretary of Agriculture Yeutter, accompanied by further evidence of the great need for soil remineralization and of its huge practical benefits, requested an update on USDA work in this direction. I'd hoped by this time they'd moved beyond their long-time narrow orientation around chemical "fertilizer" and related toxic inputs from the commerce of soil exploitation and human/environmental sickness. A response came in a letter (5/11/90) from Charles Hess, Assistant Secretary, Science and Education, sadly revealing that change to a more rational orientation within the USDA continues to be ***glacially*** slow:

"The Agricultural Research Service – the primary research agency of the Department of Agriculture – maintains an active program for research on the effective use of fertilizer for crop production. However, rock dusts, other than limestone and phosphate rock, have not been included, and we have no plans to do so in the near future."

Contrast this with the commercially uninfluenced view of University of Missouri Geology Professor Walter D. Keller, who wrote a number of "common sense" articles on the obvious need to remineralize the soils:

"Now that there is no 'new' land to take over, we are confronted with the problem of restoring, replenishing, and improving with that at hand. The preferred method to do so is to follow the pattern established for ages by Mother Nature – to use for fertilizer organic matter and the native rocks, the sources from which our enviably rich,

virgin soils derived their high level of fertility. By that method we can not go wrong." (from "Native Rocks As Fertilizer" from one of the 1950s issues of Rodale's ***Organic Farming and Gardening***, it appears)

Fortunately a growing number of farmers and gardeners are sharing in the genuinely scientific common sense expressed by Prof. Keller rather than follow the very tired – literally exhausting – USDA recommendations. Another such grower is Dan Weber of Petaluma, CA whose story is told by editor David Klein in his ***Living Nutrition*** magazine (Winter 1996) as "Organic farmer takes home first prizes – Says the secret's in the rock powder!"

"When Dan Weber set out to learn the ABC's of organic farming four years ago, he learned that NPK fertilizers just don't cut it. In a class taught by organic farmer/consultant Bob Cannard, Dan learned that plants need plenty more minerals than just the standard commercial fertilizer ingredients of nitrogen, phosphorus and potassium. To address the plant's and soil's total needs, a broad spectrum of micronutrients needs to be introduced. The answer he learned is rock dust.

"Dan then began his venture in commercial farming, applying compost, crushed oyster shell and McKenzie Rock Flour, a fine source of mineral elements derived from an andesite and basalt deposit. The rock dust is applied to the soil at a rate of 500 pounds per acre before and after planting, with direct application to the plant several times during the growing season. Year after year, the mineral content of the soil builds up and increases fertility. With that, Dan noticed the stamina of the plants increased, as did their resistance to pests which have virtually disappeared. Also, the flavors became richer and richer.

"In his third year of organic farming, Dan entered his vegetables in the Sonoma County Harvest Fair, and he won The Gold Award and took home more prizes than any other farmer. His tomatoes and bell peppers won "best of show" based on taste and aesthetics, and other produce he entered won six first prizes and four second place prizes.

“Have you ever wondered if organic farming can be profitable? Today, Dan’s produce is favored so highly by his local restaurant customers that he cannot keep up with the demand! Dan says that’s a testimony to the flavor he gets from the minerals in the rock powder. “

Was it thousands or millions more people introduced to remineralization when ***Martha Stewart Living*** (March 1996) published “Using Rock Powders” by Ingrid Abramovitch? A short history of Julius Hensel and ***Bread From Stones*** is given and it is noted that still only a small minority of farmers are remineralizing. Another of those “success stories” is quickly profiled in the first two paragraphs:

“In New York’s Union Square open-air greenmarket, chefs and home cooks make a special trip on Fridays to a stall called Berried Treasures, where the strawberries, salad greens, and other fruits and vegetables are renowned for their sweetness. Owner Franca Tantillo says it is no accident that the produce from her farm in Cooks Falls, New York, tastes so good. The reason, Tantillo says, begins with the health of the soil, to which she adds not chemical fertilizers but minerals in the form of pulverized rock.

“ ‘I started using rock powders about ten years ago,’ Tantillo says, ‘and ever since, everything has more flavor, a longer shelf life, and is more resistant to disease and bugs. I tested the sugar content with an instrument called a refractometer and it definitely went up.’ “

In Good Tilth is an eco-growing magazine primarily covering the Pacific Northwest. Its April ‘91 issue was highlighted by Oregon eco-grower John Sundquist’s article, “Rock dust: the ‘hot’ new fertilizer that makes plants glow.” Summary excerpts:

“Remineralization on my farm shows exciting and dramatic results. I’m not too familiar with the theory of remineralization, but for the last three years I’ve been applying finely crushed gravel (1/8” minus slurry grade from Egge’s Sand and Gravel [Eugene, OR]; cost, about $9 per ton delivered) to my beds to see what would happen.

"The treated ground has produced, without much regular organic fertilizer, crops that are high-yielding, vigorous, healthy, and with a tremendous shelf life and flavor. What seems really remarkable about the plants, however, is their insect resistance. … Potatoes and bush beans planted together in the same remineralized beds absolutely glowed with health and they showed no insect damage on their leaves. Our neighboring farmers (all non-organic) said 1990 was a bad year for corn earworm and that the spider mites in their corn were the worst they'd ever seen. We had no spider mites and found only three worms in a half acre patch of Golden Jubilee!

" I've been putting on 4 to 7 tons per acre as a powder applied to the surface of raised beds then rototilling or disking the rock powder in. It can be applied with a manure spreader, bander or an 'E-Z Flow'-type fertilizer applicator. I'm also using rock dust in a potting soil made of compost, ashes and peat moss."

From the Southern Hemisphere, Men of the Trees Western Australia President Barrie Oldfield refers to his increasingly fruitful remineralization work in his 6/9/93 letter:

"In brief (for we are working round the clock getting the crops in) I regard our trials at Amery Acres, Dowerin, as a window into farming for the 21st century. A neighbor who cultivates 4,000 hectares (10,000 acres!) used diorite rock dust for the past two years and has grown his best crops ever. Also his weed count is down. … My own work incorporating rock dust into the feed ration of Lumbricus rubellus, the compost eating worm, has shown positive results to date. The worms actually prefer the dust-enriched rations.

(Amery Acres, 3 Over Ave., Lesmurdie, W.A. 6076, Australia to offer assistance, obtain newsletters, etc.)

"An Austrian Window Into the Soil" is one of countless great reports in ***Acres, USA*** by editor Charles Walters. From this 8/85 article:

"How can an eco-farmer maintain 60% moisture between 20 and 30 centimeters (about 8 and 12 inches) deep after six to eight weeks without rain? How can crops harness the nutrients in the soil, year after year, maintain production levels, deliver high vitamin and

mineral levels, and still permit a soil system to insoak a six inch rain without erosion? How can a far range of microorganisms be made to inhabit and proliferate in a soil once as hard as paving stone? Sigried and Uta Lubke have not only found their answers, they have created a scientific audit trail as wide as a forest fire. International visitors – and camera crews for Austrian and German TV – can simply marvel and check the record.

"As an opener, Sigried Lubke says, ***No, it is not possible – in any suitable time frame – for microorganisms to rebuild the soil without help from the farmer***. Moreover, the farmer has to take on the job of rebuilding the soil himself. His task cannot be brokered through some fertilizer company, or handed back to nature entirely. Microorganisms need food in proper rations, or they will never obey the biblical injunction to increase and multiply. … When Lubke came to the gentle valley hectares he and his family farm near Puerback, they found a clay soil so heavy it could hardly be tilled. Traditional tillage systems only made matters worse. The result of the last moldboard plow exercise told all who wished to see that the soil was dead, inhabited by hardly 50,000 microorganisms per gram. By way of contrast, according to the 2,000 magnification microscope in the Lubke farm laboratory, 3 to 4 billion microorganisms per gram are now standard on revitalized Lubke soil. Electronic microscope counts and colored photographs have proved out this observation… .

"Each plot is scrutinized that way – before planting, during crop production, after green manuring. The population explosion and the changing nature of each soil system are watched as carefully as would be creatures from Mars in an Orson Wells spectacular. ***'That's how we discovered the effect of stone flour on the microbial population explosion,*** noted Uta Lubke. ***'That's how we discovered exactly what made soil crumbly instead of hard as a brick.'*** [emphasis added].

" 'People take leave of their senses as a group. They return to their senses individually, one at a time,' was all that came to mind. This seems to hold no less for farmers in Europe than for those in the United States."

The following are excerpts from a letter from Robert Schindele of Austria on January 2, 1986:

"I discovered the phenomenon of gravel dust by accident. While building a 1.5 mile long road through my forest property in Grimsing near Melk, Austria in July 1981, alot of dust developed from the ground being worked on. In areas where the gravel dust caused by gravel transport settled, within a few months all sick fir trees got healthy again and have grown very strongly since***. ...***

"While building this road, which is 300 m above sea level, all the other trees that grow there (spruce, Scotch fir, beech) have recovered completely from diseases caused by acid rain emissions. Since they have been exposed to the gravel dust, they grow 50% better than before. In the fall, the beech trees lose their leaves 4 weeks later than usual. Also, grass, herbs, blackberries, and raspberries grow like never before. The raspberries and blackberries taste better than those from areas not exposed to gravel dust. The deer population grew and prefers the exuberantly growing grass."

(***Soil Remineralization***, Spring 1986)

The Fall/Winter '86 ***Soil Remineralization*** published "A Visit with the Author of ***The Book on Rock Dust (Das Buch Vom Steinmehl),*** namely Helmut Snoek of Germany who has worked with rock dusts since 1958. Snoek says:

"We experience how the conventional agriculture has destroyed the soils. They did this in good faith, no doubt! And now we experience how these destroyed soils can be revived in 2-4 years if you apply rock dust to them. And naturally the right cover crop. They go hand in hand with each other. … Now concerning the forests, first you have to improve the buffering quality of the soil with rock dust. It is optimal when applied together with organic substances, then you get a very quick regeneration of the root zone. Then you can regenerate trees that are already 50% dying. … Now you recreate healthy conditions again. The mycorrhiza and roots supply each other with nutrients symbiotically. If you recreate these basic conditions, and in this Hamaker is 500% right, then things work well again. In all the cases where we have applied rock dust on areas of damaged forest, the

theme ‘Waldsterben’ (dying forests) was over, it didn’t exist anymore! ... There is already ample research of rock dust over the last 50-70 years. At the University of Zurich, they made long term experiments with rock dust in the forests and the results throughout were positive.

Editor Joanna Campe concludes by asking Mr. Snoek for his thoughts on John Hamaker’s explanation of plant nutrition via direct assimilation of microorganism protoplasm by plant roots. His response:

“Exactly! And Liebig said only nutrients in a solution. The root does not only take in mineral elements through a solution. It can also take up giant protein molecules, even total proteins. Fifty years ago Prof. Warburg showed that they can take in protein molecules with up to 15,000 atoms, but the newest research shows they can take up to 50,000 atoms and more! Soil is not only the ion exchange! In a thimble full of live soil, some 10 billion microorganisms are present. You must imagine that every half hour they are dying, they are dividing and then there is a supply of protoplasm. Hamaker has made a fundamental point: Either you fertilize now with rock dust or you wait for the next Ice Age. And that is right!”

Results are in from another forest fertilization experiment with limestone only, rather than a broad spectrum mixed rock or gravel dust, and as is usual some positive results were seen which should logically point the Forest Service to the glacier-imitating broad spectrum remineralization method. The experiment is described in a ***Pittsburgh Post-Gazette*** (10/15/95) article, “Acid rain among suspects as trees die in state forests”:

“But now federal forest researchers are acknowledging the potential ill effects of acid deposition and acid rain on tree health. They have been swayed in part by findings from a study that measured the buffering effects of 10 tons of limestone spread over an experimental forest plot.

“The 10-year study of plots in the Susquehannock State Forest and the Allegheny National Forest shows that sugar maples displayed significant increases in vigor, growth and seedling production in the limed plot. Mortality for sugar maple also declined, from 17 percent in

the unlimed plot to 3 percent in the limed plot. And foliage tests conducted on leaves shot down and collected from the tops of trees in limed and unlimed plots show deficiencies in both calcium and magnesium in the leaves from the unlimed plots. Unfortunately, beech and cherry growth and mortality was unaffected by the liming, and sugar maple seedlings died at a 60 percent rate in both the limed and unlimed plots. …

"The newest and hottest theory ties acid deposition to soil type, specifically glaciated and unglaciated soils. Glaciated soils in some parts of the northern tier are richer in calcium, magnesium and other nutrients than nonglaciated soils. … Trees growing in glaciated soils are healthier, regenerate better and are able to withstand acid deposition better."

The 1992 video ***Earth at Risk: Acid Rain*** (Schlessinger Video Productions) says Sweden is liming 500 lakes annually to attempt to prevent death by overacidity.

Alan Reed of Cairn Tech is one of the pioneers of soil remineralization in Canada. His information offerings provide many more examples of the outstanding results seen on remineralized soils. What I want to note here is Alan's observation that the forest floor carbon-rich fibrous carpet grew from about 1" to 8" in only 8 years in his experimental forest. This again shows the immense biomass carbon storage potential waiting for us to get smart and busy remineralizing forest and agricultural lands. With Korea beginning to import bulk tonnage of agricultural rock dust, one wonders whether the other countries will also wait for famine to arrive at the door before growing "smart and busy."

"Regeneration of Forests and Trees" (***Remineralize the Earth,*** Spring '93) - "The results of long term experiments released in 1986 in Germany showed that ***in a forest where pine seedlings were remineralized, after 24 years the wood volume was four times higher*** than in the untreated area. One application lasted 60 years." (Bavarian Research Institute in Munich)

"In Australia, Men of the Trees is doing trials on many different tree species and has seen increased growth rates of five times over the controls for some species.

"In a recent interview, Robert Bruck, Ph.D., forestry expert and Director of the Environment for North Carolina said the greatest concern is the chronic, long-term implications of air pollution and this is where soil remineralization comes in. As scientists become more interested not only in what the problem is, but what to do about it, forest fertilization or ***trace mineral*** fertilization, is coming to the forefront.

"Regenerating Appalachian Forests – An Interview with Forestry Expert Robert Bruck, Ph.D., Director of the Environment for North Carolina" by Joanna Campe was featured in ***Remineralize the Earth***, Spring 1992. Bruck says:

"Areas I just visited in northern Czechoslovakia, southern Poland and Germany look almost identical. We're talking about hundreds of square miles just devastated by heavy metals and air pollution. If there's any hope to get those forests back, in my opinion, it's through remineralization. They replant trees that die three to six months later, so they pull it out and shove another tree in the ground. No offense to them, but they're wasting time and money. They need to change the entire soil system." Prof. Bruck also gives an update on the results of remineralization trials on Grandfather Mountain, North Carolina. Excerpts:

"Below is a brief summary of our preliminary experimental data regarding the effects of Planters II [a rock dust from Colorado] on the growth and survival of red spruce and Fraser fir. As a brief introduction, I would state that red spruce and Fraser fir are the boreal montane ecosystem species here in the high-Appalachians of the northeastern and southeastern U.S. These trees have undergone tremendous stress via air pollution over the past several decades and, indeed, certain air-borne and satellite surveys have indicated that as much as 40 percent of this ecosystem has already died***. …***

"On April 18 through 22, 1991, a group of 21 volunteers, graduate students and I planted some 6,000 red spruce and Fraser fir

seedlings on Mt. Mitchell, NC, at an elevation of 5,500 feet (the natural forest in this area is severely declining). The plots were split in half and 175 lbs./acre of Planters II broadcast on each split-plot of Fraser fir and red spruce, respectively; the other split-plot received no treatment.

"Approximately a week and a half ago, several graduate students and I measured 1,000 trees from each treatment, at random, for height and made notes on the general appearance of trees. Twelve weeks after application of Planters II, height growth of red spruce was increased by 27 percent over non-treated controls, and height growth of Fraser fir was 19 percent greater than that of untreated controls. The general appearance of treated trees was that of a very dark green color and good flushing of 1991 tissues, whereas untreated controls appeared to be somewhat yellow and chlorotic (not unexpected)." [He concludes by pointing to the need for broadscale remineralization to proceed, with the purpose of rejuvenating the dying ecosystems around the world. Near the end of the 1990s, this need remains unmet.]

The Spring 1993 ***Remineralize the Earth*** carries another Joanna Campe article, "Making Communities More Sustainable," presented at the 26th Annual Federal Workshop on Urban Environmental Design held at the American Institute of Architects Headquarters, Wash., D.C., Nov. 19-20, 1992. Addressing the great challenge of recycling an annual 140 billion tons of human sewage, she informs the Workshop:

"Gravel dust can be used for municipal composting and treatment of sewage sludge. It can transform sewage sludge into a potential product that can be made available to local farms, gardens, tree planting, city parks and forests. … Biological activator Bio 2, of Meridian Environmental Group in Michigan, is a product created with gravel dust and used to accelerate wastewater treatment. It increases biological digestion by 300%. It is designed to increase the metabolic activity of digester bacteria in a wastewater treatment system. It is non-toxic, non-corrosive, and has no chemical additives. It is applied to the influent stream of a biological waste processing system and. can be used in most any type of press, i.e. activated sludge content, extended aeration, step aeration, anaerobic digestion, sludge

stabilization, etc. A 200-500% increase in bacterial action can be expected that results in increased processing capacity, increased nutrient immobilization, decreased volatile solids, fast 'shock' recovery, reduced D.O.C. (dissolved organic carbon) and improved sludge quality." From "Industry Leaders Address Remineralization" by Joanna Fritz (***Remineralize the Earth***, Winter '93-94):

"The U.S. aggregates industry produces more than 2 billion tons of aggregate annually. When this aggregate is processed, approximately 5-15% of the product ends up as minus #200-mesh material (also known as fines). This means that on average, 200 million tons of minus #200-mesh materials are generated each year."

"USDA Begins Field Demonstration for SR" – "The USDA has begun a series of demonstration trials with rock fines from Georgia, Maryland, and New York, and other industrial by-products. Dr. Ronald Korcak, research leader of the fruit laboratory, is directing the trials. The test plots are small and nonreplicated, but depending upon the initial observations, the study could be expanded to one or more replicated tests. Demonstration trials are usually the beginning step when the researcher has many unknowns or only anecdotal information." – Dr. Bill Becker, Research Director of Central Illinois Agricultural Research Farms in ***Remineralize the Earth***, Summer 1995

It is noteworthy that the corn yields of the eight plots, each also receiving yard waste compost on 1/2 their area (except the "fertilizer" alone plot), ranged from 102 bushels/acre up to an impressive 202 bushels/acre. The latter was from the New York glacial till fines, fitting the Hamaker prescription for mixed rock fines and a source of organic matter to provide a complete diet for the soil life. Also noteworthy, unfortunately, is the apparent lack of significant publicity or follow-through on this excellent result and confirmation of the immense value in remineralization-based agricultural, ecological and health regeneration programs. Will USDA awaken to its highest responsibilities? The latest figures I've seen say that less than 1/10th of 1% of its $50 billion budget goes to research into organic and "sustainable" agriculture systems.

Also in this issue of ***Remineralize the Earth*** was Frederick I. Scott, Jr.'s "Soil Remineralization, An Essential Environmental Action." I bring only the first paragraph to your attention:

"On May 24, 1994, the U.S. Department of Agriculture (USDA) (Beltsville, MD), the U.S. Bureau of Mines (USBM) (Washington, DC), the National Stone Association (NSA) (Washington, DC), and the National Aggregates Association (NAA) (Silver Spring, MD) co-sponsored a forum on "Soil Remineralization and Sustainable Agriculture" at the USDA Agricultural Research Station in Beltsville, MD. That forum could represent a milestone marking officially sanctioned efforts to implement long overdue action of fundamental importance to human survival, the ultimate reason for environmental concern. It deserves intensive and continuing attention to assure constructive application of the principles addressed."

Although I think that human health, integrity and survival in unity with the entire Biosphere is a better ultimate reason for environmental concern, I wish the reader to know that at least the NAA continues making some efforts to link up with farmers and gardeners and promote remineralization as a vital environmental action. Bob Able of the NAA Task Force on Remineralization in particular has expressed his concern over years of determined work to meet this need. Early in 1993 Bob brought me to the NAA Annual Meeting in San Antonio, TX to speak to a few hundred participants about the need for SR and the role their industry could play in the regeneration of the Biosphere. The reception and later comments and discussions inspired my realization that if the hearts and minds of this industry and "business" in general can activate themselves to work in synchrony for local and global regeneration of the Earth and society, most anything is possible. It sure helps that, as Dr. Aldo Barsotti of U.S. Bureau of Mines told the forum:

"On the basis of tonnage, the aggregate industry is the largest non-fuel mineral industry in the country with operations located in almost every county of the country. According to recent Bureau of Mines estimates, the aggregate industry is made up of over 6000 companies operating over 9000 pits and quarries. "

Also presenting at the forum was Andrew Euston of American Institute of Architects, a long-time activist for sustainable community development and lead Federal urban design advisor within Housing and Urban Development (HUD). I wish to place the first four paragraphs of his talk, “Where Do We Go From Here?” on the record:

“This historic gathering of well-informed speakers will advance the latent miracles awaiting our somnolent civilization through remineralization. Ahead is the emergence of a major global industry that will transform agriculture, diet, and health. The wide variety of well-informed speakers, including serious investigators in agricultural science, nutrition, and forestry have told parts of the story. The full story is yet to unfold. Rock dust will transform our culture’s perspective on nature, technology and change. It is so simple to grasp and yet a vast array of consequences will flow from its implementation. The process of its introduction will be the real story, for that will teach us all a big lesson about what’s possible.

“The potential of this resource to modern civilization has been held back by the natural skepticism we all have; by traditional conservatism in farming and by barriers in agricultural industry to technical and scientific reforms of any appropriate kind.

“A most valuable thing to do in view of these impediments is to encourage direct local testing with available fines (powdered rock dust) wherever growers and foresters are willing to try it. The gradual building of results from local acceptance will be by far the most valuable approach.

“Concerned individuals, firms, and educational institutions need to become grassroots advocates for remineralization. Successfully introducing this topic as a new idea into agriculture’s diverse cultures depends on who makes the first moves and what they encounter. Where local evidence builds and people can attest to the practical benefits, the ground will emerge for its acceptance. Acceptance will become the norm as the idea merges into common use, as the soil sciences catch up and as the picture of success begins to tell its own story.”

"SR Pumpkin Wins Prize" – "The first Saturday of October each year is the big day for big pumpkins. At least at the Great Pumpkin Harvest Festival in Clackamas, Oregon. This is the time and place when the growers from Oregon, Washington and Idaho, along with over 5,000 other folks, gather to enjoy the festivities and to weigh their prized possessions. … The winner for 1994 was Kirk Mombert of Harrisburg, Oregon. And how big is big, you ask? Would you believe 800 1/2 pounds? Yes, 800 1/2 pounds. … When asked what was behind his success, Kirk would only say: A lot of hard, but fun, work, a few guarded trade secrets, and McKenzie Rock Flour. Yes, McKenzie Rock Flour [a commercial gravel dust out of Eugene, Oregon], at about 6 tons per acre." (***Remineralize the Earth***, Summer '95)

For further insight into the potentials of people gathering together to create and celebrate "world-record" health and beauty and fruitfulness, you can read organic grower Charles Wilber's new book, ***How To Grow World-Record Tomatoes*** (***Acres, USA*** 1998). Along with careful pruning and training, it once again looks like someone had the good sense to employ the "magic" combination of rock powders and compost as Nature has done it since before Homo sapiens ("wise man"). People from the Guinness Book of World Records have visited Mr. Wilber to document his records such as 342 lbs. of tomatoes from one plant and plants over 28 feet tall. USDA people for years ignored invitations to visit John Hamaker's ten acres in Michigan. Are they keeping their distance from Charles Wilber's Alabama acres as well?

While many high school students are struggling through worlds of confusion and violence under the biological duress of malnutrition and the psychological stress of unhealthy images of life and its meaning, Jared Milarch of Michigan has spent much of his teens working with trees and the soil. Now 18 and having grown excited about rock dust from reading ***Secrets of the Soil*** by Chris Bird and Peter Tompkins, he is busy further proving out the value of remineralization as described in the Spring 1998 ***Remineralize the Earth*** article, "Milarch tests trace element fertilizer in greenhouse trial," in which he showed more excellent results with the Azomite rock dust from Utah. Let's hear author David Yarrow tell us some of the story:

“ ‘I didn’t have a lot of money, so I kept bugging my dad to order a few bags,’ remembered Jared. ‘He reluctantly gave in. When the bags arrived, I sprinkled two tomato soup cans around each baby tree.’ After 100 trees, his bags were empty, so his other 400 saplings got none.

“The next spring, Jared watched his unfertilized trees grow 12 inches. But the Azomite-treated trees grew fully three feet in one spring spurt! In Jared’s years working in his family’s shade tree business, this was unprecedented beyond imagination! ‘The results were just amazing!’ enthused Jared. **...**

“Impressed by these results, Jared bought more to sprinkle around all his trees . In the family garden, too, where the effect was similar – bigger, stronger plants, with one further benefit. ‘The taste of the vegetables is dramatically different,’ reported Jared. ‘It’s a great taste!’

“His father David, a third generation nurseryman in this remote corner of northwest Michigan, took notice of Jared’s fertilizer results. In 1996, David decided he had seen enough financial gains on his tree farm, and read enough evidence, to become an Azomite distributor.

“ ‘After the Gazette article about Jared’s discovery, we got more and more calls from all over the country about Azomite. The closest distributor to Michigan was the State of Maine, so I decided to stockpile it here so local people don’t pay double freight, and make it available to anyone inclined to try rockdust in their garden, orchard, or animal feed.’ …

“ ‘Also, as Midwest horticulture and agriculture schools smarten up, I want to have a stockpile. In the horticulture industry, no one we work with on our trees in all eleven colleges across the U.S. has ever heard of remineralization with rock dust. They add magnesium to commercial fertilizers, but know nothing about trace elements. It’s time the tree industry – all the way from seedlings to Champion Trees up to wholesale shade tree industry – tested this in horticulture.’

“David Milarch, with decades experience in the family shade tree business, founded The Champion Tree Project. The effects of

Azomite on his tree farm urged him to require that every Champion Tree must be sold and planted with rockdust.

" 'In The Champion Tree Project, seedlings distributed to schools, children and youth groups for Arbor Day will have a small bag of rockdust, with instructions to sprinkle it around the roots. I recommend seed companies use it in soil mix as seedlings are produced. And right up the ladder when shade tree liners are grown by nurseries, I ask them to use rockdust. Then, as shade trees are planted at job sites, one or two pound bags must be spread by the landscape industry.'

"I asked Jared what he will do with his new insight into soil fertility.

" 'For the immediate future, I want to apply this to our family nursery, and to the Champion Tree Project. [Preserving and propagating the oldest and largest trees of the 50 states and spreading the new seedlings far and wide.] More likely in the future I'd like to apply it or make it available for world crops – for all of our food crops.'

" 'And our garden,' injected David. 'If it's good for tomatoes and trees, it's good for humans, too. So take that thought farther from the garden all the way up the food chain.'

" 'I'd also like to study other rock dusts,' added Jared. 'Azomite is the first one I've discovered.'

"David ended, 'I'd like to see other colleges and students get involved with this investigation of how to restore our soils . And I hope to see the same in the nursery industry and farmers also.'

" 'In the long run, what would be the reduction in health care costs in humans after we get it into the food chain?' mused David, 'and we remineralize our bodies? How many diseases – like AIDS and cancer – would be dramatically diminished?' "

And how many more teenagers and adults would naturally generate the energy, strength, clarity of vision and inner joy to motivate their own ecologically- and socially-constructive ways of living?

With thanks to author Barrie Oldfield and publisher Joanna Campe, I, as another close co-worker of Betsan Coats, wish to reprint ”In Memoriam” from ***Remineralize the Earth***, Spring 1998. Considering all she did to spread the Earth Regeneration messages across all the tree-bearing continents, from grassroots village farmers and tree-planters to those holding responsibility in the “highest levels of government,” I wish to send Betsan the living vision of vast, healthy, sparkling green forests on remineralized soil, creating a renewed basis for the marriage of people and Nature to which she devoted herself. If we and those forests can sing out our gratitude, I trust that her great green heart, like John Hamaker’s, will hear.

“We received news that Betsan Coats died at her home in Queensland, Australia, in September 1997.

“Betsan had long been an outspoken advocate of remineralization. In the mid-1980s, she visited Perth, Western Australia, to urge Men of the Trees and any other groups interested to begin using quarry rock dust in their work in an effort to catalyze the enormous task of restoring the biosphere through remineralization. After the publication of John Hamaker’s book ***The Survival of Civilization***, she put all of her energy into promoting the book and particularly its message of both alarm and hope. She traveled widely visiting all of Australia, some parts of South America, Europe, India and the United States, spreading this message.

“Her ***Snowballing Plea to Save the World Environment*** sublimated the collected wisdom of E.F. Schumacher, Richard St. Barbe Baker, John Hamaker, Gernot Graefe, the Dalai Lama and others, and was widely distributed on audio cassette.

“Perhaps her greatest endorsement came from her son, Callum Coats, who surrendered his career in architecture to study and translate the work of Viktor Schauberger. ***Living Energies*** was published in 1996 and in it is glimpsed the fascinating world of bioenergy in which rock dust plays so important a role.

Betsan Coats was the first President of the Queensland branch of Men of the Trees, again underlining the closeness of remineralization and massive replanting of trees for the cause of planetary repair.

"For Betsan, tree planting and the promotion of remineralization were the essential practical responses to her deeply grounded belief in Theosophy which she and her late husband espoused.

"Betsan's flame has fired many followers and their growing number will carry the work forward in this largely unacknowledged science of Earth care."

Within Betsan Coats' ***Snowballing Plea To Save The World Environment*** packet we find this news from Austria's remineralization pioneer, Maria Felsenreich:

"The Save the Forest Fund in Austria is a pool of funds – 60% will be used for direct action to save the woods. The Viennese Woods will be the first. The media has informed people about what is happening to these woods. We have mixed up bags – one part Biovin (humus complex) and five parts rock dust, which people can buy at the entrance of the woods and carry with them on their Sunday walk. One bag is enough to remineralize five trees. They go out and they have yellow ribbons for each tree that has been remineralized. Everyone can participate, children, grandparents, the whole family."

"Arbor Day Celebration at Belmont Library" by Don Weaver (***Remineralize the Earth***, Spring 1996):

"Thanks to the fruit tree donations by Dave Wilson Nursery and distribution efforts of Peninsula Re-leaf/Magic Inc., another 2,000 fruit trees were placed into the eager and happy hands of San Francisco Peninsula school children who volunteered to 'adopt' them. This brings the total to about 22,000 trees over the past 6 years. I assisted librarian Cathy Cheek at the Belmont Library celebration where we gave away 80 trees with care instructions and, of course, a small bag of rock dust to help the trees off to a healthy start. We also had tree stories, skits and dances. I learned to appreciate trees (and children!) more than ever.

"We also did a special library planting of a dogwood tree with Ken Himes of Belmont Parks and Recreation leading the ceremony and most of Leslie Marx's dance troupe girls helping as much as they

possibly could. Such gleeful exuberance to give the dear tree friend plenty of rock dust (Spiral Stonemeal) so it would be well and happy, too. I can't help hoping such natural enthusiastic giving will eventually prove contagious and spread throughout the adult population, as it began to this day. And I hope the picture of the dogwood ceremony gives a glimpse of the sacred beauty of these moments of hope, action, regeneration and pure-hearted fun."

Children sprinkling, rock dust around a tree for an Arbor Day planting in Belmont, California, 3/6/96 (photo by Don Weaver)

Oberlin College professor David Miller from ***Remineralize the Earth***, Winter '91:

"I would like to report briefly on the results of analyses made on carrots grown on Bob Love's Minnesota farm. He had bought a load of gravel dredged from the nearby Mississippi River and had ground it himself, using a grinder provided by Konrad Ruckstall. It certainly qualified as being a mixed gravel of glacial origin. There was still some of it left on the ground, and it appeared to be very heterogeneous gravel. Bob generously provided me with several hundred pounds of the dust, which we dug and bagged for the trip

back to Ohio. I ran it through my series of screens and found that 90% passed a 115 mesh screen, and 67% passed through a 250 mesh screen, so it also scored very high on its fineness. …

"The carrots showed the following changes, reported as percentage of dusted soil carrots over controls: 33% increase in phosphorous, 8% increase in potassium, 10% increase in calcium, 0% change in magnesium, 50% increase in manganese, 25% increase in iron, 5% decrease in boron, 100% increase in copper, 41% increase in zinc, 200% increase in sodium."

In the same issue Keith Gray of Panorama Gardens, New Zealand similarly reports:

"After five years of experimentation with vegetables we know we can get a lot more production per square yard by treating the soil with a mixture of rock dust at the rate of 1 lb. of dust to the square yard or 2 tons to the acre. While this is very encouraging there have been times when we speculated on what effect this may have on the nutritional balance. In September 1988 we took the first steps on a 700 day journey to see if we could increase the mineral content of cereals by growing them in rock dusted soil. A similar trial is being carried out with carrots. The results in both cases have been most encouraging and they will continue. … The results from the graph indicate that the organic carrots had 100% more nitrogen, 50% more phosphorus, 50% more potassium, 33% more sulphur, 100% more magnesium, 66% more iron, and 100% more zinc."

"Flora-Stim" is another commercial rock dust mined from an ancient marine deposit in Mississippi which appears to be excellent at meeting the feeding requirements of soil microorganisms. The literature and video from its distributor (Strite's Warehouse, POB 128, Greencastle, PA 17225) is full of positive growth results in both quantity and nutritional value of crops, even though growers are only using about 200-300 lbs./acre. Reports include 200-300% yield increases, Brix readings (showing mineral and sugar solids) much higher such as 32 for corn next to 4 for adjacent chemically treated soil, much less insect/disease problems, drought resistance, etc. Another example from their literature:

“A fruit and vegetable grower in Florida who has been using our Flora-Stim program has had his oranges, watermelons, and cauliflowers tested by a professional laboratory and this is what they found:

His oranges contained
- 6 to 37% more juice per orange
- 37% thinner skin
- 78% less acid
- up to 30% more Vitamin C
- and 234% more minerals

His watermelons contained:
- 12.3% more Vitamin A
- 20% more Vitamin C
- 50% more Niacin
- 10.1% more Choline
- 47.5% more Sugar content
- 63.6% more Food Value in Mineral Content

His cauliflower contained:
- 218% more vitamin content
- 40% more Vitamin B2
- 183% more Niacin
- 50% more Food Value in Mineral Content

One more example:

“Peaches in an orchard in Delaware that were treated with Flora-Stim were half again as big as peaches in the same orchard but not treated with Flora-Stim. These peaches had a sweeter taste and more juice.” And back to our “lowly,” near-omnipresent microorganism we have:

“In a lab test, 1.0 gram Flora-Stim was held in 120 ml of sterile water for one week at 78 deg. F. in suspension. The suspension of the above was inoculated in nutrient agar for 24 hrs. at 78 deg. F. and gave a microorganism count of 10,200,000 per gram of Flora-Stim. To one gram there is 10,200,000 microorganisms, and there are more than 28 grams to an ounce, and 16 ounces to one pound. This totals 4,569,000,000 microorganisms per pound. All these are airborn microorganisms which are absolutely aerobic (needing oxygen).

These facts are taken from a discussion by Dr. R. Ozolins, and S. Trebolo, Agronomists."

After his retirement from the USDA, Senior Pathologist J. F. L. Childs of Orlando, Florida wrote a letter (11/15/83) to Azomite rock dust company founder Rollin Anderson summarizing some of Childs' rock dust experiments:

"You have asked for my opinion of the value of the mineral that you market under the name, Azomite, based on my research results. … Volcanic ash resembles moon rocks and moon rock dust in certain respects. One of the men (Charles Walkinshaw) formerly at our USDA Laboratory in Orlando did considerable research on the effect of moon rock dust on the growth of plants for NASA. He gave a seminar at the Station on his research results and ***reported fantastic growth of plants treated with moon rock dust in comparison with plants grown on a top grade fertilization schedule***. When I called NASA in Houston for published data from that research, I mentioned my results with Azomite. They were very interested and said that I would be hearing further from them. Washington State growers experienced similar results with the volcanic ash fall-out from the Mt. St. Helens eruption. These facts suggest the results that I obtained with Azomite on citrus trees. I enclose reprints of several of my papers on citrus Blight disease and Azomite.

A brief account of this strange disease is important to the understanding of certain peculiarities of Blight because (a) ***your Azomite corrects and controls it whereas previous to my experiments with Azomite, no case of recovery from Blight had ever been reported;*** (b) Blight was first reported in Florida in 1870 but is now recognized in ten foreign countries and in three other States in this country, and (c) because Blight is basically a nutritional disorder although a fungus is the 'hit man' or you might say, the accessory after the fact. A similar disease situation called 'short life' is widespread in peach trees in several States. ***A material that corrects or controls diseases of this type is just about worth its weight in gold to the agriculturist.***

The mechanism or etiology of citrus Blight disease is complex but briefly this fungus commonly lives year after year in the tissues of

citrus trees and passes from generation to generation through the seed w***ithout causing any disease symptoms***. Under certain conditions however, the fungus reverts from this symbiotic relationship and becomes parasitic***…***.

According to my findings, the condition that triggers this reversion to parasitism is the deficiency of certain minor or trace elements, so-called because they are required in very small amounts compared to the major elements, nitrogen, phosphorus and potassium. At present the identities of these trace elements have not been determined but I have reason to believe that several are involved, possibly five or six." [emphasis added]

"BRIX Testing, Or What You See Is Not Only What You Get!" by Yvonne Marie Rado – "Conducting growth trials using glacial dust can sometimes render surprises that seem disappointing. That was my experience during some recent testing of a newly acquired glacial dust.

"I planted wheat in six pots, each with different glacial dusts, and two pots without dust. Previous tests using lettuce and cucumbers yielded obvious differences between the subject glacial and other dusts and controls. Imagine my disappointment when the wheat test yielded eight stands of wheat with no distinguishable differences! So that the experience wouldn't be a total loss, I decided to chew the wheat of the subject glacial to drink its juice. One delicious bite led to another as I marveled at the sweetness of the wheatgrass juice. Then I got the idea to taste a control. It was bitter! Aha! I was on to something. I ran to get my refractometer (BRIX-meter) to take a reading of each stand of wheat I had tasted. The ratio of the index readings was approximately 4 to 1, test to control.

"My associate, Jon Biloon, had previously educated me to the idea that a higher BRIX reading meant a plant was healthier and, therefore, had resistance to pests and disease. … I have also noticed, time after time, that the test plots need less water than the controls. …

"Observable results using glacial dusts are always fun to experience and very gratifying. However, demanding dramatic results

immediately to justify using glacial dust overlooks Hamaker's thesis and the benefit of having food crops with an increased mineral content (both in concentration and number of minerals). Gigantism is not a guarantee of a healthy, nutritious plant. The BRIX level, as it relates to nutrient content of plants, is not accepted by all, but it does suggest that you could, indeed, be receiving more than meets the eye when using glacial dust! " (***Remineralize the Earth***, Winter '91)

"The Flowering of the Stone" by Meg Easling – "I came from a family of gardeners. I learned to garden, to raise my own herbs and vegetables from my mother and grandmother.

"On Earth Day, 1990, I saw the video, 'Stopping the Coming Ice Age,' by Larry Ephron, at the Ojai Foundation in California. It advised the use of rock dust, a full spectrum of natural minerals in natural balance, to remineralize soils that were depleted and contaminated by acid rain and chemicals. It made sense. ... The rock dust made my plants stronger against drought and freeze. We had both last year. It stimulated the growth of the secondary roots and the vigor of plant growth. But most of all, I found a superb difference in the taste of my vegetables. The vegetables that grow in the soil enhanced by rock dust are very tasty and delicious, like I remember vegetables to have been when I was growing up on the farm. I am convinced. My earthworms are convinced – they love the rock dust. I hope that farmers, gardeners and foresters everywhere start replenishing their soil with minerals – so finely ground that they are totally available for microbial and plant absorption. They are truly ready to flower into organic life." ***(Remineralize the Earth***, Spring '91)

Apparently, some in the leadership of the former Soviet Union shared some of Hamaker's sense of urgency in the late '80s, but did they completely overlook their great opportunity to shift production emphasis from military hardware to Earth Regeneration equipment including gravel grinders? Two late-80s articles revealed this chance to set an inspiring and potentially world-saving example of altering consciousness and technology from "killingry" to "livingry," as Bucky Fuller termed them:

"Soviets Urge U.N. Action On the Environment" – "The Soviet Union, warning that time is running out for saving the environment, urged the

U.N. General Assembly yesterday to quickly convene meetings to increase global cooperation on ecological issues. 'Both in significance and urgency, ensuring environmental security has become second only to eliminating the nuclear risk in the battle for the survival of mankind,' Soviet Deputy Foreign Minister Vladimir Petrovsky told a news conference.

"Petrovsky said atmospheric pollution, nuclear-waste dumping, soil degradation, desertification, burning of rain forests and climatic changes are among the biggest problems facing the world. … Petrovsky said regulations governing the environment should be universal because the biosphere 'transcends, both figuratively and directly, ideological differences.' " (***S.F. Chronicle***, 10/12/88)

"Soviet arms plants to make farm gear" – "About 250 arms-making plants will be restructured and included in a plan to produce machinery for growing and processing food, the official news agency Tass reported Monday." (***S.F. Examiner***, 1/3/89)

Through the 1980s and 1990s I've heard various estimates of how many farmers go out of business each week in the U.S., the range being from 500 to 2000. From ***Ecology Action Newsletter*** (11/97) comes "The U.S. is losing farmers at an alarming rate – 32,500/year nationally." Or 625/week who could be helped to remineralize and regenerate their farms and lives and lives of their families and communities and world in growing top-quality food and energy crops, multi-use crops like hemp, and of course the great variety of orchard and tree crops to re-green and revitalize the farm and the Earth. Let us recognize and transform a tragedy when we see one "in progress!"

I often mention to people that we need to mass-produce highly efficient gravel grinders like we produce cars for at least a few years until total grinding capacity is sufficient to meet global needs. The number of cars and trucks manufactured in the U.S. alone, virtually all of them designed to burn fossil fuels, is really quite astounding. From 'Vehicle Production to Grow': "Domestic automakers were scheduled to produce 252,195 cars and trucks this week, up from last week's 249,667, Ward's Automotive Reports said yesterday." (***S.F. Chronicle***, 5/13/88)

From “Acid Rain’s Dirty Business: Stealing Minerals From Soil” – “As ecological crises go, the damage done by acid rain had seemed pretty easy to fix. Just cut emissions of sulfur from power plants, and trees would again flourish and acidic waters return to their natural pH. But even though the United States, Canada, and European countries have cut sulfur pollution, forests, lakes, and streams haven’t bounced back as quickly as expected. The reason, scientists have suspected, is that acid rain has wrought profound changes in the soil, to which all these ecosystems are linked. Now, after looking over 30 years of data from a New Hampshire forest, researchers may have confirmed this hunch.

“On page 244 of this issue, ecologists Gene Likens and Donald Buso of the Institute of Ecosystem Studies in Millbrook, New York, and environmental engineer Charles Driscoll of Syracuse University report that over the past 30 years, acid rain has been leaching the soil in their study area of vast quantities of the base mineral ions that buffer, or neutralize, acids and are essential to plant growth. Given the rate at which these ions are still being depleted, they find it could be decades before the acid-ravaged ecosystems become healthy again. ‘Soils take hundreds to thousands of years to develop. If their chemistry is changed dramatically, it’s a major impact. It will take a very long time for them to recover,’ Likens says. … The findings suggest that the sulfur reductions mandated by the 1970 Clean Air Act and its 1990 amendments won’t be enough for ecosystems to recover, Likens says. … ‘Our view and that of soil scientists had been that soils were so well buffered that acid rain didn’t affect them in any serious way,’ Likens says. But even though the acid has abated somewhat [are they forgetting increased nitric acids from global forest fires, etc.?], its effects have lingered. Vegetation in the U.S. Forest Service’s Hubbard Brook Experimental Forest in New Hampshire’s White Mountains has nearly stopped growing since 1987, for example. …

“Comparing the loss rate with the total pool of calcium in the soil, estimated from 1970 and 1987 measurements, the group found something that ‘was very surprising to us,’ Likens says: The pool of calcium in the soil complex at Hubbard Brook has shrunk by more than 50% in the last 45 years. … The group’s conclusion also fits well with other observations, notes plant pathologist Walter Shortle of the

U.S. Forest Service. For example, Shortle's group reported in ***Nature*** last fall that because acid rain is no longer sufficiently neutralized by calcium and magnesium, it is releasing aluminum ions from minerals into the soil, where they are toxic to plants. … There may be faster ways to solve the problem, says Dave Grigal, a soil scientist at the University of Minnesota: Spread lime on forest soils, as some European countries have done. Shortle, however, says that may be too expensive in the United States. 'There isn't any quick fix,' he concludes." [If or when Walter Shortle sees his own yard trees sick and dying, will he re-consider quickly working with Nature to remineralize his soil, or will he stick with his conclusions and go fill up his chainsaw with gas instead? Those who think it "uneconomic" to remineralize and regenerate the Earth have yet to total up the full costs of failing to do so.]

Another ***Nature*** article, although ignoring the potentials for soil remineralization as well as the foundational role of soil microorganisms, may be noted here as a somewhat rare study of the links between soil minerals and organic matter/carbon storage. Four scientists from four universities authored "Mineral control of soil organic carbon storage and turnover" (9/11/97) which emphasizes how soils developing from freshly exposed rock materials with high surface area can best store, stabilize and build up carbon withdrawn from the atmospheric pool and moved into the soil organic matter. The authors focus on volcanic soils as found in Nature and say: "Volcanic soils undergo dramatic changes in mineral composition as they develop. Young volcanic soils are characterized by high organic content and an abundance of non-crystalline minerals ... which are the primary weather products. These relatively amorphous minerals have a high degree of hydration, extensive surface area, and variable charge. ... Non-crystalline minerals are metastable. Given enough time, they dehydrate to crystalline clays***…*** that have a lower surface area and charge density, and consequently a lower affinity for soil organic matter." This is another partial description of the weathering or demineralization process, and might have said ***the minerals become less useful to the microbial world in creating and sustaining soil organic matter***, but they seem to have agreed to exclude that virtually omnipresent world from their thought processes. (Would humans be thinking without the prior selfless foundational work of microorganisms? Not on this planet, so let us strive to think less

selfishly and anthropomorphically, more all-inclusively, wisely … even gratefully as well as compassionately and generously. Is there a more viable and sane way to employ this potentially great ability?) Let us consider the authors concluding sentence:

"The predictability of soil mineralogy, as it varies spatially as a function of climate and parent material and temporarily as a function of soil development (ref. 25, 26), means that an understanding of how minerals influence soil carbon dynamics should yield significant improvements to our understanding of the role of soils in the global carbon cycle."

And what is the role of humans on this living Earth ... and our optimal relationship to the soils, carbon cycle and whole Biosphere? Let's not forget to ask any of the most interesting questions, and to give the individual and collective answers as best we can.

The March 1997 ***Acres, USA*** article, "Paramagnetism Put to the Test" by eco-grower Malcolm Beck, included these important observations:

"Paramagnetic rocks and sand have shown more consistent results under more conditions than anything I have ever used other than compost. Paramagnetic rock and compost complement each other. They will work alone, but I have found each works much better when they are used together.

We blend a product using paramagnetic rock and sand, including zeolite, collected from four volcanic deposits, plus the addition of a high iron greensand to balance the minerals. We have labeled this blend "Volcanite. " It reads 2,000-plus on the PC meter. Below are some tests comparing Volcanite with controls.

Four tomato plants were planted in a raised bed containing Volcanite in the soil. Fourteen more tomato plants of same age and species were planted nearby in garden soil containing no Volcanite. All the plants were blooming and setting fruit when a late cold norther hit with a high wind, dropping temperatures well below freezing. All the leafed out trees, shrubs and other plants were severely damaged. All of the tomato plants were killed except the four in the soil containing Volcanite. This test is too good to be true. However, I can find no

other factor contributing to their survival. Those four plants were completely untouched as if a freeze never occurred. You can bet I will be trying to duplicate this experiment. Just think what this could do for the citrus industry if we can learn to give trees 3 to 4 degrees more cold tolerance, and at the same time have a natural supply of minerals constantly becoming available that could last for years from just one application of volcanic rock.

I have since done many other tests. Never was there a negative result. All tests, in pots or in the garden always showed better growth, less insect damage, and better color in the leaves and the blooms where Volcanite was used. The plants seemed to withstand stress of all types better.

Other people were given some of the Volcanite to try. Among them were a rose grower, retired County ag agent, a PhD, and a commercial native plant grower. All did tests against controls and all reported amazing results."

The package of literature from Trace Minerals Research of Ogden, Utah provides this quote from Dr. Alexis Carrel, Winner of the Nobel Prize in Medicine in 1912:

"Soil is the basis of all human life and our only hope for a healthy world. … All of life will be either healthy or unhealthy according to the fertility of the soil. Minerals in the soil control the metabolism of cells in plant, animal and man. … Diseases are created chiefly by destroying the harmony reigning among mineral substances present in infinitesimal amounts in air, water and food, but most importantly in the soil."

To return present CO_2 levels to normal interglacial levels (about 280 ppm), we need to support life to the extent of withdrawing about 90 ppm from the current ca. 370 + level. With remineralization of soils and inland waterways leading to the oceans, plus remineralization of old and planting of new forests and tree plantations, it may still be possible. These final two article excerpts show us again how Nature has previously done it with generous glacial and volcanic nutrient support systems:

"Ocean life in the ice age: Time to party" – "Given a choice between an ice age climate and today's balmy conditions, most residents of North America and Europe would opt for the warmer weather. But a fish or a whale might pick differently. Emerging evidence suggests that oceanic life enjoyed an extended bash during the last ice age, complete with plenty of nutritious refreshments and unbridled procreation, at least on a microscopic level**. ...** Higher nutrient concentrations during the ice age could help explain a persistent puzzle about the glacial world, according to Ganeshram and his coworkers. From studies of ice layers in Antarctica and Greenland, researchers know that atmospheric carbon dioxide concentrations dropped during the glacial period, weakening Earth's natural greenhouse effect. If a surfeit of nutrients fertilized marine plankton during the ice age, the plants would have sopped up carbon dioxide as they grew, thereby reducing atmospheric concentrations of this gas." (***Science News***, 9/2/95)

"Increased biological productivity and export production in the glacial Southern Ocean" – "Martin postulated that the biologically available iron [1 of 92+ associated with the 15- to 50-fold increase in deposition of dust, as recorded in glacial-age sections of Antarctic ice cores] could have relieved the iron deficiency that at present limits biological productivity and biomass. Martin further postulated that this relief from iron limitation enabled phytoplankton to consume nearly all of the nutrients that upwelled into Southern Ocean surface waters. … Complete consumption of nutrients in Antarctic surface waters, coupled with the export of biogenic detritus to the deep sea, would have effected the partitioning from the atmosphere to the deep ocean (as dissolved inorganic carbon) an amount of carbon more than sufficient to have caused the lower (by ~80 ppm) atmospheric CO_2 concentrations that existed during glacial periods."
(***Nature***, 12/14/95) [Drops as low as about 200 ppm.]

Paleoclimatologist Lonnie G. Thompson and co-workers have discovered further evidence showing the very "dusty" conditions of the glacial periods, this time by studying the ice cores taken from the Peruvian mountain glacier "Huascaran":

"In core samples dating from the final grip of the Northern Hemisphere's ice sheets, Thompson and his co-workers discovered a

bevy of dust particles that had settled on this peak. They reported last summer in ***Science*** that atmospheric dustiness was about 200 times higher during the last ice age than-during modern times." [More accurately described as the last glacial period and the current interglacial!] (***Scientific American***, March '96)

More on Reforestation and the Biomass/Solar Energy Conversion

"Even if I were certain that the world would end tomorrow, I would plant a tree this very day. "

– Martin Luther King, Jr.

In their Policy Options article "Reforestation" (March/April 1990 ***EPA Journal***), Robert Moulton and Kenneth Andrasko attempt to estimate the annual cost of offsetting U.S. CO_2 emissions through reforestation, without adding remineralization into the cost or increased health and growth into their calculating. Their figures rise to a maximum of 67 percent of emissions offset for the price of $19.5 billion. It appears that 100 percent would cost something under $30 billion. That would be somewhere in the range of about 3-5% of the annual military expenditure or the "health care" expenditure in the U.S. Those concerned with true national or world security and the positive dynamic health available to humanity in a healthy interglacial Biosphere will see how much more is called for from all the debates and proposals for "balancing the budget."

Let us be quite clear about the important fact that we humans – now over 6 billion of us and for now still rising – are physically and technically quite capable of reforesting the Earth. Aside from the spontaneous afforestation/reforestation that will occur as soils are remineralized and bioregions are no longer greedily "vandalized" and mined as at present, and also aside from the vast areas that could be simultaneously remineralized and re-seeded with tree seeds (as well as specially designed tree seedling "bombs" incorporating gravel dust), let us consider the potential of a concerted effort to plant tree seedlings.

Charles Peaty of All Forest Tree Services (8 Clive St., West Perth, W.A. 6005, Australia) is one of the many people who have developed machines to assist in tree planting. His enables 2 people to plant 500 trees/hour. In an 8-hour work day those 2 people could plant 4000 trees. In a 5-day work week they could plant 20,000 trees. In a 50-week work year the 2 could plant 1 million trees. Not enough trees. 2000 tree planters could plant 1 billion trees/year. 20,000 could plant

10 billion trees/year. 200,000 could plant 100 billion trees. Therefore only 1 million people, simply working “normal business hours,” could in less than a year add 500 billion trees to the Biosphere’s land surface! One million people out of 6 billion + means just one of 6000 employed as tree planters. Michael Pilarski of Friends of the Trees calculates that to reach a goal of reforesting 5 billion acres at an average of 300 trees/acre we will need to plant 1500 billion trees.

Therefore, 3 million planters would be needed at the 500 trees/hour rate to get in the 1500 billion tree seedlings on 5 billion acres. ***If we started now we could have those 5 billion acres reforested in one year!*** About 5,997 of every 6,000 people would remain to care for the other essential tasks of remineralizing the soils to support the trees and revitalize the agricultural soils and crops and consumers, remineralizing remaining forests, building the new ecologically-supportive technologies and infrastructure of Earth Regeneration (transforming or retrofitting current systems and equipment designed for the Earth-exploiting era) and the peaceful Solar Age mandated by Nature and fully supported by the deeper human conscience and Intelligence.

Recognizing the planetary need for positive transformation and regeneration makes it clear that world “unemployment” could end almost immediately, and “mal-employment” in ways of work out of alignment with ecological sanity could disappear as soon as we all learn how to cooperate in understanding of “the greater good” of Whole Earth Health, Balance and Happiness/Harmony. If this makes sense let’s get started on completing the “PR” work we’ve been growing towards for about 10,000 years: Personal Responsibility for Planetary Regeneration. Right, we are all the Public and our Relations with each other and all life can be healthy and mutually supportive, liberating all into our natural interdependence. Daily Plantings of “Reverence for Life” are also needed from each of us, obviously!

As you keep in mind the above considerations please remember how urgent the need remains for production of gravel grinders, tree planting machinery such as the All Forest Tree Services planter mentioned above (a worldwide inventory would show how many?), and of course the billions and trillions of tree seedlings to be planted.

Another figure is given by Dr. Michael W . Fox in his valuable book ***Eating With Conscience*** (1997):

"Since around 1985, the plight of small farmers and ranchers has intensified. Between 1985 and 1990, more than 425,000 family farms have gone out of business."

John Hamaker has suggested solar/biomass powered steam engines as perhaps the optimal way to grind gravel, run cars, etc. I don't know whether the engineers at Australian National University are responding to the TSOC messages or are independently using their own as yet uncommon sense, but I received a brief article on their work, "ANU builds solar-powered steam engine":

"Engineers at the Australian National University have developed a small, highly efficient steam engine that can be driven by solar energy or heat from burning wastes. The steam engine, based on an inexpensive standard diesel engine block, could provide low-cost power to villages in developing nations, or could allow companies in industrialised nations to cut costs by generating electricity from their wastes [or tree plantation/biomass crops]. The engine is more efficient than any small steam turbine and, according to Professor Stephen Kaneff, of the school of engineering physics, ANU engineers hope to make it even more efficient by using valve components made of the Australian-developed ceramic, partially stabilised zirconia. In its present form, the engine could operate at about 500 degrees celsius and at pressures up to 70 atmospheres. Ceramic components could improve these figures to 800 degrees celsius [running cooler may be wiser] and 140 atmospheres, making the engine about 50 percent more efficient." (***Melbourne Age***, 7/11/87)

Fred Koomanoff is the Director of DOE's CO_2 Research Division. At an October '87 hearing in Congress on climate and the greenhouse effect, ***Soil Remineralization*** editor Joanna Campe asked him (between formal testimony periods) what he thought of shifting to tree-plantation energy in response to the CO_2 buildup. Koomanoff's response: "That's the way to go." [Yes, but in a time frame that is meaningful? ? ? ! ! !]

With its huge potential to help reverse erosion, deforestation, CO_2 buildup, loss of family farms and overall rural-and-urban degeneration, you would think an allegedly progressive country like America would throw its support behind not only organic-remineralized agriculture and forestry but industrial hemp growing as well. Unfortunately, as of July 1999, the former practices are still in the stage of being pioneered by individuals and small groups/organizations, while the latter remains "illegal." Perhaps Canada's wise change of thinking will inspire like changes south of the border. From ***Co-op America Quarterly*** (Fall '98), the report "Canada legalizes hemp":

"After a 60-year prohibition, the Canadian government in March permitted farmers to grow industrial hemp nationwide. Hemp has been touted as the world's wonder fiber, a crop that grows easily, is naturally resistant to disease, and has tremendous strength and durability.

"Though its uses vary from clothing and paper to medicine and automotive parts, both Canada and the U.S. banned farmers from growing it in the late 1930s, at the same time that its cousin, marijuana, was outlawed, even though industrial hemp is nonnarcotic. 'This new crop has a tremendous potential for creating new jobs in agriculture, industry, research and retail,' said Canadian Health Minister Allan Rock." [Consider the synergistic potential of Rock, hemp and rock dust. I trust he will do so soon.]

John Hamaker called for an all-out transition to CO_2-withdrawing biomass energy sources such as methanol from new fast-growing tree plantations on well-remineralized soils starting in the late 1970s in order to reverse the CO_2 curve. 20 years later about 3% of U.S. energy use is from biomass. 20 years of growing weather and climate extremes and the related curses of fossil fuel and nuclear energy addiction have at last apparently prompted a new Clinton Administration "initiative" to begin a biomass transition. Unfortunately the initial reports give no indication it is based on soil remineralization and suggest that without a much greater rapid expansion and commitment to solving the entire eco-climatic and food-health crisis, it will prove "too little too late." Here are some excerpts from the ***Reuters*** and ***AP*** news service reports of 8/12 and 8/13/99 found on

the internet website dailynews.yahoo.com and titled “Clinton Orders Step-Up In Crop-Energy Development,” “Clinton Pushes for Cleaner Fuel,” and “Clinton Orders More Work On Turning Crops To Fuels”:

“President Clinton Thursday stepped up a federal push to develop ways of turning crops and trees into energy sources, aiming to triple the amount of fuels and other products derived from such sources by 2010. ‘Bioenergy and bioproducts have enormous potential to create new economic opportunities for rural America, enhance U.S. energy security, and help meet environmental challenges like global warming,’ the White House said in a statement. ’By creating high-tech jobs and new economic opportunities, meeting the president’s goal of tripling U.S. use of bioenergy and bioproducts could add $15 billion to $20 billion in new income for farmer’s and many rural communities,’ it said. Clinton was to highlight his new efforts with a speech at the U.S. Agriculture Department Thursday. An executive order issued by Clinton Thursday established a research council consisting of the heads of the Agriculture and Energy departments, the Environmental Protection Agency, the National Science Foundation and other agencies. The council will annually propose a detailed research program for biomass projects, which aim to produce fuels such as ethanol or other products from crops, trees and agricultural and forestry wastes.

“Clinton cast the initiative as both a security issue and a crucial stroke against global warming. ‘If we can make the raw material of tomorrow’s economy living, renewable resources instead of fossil fuels, which pollute the atmosphere and warm the planet, the future of our children and our grandchildren, the likelihood that there will be more prosperity and peace – all that will be far greater,’ he said.

“Supporting the initiative were two key farm-state senators who have legislation of their own promoting ‘biomass’ development. ‘We must press forward with creative, high-tech solutions to counter the world’s finite supply of traditional energy sources,’ said Sen. Chuck Grassley, R-Iowa. GOP Sen. Richard Lugar of Indiana, chairman of the Senate Agriculture Committee, added: ‘We are only at the beginning of a revolution in biotechnology that will lead to more efficient use of the world’s resources, enabling ecologically sustainable growth.’ … Vice

President Al Gore unveiled the plan in Iowa, where he has been campaigning for the Democratic presidential nomination*. …*

"President Clinton Thursday stepped up a federal drive to use crops, grasses and trees to develop motor fuels, electricity and industrial products, aiming to triple their use by 2010*…*. 'Believe me, if the technology develops fast enough, it would be easy to beat this goal,*'* Clinton said at the Agriculture Department, where he signed an executive order to put federal muscle into the job." [Then why not set the goals in accordance with ecological reality and our human potential to regenerate the Earth? !]

From "Mideast Oil Forever?", April 1996 ***Atlantic Monthly***:

"Consider biofuels. … This and other federally supported research has brought the cost of making ethanol from $3.60 a gallon fifteen years ago to about $1.00 a gallon today. If biofuels R&D were funded at current levels for five to ten years, ethanol from fast-growing dedicated crops, crop waste, and wastepaper could be produced for as little as sixty to seventy cents a gallon by 2005*…*. Technologies are also being developed to make possible a superefficient hybrid vehicle that has both an internal-combustion engine and some kind of energy-storage device, such as a battery or a flywheel. A very advanced hybrid has been described by Amory Lovins and L. Hunter Lovins (see "Reinventing the Wheels," January, 1995, ***Atlantic***). Supporting technologies include lightweight, superstrong materials and advanced engines, among other things. This research has been undertaken by the Partnership for a New Generation of Vehicles, a collaboration among several federal agencies, the DOE's national laboratories, and the auto industry. The goal of the partnership is to design and construct by 2004 a prototype clean car that has three times the fuel efficiency of existing cars and very low emissions, and also comparable or improved performance, safety, and cost. Such a car would allow domestically produced advanced technologies to replace oil imports*. …*

"Indeed, in the past fifteen years the Department of Energy, working with the private sector, has reduced the costs of electricity from biomass (such as crops and crop waste) and wind, bringing them into

the current range of wholesale costs for coal and other traditional sources of electricity: three to five cents per kilowatt-hour. …

"Some of the most pressing national needs in the coming decades [days] are to reduce the country's huge and growing trade deficit in oil, to minimize any economic or political threat that might arise from the growing world dependence on Persian Gulf oil, to prevent pollution, to avoid irreversibly changing the global climate, and to capture a large share of the enormous potential market for energy and environmental technologies. Remarkably, a great many of the same R&D investments can simultaneously achieve all these ends while cost-effectively reducing the energy bills of businesses and consumers. Equally remarkable, Congress demonstrates an overwhelming desire to gut the funding for investments by the energy-efficiency-and-renewable-energy program, although it costs Americans only $4.00 per person a year.

"Nothing is clearer to those who study the matter than that the world is on the verge of a revolution in energy and environmental technologies – a revolution made possible by more than two decades of U.S. government investment. This revolution can be expected to create a number of industries that collectively will provide one of the largest international markets and one of the largest sources of new high-wage jobs in the next century, with annual sales in excess of $800 billion.

"Yet just as our foreign competitors are starting to catch on to the major trends in this American-led revolution, Congress wants to pull the federal government out of every relevant technology, leaving America on the sidelines, perhaps for good. Only a misbegotten ideology could conceive a blunder of such potentially historic proportions." [If you have a representative or more in the U.S. Congress, you may want to discuss all these topics with them.]

Another biomass technology possibly available now to speed the solar/biomass energy transition ***may*** prove a "worldsaver" and demands our in-depth investigation and, ***if workable and true***, probably our strong support as well. I'll quote a little from the company's July 1998 "Special Advertorial Feature" and encourage readers to contact them for further info:

"In the Middle Ages, men were always trying to turn something common into something precious*...* like lead into gold. It was called alchemy. Of course, we now know that's nonsense. It can't be done. Right?

"Actually, wrong. A small company, DynaMotive Technologies Corporation, has discovered a modern alchemy that really works. Using its BioMass Refinery, DynaMotive can convert 100 pounds of organic waste into 70 to 75 lbs. of environmentally pure crude oil in FIVE SECONDS. … Garbage such as farm manure ... straw … sugar cane waste ... sawdust ... bark ... anything natural is usable. Garbage into oil, with nothing added – hard to believe, isn't it? But there are more breakthroughs.

"The potential for DynaMotive's patented discoveries are so mind-boggling – socially beneficial, too – they're attracting official attention. The U.S. and Canadian governments are financially backing the company with millions of dollars. The European Union is also getting financially involved.

"Remember, this is not recycling (i.e., converting old newspapers into new paper products). This is about turning natural waste into entirely new products ... and doing it profitably. Do you see? Modern alchemy. Thomas Edison would have loved DynaMotive. The old wizard was always searching for practical solutions to everyday problems – finding discoveries where no one else thought to look ... always defying the conventional wisdom."

I received a large information packet from this company through: Communications Director, DynaMotive, 3650 Wesbrook Mall, Vancouver, B.C. V6S 2L2, Canada. Ph: (604) 222- 5590. Website: www.dynamotive.com. I've sent them TSOC and asked them to respond to it in their work; perhaps you could do the same or more.

Excerpts from another article, "Car can go 280 miles powered by fuel cells," further shows the technological feasibility of freeing ourselves from petrochemical addiction and on to biomass-based technologies such as methanol fuel as recommended by Hamaker:

"DaimlerChrysler has built a compact car powered by fuel cells that seats five people, goes 280 miles before refueling and travels as fast as 90 mph. The concept car, called Necar 4, is the latest demonstration of progress on fuel cell cars as the world's automakers continue their race to bring such cars to market by 2004. Fuel cells convert hydrogen and oxygen into electricity to power a vehicle. … DaimlerChrysler officials said the concept car would be replaced with Necar X, which would run on methanol. Methanol contains hydrogen and is the auto industry's favored fuel to power fuel cells. Nationwide use of methanol-powered fuel cells would require a network of methanol pumping stations." (***San Mateo Times***, 3/17/99 via ***AP***)

Is the world finally reaching the time when global ecological regeneration work will include the constructive mobilization of the military as urged by Hamaker, St. Barbe Baker and others? It seems possible in reading "Corps plans $7.5 billion remedy for Everglades ecological repairs!" (***San Mateo Times***, 6/18/98) Excerpt:

"The U.S. Army Corps of Engineers is putting the finishing touches on the most expensive environmental restoration ever undertaken: a $7.5 billion effort to undo the damage the Corps did decades ago when it drained Florida's Everglades." Stuart Strahl, director of the National Audubon Society's Everglades restoration office backs the plan: 'We think it's the most important proposal in the country right now. It's going to set precedents all around the world.' "

U.S. Secretary of State Madeleine Albright said the following in her Keynote Address to the 1994 Symposium for the Environmental Defense Fund on The Global Environment: International Issues and Institutions:

"***…*** It's no secret that the Clinton Administration has a fundamentally different philosophy than its predecessors. We believe that America should be the world's environmental leader, not foot-dragger. We believe environmental awareness is a prerequisite to, not an obstacle to, economic growth. We believe that environmental degradation is not simply an irritation, but a real threat to our national security.

"During the Cold War, we mobilized against the risk of nuclear Armageddon. The environmental risk is not as spectacular or as sudden. It does not focus the public's mind in quite the same way. But left unaddressed, it could become a kind of creeping Armageddon. It is both a product of, and a cause of, social disintegration. It is making uninhabitable increasing chunks of our planet. And it could, in time, threaten our very survival.

"International cooperation on the environment is no longer an option; it is an imperative. The lines we draw on maps matter less and less. The forces that now shape our lives are global and interlocking. That is why sustainable development is not an economic policy or an environmental policy or an education policy or a health policy – it is all of those things and more." (4/21/94)

John J. Berger, author of ***Restoring the Earth*** (1985) and ***Charging Ahead*** (1997) was interviewed by science writer Charles Petit in a ***S.F. Chronicle*** article, "Getting Resourceful About Energy" (10/26/97). He helps put in perspective where we are in this fossil fuel-powered game of pushing Nature and the Earth's climate and life-support system to the brink of irreversible catastrophe. Referring to the U.S., he says:

"We are 93 percent reliant on nonsustainable fossil fuel and nuclear energy. Our cars and trucks depend on petroleum for 97 percent of their energy. So we're not doing too well. We get 57 percent of our electricity from coal, and this creates a tremendous environmental burden on the Earth, in terms of releasing carbon and other negative environmental impacts that lead to acid rain, air and water pollution. …

"Time is not on our side. We know the preponderance of environmental impacts from those carbon releases will be adverse. There will be devastating effects. … We have a plethora of nonpolluting energy technologies that are either carbon-free or carbon-neutral. If we were to use these, we would make available to the U.S. economy millions of dollars' worth of clean, nonpolluting, renewable resources – money that is being sent overseas to support dictatorial regimes in volatile parts of the world like the Middle East and, apparently in the near future, the Caspian Basin. ... We spend

$56 billion importing oil from abroad and $65 billion a year importing oil and natural gas. Over a decade, you're talking about $650 billion. If we were to use domestic biomass resources – which can be thermochemically and biochemically converted to gaseous and liquid fuels and electricity – for our transportation fleet, we would be recycling hundreds of billions of dollars through the domestic economy, creating new industries and jobs."

Let's note here the ongoing farm and rural community crisis and how growing biomass energy crops on remineralized soils can hugely help transform and rejuvenate the rural "sector." Before the 10/2/98 Farm Aid Concert in Chicago it was announced by singer Willie Nelson that 500 farms per week are still "going under"! A little more from Berger:

"We've also not given the renewable technologies credit for the domestic economic stimulus they would provide – through the multiplier effect of dollars invested here and the new jobs and clean environment. For the first time in the history of industrial civilization we have the capability to create a clean energy economy, a clean industrial sector. And we're not doing it. We're trifling with these technologies.

"If you look at the money that's spent for research and development for the whole United States on all renewable energy technologies, it was $266 million in 1997. That's a trifle for a nation with a $7.6 trillion gross domestic product. We ought to be spending tens of billions of dollars to begin rebuilding our energy infrastructure."

It ought to be obvious, although apparently it isn't to what Hamaker called the 'Demopublican' supposed political leadership, that the vast number of very important and inherently meaningful work positions which a serious solar-biomass energy and Earth Regeneration effort would create, would also eliminate much of the crime and despair of urban and rural poverty. Ted Turner or someone just might be inspired to create a 24-hour Good News Channel as unnatural acts of madness and desperation dwindle and natural acts of human goodness and generosity are enabled to flourish. (Why not get it started now, Ted, and send out the reporters who can find the rising tides of health, beauty and goodness?) Not long after ***The Survival of Civilization*** was first published, I reported in an early ***Bulletin*** on the

S.F. Chronicle article (4/25/83), “Record Rise in U.S. Prison Population” which noted: “The number of prison inmates in the U.S. grew by a record 42,915 in 1982 to reach an all-time high of 412,303, the Justice Dept. said yesterday.” Fifteen years later (8/3/98) we pick up the ***Chronicle*** for another update in “Record Population in U.S. Prisons”: “The U.S. prison population increased by more than 61,000 inmates last year to a record of nearly 1.25 million state and federal prisoners, the Justice Dept. reported yesterday.” The next time you hear a ‘Demopublican’ calling for “more prisons” and “more police” you might suggest the addressing of some primary causes for a ***change***.

And ask what they think of this quote from an author unknown but not unappreciated:

“Man’s presence should be the source of spreading paradise, not spreading deserts.”

More on Soil and Health, Our "100% Junk Food Supply", and the Human Self-Poisoning Crisis

"When health is absent, wisdom cannot reveal itself, art cannot become manifest, strength cannot be exerted, wealth is useless and reason is powerless."

– Herophilus

From my Summer 1995 ***Remineralize the Earth*** book review of ***Electrolytes: The Spark of Life*** by Gillian Martlew, N.D. (Nature's Publishing, 1995):

"Naturopathic Dr. Martlew is one of a growing number who has understood some of the key reasons why we must remineralize the soils.

"Further addressing the soil-health connection, she states: 'In U.S. Senate document number 264, written in 1936, it says "Sick soils mean sick plants, sick animals, and sick people." Today, after nearly six decades of continuing to sicken and deplete the soils, degenerative disease is at an all-time high. The U.S. now ranks at the same level as Third World countries with respect to health. And the $750 billion or so that is spent on health care annually in this country has done nothing to prevent Americans ranking 17th in the world in longevity, 19th in general health and 23rd in infant survival, according to W.H.O. figures.'

"The book discusses many specific health and behavioral problems known to heal with restoration of trace element balance and healthful living, such as cardiovascular disease, cancer, immune system (or health system) weakening and hyperactivity in malnourished children. The dangers of eating refined sugars and other products deviating from our biological-ecological norm of whole natural foods are pointed out with an emphasis on the great trace element drain to our body's reserves when it is required to metabolize and eliminate such 'foods.' Virtually any stress or over-indulgence can deplete mineral, vitamin and other nutrient stores, hence soil and dietary deficiencies can in short order prove a "recipe for disaster." John Hamaker has pointed out how the disaster can be a shared global experience!"

S.F. Examiner Science Writer Keay Davidson wrote the story (5/25/92) “Malnutrition figures for U.S. nonexistent” – subtitled “Government has virtually stopped gathering data on illnesses related to deficiencies in diet”. The opening paragraphs:

“You can open slick magazines and see the sad faces and distended bellies of starving kids in Third World nations. But just try to get reliable hunger and malnutrition statistics for the entire United States. You might as well ask the Pentagon for the blueprint for the neutron bomb.

“And that makes it hard to answer the crucial question: How seriously is malnutrition affecting the health of Americans, especially children?”

Most health-conscious people in this country have been saddened to both see and to read about the ongoing tragedy of malnutrition and health degeneration for all ages and income levels. Those who’ve read Price’s ***Nutrition and Physical Degeneration*** and ***TSOC*** will understand how and why this could have happened. More powerful evidence showing how advanced the soil-and-food demineralization crisis has become is found in Paul Bergner’s 1997 book, ***The Healing Power of Minerals, Special Nutrients and Trace Elements*** (Prima Publishing). Those of us not yet convinced that we’ve been robbing and laying to waste our soil foundation, crippling its marvelous capacities to provide us complete and delicious health-supporting produce, should have their thinking revised by its important factual evidence. Thanks to Paul Bergner for offering to us this well-written wake-up call for a positive revolution in agricultural and nutritional practices. (Since being informed of the current worldwide ***Remineralize the Earth*** movement, Paul is further activating his deep concern by helping inform others via the Internet. Can you do so as well?)

I want to give you at least these short excerpts to help clarify the value of ***The Healing Power of Minerals***:

“These facts about the effects of modern commercial agriculture on the nutrient content of plants have been known for decades. Actual measurements of the changes in nutrient content of foods over time

are much harder to find, however. Searching the computer archive of the National Library of Medicine in Bethesda, Maryland, dating back to 1966, I was unable to find a single article tracking such changes. Other references described the problem in general, but none contained comparative data. Tables 3.7 through 3.12 give some comparisons for major categories of farm products. The data in the charts compares U.S. Department of Agriculture data from an out-of-print 1963 book with USDA information now available on the Internet. [See book for all tables.] ...

"Table 3.7 shows the changes in the nutritional value of some fruits. All the nutrients except potassium and vitamin C have declined consistently. Potassium is added to fertilizers. … The vitamin content of fruits and vegetables varies widely within a season depending on when they are picked. Vitamins are also less susceptible to loss than minerals because the plant can make its own vitamins but must take minerals from the soil. Despite this, the vitamin A content in the three fruits [oranges, apples, bananas] declined by 66 percent. That means you'd have to eat three pieces of these fruits to get the same amount of vitamin A you got from one piece in 1963. Of the minerals, the trace element iron took the biggest hit, with a 57 percent decline. This is an ominous sign, because the other eighteen essential trace elements may have followed the same pattern. (p. 58) [On p. 3 the author gives an updated list of the known and probably still growing "Thirty-One Minerals Beneficial to Animal Life."] ...

"Leafy green vegetables are promoted in virtually every nutrition book as a good source of calcium, but they may not be anymore. The calcium content of the five greens in Table 3.9 has dropped by 46.4 percent in the last generation. If we exclude iceberg lettuce – which is not a very good source of calcium anyway – the average drop is 57 percent. Collard greens, originally the highest source on the list, have lost more than 85 percent of their calcium. Again excluding iceberg lettuce, the iron content of all the greens has dropped an average of 41.5 percent, perhaps indicating a similar decline in the other essential trace elements. (p.61) …

"So the bad news is that the 1992 entries in this chapter – dated according to the most recent USDA publication – may actually contain much older data. The food you buy in the store may have

nutrient content even lower than the most recent figures in my tables. The data on fruit may come from 1982, vegetables from 1984, beans from 1986, and so on." (p. 67)

In this same chapter, "The Food Chain Broken: The Crisis in Modern Nutrition," Bergner compares mineral content data from Dr. Henry Lindlahr from 1914 which shows even more dramatically the great decline over these decades of soil mining. His Table 3.15 is reprinted below.

TABLE 3.15 DECLINE OF MINERAL CONTENT
IN SOME VEGETABLES, 1914-1992 (PER 100 GRAMS)

	1914	1948 (average)	1992
Cabbage			
Calcium	248.00 mg	38.75 mg	47.00 mg
Magnesium	66.00 mg	29.60 mg	15.00 mg
Iron	1.50 mg	5.70 mg	0.59 mg
Lettuce			
Calcium	265.50 mg	38.50 mg	19.00 mg
Magnesium	112.00 mg	31.20 mg	9.00 mg
Iron	94.00 mg	26.25 mg	10.50 mg
Spinach			
Calcium	227.30 mg	71.75 mg	99.00 mg
Magnesium	122.00 mg	125.40 mg	79.00 mg
Iron	64.00 mg	80.15 mg	2.70 mg

(Source: ***The Healing Power of Minerals*** by Paul Bergner, Prima Publishing 1997)

Although not showing any comparisons of remineralized foods with conventional, he does note one study showing organically grown foods averaged about twice the mineral content of chemically forced foods when analyzed for 26 minerals. So even if one hasn't access to some or all mineralized food, it again appears wiser to support current organic growers even as we encourage them to incorporate generous soil remineralization into their soil-and-health building

foundation. And when possible, why not give yourself and others the gift of homegrown mineralized produce at its freshest and most nutritionally wonderful?

There is much more of value in this 312-pg. book including information on the essential and intricate functions of the increasingly researched minerals, as they circulate in and build the human body and brain. The last excerpt I'll share before you perhaps rush off to find ***The Healing Power of Minerals*** provides more important evidence supporting Hamaker's warnings:

"Because the initial nutrient deficiencies have not been addressed, the diseases progress to the organic stage. The first to appear is usually obesity. Since 1980, the percentage of the population classified as obese has increased from 25 percent to 33 percent. … Many children suffer from obesity and other early stage organic diseases before they are old enough to enter school." (p.193)

More about demineralization, malnutrition, man-made chemicals, cancer, etc.

As an intelligent human being, please see what you can learn from the following:

"Next year, 108,000 women will learn they have breast cancer, and 35,500 will die of the malignancy. Also in 1980, the [American Cancer] society estimated, 785,000 Americans will learn they have cancer and there will be 405,000 cancer deaths – 54 percent among males." (***S.F. Chronicle***, 11/7/79)

"Some 855,000 Americans will learn this year they have cancer and the disease will kill an estimated 440,000, or 9,000 more than last year, the American Cancer Society predicts." (***AP***, 1/14/83)

"Remember when the American Cancer Society was saying that one of every four Americans would develop cancer in their lifetimes? Here is their 1985 projection for children entering this world: 'One of every three people born this year eventually will develop cancer too. … ' 'The National Cancer Institute has published an estimate based on

data from 1973 to 1977, saying anyone alive at that time had a 30 percent chance of developing cancer by age 75. The cancer society says a 30 percent figure means that about 71 million Americans now alive will have cancer someday. The society recently estimated that about 462,000 Americans will die of cancer this year, accounting for one in five deaths in the nation." (***San Jose Mercury-News***, 2/14/85)

"The number of Americans who will learn they have cancer this year will surpass the million mark for the first time, and more than 500,000 will die from the disease, the American Cancer Society said Friday" (***San Mateo Times***, 2/18/89)

And in 1998, the "Call to Action" mailing from the Radiation and Public Health Project (305-993-5140) gives more recent figures:

"Each year nearly 1,400,000 Americans are diagnosed with cancer! Each year 560,000 Americans die of cancer – compared to 41,000 annual deaths from AIDS. Cancer is our deadliest national killer, taking 1,500 lives a day." The radioactive pollutants they fight against are of course one of the unleashed causes which our wisdom should lead us to contain to the maximum possible.

From Cecile Andrews' 1997 book ***The Circle of Simplicity: Return To The Good Life*** (Harper Collins):

"It is not only people who are suffering. The earth is dying. Perhaps our despair is a reflection of the dying earth. We see the link most directly in statistics on cancer: in 1900, one person out of thirty-three got cancer. Now it is one out of three."

Peter Montague, editor of the excellent ***Rachel's Environment & Health Weekly*** (www.rachel.org), gives us a good short review of Sandra Steingraber's 357-page book, ***Living Downstream: An Ecologist Looks at Cancer and the Environment*** (Addison-Wesley, 1997). It is published in ***YES! A Journal of Positive Futures***, Winter 1997/1998. Excerpts:

"In the U.S., the cancer epidemic has been progressing steadily. In 1950, 25 percent of adults in the U.S. could expect to get cancer

during their lifetimes; today about 40 percent of us (38.3 percent of women, 48.2 percent of men) can expect to get cancer. …

“Steingraber cites the following evidence as indications that certain chemicals (and radiation) can cause cancer:

* Immigrants soon exhibit the cancer rates of their adopted countries, rather than the cancer rates of the place where they were born.

* Maps show more cancers in urban than rural areas.

* Maps show more cancers in rural counties with heavy pesticide use than in those with low pesticide use.

* Individual studies reveal cancer clusters near chemical factories and near particularly polluted rivers, valleys, and dumps.

* Rates of childhood cancers are rising. The lifestyles of children have not changed much in 50 years; they do not smoke, drink alcohol, or hold stressful jobs. Yet childhood cancers are steadily rising***. …***

* Studies show that chemicals can damage the immune system and the endocrine system, promoting cancers.

“ ... Yet many scientists and policy makers exhibit a hushed complicity, afraid to speak out about what they themselves believe to be true: that cancer is caused by exposure to carcinogens and that enormous suffering could be avoided if we would reduce our exposures to cancer-causing chemicals in air, water, and food.

“Steingraber says we will have to adopt a new way of thinking about chemicals. ‘This requires a human rights approach,’ she says. ‘Such an approach recognizes that the current system of regulating the use, release, and disposal of known and suspected carcinogens – rather than preventing their generation in the first place – is intolerable.’ Such a practice shows ‘reckless disregard for human life.’

“And: ‘When carcinogens are deliberately or accidentally introduced into the environment, some number of vulnerable persons are

consigned to death. The impossibility of tabulating an exact body count does not alter this fact.' "

The S.F. Bay Guardian published "Not fit to print?" on the most underreported news stories of 1998, as evaluated by Project Censored at Sonoma State University since 1976 (choosing not to investigate the very underreported Hamaker Thesis). Number 2 on its top ten list for 1998 (3/24/99) is "Chemical corporations profit off breast cancer" and it summarizes the research of Peter Montague in "The Truth about Breast Cancer" (***Rachel's Environment & Health Weekly***, 12/4/97) and "Profiting off Breast Cancer" by Allison Sloan and Tracy Baxter (***The Green Guide***, 10/98). This summary fits in well with our concerns here:

"Every October the sponsors of National Breast Cancer Awareness Month roll out a massive publicity campaign encouraging women to have their breasts x-rayed. The message of activities such as the Race for the Cure is a simple one: breast cancer can be beaten by pouring money into research and by getting regular mammograms.

"Official propaganda for Breast Cancer Awareness Month never mentions the environmental causes of the disease. Breast cancer rates have crept up by 1 percent a year since 1940 – a period in which tens of thousands of new chemicals have been introduced into the environment.

"That's bad news for women. But it's good news for the chemical and technology companies that sponsor Breast Cancer Awareness Month.

"The event was founded in 1985 by British multinational Imperial Chemical Industries, now known as Zeneca Group. The firm manufactures Nolvadex, the drug most often prescribed for breast cancer, and runs 11 cancer treatment centers in the United States. The company also makes acetochlor, a pesticide thought by the EPA to cause cancer.

"Many of the event's other sponsors also profit from cancer. General Electric makes mammography machines, and Du Pont makes the film used in those machines. During Breast Cancer Awareness Month,

younger women are encouraged to get screened by those machines regularly – although exposure to X rays, including those used in mammography, increase their chances of contracting breast cancer.

"You're unlikely to learn that from Breast Cancer Awareness Month publicity though. Zeneca has veto power over any material used to promote the event. For more information contact the Toxic Links Coalition at (415) 243-8373, ext. 305."

"Childhood Handicaps on the Rise" – "More children than ever in the U.S. are being born with some type of physical or mental handicap, according to a number of indicators. Researchers say that the percentage of newborns with physical, mental, or learning defects has doubled from about two percent in the 1950s to four percent today. ... Dr. Peter Budetti of the Univ. of Calif. at San Francisco told ***The New York Times***, 'Compared with twenty-five years ago there are in the United States today at least half a million more children who have some limitation of activity due to either a chronic medical condition or a learning disability.' He and others have pointed to rising rates of debilitating diseases such as asthma and chronic bronchitis, cerebral palsy, and diabetes among children. The federal goverment says that the number of children enrolled in some type of special education has risen by half a million over the past five years, despite declining figures for total school enrollment." (***East-West Journal***, October 1983)

"Trace mineral deficiencies in the diet may play a bigger role in human health than most physicians [not to mention their artificial dependents, most people] now realize, according to a series of papers presented last week at the AAAS [American Association for the Advancement of Science] meeting. Many of these reported links between trace minerals and health problems – such as heart disease and diabetes – are still only suggestive. However, the deficiency levels discussed at the meeting are common in the typical American diet, the researchers warn, and if such subtle deficiencies are definitely found to jeopardize health, they may be affecting millions [about 250 million?] of people in the United States alone. For example, while the safe and adequate [?] amount of copper is generally thought to be 2 to 3 milligrams per day, 'probably 75 percent of daily diets in the United States contain less than 2 mg of

copper,' reports Leslie Klevay, acting director of the Agriculture Department's Human Nutrition Research Center in Grand Forks, N.D. Several papers reported data suggesting that copper-deficient diets may increase one's risk of developing a host of health-threatening conditions, including coronary heart disease.

"When fed a diet deficient in copper, animals have developed bone fragility, anemia, defects of the connective tissue, arteries and bone, infertility, heart arrhythmias, high cholesterol levels, heart attacks and an inability to control blood sugar levels. Klevay notes that any condition associated with coronary heart disease In humans can be triggered in laboratory animals merely by putting them on a copper-deficient diet. ... In another previous study, 13 of 15 animals on copper-deficient diets had dropped dead in the fifth week of a six-week study. 'Limited autopsies showed ruptured hearts and aneurysms,' Klevay says." (***Science News***, 6/8/85)

As usual, the Agriculture Department's huge neglected responsibility to promote and maintain abundant levels of all soil minerals is not brought into question. Will this matter of neglect be brought into Congress, into the light of public scrutiny, into court? Not while the consumers of poor quality food, including probably the whole Congress in the U.S., remain passive and accepting of this primary cause of ill-health and its immense consequences. As of March 2000, the current USDA Secretary of Agriculture is Dan Glickman, and current USDA Forest Service Chief is Mike Dombeck. Not having communicated with them since their appointments to these key positions, I wrote to each in Fall 1998 with neglected questions about the state of the soils, foods, and forests. Since neither of them nor any of their staff sent a word of response, I suggest readers who wish these questions addressed follow up with your own inquiries ***until the questions are addressed***. More specific questions about their current remineralization work and future plans would seem more than appropriate. I will see that they are among the first to be given this book. If there are new appointees with the next presidential administration, your questions will be as fitting for them. My letters to these two men went as follows:

Mr. Dan Glickman
Secretary of Agriculture October 30, 1998
200-A Whitten Bldng.
1400 Independence Ave. SW
Washington DC 20250

Dear Secretary Glickman,

I'm writing to wish you great progress in a very difficult job as you are, I hope, attempting to move agriculture into the essential restorative or regenerative mode required for the health of Man and Nature.

Like the late John Hamaker, whose pioneering of the modern soil remineralization and Earth Regeneration movement has probably come to your attention, I remain greatly concerned about the condition of the soil and the chain of life it supports. I'm more concerned than ever after reading the 1997 book by Paul Bergner, ***The Healing Power of Minerals***, which documents very strongly the depletion of soils and foods over the decades of this century. I ask you to take time to read this book, and perhaps with me and others ask why the USDA has not (according to my researches and inquiries) done similar comparative analyses, and ask what we need to do to reverse this catastrophic trend.

In his 1935 ***Atlas of American Agriculture***, C. F. Marbut attempted to document by total element analysis data the mineral reserves of U.S. soils. Would you please inform me as to what has been done since to update and expand his early efforts? Are you able to send me recent summary or detailed reports on the overall condition of U.S. soils including reserves of biologically essential elements and organic matter? Is there any annual state of the soils report, as the Forest Service has a Forest Health Report?

In case you've not seen it, here is the latest issue of ***Remineralize the Earth*** magazine which includes a short update article by me on my eco-climatic concerns and work with John Hamaker. Also other papers I'd expect you to find interesting. Naturally, I encourage you to consider how you might set up further rock/gravel dust

remineralization trials as Ron Korcak and others have been doing in Beltsville. Perhaps you can work with them on expanding this critical work?

Thanks for your attention and response, and please let me know how I might assist you in any efforts to regenerate the soils and health of America.

cc: Mike Dombeck, ***Remineralize the Earth***,
Acres, USA, Ron Korcak (USDA), Paul Bergner

Sincerely
Don Weaver

Mike Dombeck, Chief
USDA, Forest Service Nov. 2, 1998
POB 96090
Washing ton DC 20090-6090

Dear Chief Dombeck,

I know little about you and your background which has led you to your key role as Forest Service Chief, but I write you hoping you're a man of open-mindedness and integrity who understands that the world has lost about half its 1950 tree cover and wants that disastrous trend reversed.

Perhaps you're aware of John Hamaker's work for worldwide soil remineralization and afforestation and overall climatic stabilization via Earth Regeneration. I'm enclosing some papers and the latest issue of ***Remineralize the Earth*** magazine to be sure you have opportunity to read it. I'm also sending a copy of my letter to Dan Glickman who, like you, holds to great degree the world's ecological health and future in his hands. That letter is to further share my concerns and to encourage you to consider every possibility for cooperative discussions and work between all divisions of USDA/Forest Service.

Are you now conducting remineralization trials to demonstrate greater tree health and growth? Is the Forest Service remineralizing any of the widespread forest ecosystems gasping under the combined stresses of soil demineralization and acidification, climatic extremes, overlogging and erosion, air pollution and ozone thinning, etc. ? If not, please let me and the whole soil remineralization/Earth Regeneration network know how we might assist you in starting such work as soon as possible!

Along with Paul Bergner's book I recommended to Secretary Glickman, and our book ***The Survival of Civilization –*** probably in your Forest Service Library – I recommend to you the Forestry/Sewage Sludge info packet from ***Remineralize the Earth***, and ***The Dying of the Trees*** by Charles Little and ***An Appalachian Tragedy*** by Little et al.

Also, if you wish back issues of the update publication to our book, ***Solar Age or Ice Age? Bulletin***, please let me know.

Thank you for giving this letter the consideration of your integrity,
Mike Dombeck.

For Life and Regeneration,

Don Weaver

"U.S. Nutrition Book Unreliable, GAO Says" – " ... In some cases the nutrition information in the publication known as Handbook 8 is wrong, the GAO said, and in many other cases, the flaws are a matter of sloppy, inconsistent or questionable collection of data. … For example, Handbook 8 says there are 3,000 international units of Vitamin A in a papaya. Methodology available elsewhere indicates that there are only 400 units. … In the report, requested by Rep. George Brown Jr., D-Calif., chairman of the House Committee on Science, Space and Technology, the accounting office criticizes the Agriculture Department's Human Nutrition Information Service for using lax methods to evaluate the nutrients in about 5,300 food items. The report says the agency often does not have enough samples on which to base the data and accepts data with 'little or no supporting information on the testing and quality assurance procedures used to develop the data.' " (***S.F. Chronicle***, sometime in 1998, it appears)

While most organic produce still comes from less than generously remineralized soil, it is still likely to contain more nutrients as well as far less contaminants than that produced by chemical agriculture, as recently shown in the 6/98 ***Acres, USA*** article, "A Fresh Look at an Old Debate – Is Organic Produce More Nutritious?" by Virginia Worthington:

"There are more than 30 studies comparing the nutrient content of organic crops and those produced conventionally with chemical fertilizers and pesticides. In these studies, various individual nutrients in individual crops were compared, such as zinc in organic versus conventional carrots, or vitamin C in organic versus conventional broccoli. In the more than 300 comparisons performed in these studies, organic crops had a higher nutrient content about 40 percent of the time, and conventional crops had a higher nutrient content only about 15 percent of the time. Overall, organic crops had an equal or higher nutrient content about 85 percent of the time."

The mineralized-organic produce of the future – which you may start growing today – can be far superior to all current methods neglecting generous soil remineralization.

"The Death of Globalization" – "My thesis is that there are no effective institutional methods for 'policing the global environment'. …

As far as I know, the only environmental agency with any executive powers at all is the Environmental Protection Agency (EPA) in the USA, which has a budget of 2 billion dollars. However, this is but a minute fraction of what it would need to control the environmentally destructive activities of the vast transnational corporations it was set up to control.

“Thus, among its duties is to examine the 70,000 or so chemicals already marketed in the USA, for their potential adverse health effects, as well as a thousand or so new ones that are put onto the market every year. But after many years it has only succeeded in examining – in a cursory way at that – little more than about 5% of these chemicals. 95% of those that are still on the market have thus never been tested at all – a truly horrifying thought. What is more, when it does establish that a particular chemical is carcinogenic, the EPA is incapable of forcing the corporation that produces the offending chemical to take it off the market. All it can do is negotiate with it and from a position of weakness rather than strength.

“Let me give you an idea of its weakness. According to the law, if studies undertaken by a corporation reveal that one of its products has serious health effects on people exposed to it, the EPA must be informed within a given period of time. Failure to do this results in fines that increase every day so long as the information is withheld. The EPA, knowing that many such studies were being carefully kept under wraps by the corporations involved, and knowing that it did not have the power to enforce the law, offered the corporations a drastic reduction in the fines they should incur for withholding this critical information if they handed it in before a certain date. To the EPA’s amazement, as many as 11,000 sets of such dissimulated studies were dispatched to them in all haste so as to take full advantage of the amnesty. Under such conditions it is perfectly clear that the EPA cannot offer an assurance that any chemical on the market is harmless. “

(***The Ecologist*** editor Edward Goldsmith address to International Forum On Globalization 1998 Conference, USA)

From the May ’99 Green Guide article, “The New Food Pyramid: How Corporations Squash Regulation”:

"According to Environmental Protection Agency figures, annual U.S. pesticide sales surpass $11 billion. To help protect this big business from regulation, chemical and agricultural interests joined alcohol and tobacco companies and supermarket associations in the 230-member Food Chain Coalition. The Coalition showered Congress with $84.7 million between 1987 and 1996, the Center for Public Integrity (CPI) reports in its 1998 study, ***Unreasonable Risk***. The investments have paid off: Between 1988 and 1995, not one of the more than 65 bills introduced to strengthen pesticide regulations passed.

"Monsanto, DuPont, Dow Agro-Sciences and 32 other pesticide manufacturers have also formed a lobbying group, Responsible Industry for a Sound Environment, or RISE, which 'spent more than $15 million in 1996 to employ 219 Washington lobbyists,' CPI reports. Seventy-two of the lobbyists had worked on Capitol Hill, in the Executive Branch or for the White House directly. And the implementation of the 1996 Food Quality Protection Act (FQPA) was weakened by presidential hopeful Al Gore, at the urging of a key House Democrat beholden to the pesticide industry."

The valuable publication from Mothers and Others, ***The Green Guide***, carried "Children's Cancer and the Environment" (11/1/97) which reports:

"According to a March 1997 National Cancer Institute (NCI) report, the incidence of cancer among U.S. children has been steadily increasing for over 20 years. More than 8,500 new cases occur annually among children under 15; the NCI calculates the rate of increase at nearly 1 percent per year. The most commonly occurring cancers are leukemia and brain cancer, up 30% and 40% from the 1970s, respectively, according to Dr. Philip Landrigan, pediatrician at Mount Sinai School of Medicine and senior advisor to the Environmental Protection Agency on children's health. Dr. Landrigan stresses that the cause of these increases are not known, but may very well be attributable to environmental factors. Likely culprits include some of the 75,000 synthetic chemicals produced over the past 50 years, including pesticides, PCBs and plastics, and auto emissions. Less than half of these chemicals have been tested for

toxicity to humans, and even fewer for toxicity and cancerous effects in children."

A later issue of ***The Green Guide*** (6/1/98) also focused on children's health has more on the ongoing cancer tragedy plus the feature, "Hormone Imbalance: How Pollution Skews Sexual Development," which begins:

"When Carolyn Dayley's son was born with an undescended testicle, her pediatrician said not to worry because this condition, also known as cryptorchidism, is very common these days. When Carolyn's daughter started developing sexually at the age of eight, the pediatrician explained that early puberty is increasingly common among American girls. But Carolyn is convinced that something is wrong. 'Things haven't always been this way,' she says. She suspects that manmade chemicals are causing these problems in the health of her children, and others.

"This mother's intuition has basis in research being done worldwide. Some scientists have begun to demonstrate that certain chemicals are sabotaging our children's sexual development. These chemicals simulate or block estrogen and other hormones, and may be causing increased incidence of early puberty, undescended or undersized testicles, falling sperm counts, testicular cancer, and hypospadias, where the urinary canal is open on the underside of the penis. Known as endocrine or hormone disruptors, they include a broad list of insecticides, herbicides and fungicides, and industrial chemicals, such as dioxin, PCBs, mercury, lead, cadmium, alkyl phenols, phthalates and styrenes***. ...***

"The Environmental Working Group warns in a January 1998 report that, every day, more than one million children age five and under eat an unsafe dose of organo-phosphate pesticides. [Conservative estimate just for U.S.]

In 1997, a re-analysis of human sperm counts, which took into account 61 studies, concluded that they have been on a steady decline for some 50 years."

The Nov. ’87 ***Acres, USA*** published testimony given by former Pennsylvania Secretary of Agriculture Jim McHale to the Governor’s Energy Office on 8/17/87. “McHale Answers Killer Agriculture to Commission” is the ***Acres*** title, and here is just a short excerpt:

“In 1977 we poured herbicides, fungicides, and insecticides on our American agricultural land at the rate of five pounds for every man, woman and child in the U.S. By 1981 we were pouring those killers on at the rate of seven pounds for every man, woman and child in the U.S. Since 1981 the rate of application has approximately doubled. News media is properly questioning present agricultural practices which pour 1.7 billion pounds of pesticides into our environment each year in the form of 600 generic chemicals that are used in the formulation of 38,000 brand name products. In addition, farmers are pouring millions of tons of unneeded fertilizer, particularly nitrogen fertilizer, on their land, and it is ending up polluting our water supplies.”

From the 1991 report, “The Promise of Primary Health in the Developing World” by Raymond Obomsawin, Canadian International Development Agency: “The worldwide use of commercial chemical fertilizers and pesticides has increased by factors of 9 and 32 respectively, during the recent 35 year period.”

From ***Trends 2000*** (Warner Books 1997) by Gerald Celente: “Over 2 billion pounds of pesticides were used each year in American agriculture. … Altogether, four hundred types of pesticides were being used on food crops. More than seventy, including most of the top-selling ones, caused cancer in laboratory animals. A 6/7/96 ***AP*** report is then given: ‘Pesticides far more harmful when combined, study finds’ – “Pesticides that by themselves have been linked to breast cancer and male birth defects are up to 1000 times more potent when combined, according to a study. ‘If you test them individually, you could almost conclude that they were non-estrogenic, almost inconsequential,’ he [John A. McLachlan of Tulane University] said. ‘But when you put them in combination their potency jumped up 500-1000-fold. Instead of one plus one equaling two, we found that in some cases one plus one equals a thousand.’ ”

From “Earth Week” in the ***S.F. Chronicle*** (1/31/98), this relevant note on “Gender Benders”: “Pollution and human waste appear to be causing the majority of male roach, one of Britain’s most common freshwater fish, to undergo sex changes. A study by Brunei University revealed that 100 percent of the male roach examined in two rivers, the Nene and Aire, showed signs of feminization. In the worst case, large parts of the fish’s sperm-producing testes had turned into egg-making ovary tissue. This is the first time that feminization of male fish has been attributed to factory discharges. Earlier studies have linked fish sex changes to human and synthetic estrogen released into waterways through sewage.”

“AIDS: Putting An Alternative To The Test’ ” … Usually the average life expectancy after diagnosis is twenty-two months***. …*** ‘From our point of view the real cause of AIDS is the underlying biological condition of the individual, in particular an immune system that has been abused and rendered ineffective. So to prevent AIDS and to cure [enable self-healing] it we must focus on strengthening and reviving the natural immune [defense-cleansing-repair] function of the human organism. We must teach people to eat and to live in a way that supports rather than debilitates the body’s natural ability to deal with invading organisms.’ [Dr. Martha Cottrell] ... These are factors which are usually found in AIDS patients and which have been demonstrated to be immuno-depressant, that is, injurious to the body’s ability to protect itself from foreign organisms. These co-factors include the following: A history of bottle feeding ... Removal of the tonsils ... A diet high in refined carbohydrates (sugar and white flour) and dairy foods ... A diet low in trace minerals and complex carbohydrates … A history of disease [poor health] … Extended use of antibiotics … Extended use of recreational drugs ... Very high levels of sexual activity, which can exhaust the kidneys and adrenal glands [as well as further demineralize the body] . … (***East West Journal***, 9/86, article by Ronald E. Kotzsch, Ph. D.)

From ***Minerals: What Your Body Really Needs and Why*** (Avery, 1999) by George L. Redmon, PhD, ND:

“In addition our farmland is fertilized with NPK (nitrogen, phosphorus, and potassium). Again, on the surface, this may seem beneficial. However, there should be at least sixty minerals in soil, most of which

are depleted due to modern farming methods. Then only three are replenished with the use of NPK. Farmers are paid for tons and bushels of crops; however, no cash incentives are paid to farmers to insure that there are sixty minerals in the soil.

“Recent studies conducted at the Earth Summit in Rio (June 1992), which compared the mineral content of soils today with soils 100 years ago, revealed some startling facts. Researchers found that in African soils, there were 74-percent less minerals present in the soil today than there were 100 years ago. Asian soils have 76-percent less, European soils have 72-percent less, South American soils have 76-percent less, and the soils in the United States and Canada contain 85-percent less minerals today than they did 100 years ago. These statistics show that our soils are not the ‘nutrition fields of dreams’ on which our ancestors flourished.

“The evidence clearly shows that we as a nation, as well as our lands, are mineral deficient. “ (p. 16-17)

How many of the human body breakdown symptom-complexes increasingly lumped under the “AIDS” label in Africa and worldwide is primarily caused by “An Immense Depletion of Soil“?! I do not as yet have further details on the Earth Summit studies mentioned above.

In 1987 the FAO published an updated edition of their study, ***Agriculture: Toward 2000*** which again apparently sustains the belief in toxic technology while calling for “more research” to help out those who appear to be closest to death by malnutrition and starvation. From a late-80s issue of ***United Nations’ International Review***:

“While hailing the contribution of technology to the rise of food production over the past quarter-century, the study urged that much more be done to direct research towards helping the 2 thousand million or so of small farmers whose average income is in the area of $75 a year. They are the rural poor who have been largely bypassed by progress. Many of the Earth’s c. 500 millions of seriously undernourished people are, paradoxically, farmers or fisherman. “

Healthy and Natural (Vol. 5, Issue 5, 1999) carried a quite interesting article, “HSOs: Beyond Probiotics” by Herb Rubin, D.C. Consider these excerpts:

“A disturbing question I’m often asked as a health professional is, ‘I try to eat right, I take supplements, but I just don’t feel healthy. What can I do?’ We are seeing a dramatic rise in degenerative, chronic and auto-immune diseases, even in children. Diseases that were once unusual, such as chronic fatigue, severe allergies, asthma, fibromyalgia, diabetes, candidiasis, severe digestive disorders, and environmental/chemical sensitivities are becoming common. More people complain of getting recurring colds, flu and infections. Each generation seems weaker than the last. With all the nutritional supplements and advances in traditional medicine, why is this happening?

“For thousands of years humans ate fruits and vegetables from soil rich in life-sustaining bacterial organisms. But after World War II, in our quest to reduce unwanted disease-causing pathogens, chemicals and pesticides were introduced to agriculture and chlorination to water treatment. As a result, most beneficial bacteria were eliminated along with the harmful ones. ...

“It is just now being understood what a critical role these homeostatic soil organisms, or HSOs, play in proper immune function. They are called homeostatic because their function is to work with our immune system to help create homeostasis or balance of body systems.

“HSOs were identified approximately 20 years ago in pristine soil found in a secret location outside of the civilized world. The beneficial bacteria were further refined in a laboratory to remove pathogens. The HSO formula, as it is widely known, comes from colonies of these beneficial bacteria that are bred in conditions that mimic the pristine earth where they were originally found***. ...***

“More than 400 different species of micro-organisms, totaling about four pounds in an ideal ratio of 85 percent good to 15 percent bad, inhabit the human digestive tract, far exceeding the number of tissue cells. If one has them in sufficient quantity, friendly bacteria are responsible for numerous essential body functions. These functions

include preventing infiltration and growth of harmful bacteria, fungi, yeast, viruses, molds, and other parasites; maintaining chemical and hormonal balance; producing and regulating vitamins; stimulating the entire digestive system; and promoting proper immune function. ... The more than 70 micronutrients in the HSO formula provide the body with materials needed to correct nutrient absorption deficiencies. The nutrients in the HSO formula are actually whole foods, a form that the cells can easily recognize and assimilate. Because they are naturally occurring, live and active, these micronutrients are absorbable on a cellular level to promote the proper functioning of the human body."

I think the article makes a good case that all 6 billion and more of us should consider "HSO formula" ... ***or eating whole foods from mineralized, HSO-rich soils!***

A 1998 letter from the Pesticide Action Network (49 Powell St., Ste. 500, San Francisco, CA 94102 (415) 981-1771) updates Jim McHale's 1.7 billion pounds figure only about 10 years later:

"In the United States, a staggering 4.5 billion pounds of pesticides are used each year. Another 700 million pounds are exported. … " Also: "Breast cancer in women is increasing at a rate of nearly 2% per year."

Are we staggered enough to withdraw our support from killer agriculture and the other unwise and obsolete experiments of the 20th Century, and give our support to the ways that truly create healthy people gratefully living in healthy ecosystems?

"Picturing pesticides' impacts on kids" was published in ***Science News*** (6/6/98):

"Heavy exposure to pesticides appears to have impaired child development in a Yaqui Indian community in Mexico, a new study finds. However, observes Elizabeth A. Guillette, the University of Arizona anthropologist who led the research, 'I don't think the kids' exposures are either more or less than might occur in other agricultural areas' – even in the United States. …

"The scientists asked 4- and 5-year-olds to jump up and down as long as possible, catch balls, drop raisins into bottle caps, perform memory drills, and draw pictures of people. In the June ***Environmental Health Perspectives***, they report that valley children demonstrated significantly less stamina, gross and fine eye-hand coordination, 30-minute recall, and drawing ability than preschoolers from the foothills communities.

" 'I know of no other study that has looked at neurobehavioral impacts – cognition, memory, motor ability – in children exposed to pesticides,' says neurotoxicologist David O. Carpenter of the State University of New York at Albany. 'The implications here are quite horrendous,' he says, because the magnitude of observed changes 'is incredible – and may prove irreversible.'

" 'Though the children exhibited no obvious symptoms of pesticide poisoning, they're nevertheless being exposed at levels sufficient to cause functional defects,' observes pediatrician Philip J. Landrigan of Mount Sinai Medical Center in New York.' To ignore these data would not be sound,' concludes Landrigan, who is directing the development of the new federal Office of Children's Health Protection."

And two more excerpts on "cancer, etc.", the first from the ***ABC World*** (3/96) article, "Threat of Pesticides Greater Than Just the Cancer Risk":

"Evidence is challenging the fixation on cancer as the predominant risk in assessing the safety of synthetic chemicals. For almost 50 years, scientists have documented disruptive effects of pesticides and other synthetics on the nervous, immune, endocrine, and reproductive systems of laboratory animals, wildlife and humans.

"In 1950, Burlington and Lideman reported that DDT mimicked the female hormone estrogen. High levels of DDT and other organochlorine chemicals caused female-female pairing in nesting birds, caused male birds to grow oviductal tissue and to be deprived of their male behavioral characteristics in adulthood, produced Florida alligators with shortened penises, physically unable to breed, and

slider turtles that were either female or intersex – a mixture of both sexes.

”In humans, these chemicals readily cross the placenta and brain barrier and are passed from mother to developing baby. The disruptive effects of these poisons in the womb ranges from mild to severe, each leading to potentially different changes in the individual’s course of development and behavior. …

“None of these effects are described as single diseases or syndromes associated with exposure to a chemical or class of chemicals. It can sometimes be 20 or more years before effects are noticed. So although an individual’s health and behavior is modified for life, and vast social and economic impact is made on the population, the true cause will probably never get the official blame, nor will the full danger of chemicals in our food and environment ever be known.” (Apparently this information came from ***Environmental Health Perspectives*** 103 (Suppl. 6):81-83. A recent book receiving good reviews covers this topic in greater depth: ***Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival?*** by Theo Colborn et al., Plume 1997)

“Ask any American woman what disease she fears most and she will probably say breast cancer. Yet hip fractures kill more women than cancers of the breast, cervix and uterus combined. Each year, more than 280,000 Americans suffer hip fractures; half are unable to walk again unassisted, 25% end up in nursing homes, and 25% die within 3 months of surgery. …

“Osteoporosis literally means ‘porous bones,’ a crippling and disfiguring disease marked by the progressive loss of bone tissue, loss of height and fractures. One third of American women over age 65 will suffer a spinal fracture and half will lose 50% of their bone density. Osteoporosis is a major health problem in industrialized nations but relatively rare in developing countries.” (p. 183 of ***Long Life Now*** by Lee Hitchcox, D.C., Celestial Arts 1996)

Also, in the Introduction to ***Long Life Now***, author Hitchcox recalls his army experience in the Vietnam War era and concludes:

"The government claimed that those exposed to Agent Orange had no higher cancer rates than the general population. This was not reassuring. More Americans die of cancer each year than were killed in World War II, Korea and Vietnam combined."

Like John Hamaker, the Florida scientist Maynard Murray, M.D. saw the critical need to investigate the deeper realm of fundamental causes for health and disease, rather than get lost in the confused world of superficial reaction to the rising tide of ill effects brought on by ignorance of cause. Murray, too, discovered how life prospered in health within mineralized ocean environments. He recounts his research in the ***Acres, USA*** article (12/81) "Sea Energy Agriculture, A Guide to Perfect Natural Nutrition" which is also the name of his book. After all the grim statistics on cancer and degeneration which demand our awareness and response, let's listen to a few words from Dr. Murray:

"As a university student, I became interested in these mysteries and decided that I would seek a reasonable explanation for the presence of malignant disease in fresh water and land animals as opposed to ocean animals. Much time and money were spent traveling, studying, and dissecting sea life. The study ranged from South America to the Pribilof Islands and included whales and seals. In dissecting many of these animals, no malignant disease could be found; in fact, no tissue suspected of malignant disease was seen.

"At this time it occurred to me that if there were some way to nourish land animals on food that contained all the essential elements, it should make a difference in their resistance to disease. Diet must be the secret. Ocean water contains a complete spectrum of elements, whereas soil and fresh water do not. Plant material in the ocean can select any and all the elements they need to grow. In turn, ocean animals feeding on these plants easily obtain their element requirements and thus better disease resistance. If ocean animals can establish their resistance through diet, I feel that land animals can also obtain this resistance if the food which they consume is raised with all available elements."

Dr. Murray then explains how he used sea solids from evaporated seawater to remineralize various agricultural soils and crops – you'll

recall Hamaker's recommendation of adding sea solids to gravel dust, especially in inland areas receiving minimal sea solids borne on winds and stormfronts. Murray then began animal feeding and health recovery experiments (my reference to such experiments doesn't mean I "endorse" any or all experimentation on animals):

"A first animal experiment was carried out on C_3H mice which get spontaneous cancer of the breast. These cancers are most probably due to the so called Bittner Virus. We hoped that by using sea solids-grown food, we could build resistance to the virus or cancer. [He may not have been as keenly aware of the chemical pollution problem – 22 billion pounds of toxic chemicals released into the air, water and land in 1989 EPA figures – in his pre-1980 researches.] The C_3H mice were divided into two groups. The control group was fed on regular cereal grain, while the experimental group was fed cereal grain raised on sea solids-treated soil. The results showed that instead of getting spontaneous cancer in 90% of the animals as the control group did, the experimental animal figure dropped to 55%. The second generation born to parents fed on sea solids food produced cancer in only 2% of the population!

"We also tried the special feed on transplanted malignancies (sarcoma) in rats. The sea solids-fed rats showed high resistance to the transplanted sarcoma. A transplant would die off most of the time, but occasionally it would take. After growing for a while it too would die off. This success occurred in over 90% of the animals treated with the sea solids-grown food**. ...**

"Other animals were fed sea solids-grown food and did well ... it is interesting to note that if a bundle of corn stalks containing a mixture of sea solids-grown corn and untreated corn was offered to the cows, they would nuzzle through the bundle and always eat the sea solids-grown corn first. …

"In studying those human populations where malignancy is rare, it was found that the soil in which the food was grown contained all the essential elements for optimum growth. In other words, the soil appeared almost like a spectrum of sea solids. In these areas, for the most part, there is very little egress of water to the sea and the elements are usually washed down from the mountains and

highlands into the valleys by rain or melting snow. These elements are not carried away by water, erosion, or by man. They remain to be utilized again and again. “

While the U.S. Dept. of Agriculture appears willing to continue dragging its dinosaur tail into a new century regardless of the human, animal and total eco-climatic costs, other countries are beginning to demonstrate a higher level of intelligence and integrity in supporting the shift to ecologically constructive agriculture – although they may not yet have seen the need for soil remineralization as its foundation. Some examples follow, starting with the news release I received from England’s Ministry of Agriculture, Fisheries and Food in response to my inquiry. Excerpts from “Going Organic: Major Boost Announced By Nick Brown”:

“Increased payments to English farmers wishing to convert from conventional to organic farming were announced today by Agriculture Minister Nick Brown.

“Giving details, Mr. Brown said in a written reply to a Parliamentary Question from David Kidney MP (Stafford): ‘Since we came to office, we have been determined to encourage more farmers to convert to organic production. We have made more resources available for advice to help them and I am pleased to say that many more are realising the opportunities that organic farming can offer and seeking to convert. However, conversion has costs and the additional returns can not be realised immediately.

“ ‘More support is justified for farmers during the conversion period. Subject to the agreement of the European Commission, it is my intention to increase payment rates under the English scheme to those recommended in the review which we commissioned last year.’

“ ‘If organic farming is to become a mainstream option, it is important to encourage larger farms to convert. For this reason, I intend to go beyond the recommendations of that review and lift the 300 hectare limit on the area which can qualify for aid. I will also be going beyond the recommendations of the review by making the annual payment at the end of the first quarter, thus helping farmers’ cash flow at a difficult time.’ “ (7/30/98)

The second example comes from the ***Acres, USA*** January 1998 regular report by Steve Sprinkel called “Transitions: Certified Organic Industry News.” From the sub-heading “Organic Denmark”:

“The whole country is going organic. Officially. High-level members of the regulatory community, politicians and planners are tentatively proposing that by the year 2010 all synthetic agriculture inputs will be banned. But they will probably be able to accomplish that goal as early as 2004. Setting a date far in the future does give certain economic sectors a chance to cover their head, but the Danish domestic economy will best benefit by an earlier cut-off. “

Regardless of one’s thinking about the various human political, social and economic experiments in the world up to the present, the following article from which I’ll excerpt is obviously quite interesting. It is from the ***S.F. Chronicle*** (2/21/98) and titled, “Cuba Turns to Mother Earth”:

“After four decades of communism, Cuba is reluctantly pushing ahead with a new experiment that is no less revolutionary and may turn out to be much more successful – organic farming. The change, forced on the government by a catastrophic economic crisis, has allowed Cubans to survive and has eliminated the specter of widespread hunger.

“From the streets of Havana to fields throughout the island, Cuba has gone ultra-environmentalist. What was the most mechanized agricultural system in Latin America has been turned into the world’s largest area under organic and semi-organic farming.

“Manure has replaced chemical fertilizers, worms have replaced insecticides, oxen have replaced tractors. And a new land reform program has broken up most of the nation’s huge state farms and given the land to their workers, creating an innovative system of profit-driven cooperatives.

“The shift has pulled Cuba back from its economic collapse after the fall of the Soviet Union. The end of Soviet supplies and subsidies caused a more than 80 percent drop in supplies of pesticides and

fertilizers, and a 50 percent cut in fuel and spare parts. That put a stranglehold on Cuban farm production, which dropped by nearly one-half between 1990 and 1994, and cut Cubans' daily caloric and protein intake by one-third.

"The country is still strapped for cash and cannot afford to buy agricultural supplies on the world market. But its switch to organic techniques has almost completely reversed the drop in farm production. [Elsewhere it reports that "Cuba had record levels of production for 10 of the 13 principal domestic food items in the 1997 growing season."] ...

"Since 1991, more than 27,000 organic gardens covering 5,000 acres have been created in the Havana metropolitan area, producing an estimated 1 million tons of food annually. …

"The government began to promote organic techniques aggressively, assigning hundreds of agricultural extension scientists to the task. More than 200 factories were created to produce beneficial insects and pest pathogens. Independent experts say the changeover is an example for poor nations – and even for the United States. … The shortage of fuel has caused a switch to renewable energy sources. Construction of a nuclear power plant has been suspended; windmills, solar panels and biomass generators are increasingly common. All of the nation's sugar mills are now powered by burning waste from the cane. [Would replacing sugar cane fields with biologically diverse fruit and nut orchards be the next best step to human and ecological health regeneration, along with adding the recommended generous soil remineralization as the perennial foundation?]

"In addition, a bicycle revolution has swept Cuba. The government has imported 1 million bicycles from China in recent years, and the well-marked bicycle lanes throughout Havana and other major cities usually are clogged.

"The only danger ahead for Cuba's new ecology-mindedness is the possibility of a weakening of the U.S. economic embargo on Cuba. Some Cuban organic supporters worry that if the embargo is loosened, Cuba would partially revert to chemical-intensive

agriculture and foreign imports for its food. But that prospect seems unlikely in the short term, given the fierce anti-Castro sentiment in Washington. For the time being, Cuba seems destined to remain a reluctant world leader – not in Marxism, but in environmentalism."

I'll note here that India might have been the first country to convert to a remineralized-organic agriculture had Prime Minister Rajiv Gandhi not been murdered, as he was one of the rare "statesmen" willing to both examine and discuss the Hamaker Thesis. In one letter from Gandhi to Hamaker, he said:

"I have seen ***The Survival of Civilization***. There is no doubt that preservation of the environment, and 'the balance of nature' is an essential imperative for our survival. I am asking our scientists to examine your suggestion to re-mineralise the soil and restore its fertility." (8/16/85) Very brief excerpts from John's reply:

"The people of India are very fortunate in having a government which makes decisions on a rational basis instead of the usual basis of financial considerations and the politics dependent thereon. … The influence of the agricultural chemicals industry on governments and schools has prevented any university-conducted tests. ***…*** The attitude of your government makes India the most likely place for the first grinder industry to be established. … In a world which has very little comprehension of the developing tragedy, humanity is in a very desperate situation." (9/16/85)

Next, an excerpt from "What's happening to our foods? Commercial foodstuffs found wanting" by Parris M. Kidd, PhD in ***Focus on Nutricology***, Spring 1994:

"As the 'junk food' culture spreads, some of the best scientists and medical researchers of this generation are learning from their own research findings that health is much more closely linked to nutritional status than was previously thought. … While the more modern research suggests that the estimates for minimum daily nutrient intakes should be higher, modern foods are falling off in their nutritional content. More often than not, modern commercial foods are being grown in soils that are polluted and increasingly depleted of nutrient content. After the foods are harvested, excessive processing

and sometimes also the addition of artificial chemicals further damages their nutritional value.

“A recent study suggests what many had earlier suspected, namely that ‘commercial’ foods are likely to be inferior in nutrient content to organically grown, cleaner foods. Bob L. Smith, President of Doctor’s Data, Inc. of West Chicago, Illinois, assessed the elemental content of foods purchased in the Chicago area. His analyses, published in the ***Journal of Applied Nutrition*** (Vol. 45 No. 1, 1993) showed that 20 elements important for nutrition were present in greater amounts in the organic foods, and 3 potentially toxic elements (aluminum, lead, and mercury) were present in lesser amounts. Meanwhile, population surveys show that nutritional deficiencies continue to be prevalent among children, teenagers, the aged, and the institutionalized.” [And notice how quickly people are going from teenager to aged!]

From the internet website www.trufax.org/research/f12.html a correspondent researching “Diet and Degeneration” sent me the following on “The Canyon Verde School Study on Additives and Intelligence.” See how similar to the Robert McCarrison findings, etc. in the Chapter 5 Perspectives in TSOC.

“After the use of saccharin was marginally addressed in 1976, many people began to look at the use of chemical food additives more closely. After a school nutritionist met with students on food guidelines, a study was conducted in 1982 at the Canyon Verde School in California. The study was performed by students, who used three groups of rats to demonstrate the effect of additives. The control group of rats was fed natural food and clean water. The second group was fed natural food, clean water and hotdogs. The third group was fed sugar-coated cereal and fruit punch. The fourth group was fed doughnuts and cola.

“It was immediately apparent that the different diets had different effects on behavior in the three groups. The rats receiving natural food and clean water remained attentive and alert. The rats receiving natural food and hotdogs became violent and fought aggressively. The third group of rats subsisting on products containing sugar-coated cereal and fruit punch were nervous, hyperactive and behaved aimlessly. The fourth group subsisting on doughnuts and

cola were unable to function as a social unit. They were fearful and had trouble sleeping." The next paragraph reports that offspring of each group "displayed the same traits as the mothers." The last paragraph:

"When students in the Canyon Verde Study reverted to natural food for the groups who had received food with additives, it took several weeks for the rats to return to a natural state of behavior. It is unknown whether this same time period applies to humans, especially after sustained consumption of these chemicals by the time a child becomes an adult, but there are encouraging indications that symptoms can be reversed by altering human diet. When the children at Canyon Verde School began eating foods without chemical additives (BHT, BHA, TBHQ and artificial flavors and colors), profound changes began to take place. Students formerly disruptive and hyperactive became civilized, calm and attentive." Of course, we should note that apparently ignored here are the great deficiencies of minerals, etc. which must have existed in at least the latter two groups of rats studied and were, logically, at least as influential as the unnatural chemical additives. The "natural food" used was not necessarily mineral rich, either.

Further very dramatic evidence is found in "Locks – A Key to Violence" and its incorporated section, "The Diet-Behavior Connection" in ***Science News*** (8/20/83, p. 122-25), with a greater emphasis on the critical roles of minerals. Hair analysis of violent individuals showed distinct patterns of mineral imbalance whereas their nonviolent siblings didn't show these patterns. Even the two general categories of "episodic criminal" and "sociopath" were correlated to distinct trace element patterns. The violent people exhibiting neither of these patterns "were also peculiar and identical: They were very, very low ***in absolutely every nutrient***"! Cobalt was found to be one powerful predictor. Again, study director William Walsh says:

"We took a group of violent people and controls and found you could practically predict their degree of violence from cobalt concentrations – the lower the levels, the more violent the individual." He also concludes with: "my suspicion is that these trace-metals are going to correlate with a lot of things besides violence."

"The Diet-Behavior Connection" reviews the work of Ohio probation officer Barbara Reed and California professor Stephen Schoenthaler and their great results altering the refined and sugar-drugged diets of inmates and juveniles, with a reduction by about half in "anti-social behavior" being typical. What could the addition of real and whole mineralized foods do to promote internal health and its outward expression? The concluding paragraph:

"Schoenthaler suspects that chronic deficiencies in elements essential to glucose metabolism – such as zinc, iron, phosphorus and magnesium – may contribute to a deprivation of the chemical energy needed by the brain for intellectual functioning. He told ***Science News***, "We know that if there is an energy shortage, the limbic system, the most primitive part of the brain, gets priority since that's the part that controls involuntary muscle responses" – such as those for breathing and pumping blood. That region also seems to control emotions. Therefore, he speculates, if the brain is denied sufficient energy, the region "sacrificed" might be that which contributes to reasoning. He points out that Walsh's data, Thatcher's findings and his own Tidewater studies are all consistent with this theory."

From "Brain Food" by Bill Gottlieb in ***Prevention*** (9/79):

"In your brain is a neuron, a special cell. Root-like fibers dangle from its wall, tiny bulbs at their tips. Suddenly, a chemical bursts out of the bulbs and latches onto the wall of a nearby cell, charging it with electricity. The chemical is a neurotransmitter. It just told you what these words mean. Learning, memory, intelligence: they are all masterminded by neurotransmitters, chemicals that carry messages between neurons. But neurotransmitters control more than IQ. They wake you up and put you to sleep. They make you happy or sad, tense or calm. They influence your appetite, your dreams and your sex drive. In fact, you can't make a move without them – they control your coordination, too. But something controls the controllers. Diet. … Dr. Yaryura-Tobias: [Bio Behavioral Psychiatry Clinic, Great Neck, NY] also explained that every nutrient is important in the formation of neurotransmitters. 'The brain's chemistry is complex, and its proper functioning depends on all nutrients.' "

From the 4/96 “Townsend Letter for Doctors and Patients,” in a letter from Dr. Joseph D. Campbell of Victoria, B.C.: “In 1970, I pioneered Hair Tissue Mineral Analysis in Canada. Since then, I have done several thousand analyses. Results prove that most Canadians have serious deficiencies in one or more of the 20 [at least] essential minerals. The end result of such a depletion, explains in part, the high incidence of poor teeth, weak bones, obesity and the degenerative diseases so common in our society.”

More on the demineralization-related health challenge of “obesity” which, along with excessive spicing-salting-sugaring, cooking and fat-inundating of more-and-less natural foods, is logically caused primarily by the human body’s need to eat until all its mineral and other requirements are met, at least up to survival level. Brief excerpts from “ ‘Epidemic of Obesity’ In U.S., Scientists Warn” (***S.F. Chronicle***, 5/29/98):

“Americans are just too fat, researchers say, with 54 percent of all adults heavier than is healthy. If the trend continues, experts say that within a few generations virtually every U.S. adult will be overweight. The percentage of overweight Americans has increased by about a third in the last 20 years, and more hefty adults are on the way because more than 25 percent of today’s children are overweight or obese, says obesity researcher James O. Hill***. …*** The body, he said, has mechanisms to prompt people to eat when they are undernourished. … A study by the Institute of Medicine estimates that obesity costs the United States about $70 billion annually in health care expenses or in lost productivity. … Another researcher, Steven Blair … said Americans spend $40 billion a year on weight-loss treatments. ‘This approach is clearly not working,’ he said.”

Those with the great fortune of having good eyesight can observe the overall health catastrophe still unfolding itself in this country and all those failing to replenish Nature’s gifts. Consider what is happening in the U.S. according to the overall health rankings noted in “Whose Responsibility Is Your Health?” (***Sarasota/Florida Eco Report***, March 1996) by Annette Thornhill:

“In fact, in a fairly recent ***Public Health Science Report***, there was emphasis on the decline of wellness in the U.S. titled: ‘How Healthy

Are We?' The report pointed out that: Of the 100 healthiest countries in the world:

- in 1900 we were TOPS!
- in 1920 we were 2nd;
- in 1973 we were 60th;
- in 1980 we were 95th;
- in 1995 we are 100th

Where will we be in the year 2000?"

"American Adults Found Lacking in Calcium" (***S.F. Chronicle***, 6/9/94) reveals more of the demineralization crisis while focusing on just one of the many essential minerals:

"Half of America's adults are not getting enough calcium and that is contributing to a plague of brittle bones and fractures that costs the health care system $10 billion a year, a federal committee said yesterday. … Osteoporosis affects more than 25 million Americans, causing an estimated 1.5 million fractures and leading to medical costs of about $10 billion per year . … New studies, the committee found, show that recommended levels of calcium now carried on most food labels are far below what nature requires for strong bones. ... The committee … said most Americans may need to supplement their diet with calcium pills or processed foods enriched with calcium."

Another partial glimpse at the total reality of mineral-vitamin-enzyme-etc. deficiency and malnutrition in this country (and worldwide), from ***Understanding Vitamins and Minerals***, Rodale Press, 1984:

"When home economists from the USDA studied the diets of nearly 40,000 Americans, they discovered that at least one-third consumed less than 70 percent of the government's RDAs for calcium, iron, magnesium and vitamin B_6. … And when you consider that many experts believe the RDAs are set too low, you see why most Americans would probably be healthier if they took nutritional supplements." As we know, Rodale Press founder J.I. Rodale instead recommended soil remineralization after visiting Hunza, but tragically this "get to the root of the matter" consciousness did not take hold. An accompanying graph actually shows major deficiencies from the

RDAs in eleven of the essential minerals and vitamins in high percentages of those studied. Each year of agribusiness soil mining since then will logically have steadily continued to cripple the physical, mental and other capacities of human beings.

As the soil and food supply annually becomes more demineralized, and the natural multi-mineral-dependent good taste of the soil produce fades away, what do you think the "average" person, appearing far from blissful in their unawareness of this "hidden" crisis, will do with this "junk food?" Aside from either stuffing and/or "supplementing" consider this information from "How American tastes are turning torrid" (***S.F. Examiner*** 12/3/86): "With record amounts of herbs and spices being stirred and sprinkled into dishes from breakfast to dinner, the American diet is growing spicier. Americans last year consumed more than 636 million pounds of fragrant leaves, flavorful seeds, roots, barks and tropical fruits in quest of a more savory diet. U.S. spice use last year hit an all-time high, according to figures from the American Spice Trade Association in Englewood Cliffs, N.J. The 636 million pounds consumed was a third more than was used 10 years ago."

"The Organic Revolution" is the feature article of the March-April 1999 ***Audubon*** magazine. While it is unfortunate its author Joel Bourne didn't investigate remineralization, it is worth reading for further perspective on the failures of chemical agriculture, the rise of organic agriculture, and how astoundingly slow USDA has been to support the sane transition toward the latter. Let's pick up with:

"An estimated 300,000 farmworkers will be poisoned by exposure to pesticides. Researchers at Cornell University estimate that at least 67 million birds die each year from pesticides sprayed on U.S. fields; the annual number of fish killed is conservatively estimated at 6 to 14 million. Pesticides have also been implicated in numerous cases of wildlife deformities. … DDT, one of the greatest bird killers of all time, was banned in 1972, but it is still manufactured and exported overseas, particularly to Latin America, where many U.S. birds overwinter. Between 1992 and 1996 the U.S. Geological Survey sampled thousands of wells and streams around the nation and discovered that half the wells and nearly all the streams contained at least one pesticide.

“What makes these figures even more dramatic is the fact that chemical-intensive agriculture is a fairly recent phenomenon. Many modern pesticides are the descendants of chemical weapons developed in World War II and were not widely used until the 1950s***. ...***

“Most farmers, however, saw pesticides as silver bullets, providing relatively cheap, extremely effective control of their worst problems. Even the professors at land grant universities seemed to give up on alternatives to chemical pest control – especially since chemical companies and the U.S. Department of Agriculture were shelling out millions of dollars for pesticide research. The trend continues: Of 30,000 research projects supported by the USDA in 1995 and 1996, only 34 focused on organic production, according to the Organic Farming Research Foundation, in Santa Cruz, California.

“ ‘The majority of farmers really want to do the right thing for the environment,’ says Fred Kirschenmann, a leader in the organic movement. ‘But they don’t know how. They don’t know where to get the information, and the companies they buy their chemicals from are certainly not helping them.’ “

Consider this from the January 1996 ***Acres, USA*** “View From The Country”:

“Recently Hugh Paddock called our attention to irrefutable research on bioaccumulation of toxins. The details have been made a matter of record in ***Acres, USA***. For now we wish merely to call attention to the fact that by the year 2005, approximately 100% of the American population will have been exposed to chemicals of organic synthesis from the moment of conception until death. These toxins stack up in fatty tissue like cord wood, or they proceed forthwith to attack the immune system, striking down the weakest first, then expanding their kingdom ranging from mild allergies all the way to full-blown AIDS.

“Today, people past retirement age seem to endure, having spent the formative years of their lives with real food, fresh food, uncontaminated food. Degenerative metabolic diseases were first noted on the rapid increase when the working population had been

exposed only 20 years. By the time most of the population had been exposed 40 years, the alarm bell sounded. Cancer, heart problems, diabetes – dozens more – ran rampant. The full dimension of the chemical monument to the stupidity of man escaped professors, scientists, and doctors, because Rachel Carson's prophecy was unappreciated, and because formal science was tardy in coming to terms with chapter and verse.

"This is no longer the case. We will now quote a view directly from the country, one that might be politically incorrect, albeit scientifically valid. An Iowa reader writes: 'It is now self-evident – if we read the latest scientific findings (footnoted in the communication, but too voluminous to be repeated in this View) – that pesticides and substances such as dioxin are estrogenic compounds. This means that they mimic estrogen in the human system. These pollutants are responsible for male infertility, and the steady erosion of the male sperm count – 50% between WWII and the present. Further studies reveal that these estrogen compounds can be 'gender bending.' Recent laboratory findings have revealed that when estrogenic forms of polychlorinated biphenyls (PCBs) were painted on turtle eggs, the male hatchlings were sex reversed to females.'

"Agricultural herbicides such as the popular crabgrass and dandelion killer, 2,4-D, alachlor, amitrol, atrazine, etc. are such estrogen-mimicking compounds.

"Dioxin, a frequent contaminant in phenoxy herbicides, is bioaccumulative at 1 part per trillion, and is also such a compound. The average teenager in the United States has the maximum FDA allowable dioxin level because of heavy fat (junk food consumption) and the bioaccumulation factor.

"When a woman becomes pregnant, there are two or three days in the first trimester during which the new baby's sex is determined. Unfortunately, the expectant mother does not know that by eating ordinary vegetables from the supermarket, she exposes herself and her progeny to estrogen-mimicking compounds. The university professors, USDA, Extension and the several republics of higher learning make such exposure inevitable by teaching chemical agriculture as high science."

The International Food Policy Research Institute of Washington, D. C. published ***Human Nutrition: Food and Micronutrient Relationships*** in March 1995. Under "Populations at Risk" it notes a category of malnutrition based on simply calorie/ protein intake and says "By this criterion, during 1988-90, 20 percent of the developing-country population (including China) was malnourished – some 786 million persons." It also says "Taken together, micronutrient deficiencies affect a far greater number of people in the world than protein-energy malnutrition, with serious consequences for health, cognitive ability, and productivity." We have to assume these people have yet to hear of soil remineralization, or discover the idea through their own reasoning abilities, as not a word can be found on it in this Working Paper on Agricultural Strategies for Micronutrients, No. 1. We'll continue attempting to inform everyone, but obviously need much assistance!

Another IFPRI 1995 publication is ***Population and Food in the Early 21st Century***. It further shows how chemical agriculture became functionally obsolete as a crop forcing method in the 1980s, e.g.:

"A recent disturbing development relates to the decline in per capita world cereal production from the mid-1980s onward. In the net cereal-exporting countries, which are mostly developed countries, there has been a fall in both total and per capita cereal production." (p. 3) And: "The years from 1950 to 1984 were a remarkable and unprecedented period of agricultural expansion. Since 1984, however, the response to the additional use of fertilizer [chemical] has dropped precipitously, as shown in Table 1 (p. 165). …"

And this from the ***S.F. Chronicle*** (3/22/93):
"Fast approaching its May 1 deadline for a health care reform plan, the Clinton administration is racing to identify potential savings in the nation's enormous health care bill. [Would that be more of the "shuffling the deck chairs on the Titanic" kind of "reform"?] U.S. health care costs, which have climbed 3 percent to 4 percent per year faster than the rest of the economy since 1940 [when chemical agriculture and food processing were really becoming "modern and scientific"], amounted to about $800 billion last year, or $3,150 per person. And by 2000, health care spending is expected to reach $1 .7 trillion."

From the paper “Health Situation in the USA “ by Viktoras Kulvinskas, 1997 (POB 2853, Hot Springs AR 71914):

“Today, according to the World Health Organization, over 65% of Americans are suffering from some sort of ‘incurable’ disease. Over 90%, over the age of four, have plaque in their arteries. Over 90% suffer from constipation and 95% from indigestion. Over 80% are seriously overweight with a considerable strain on the cardiovascular system and an interlude to degenerative diseases. In 1989, Americans spent $600 billion trying to regain their health; 33 billion for weight loss alone. In 1992, 14% of the total income is related to disease treatments, certainly not for health maintenance.”

On nutritionist Raymond Francis’ Bay Area radio program, “An Ounce of Prevention” on KBPA AM 1220 (9/22/98), he refers to a recent ***Journal of Pediatrics*** study finding that “only 1% of children under 18 are getting enough minerals, vitamins, etc.” That fits pretty closely with John Hamaker’s assertion that the U.S. survives on a “100% junk food supply.” With the rapid growth of organic acreage and slower growth of mineralized-organic, perhaps we’re moving slightly away from the brink of mass nutritional suicide? We know there is yet a great transformation needed when we read that:

“Medical care expenditures in the U.S. have grown from a few billion dollars a year in 1960 to more than $1000 billion a year in 1996.” (“Toward a health-care system” by editor Frederick I. Scott, Jr. in ***American Clinical Laboratory***, May 1998)

“National Strategy Urged For Suicide Prevention” - “Surgeon-General David Satcher issued a ‘call to action’ yesterday to combat suicide in America with a declaration that suicide, the nation’s eighth-leading cause of death, is a serious public health-problem***…***. Even though suicide accounted for nearly 31,000 deaths in 1996, compared with about 20,000 homicides, victims of life-threatening despondency are often ashamed to seek help, Satcher said. … Aside from those who die, about 500,000 Americans are treated in emergency rooms every year after attempting suicide, Satcher said. “ (***S.F. Chronicle,*** 7/29/99)

"How we lost the war on drugs" – "After 10 years, $100 billion, 1.8 million imprisoned, the verdict is in – it failed. … More youths are doing dope today, and more people are ending up in medical emergency rooms with overdoses and drug-related problems. … Between 1985 and 1998, under a deluge of drug criminals, the nation's prison population expanded from 744,206 to 1.8 million. When the prisons were filled, the taxpayers built more. In 1980 the total nationwide operating budget for state and federal prisons and jails was $7 billion. By 1998, it was $39 billion." (***San Mateo Times***, 9/4/99)

From ***Acres, USA*** (6/95) comes the summary article, "Common Nutritional Deficiencies." Excerpts:

"In spite of being reassured by the medical establishment that the American diet supplies sufficient nutrients, actual studies reveal otherwise. Add to that fact that about a third of Americans are considerably overweight, and the aphorism that we are 'overfed and under-nourished' takes on real meaning.

"According to Melvyn R. Werbach, M.D., quoted in the ***Townsend Letter for Doctors***, recent studies of both U.S. and British populations 'illustrate the frightening disregard of mainstream medicine for even the most obvious, noncontroversial, nutritional requirements.' … "Dr. Werbach identified the following as major contributors to nutritional deficiencies: food processing, high sugar and fat consumption, varying individual needs, stress, food allergies, and poor digestion. We could add the growing of crops on degraded and out-of-balance soils.

"It has been estimated that only about 9% of adults manage to eat the five servings of fruits and vegetables each day as recommended by the U.S. dietary guidelines. A 1989 USDA survey of 21,500 Americans found that not one of them took in 100% of the Recommended Daily Allowance of ten essential nutrients over a three-day period.

"According to a 1991 article in ***Health Counselor***, some common rates of nutritional deficiency include:

90% are deficient in chromium
80% are deficient in pyridoxine (vitamin B_6)
75% are deficient in magnesium
68% are deficient in calcium
57% are deficient in iron
50% are deficient in vitamin A
45% are deficient in thiamin (vitamin B_1)
41% are deficient in vitamin C"

Again, logically, close to 100% of people attempting to live on the standard American-type diet as grown on demineralized and toxified soils, then further denatured by numerous means, are dangerously and likely terminally deficient in multiple nutrients. These nutrients are called "essential" for good reasons.

A TV ad (2/16/99) for General Mills cereals (now including "organically grown") says 72% of kids don't get enough calcium at the time of greatest need, so they're adding this single essential element to their cereals. "Look for the 'good source of calcium' label," they recommend.

"The Center for Disease Control tells us that one-third of all Americans are chronically ill. Contrast that to 50 years ago, when it might have been 5 to 10 percent of the population. This is a serious, and it's a growing, segment of the population. It's estimated that by the year 2,000, about 50 percent of America will be chronically ill." – Dr . Robert J. Marshall, quoted in ***Remineralize the Earth***, Spring '98

Scientists on Gaia (M.I.T., 1991), with a chapter on "Microbial Weathering and Gaia" by David Schwartzman et al, gives the soil microorganisms some of the growing acknowledgement of their large role in "weathering" and converting rock minerals into living protoplasm and fertile soil. Short excerpts:

"Other effects of biota and soil microbes contributing to higher rates of chemical weathering include their production of humic and other organic acids, chelating agents, and inorganic acids, acting as a sink for weathering products and acceleration of physical weathering

through microfracturing of mineral grains (Silverman, 1979; Parfenova and Yarilova, 1965). …

“Silverman has noted the limitations of previous work:

‘The weathering of silicate rocks and minerals in nature is usually envisaged as a relatively slow process, taking place over geologic time. But biological and organic chemical weathering can be remarkably rapid in the laboratory where significant breakdown of silicates within days or weeks appears to be the rule rather than the exception. However, direct extrapolation of laboratory findings to natural events may be premature because of the many variables that cannot be controlled under natural conditions. One can only acknowledge the great potential that exists for rapid and extensive biological and organic chemical weathering of silicate rocks and minerals in the natural environment.’ …

“We recommend an extensive research program to determine experimental weathering rates in soils of a variety of types including tests of the effects of temperature, moisture levels, and other parameters. [The fineness and availability of mixed rock dusts and their organic matter complements being key?] These experiments are needed to make assessments of the contribution of soil microbes to biotic enhancement of weathering.”

I’ve not heard whether or not the recommended “extensive research program” was started.

“In the final analysis, the plants growing on the soil subsist on the products of microbial activity. … ”
–Prof. E. Walter Russell,
Soil Conditions and Plant Growth, Longman, 1973

More support for Hamaker’s explanations of plant and human nutrition is found in the 404-pg. ‘underground classic’ by N.A. Krasil’nikov, ***Soil Microorganisms and Higher Plants*** (1958), translated from Russian and distributed by U.S. Dept. of Commerce, Washington, DC 20230. I wonder if anyone in the USDA has applied themselves to this work and read:

“Our knowledge of forms of organic compounds and of the dynamics of their transformations in the complex microbial coenoses, is inadequate. The knowledge we do possess, however, allows us to assume that the processes of synthesis of various organic compounds proceed incessantly in the soil. Owing to such uninterrupted synthesis (be as it may in small amounts) the total production of these compounds may be sufficient to meet the needs of plants.

“The microflora of the root zone is of great importance in plant nutrition. Growing near or on the roots, microorganisms, together with the plants, create a special zone – the rhizosphere. Soil in this zone differs in its physical, chemical and biological properties from the soil outside the root zone. It possesses different conditions for the absorption and excretion of substances by the roots.

“The interaction between microorganisms and plants on one hand, and between individual microbial species and their metabolites, on the other hand, is the basis for the different transformations of inorganic and organic compounds. As a result, compounds which serve as nutrients for plants are formed. These are absorbed by the roots.

“Substances present in the soil are subjected to a greater or lesser extent of processing before their absorption by the roots. The plants do not absorb those compounds which are characteristic for this or other soil, but metabolic products of the rhizosphere. The rhizosphere microflora prepares various organic and inorganic nutrients for the plants.

“The role of the rhizosphere microflora reminds one of the digesting organs of animals. Microorganisms in the final account serve the same function in the plant nutrition as the digestive system of animal organisms.

“The same point of view is held by the American specialist Prof. Clark. He considers that microorganisms living in the rhizosphere perform the same work as do the intestines of animals. Academician Lysenko is even more definite in this respect. He thinks that the

microflora of the root zone acts as the digestive organ of plants. We can agree with such a comparison if we recall the function of the microflora of the intestines. In recent years, the microflora of the intestines has more and more come to be considered as a factor of supplementary nutrition for animals and human beings. Many intestinal bacteria are known to produce substances which enter the organism of the animal and play an essential role in biological processes as biocatalysts. In many animals, microorganisms of the digestive tract participate directly in the digestion of food." (p. 263-64)

From ***Discover*** magazine (12/98):
"An estimated 5 million trillion trillion bacteria live on Earth (and they have a combined weight roughly equal to that of the top three feet of France). That bacterial census, the first of its kind, was taken by microbiologist William Whitman and his colleagues at the University of Georgia, who divided the planet into different habitats, such as ocean, soil, sub-surface, air, and the insides of animals. … Although bacteria live almost everywhere, from some 40 miles high in the atmosphere to deep-sea vents, 94 percent of them live in the top 1,300 feet of Earth's surface. The bacteria inside animals and us account for just a fraction of 1 percent."

Further support for the Hamaker explanation of plant nutrient uptake from the soil protoplasm/cytoplasm comes from in-depth researcher Dr. Bargyla Rateaver in the May '89 issue of ***Acres, USA***: "How Large Molecules Are Absorbed" – "For decades, the chemical industry has taught university grantees to insist that only chemical fertilizers should be used, as they are instantly dissolved into ions, and 'only ions can be absorbed.' Therefore, there would be no point in using organic fertilizers, because they would only have to be broken down into ions, anyway, before they could be absorbed by roots. At the same time, these salespeople recommend their pesticide poisons, which so completely infiltrate the plants [the systemics], that, wherever a pest attacks the plant, the pest dies. These compounds are large molecules.

"That there is a direct contradiction between these two statements seems not to disconcert their proponents at all. They assume that the ignoramus who farms organically [or who normally would?] is too stupid to see the discrepancy in these explanations. Other

researchers who have agreed that whole molecules could be absorbed have insisted that they must be small since 'large molecules could not enter.' The great emphasis of research has been ion absorption, exchange of ions (involving electrostatic charges) and a host of theories about cation relationships and transport.

"The picture presented of naked roots swimming in a soil solution of ions, or carrying on a trading transaction with colloids for ions, is false to start with. Root hairs, which do most of the absorption, are completely encased in mucigel [created by the microorganism-root symbiosis and full of microorganisms], so any ions ready to enter the root hair itself must first traverse this gelatinous matrix. There is no soup that floats ions to the root hair cell wall. ... My insistence, over so many years, has been that whole molecules can be absorbed directly, and I have documented this with research data from around the world.

"The cytoplasm is not a solution, but is a tightly jammed, somewhat gel-like mass, with globules, bags, plates, irregularly shaped structures (organelles), tubular tracks, fine tubes and filaments running all through it. Everything in it is carefully, precisely designed for a particular purpose, and is exquisitely programmed to exacting assignments, which are rigidly governed by enzymes [which are built with and keyed by soil minerals] prescribed for each series of reactions. Every molecule in it 'knows' what it is made to do, and its action is so rapid that the human mind cannot comprehend the speed – millions or billions of reactions per second.

A 2/10/96 New Scientist cover story article, 'Life Unlimited,' gives a sense of our current state of knowledge/ignorance in this largely "invisible" world of Biosphere-binding microorganisms. Excerpts:

"… Now microbiologists have the tools to probe the entire microbial world for the first time. Everywhere they look they are finding a vastly richer cast of microbial characters than they ever imagined. 'You could go out in your back yard and if you really put your mind to it, you could find a thousand new species in not much time,' says John Holt, a microbiologist at Michigan State University in East Lansing. The diversity of these microorganisms dwarfs that of the macroscopic world. Indeed, microorganisms dominate the tree of life with more

than a dozen groups as different from one another as humans are from pine trees**…**. And most bacteria – like delicate hothouse flowers – will not grow unless the physical and chemical environment is just right. … But after a century of hard labour bacteriologists have described only about 5000 species. For decades, they have wondered: are there more out there that we're missing? Molecular biology now provides a way to answer this question by bypassing cultures and plucking bacterial DNA straight from nature. … 'This technology opens the microbial world to us for the very first time,' says Norman Pace of Indiana University in Bloomington, the first person to use 16S genes to measure bacterial diversity almost a decade ago. … researchers can do little more than guess at the number of bacterial species. 'I would be surprised if there were fewer than hundreds of thousands, and it could be in the millions,' says Fuhrman. … Pace puts the number in the millions or tens of millions**…**. A few years ago, a Norwegian researcher, Vidgis Torsvik, extracted bacterial DNA from a gram of soil, perhaps the most diverse of all bacterial ecosystems. … Torsvik calculated that the sample contained in the order of 10,000 bacterial types – twice as many as all the species described since bacteriology began." [Note they are not including fungi and other kinds of microorganisms in that count.]

From "Organics: Choosing a Healthier World for Everyone" by Patricia Dines (***Share Guide***, July/Aug. 1998):

"With organic foods, we can deeply nourish our bodies and our minds, empower all the activities and goals of our lives – and enjoy really delicious food! And we can nurture and honor the well-being of our communities and our environment as well, supporting healthy conditions and helping prevent the predictable (and costly) health and environmental crises that toxics bring. Cornell entomologist David Pimentel estimates that pesticides conservatively cost the United States $8 billion a year through indirect costs, including harm to human health, animals, crops, pollinators, natural pest enemies, and our groundwater.

"When we buy organic, we vote with our dollars for a future where this harm isn't being done, where our food is grown without poisoning

farmers, workers, neighbors, and the environment. How joyful to have that choice!

"Consumers all over the world are demonstrating with their food purchases just how strongly committed they are to that vision. The U.S. organic market has grown at least 20% a year for the past seven years, and is one of the fastest growing segments of the food market. And when the USDA recently proposed national organic standards that violated the very essence of organic principles, 200,000 [later about 300,000] people wrote and told the USDA that they wanted true organics – the highest response the USDA has ever received for a proposed rule (the last record was 25,000). Because of our strong and clear commitment, the USDA has said they will drastically revise and re-propose these national organic standards!" [As yet we see no total commitment by growers, consumers, farm suppliers, teachers and the USDA to the needed remineralized-organic farming to establish the foundation for total human-and-environmental regeneration and the critical interglacial climate stabilization. The mind- and heart-probing question asked by remineralization pioneer Albert Carter Savage in his 1941 book title still seeks us out, individually and collectively: ***Mineralization – Will It Reach You In Time?***]

The world should know about people and technologies like Jeremy Criss and his Bio-Recycler Vermicomposting Vacuum Sanitation Process which I saw mentioned in a magazine in Spring '98. A phone call to Maryland led to a good talk and information exchange, and he is naturally excited about rock dust and superior compost. His 6/23/98 letter begins:

"Thank you for your phone call. Enclosed is literature on the Bio-Recycler. For the past 20 years while 270 million American flush toilet users have irreversibly polluted 12 trillion gallons of clean water with nitrogen [among many other elements/compounds] the Criss family has polluted nothing and produced 60 tons of zero coli sweet smelling worm castings. The castings have fertilized our fields to the point where we have consistently achieved crop yields exceeding 7 tons of produce per acre (570 bushels/acre), using no fossil fertilizers, even during the worst drought in Carroll County history."

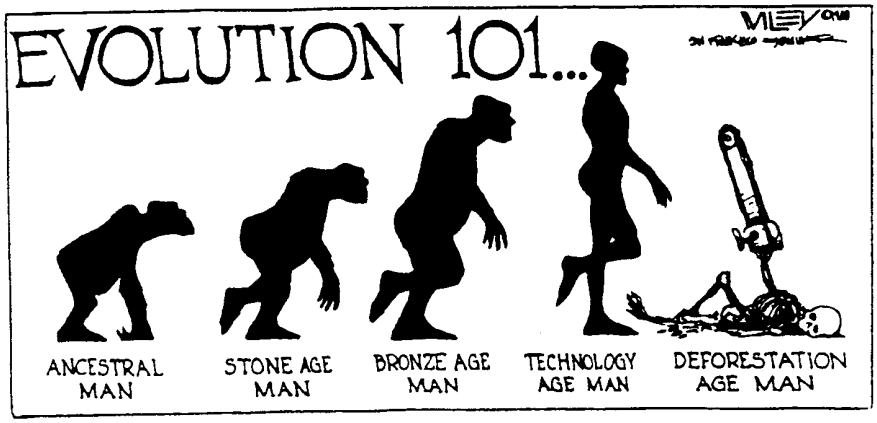
The accompanying photos of the Bio-Recycler and the temperate zone jungle of beans, squash, 10-feet-and-taller corn, etc. show Jeremy Criss and his family to be a new kind of American pioneer. Not one only concerned with survival or personal wealth accumulation, but one having the intelligence and maturity to share in the Native American vision of caring for the whole community of life now and to "the 7th Generation." Potential manufacturers and co-workers may care to contact Mr. Criss at: Bio-Recycler Corp., 5308 Emerald Dr., Sykesville MD 21784 (410) 795-2607.

"Look after the root of the tree and the fragrant flowers and luscious fruits will grow by themselves. Look after the health of the body, and the fragrance of the mind and richness of the spirit will flow."
–B.K.S. Iyengar

More on the Critical State of the Forests and Biosphere

"When we read that over the next sixty years, if we go on as we are doing, a third of all the forms of Life living on this planet could be extinct, can we feel anything but a kind of cosmic horror ?"

- Prince Charles of England



(1988)
Green Letter
Vol. 3, No. 6

Soviet-U.S. Scientists Agree 1 Billion Will Die

In a joint communique released by the Environmental Policy Institute, a group of American and Soviet scientists has warned that up to a billion people will starve to death in the tropics as a result of the deforestation of the world's rainforests. Unless present trends are reversed, the forests will be destroyed within the next thirty years. The Soviet scientists represented the Russian equivalent of the EPA, the Ministry of Agriculture, the National Academy of Sciences, and Moscow State University. The U.S. representatives came from EPI, the National Audubon Society, the World Resources Institute, Natural Resources Defense Council, and the Environmental Defense Fund. The forests are currently being clear-cut at a rate of about forty acres a minute.

From *The Progressive Review*, 1739 Connecticut Avenue N.W., Washingotn, D.C. 20009-8922.

Intellectuals urge Mexico to halt jungle destruction

Mexico City, Monday

One hundred Latin American writers, intellectuals and artists have written to President Carlos Salinas de Gortari pleading for a halt to the destruction of the Lacandona jungle in southern Mexico and the Yucatan peninsula.

The open letter says that the magnificent tropical forest, which once covered more than 8000 square kilometres, is being destroyed more rapidly than that of the Amazon. Within five to 10 years it will have disappeared completely, taking with it both wildlife and archaeological treasures.

The group accuses the Mexican Government of "indifference" and its Environment Ministry of standing idly by while 70 per cent of the Lacandona jungle has been destroyed over the past 30 years. The ecologists principally blame the state oil company, Pemex, for enormous damage while exploring and drilling. But they say tree burning to clear areas for hydroelectric projects and farmland has reached epidemic proportions.

– Independent

(Melbourne Age, 7/18/89)

John Hamaker's predictions of increasing forest die-back worldwide have been shown to be true by various studies, such as Charles Little's 1995 book, ***The Dying Of The Trees: The Pandemic in America's Forests*** (Viking) which ought to have been read by every member of the U.S. Congress and governments worldwide, and every conscious person. Little begins:

"This book, as its title quite explicitly states, is about the dying of trees, and of a related phenomenon that ecologists call forest decline. I do not mean by this simply that some trees are dying – in, say, the forests of Brazil, where they are felled by the buzz saws of international greed, local poverty, and ecological ignorance. That's a part of the story, to be sure – as is the destruction of trees in Europe and Southeast Asia – but it's not all of it. For the trees are dying everywhere, including everywhere in the United States of America. They are dying on the ridges of the Appalachian chain and in the sugar bush of Vermont. They are dying in the mixed mesophytic of the mid-South border states, in the thick forests of central Michigan, on the mountainsides of Colorado and California, on the gulf of Mexico, and in the deserts of the Southwest. And they are dying in the Northwest, too – even before they are cut."

Later, in his chapter "Pandemic," he lists a number of the causes of the dying, including the primary one of soil demineralization, stated as: "acidified soils over vast forest regions; a pattern of nutrient loss and an excess of other nutrients, such as nitrogen, that prove toxic.". His frustration with the lack of wholistic human response is evident throughout, as when he says: "The compass is boxed. From the cedars of Alaska to the palms of Florida, from the maples of Canada and New England to the saguaro cactus of Sonora. The incidents of death and decline are increasing at an increasing rate. Science vainly struggles to keep up, offering hypotheses implicating all manner of causes and suggesting all manner of effects."

Yet he does reveal the potential wholistic response offered by the global remineralization movement which he introduces in his chapter on "The Treesavers," eloquently summarizing our option to work our way out of the crisis and even to "re-create Eden." Unfortunately he chooses to give the reader the impression that this task of over six

billion souls may be too “daunting,” then seems to deny what he has learned from John Hamaker when he says, on the book’s final page:

“I have learned things I wish I had not learned. I have learned that the trees are dying. And that the more trees die, the more will die. I have learned that we have crossed the threshold. And I simply do not know how we can get back safely to the other side.”

Yet Charles Little recalls Wordsworth’s words, including “Nature never did betray the heart that loved her,” urging us to believe this is true. Is he not in deep agreement with Hamaker and the remineralization movement when he then realizes:

“And now we must love her as we have never been asked to love before. That is the crux of the matter: The trees could save us, if we would save the trees, for they ***are*** the threshold.” ***[Love stays true, undaunted.]***

Charles Little is also an editor of ***An Appalachian Tragedy: Air Pollution and Tree Death in the Eastern Forests of North America*** (Sierra Club Books, 1998), another extensively documented and photo-laden attempt to wake us up to forest collapse. The book was recommended to me by Prof. Robert Bruck at North Carolina State University when I called him for any further update he could provide on the state of the forests. Bruck called the condition of the Eastern forests he has been studying, “worse than ever.” Another contributor to the above book is Prof. Orie L. Loucks, Ohio Eminent Scholar in Applied Ecosystem Studies at Miami University, Oxford, Ohio. After we spoke by phone and he confirmed the declining condition and acidity levels of the forest soils, he sent me additional documentation on the “Forest Decline,” including a manuscript still in review and not yet to be cited. He writes:

“It is for a book on Global Integrity that should be out next year. It shows the problem is much worse than most people believe.”

An Appalachian Tragedy further reinforces ***The Dying of the Trees*** message that we’re in the middle of the global forest pandemic, which Hamaker began warning us was underway in the late 1970s. It also shows the continuing closed-mindedness within the U.S. Forest

Service and overall “forest establishment,” very similar to the closed-mindedness we’ve found in the government climate and agriculture agencies and the established fossil fuel-based industries they appear committed to serving, even at this late date near century’s end – and civilization’s end?

Reviewing the 1995 and 1996 editions of the U.S. Forest Service publication, “Forest Insect and Disease Conditions in the United States” as I did before the original publication of ***The Survival of Civilization*** and Supplement, reveals the expected picture of worsening epidemics of “new” diseases and insects which were not major “killers” in decades and centuries past when soil reserves and overall ecosystem health were in less advanced decline. Someone in the Forest Service may be starting to catch on, as its 1996 Health Update notes that outbreaks of the southern pine beetle in the South were commonly on sites “where the soil was depleted of nutrients and organic matter.” Now how could we possibly solve such a fundamental problem?

To further clarify the state of the late-interglacial forests and forest-dependent Biosphere, I provide a few more excerpts and summaries of obvious significance.

“New Prognosis For Dying Woodlands: Simply Rotten” – “Researchers at the Institute for Forestry and Botany in Gottingen, using radioactive gamma-rays and computer tomography have discovered new explanations for the alarming dying of forests in the Federal Republic. The trees, they say, are being starved and dehydrated because the soil, demineralized and overly acidic from too much pollution, is causing their roots to die. The scientists, working on a project funded by the Ministry of Research and Technology, are the first to run such fluoroscopic tests on living trees up to 70 centimeters in diameter. The pictures thus obtained show that only the shallow peripheral roots still transport water to the rest of the tree. The deeper stratum of soil is so polluted, said Institute Director Aloysius Huttermann, that the tap roots must die. This, he explained, was why the last fall storm, without being particularly fierce, uprooted 36 percent of the trees in the region marked for felling. In textbooks from the ’60s, Huttermann went on, are pictures

of trees, especially spruce, with deep root structures. Today in northern Germany, he said, one looks in vain for such a tree. …

" 'Processes have been occurring under our feet that we were not aware of,' he said, 'and the forests can no longer be saved without man's help.' In the Director's opinion, a new beginning for the seven million hectares of German woodlands could be brought about by turning over and fertilizing the soil down to 80 centimeters." [Or remineralized without tillage, allowing the rains and soil life to distribute the minerals!] (***This Week In Germany***, 7/26/85)

"The Mighty Falling" – "Oak trees in Europe are suffering record levels of disease and defoliation. The European Commission's annual survey of trees has found that between 1992 and 1997, 51 per cent of European oaks (Quercus robur) deteriorated significantly, while just 8.2 per cent improved in health. By 1997, nearly three-quarters of the oaks monitored had lost 20 per cent or more of their leaves. … The authors draw attention to the role of air pollution, which can cause acid rain, disrupting the nutrient balance in poor soils by leaching out minerals and enhancing the concentration of nitrates. This encourages the growth of leaves that are more delicate and more susceptible to frost and insects.

"The survey found that oak trees suffered most on soils that had nutrient imbalances, such as those affected by pollution. But the worst declines were in northern Spain and southwest France, where there is relatively little air pollution – and nobody knows why." (***New Scientist***, 11/14/98)

"Already every 4th Tree without Leaves or Needles" – "Brussels (dpa) – In Europe circa 2 of 3 trees are sick, says the recent report about the forest in Europe by the EU-commission in Brussels. In the EU countries and 15 mid- and east-European states, 25.3% of all trees have lost their leaves and needles. 39.3% of all trees are with some less loss of leaves and needles in a 'warning fuse.' Healthy are seen only 35.1% of all trees. Overall the condition of all the forests in Europe in the past 10 years is clearly deteriorated. The count of the damaged trees in this time period is more than doubled. … The biggest damages are in the Czech Republic (68.6% sick trees), Bulgaria (49.6%) and Poland (36.6%). The least sick trees are in

Austria (7.1%). [Due to being more mountainous and naturally remineralized, with some human help?] In Germany, 19.8% of all trees were mid-severely to severely damaged. … ” (Renate Hageman translation of ***Amerika Woche***, 10/10/98)

“Trees Suffer in ’98 Ice Storms” – “Officials say it could be months before they have a definitive tally of the destruction wreaked by the January ice storm that toppled life as Northeasterners knew it. The storm claimed more than 20 lives and racked up damage totals that included more than 50 percent of Maine’s forested areas and caused one Canadian city to redirect its snowplows to clear away trees. … The storm coated trees in parts of the U.S. and Canada with a deadly crust of ice two to three inches thick. Hardest hit were New England, northern New York, Quebec, eastern Ontario, and Canada’s Atlantic Provinces. In Maine, 11.3 million acres – more than half the state’s forested areas – were affected, with half suffering moderate to severe damage. More than 400 municipalities reported tree damage, and MFS estimates a loss of more than $300 million from downed timber***…***. Canada’s forests met a similar fate: 70,000 trees were killed on Mount Royal in Montreal; 30,000 100-year-old trees were destroyed in urban Kingston; and an estimated 39,000 Ottowan trees will require life-sustaining surgery. … In the U.S. President Clinton declared several communities disaster areas, making them eligible for federal aid. Unfortunately, the Federal Emergency Management Agency (FEMA) no longer provides disaster funds for tree planting.” (***American Forests***, Summer ‘98)

“The Climate Change Connection” – “A study by Canadian Forest Service scientists concludes that their northern boreal forests have already lost almost one-fifth of their biomass over the last 20 years because of increases in fire and insect outbreaks. They worry that the reversal of forests from absorber to emitter of carbon dioxide could be contributing to the acceleration of greenhouse gases.” (***American Forests***, Autumn ‘98)

“Hot Times” – “***…*** Instead, one must examine over-all decadal or longer trends. For example, in Canada, forest fires, insects and diseases have affected twice as much area of the boreal zone in the 1980s and 1990s as in previous decades.” (***Montreal Gazette***, 8/29/98)

And from ***Worldwatch Paper 140*** (April '98), "Taking a Stand: Cultivating a New Relationship with the World's Forests" by Janet Abramovitz (worth reading in its entirety):

"For millenia, humanity has left its mark on the world's forests, although much of it was hard to see. During this century, however, the scale and impact of our footprint has expanded, and the forests that we have always pictured as endless are rapidly shrinking before our eyes. Almost half of those once covering the earth are gone, and deforestation is expanding and accelerating. Between 1980 and 1995 alone at least 200 million hectares of forests vanished – an area larger than Mexico. The deteriorating health and quality of much of the remaining forests weaken their ability to support the species and services they once did, rendering them vulnerable to further decline.

"Whereas deforestation was once a localized problem, now it affects the entire planet. The blinding smoke created by the fires that swept through the forests of Indonesia in 1997-98 helped bring the global dimension of catastrophic forest loss into focus when it darkened neighboring countries. The growing understanding of deforestation's role in altering the earth's climate also increases awareness of its global impact. … The world's forests now lose more carbon to the atmosphere than they absorb – a recent and radical shift in the functioning of these critical ecosystems – fueling global climate change. One quarter of all the atmospheric carbon produced by human activities comes from cutting and burning forests. Those that burned in Indonesia sent as much carbon into the atmosphere in a few months as all of Europe's industrial activity did in a year. …

"During the first half of this decade, at least 107 countries experienced a net loss of forest cover. Each year at least another 16 million hectares of natural forest - an area the size of Washington state or more than twice the size of Ireland - is lost in developing countries. ["Developing" has obviously become a very misleading hence obsolete term. Let's first ***develop*** a high level of ecological understanding, respect and conscience in action!]

On pg. 62, Janet brings to our attention an Earth Summit action plan that should, logically, be throwing whatever weight it carries behind global soil remineralization plus reforestation:

“Agenda 21 - the plan of action that emerged from the Earth Summit - contains a chapter called ‘Combatting Deforestation’ that also provides guidance for action. Nations agreed to sustain the multiple roles of all types of forests, to enhance sustainable management and conservation, to rehabilitate degraded forests, to value and use forest goods and services more fully, and to improve the quality and availability of information about forests.”

Although author Abramovitz has continued the puzzling Worldwatch Institute tradition of ignoring or overlooking the great gift of soil remineralization we’ve tried to provide them, her concluding message still carries the general ring of truth:

“We have the opportunity and the know-how to cultivate a new relationship with the world’s forests, one that will reverse their decline, improve people’s quality of life, and ensure that future generations inherit healthy forests. Whether this relationship develops fast enough will depend on who wins the fierce competition now under way – between the powerful supporters of the status quo racing to harvest the remaining forests before someone else does and the growing ranks of environmentalists, scientists, local people, and business and government leaders pressing for a viable alternative. Whether or not the bystanders to this competition recognize its urgency and throw their support to a new relationship with the forests in time will determine the outcome. “

“World Bank reforms its ‘green’ policies” - “The finance ministers and central bankers from the most powerful countries in the developed world are meeting this week in Washington to work out ways of putting development aid [? ?] on a sounder environmental footing. Tomorrow, the development committee of the World Bank will consider a package of reforms designed to make ‘green’ policies on sustainable development more central to its lending policy. It even includes the idea of paying poor countries to preserve their environments ‘in the global interest.’ These proposals, which include plans to strengthen the environmental and ecological expertise

directly available to the bank, surface in an internal paper prepared for tomorrow's session by a British-born economist, Jeremy Warford. ... The physical indicators of environmental degradation, set out in the paper, are stark. Deserts worldwide are growing at a rate of 6 million hectares [about 15 million acres] a year – an area the size of Ireland. Tropical forests are being lost at a rate of 10 million hectares annually. Soil erosion destroys 20 million hectares of agricultural land every year." [The president of the World Bank was recently given and has viewed "Stopping the Coming Ice Age" and may now realize the inadequacy of minor "reforms," were the above statistics insufficient to inspire this realization. Will he be capable of asking, "Now, ***how can the Earth profit*** by human (my) action for a change?!"] (***New Scientist***, 4/9/87) [DW comments also from the late 1980's.]

"At the rate that the world's topsoil is being lost to erosion, there will be 32 percent less of it for each person on earth by the year 2000. Each year 24 billion tons from the approximately six-inch deep nutrient-rich layer is washed into the sea and blown into the air as dust." (***Geo***, Jan. 1985)

Washington, D.C.'s Worldwatch Institute, headed by Lester Brown since the late 1970s, has efficiently ignored several efforts since then to engage them in a dialogue of open-minded concern regarding the Hamaker Thesis and the global need for soil remineralization and overall Earth Regeneration. Could this very strange lack of response be related to contrary interests of some of its funding sources such as those listed in the Worldwatch ***State of the World*** annual reports and/or an apparent orientation of Mr. Brown to the chemical agriculture paradigm, possibly due to previous employment with USDA? It is rather painful to see someone widely considered an environmental leader still using the term "fertilizer" to primarily mean, not the natural spectrum of elements used by Nature to create soil fertility, but the commercial N-P-K based, imbalanced growth-forcing concoctions of chemical "fertilizer" companies. Our challenge now: can we all develop the greater perspective and clarity which will allow us to go beyond the limiting and obsolete paradigms which guided us right to the edge of the eco-climatic abyss we now face?

Let's take a quick look at the 1998 edition of the annual ***State of the World*** ("over 1 million copies sold"), A Worldwatch Institute Report on

Progress Toward a Sustainable Society, which does as usual carry important information and perspectives which to the less "conservative" suggest the need for all of us to do less world watching and consuming and much more world nourishing, healing and regenerating. Some excerpts and comments:

"But El Nino also reminds us of our growing vulnerability to climatic extremes. Unless we reduce our dependence on fossil fuels and accelerate reliance on new energy and transportation options, the climate will become more erratic over time, and all of the Earth's ecosystems will be threatened. **...** The growing demand for food, pulp, and other commodities of an increasingly affluent population of nearly 6 billion is putting more and more pressure on the land. According to one estimate, the demand for food alone will require an additional 90 million hectares by 2010. … One of the great challenges faced in the coming decades is to shift that flow of capital to more sustainable – and ultimately more productive – investments in areas such as renewable energy, regenerative agriculture, and closed-loop, zero-emission factories." [Let us thank Mr. Brown for at last using the word "regenerative" and encourage him to see the obvious fact that soil remineralization is the natural foundation for a truly regenerative agriculture as well as forest and biomass energy culture!] ... Unless humanity stabilizes the global atmosphere that we have been steadily altering for more than a century, virtually every ecosystem on Earth will be at risk. By focusing on the magnitude of this threat – and on the means for addressing it – we hope to have played a small role in spurring governments to action."
(from the Foreword by Lester Brown et al)

[By understanding the magnitude of the threat within the context of the glacial-interglacial cycle, both our species' survival instinct and higher conscience of planetary responsibility call us not merely to stabilize the severely imbalanced atmosphere but attempt to return it to normal interglacial levels of about 280 ppm CO_2 via extensive remineralization and re-greening of the Biosphere. These primary means of addressing the crisis were again neglected by Worldwatch, so unfortunately they have played a very small role in spurring governments, and those governments are meant to serve, to only incomplete, inadequate, therefore "ecocidal" actions. We can do better than this. Why not try in future editions, Worldwatch people?]

More from the 1998 ***State of the World***:

"The United Nations projects that over the next 50 years world population will reach 9.4 billion – 3.6 billion more people than today." (p. 174)

With the big steps that are still needed – stabilizing population and stabilizing climate – some countries have crossed the thresholds, other have not." (p. 184)

"Within the fossil fuel industry itself, as noted earlier, some companies such as Enron, British Petroleum, and Royal Dutch Shell are already looking to the future, and beginning to invest in alternative energy sources. Enron's chairman, Ken Lay, who publicly discusses the need to reduce carbon emissions and to stabilize climate, sees Enron at the heart of the transition from fossil fuels to renewable energy sources. … In an important speech at Stanford University in May 1997, British Petroleum's CEO, John Browne, said, 'The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are a part. We in BP have reached that point.' This was a big jump for big oil. … A few other corporate leaders are also beginning to grasp this new reality. Among this new breed of corporate CEOs is Robert Shapiro of Monsanto, who puts it simply: 'The whole system has to change.' ... Shapiro has gone further than perhaps any other CEO in developing a strategic plan by asking, What will an environmentally sustainable economy look like and how can Monsanto use its resources to help get from here to there? In this vein, Monsanto has sold off its pesticides division, choosing to focus on the use of genetic engineering to breed pest-resistant crop varieties." [What might Monsanto do with its resources if it understood the need for soil remineralization and how healthy soils and crops enable natural health balance and "immunity" throughout the chain of life? Perhaps we'll soon find out?] (p. 185)

"One defining characteristic of a civilized society is a sense of responsibility to the next generation. If we do not assume that responsibility, environmental deterioration leading to economic

decline and social disintegration could threaten the survival of civilization as we know it." (p. 187, last page) [Well said, Lester Brown and Jennifer Mitchell, in this concluding chapter, "Building a New Economy." Now if the world could only agree on the natural, regenerative means to ***demonstrate*** that immense responsibility!]

A July 2001 update: Worldwatch Chairman Brown, possibly tired of watching and documenting the degeneration of Earth, has announced the creation of a new Earth Policy Institute to help build an eco-economy. I offer good luck and this volume to him. Website: www.earthpolicy.org.

From "Green Deserts: Planting For Our Very Lives'' (***Rain Magazine***, Jan. '83):

"Trees, The Key to Recovery – Dry areas cover about a third of the earth's land surface. However, much of the remaining two-thirds is unsuitable for agriculture. If we exclude tundra, polar and high mountain regions and consider what percentage of potentially usable land has become desert during the last century, the figures are as follows: In 1872 about 14% was desert; in 1952 this had risen to 33%; and by 1977 it was a staggering 55%. Now, in 1982, almost two-thirds of the usable land on earth has become dry and barren. The UN estimates that at the present rate of cropland loss and population growth, there will be half as much cropland available to feed each person by the year 2000."

Sierra Club Yodeler Editor Steve Rauh, a cofounder of the Conference on the Fate of the Earth, and Carl Casebolt have produced a lengthy article (which may soon become a book) in newspaper format entitled, "Toward Organic Security – Environmental Restoration or the Arms Race?" At least a few quick excerpts should be considered here:

"The declining environmental and economic conditions in the United States and the Soviet Union derive from an over-emphasis on military spending and a neglect of ecological support systems both within their own borders and globally. The Third World debt (much of which can never be repaid) menaces the stability of developed nations' economic systems and is shown to be directly related to degraded

ecological support systems and increased population demands. The age of expanding economies and increasing expenditures on armaments has come to an end. World governments can no longer provide for the security of their people without making the restoration of the environment and the reduction of world tensions their first priority. …

"However, present supplies and long term prospects should not be confused. The trends speak a different language: average soil losses of 10 tons per acre per year in the United States; little progress being made since 1977 in controlling desertification (productive farm acreage becoming desert); 150 million people in Africa facing food scarcity in coming months; and 64 nations estimated to be unable to feed their people by the year 2000. … Estimated global losses in productivity from desertification and soil losses are $26 billion annually; thus adequate global conservation programs (at a total cost of $120 billion) would pay for themselves in 5 years. However, global actions to meet this crisis have foundered. In 1977 the United Nations established the Plan of Action to Combat Desertification. The goal was to raise $2.5 billion per year. By 1985 that would have meant $20 billion collected. As of April 1985 the fund had received $48,524 directly with some $26 million additional being given through auxiliary programs. Undoubtedly the situation in Africa today would have been very different if these funds had been available at greater levels than 1/10 of 1% of the acknowledged need."

Unfortunately the authors have accepted the greenhouse "warming" trend without apparent question, which is strange, considering their conclusion to this section: "The trend probably cannot be reversed but it could be meliorated by reduction in fossil fuel use, reforestation and remineralization of soil."

"Soil erosion is the number one environmental problem of the world. The rate of degradation is such that the productivity of land is falling by up to 30% annually. Up to now, the effects of soil erosion could partly be masked by irrigation and fertilization, but this will be less and less possible. The problem is much greater still in developing countries. India is losing 30 tons of soil per hectare every year, and, in Africa, the rate of soil erosion has increased 20-fold over the last 25 years." (***Environmental Digest***, March 1988)

John Seed of the Rainforest Information Centre in Australia, in "A Passage Through India," reports: "Desertification now threatens 35% of the planet's land surface and 850 million poor people. About 78, 000 square miles turn to desert yearly. About 50 million acres of forest are destroyed each year. About 25 billion tons of topsoil are being eroded yearly and the rate of loss is increasing. And if you think that the Ethiopian famine is bad, consider this: 'The UN estimates that at the present rate of cropland loss and population growth, there will be half as much cropland available to feed each person by the year 2000.' (***Rain***, Jan. 83) People, wake up!" (***Earth First Journal***, 2/2/86)

"Everywhere the process of soil alienation, destruction, degradation, depletion is going on. According to experts' estimate not less than 5-7 million hectares of land is being destroyed annually. Up to 2 billion hectares of land is lost in the course of the history of human civilization. If it continues as it is going on now, mankind could lose during the forthcoming 50-70 years .5-.7 billion hectares more."
–Victor Kovda, ***Biosphere, Soil Cover and Their Changes*** booklet (mid-1980s)

"The soil cover of the Earth (the Pedosphere) is an important component of ecological environment and of the global biosphere as a whole. The soil shell is an irreplaceable and indispensable part in the biospheric mechanism. Should this part be destroyed or wiped away this will throw the general biospheric mechanism into deep, actually, irreparable disarray and a state of total disaster. … The composition of normal atmosphere (CO_2, O_2, O_3, N_2, vapours Of H_2O, dust, etc.) considerably depends on normal functioning of the soil-vegetative cover of the Earth."
– Viktor Kovda, "Problem of World's Soil Resources and Proposals for a Long-Term UNEP Programme," in ***Glimpses of Ecology*** (mid-1980s)

"Huge soil loss threatens world's food supply" – "About 745 million acres of fertile land has lost most of its agricultural productivity since farming began, according to a group of soil scientists who attended the International Soil Reference and Information Centre in the Netherlands last week. Another 2.25 billion acres, equal to an area

larger than Australia, is in imminent danger. … 'Are we going to have enough good land to feed the extra 2.6 billion people who will be on this planet by the year 2025 ?' FAO Director General Edouard Saouma said. 'Land degradation is now proceeding so rapidly that few African countries can hope to achieve sustainable agriculture in the near future.**'** [Can he name one country now practicing a regenerative therefore truly sustainable agriculture? Next note the total denial of the role of soil poisoning and mining via ag chemicals.] **…** Manmade soil degradation is caused primarily by overgrazing, but deforestation and destructive farming practices, such as misuse of heavy equipment and planting on steep land, also play a major role, the FAO said." (***San Mateo Times***, 8/14/93)

"Acid soil blamed for thinning eggshells" in ***Science News*** (4/2/94, p. 212) further reveals the whole-ecosystem effects of soil demineralization and late-interglacial life-support system breakdown. Birds trying to survive and reproduce in the acidified forests are finding far fewer snails and other normally mineral-rich foods to eat. Lead researcher Arie van Noordwijk of the Netherlands Institute of Ecology reports that the soil's calcium content is 0.3 gram per kilogram of dry matter whereas 5 to 10 grams is considered normal. No doubt focus on the many other key minerals will reveal a broad pattern of "abnormality"!

Yes, acid rain and fallout continue to assault the weakened Earth, as John Harte notes in his "Acid Rain" chapter of ***The Energy-Environment Connection*** (Island Press, 1992): "In the northeastern United States, southeastern Canada, Scandinavia, northern and central Europe, and parts of China the annually averaged pH of precipitation is between 4 and 4.5. Forests and lakes continue to increase in the biologically 'dead or dying' classes, including over 20,000 lakes in Norway and Sweden with a similar trend found in the northeastern U.S." Harte reminds us:

"A nation that poisons its forests and lakes poisons an aesthetic and spiritual well of its people. There is a pathetic sort of positive feedback lurking here, for as children grow up in a world that affords meager opportunity to enjoy wilderness and natural ecosystems, then later, as adults, their incentive to save what little is left for future generations will be less."

He also notes we're being forced to recognize that human health and total ecosystem health necessarily grow together from the same primary causes.

"An international acidification week is being planned all over Europe for this spring. It is timed for 20th-27th April. In Sweden this summer, a number of youth organizations – political, Christian and environmental – will be conducting an intensive campaign against tree death. They call themselves the Youth Action for European Forests and they represent at least 300,000 youngsters." (English summary translation of "Acidification Week in April," in ***Sveriges Natur***, 2-3/86)

A 1984 Worldwatch Institute study conservatively estimates, according to "Soil Losses Eroding Food Security" (***Science News***, 10/6/84) that "cropland losses now exceed new soil formation by 25.4 billion tons per year." The next sentence confirms how little topsoil remains as our interglacial Biosphere comes to its unnaturally accelerated telocratic/end phase: "With topsoil being on average only 7 inches deep worldwide, this rate could correspond to mining the resource at a rate of about 7 percent per decade. … " How much less topsoil is there today after another 15 or more years with about 6 billion of us supporting ***parasitic*** soil mining rather than ***symbiotic*** soil building and regeneration?

"Degradation of the world's agricultural land – from water and wind erosion, salinization and water-logging of soils [demineralization still being ignored even though so primary!] – causes abandonment of 25 million acres of productive arable land each year. Topsoil is being lost 20 to 40 times faster than it is being replaced. To feed the 92 million humans added yearly to the world population, 13 million acres of new land must be put into production each year. Most of the 37 million acres needed for replacement and expansion comes from the world's forests." ("Natural Resources and an Optimum Human Population" by Dr. David Pimentel et al; Cornell News Service, Village Green, 840 Hanshaw Rd., Ithaca NY 14850)

"Central American Beef" – "In the past 30 years more than two thirds of Central America's rain forests have been cleared to provide

pasture for beef cattle. According to Catherine Caufield, author of ***In the Rainforest***, beef production is three times that of 1961, but beef consumption of Costa Ricans has fallen 40 percent since 1960 because they can't afford to buy the beef even at the cheap, competitive prices that foreigners pay. After initial clearing, about 2.5 acres of formerly rain forest land are required to support one head of beef. In five to 10 years, however, seven times as much land is required to support one beef animal – raising the costs of production [again pointing out the rapid soil degradation which follows the forest to pasture catastrophe]. Author Caufield also notes that while peasant Central American agriculture may support as many as 100 people per square mile, rain forest ranches typically employ only one person per 12 square miles. ... As Gerardo Budowski, director of the Tropical Agricultural Research Center in Turrialba, Costa Rica, quoted by Catherine Caufield, said: 'Land degradation caused by grazing is by far the greatest challenge in Latin America.'" [Might we each be wise to consider the whole spectrum of potential benefits to planetary and personal health of an intelligently chosen vegetarian or vegan diet emphasizing truly fresh, raw foods grown oneself or locally in mineralized gardens, fields and orchards? Helping prevent complete rainforest-and-interglacial climate devastation while building personal and bioregional health could be key benefits.] (***The Plain Truth***, Nov.-Dec. 1987)

More thoughts from James Lovelock in his book, ***The Ages of Gaia***: (W.W. Norton & Co., 1988)

"The things we do to the planet are not offensive [?] nor do they pose a geophysiological threat, unless we do them on a large enough scale. If there were only 500 million people on Earth, almost nothing that we are now doing to the environment would perturb Gaia. Unfortunately for our freedom of action [?], we are moving towards eight billion people with more than ten billion sheep and cattle, and six billion poultry. We use much of the productive soil to grow a very limited range of crop plants, and process far too much of this food inefficiently through cattle. Moreover, our capacity to modify the environment is greatly increased by the use of fertilizers, ecocidal chemicals, and earth-moving and tree-cutting machinery. When all this is taken into account we are indeed in danger of changing the Earth away from the comfortable state it was once in. ...

"There is no way for us to survive without agriculture, but there seems to be a vast difference between good and bad farming. Bad farming is probably the greatest threat to Gaia's health. We use close to 75 percent of the fertile land of the temperate and tropical regions for agriculture. To my mind this is the largest and most irreversible geophysiological change that we have made. Could we use this land to feed us and yet sustain its climatic and chemical geophysiological roles? Could trees provide us with our needs and still serve to pump carbon dioxide as well as the natural ecosystems they replace? It should be possible, but not without a drastic change of heart and habits. I wonder if our great grandchildren will be vegetarian and if cattle will live only in zoos and in tame life parks." (p. 178-79.)

A newsletter from the Farm Animal Reform Movement, Inc. (PO Box 30654, Bethesda MD 20824) has this to say about our largely animal-based agricultural system: "In all, 5.3 billion feeling, warm-blooded animals – cows, sheep, pigs, turkeys, and chickens, are raised and killed for food in the U.S. each year. That's 30 times as many animals as are killed in this nation's laboratories, pounds, and forests, combined. And most of them never have a nice day. From birth, they are confined, crowded, mutilated, malnourished, and deprived. And there are no laws to protect them. Unfortunately, animals are not the only ones to suffer from the excesses of the farm animal industry. Each year, nearly 1.5 million Americans are crippled and killed prematurely by heart failure, stroke, cancer, and other chronic diseases that have been linked conclusively with excessive consumption of the industry's products. As many as 800 million people throughout the world face starvation, as America wastes 80-90 percent of its prime crops on feeding farm animals. Still, there is more. The farm animal industry takes up 90 percent of our agricultural land and water, depletes irreplaceable topsoil and groundwater, destroys forests and other wildlife habitats, and contributes most of the pollution burden to our lakes and streams."

And from ***Sacred Cows at the Public Trough*** by Denzel and Nancy Ferguson: "Seldom in history have so many been so thoroughly brainwashed by so few. The truth of the matter is: No industry or human activity on earth has destroyed or altered more of nature than the livestock industry. The slow-talking cowboy and his docile cows

are the center of a monstrous myth, a part of Americana that rests on concocted imagery and fabrication – an enormous falsehood based on profound ignorance."

"The greatness of a nation can be judged by the way its animals are treated.
–M. K. Gandhi

More on Late-Interglacial Forest Fires Around the Globe

"Amazon forest fires 'may damage ozone' "- "For the first time, Brazilian scientists have measured the exact amount of Amazon forest burnt down during the annual dry season to make way for cattle pasture and crops. The figures are terrifying. The scientists found that last year 204,606 square kilometres of forest went up in smoke, about half of it virgin forest. The Amazon region covers more than five million square kilometres. The Brazilians have begun to investigate the possibility that the huge dense pall of smoke and gases released into the atmosphere by the burning, and carried south by the regular windcurrents, could be contributing towards the thinning of the ozone layer in the Antarctic. 'The amount of smoke produced is so great that it's as though the Amazon had a hundred volcanos in eruption,' said Dr. Alberto Setzer, the environmental engineer in charge of the forest fire monitoring project at Brazil's space research institute. 'And each of them is as big as El Chinconal (a Mexican volcano whose eruption in 1982 was thought to have damaged the ozone).' For West Germany's leading ozone expert, Professor Paul Crutzen, the connection is already clear. 'One of the main causes of ozone destruction is these enormous fires, not just in Brazil but in Africa too.' Dr. Setzer [like most scientists, apparently] is more cautious about making a definite link, and said there was no scientific confirmation yet of a direct relationship." (***Melbourne Age***, 4/19/88)

"Firewood need is sending world's forests up in smoke" – The United Nations Food and Agriculture Organization estimates that half the world's forests have disappeared since 1950. FAO says Latin America has lost 37 percent of its tropical forests, Central America 66 percent, Southeast Asia 38 percent, and Central Africa 52 percent. The World Bank has redoubled its reforestation efforts in recent years

and now has 48 ongoing reforestation and forestry-related projects around the world. ... Dr. Jay Savage, chairman of the biology department at the University of Miami ... says of reforestation efforts: 'We're slipping behind all the time. It's a pretty pessimistic outlook.' At the same time, there are isolated, yet conspicuous examples – in China, South Korea, and India – where strong community involvement has resulted in the greening of tree-denuded landscapes - often with trees that are faster-growing and more commercially productive than those that had been felled." (***S.F. Examiner***, 2/23/89)

"Firewood scarcity, then, is intimately linked to the food problem facing many countries in two ways. Deforestation and the diversion of manures to use as fuel are sabotaging the land's ability to produce food. Meanwhile, as an Indian official put it, 'Even if we somehow grow enough food for our people in the year 2000, how in the world will they cook it?'" (Worldwatch Paper 1, ***The Other Energy Crisis: Firewood*** by Erik Eckholm)

Of course the only practical "somehow" to fulfill their food and wood needs is an ecological, ***fertility-building*** agriculture/forestry system based on ***soil remineralization*** and universal ***tree planting*** – forests, orchards, energy plantations, windbreaks, etc. – in the context of a cooperative global mobilization to regenerate the Earth and reverse the glacial process. It should also be pointed out that the largely vegetarian peoples of India (and elsewhere) ***have the option*** of freeing themselves of some or all of their cooking fuel requirements simply by eating more of their fruit-vegetable-pulse/bean-etc. diet in its "sun-cooked" raw and sprouted forms. This is the essential diet of the "world's healthiest people," their Hunza neighbors in the Himalayas just north of India. After 24 years on such a (tree-crops based) diet free of cooked foods, this editor can gratefully report (as many others have) that it's nutritional and health-building qualities are excellent and complete (and illness has disappeared) - ***provided***, of course, all other co-factors of health are respected. ***Mineralized produce***, (as in Hunza) from remineralized farm and orchard and garden soils is ***essential***.

"Burning Rains" – " A veil of smoke that develops each summer from Brazil to Africa may be contributing to global climate change, and causing extremely acidic rain to fall in the tropical forests of the

Congo. A team from the Max Planck Institute of Chemistry in Mainz, Germany, has found that the smoke is partially caused by huge fires resulting from clear-cutting of Brazil's tropical forests. Acid content of the rain falling on the Congo River basin exceeds that monitored in the heavily industrialized areas of the northeastern United States." (***S.F. Chronicle***, 4/17/93)

"Wildfires" – "Massive brush fires blazing out of control in remote northwestern Australia have destroyed vegetation in an area the size of England. Drought and temperatures soaring to 104 degrees F. have fanned the fires, which occur on a much larger scale each year. Landowners have described the blazes as the worst in living memory, scorching twice as much land as the Indonesian infernos of recent weeks." (***S.F. Chronicle***, 10/18/97)

"A Mark of Fire on the World" – "What do homeowners in Sydney, children in Jakarta, orangutans in Indonesia and elephants in Kenya have in common? All are feeling the adverse effects of the world's worst year for fires. More tropical forests burned in 1997 than at any time in recorded history, sowing death, respiratory illnesses and pollution, and destroying wildlife habitats, the World Wide Fund for Nature said yesterday. 'This was the year the world caught fire,' said Jean-Paul Jeanrenaud, head of WWF's forest program and co-author of the report. Up to 12.4 million acres of forest and other land burned in Indonesia and Brazil, where the Amazon region alone had more than 45,000 fires, the report said. Vast areas of Papua New Guinea, Colombia, Peru, Tanzania, Kenya, Rwanda and other parts of Africa also burned, and large-scale fires were reported in Australia, China, Russia and several Mediterranean countries . … In his preface to the report, fund director general Claude Martin called it 'a planetary disaster.' ... At least 80 percent of the fires were set deliberately, often by multinational companies trying to clear land for planting or development. … " (S.***F. Chronicle***, 12/17/97)

"Up in smoke: the world's rain forests are burning" – " … Today's fires are only the latest chapter in a decades-long history of destruction of the rain forests. Once spread thickly along the tropics ... rain forests are now being destroyed at a rapid rate. According to U.N. experts, 150 acres of tropical rain forest are destroyed each minute; 214,000 acres (an area the size of New York City) are

destroyed each day; 78 million acres (an area larger than Poland) are destroyed each year. … 'Unless we do something soon to save the rain forest, said Edward O. Wilson, a well-known biologist, 'it will be too late to do anything, and humanity will be face-to-face with the consequences.**'** "(***Current Events***, 3/20/98)

"Rain forests wiped out faster than reported" – "After years of Brazilian government claims that stricter environmental laws had slowed destruction of the Amazon rain forest, newly issued figures show that deforestation has actually increased sharply since the 1992 Earth Summit was held here, with fires and logging consuming rain forest the size of Denmark in just a few years. … The data show that deforestation rose 34 percent, from 4,296 square miles in the 1990-91 burning season to 5,750 square miles a year by 1994. Analysis of the data for 1995 is expected to show a yet greater increase . … (***San Mateo Times***, 9/12/96)

"Amazon facing huge fire danger" – "At least half of the Amazon rain forest is a tinderbox ready to go up in smoke, raising the specter of an ecological disaster that may wipe out the world's largest wilderness. About 12 percent of the two-million-square-mile jungle is already gone, and burning has been so intense in recent months that a lake caught fire and people in jungle cities are being treated for respiratory ailments. And now, a new seven-year study suggests the burning may get much worse: The rain forest – even at its pristine core – is dangerously dry and flammable because of logging, deliberate burning around its edges and El Nino." (***San Mateo Times***, 12/4/97)

"More of the rain forest is ravaged" – "In the 1980s, dramatic photos showing the Amazon forest on fire helped ignite an international outcry against destruction of the world's rain forests. Although Amazon deforestation declined slightly in the early 1990s, a report released last week by the Brazilian government shows record-high destruction rates more recently. Based on satellite photos, the study concludes that nearly 19,000 square miles of forest were cleared from 1994 through 1996. An area roughly the size of Connecticut and New Jersey combined was cleared during 1994-95 alone." (***U.S. News and World Report***, 2/9/98)

"Teetering on a limb? " – "Though the consequences of deforestation – from Oregon to Brazil, from Cameroon to Malaysia – have been well documented for at least a decade, worldwide deforestation rates continue to escalate. Unless we change the way we value our forests, the remaining woody lands are in danger of someday disappearing altogether, says Alan Durning in 'Saving the Forests: What Will It Take?,' a report issued recently by the Worldwatch Institute. … Durning outlines three steps that he says are critical to saving forests: empowering forest residents, pricing forest products as if the Earth mattered and, most important, wresting political power from the beneficiaries of deforestation – powerful logging, mining, ranching and real estate development concerns. ... Durning says that if prices of wood and other forest products 'told the ecological truth' the cost of a hamburger produced on former jungle land turned into pasture for grazing would be about $200 after accounting for species loss, flood damage, erosion and climate change. " (***Vegetarian Times***, April 1994)

"Record Amazon Blazes" – "Huge wildfires burning in Brazil's Amazonian state of Roraima spread into conflagrations unprecedented in the country's history. The fires have now reached remote rain forests that are normally too wet to burn. Five months of El Nino-produced drought have brought virtually no rainfall to the region near the Brazilian border with Venezuela. Vast areas of savanna have been reduced to smoldering fields of gray ash, destroying grazing lands and killing tens of thousands of head of cattle. Monkeys, snakes and other creatures are fleeing deeper into the forest to escape the fires." (***S.F. Chronicle***, 3/21/98)

Intelligent comments from Heads of State or candidates for that role have been so few and far between for so long that many of you may doubt we'll live long enough to see anything approaching ecological intelligence expressed by these men and women on a consistent, reliable basis. You may be right. Or maybe Biospheric realities will simply become impossible to ignore, even for those most practiced in the "art of compromise" with the Laws of Nature. This appears to be what is happening, but of course "public outcry" has been increasingly instrumental as a motivating force as its volume and seriousness has grown. Among U.S. presidential candidates it appears that Jesse Jackson (who has received ***TSOC***, ***The End*** and

"Stopping the Coming Ice Age") has gone further than anyone previously in acknowledging the need for deep changes in humanity's relationship with the rest of the Biosphere. Here you may like to read some things Jackson said in 'The Challenge of Our Day; Confronting Environmental and Economic Violence' printed in ***Earth Island Journal***, Spring 1988, preceeded by the Earth Island introduction:

"On March 20, the Reverend Jesse Jackson was to deliver a major campaign address – the first major environmental speech of the 1988 presidential campaign – to an audience of 4000 waiting on the Mendocino Headlands on the California coast. Flying conditions made it impossible for the Rev. Jackson to deliver his speech. ***Earth Island Journal*** is pleased to be able to publish this important statement."

"I've been reading the papers and seeing on television what this coast means to you. I've heard about the 4000 of you who showed up to speak at Fort Bragg and Eureka to protest the desecration of this ocean for a few weeks of oil. I have been impressed that people could care so much about the place where they live. … The laying waste of the resources of this coast, like those of the rest of the planet, are not part of my vision for our social and economic system. The welfare of the many must not be sacrificed for the short-term economic interest of the few. We must stop mortgaging the future to the present. We must stop destroying, or threatening to destroy, the most precious gifts of the Creator. Those gifts include the air we breathe, the water we drink, the food we eat, the mountains and forests that inspire awe in our hearts and the companionship of billions of fellow travelers on this Spaceship Earth. This plan to drill for oil, pollute the ocean and dirty the air is environmental violence. It's also economic violence. We must say no to Big Oil and their friends at the Interior Department. We must not sell our resources to the highest bidder – or in the case of Lease Sale 91 – the lowest bidder at $25 per acre. The Reagan-Bush years challenged us merely to survive. The Jackson years will give us the opportunity to move beyond environmental and economic violence, beyond survival to restoration. ... We need an environmental – and economic – policy that makes sense. Restoring and preserving the environment for this generation and those that follow requires more than a change in any one Administration. We need a shift in values. We need to prevent

pollution at the source, not try to clean it up later. We need an Attorney General who will be in court enforcing the laws against polluters, not trying to dodge the law himself. We need to restore the damage that's already been done to this environment, not allow it to continue. We will either reduce, reuse, recycle and restore – or we will perish.

"A Jackson administration will be about prevention, not reaction. To prevent the pollution of this coast, we need an energy policy that promotes conservation and renewable sources, not a Drain America policy at any environmental price. To prevent the assault of toxic chemicals, we need a long-term strategic plan. Industry must be redirected to manufacture products using less toxic materials. To prevent the growing pollution of our food and water supplies, we need to help farmers shift to organic farming and other safe production methods. To prevent waste incineration, we must mandate recycling. To prevent smog, we must manufacture cars which don't create it. To prevent another Three Mile Island or Chernobyl and to eliminate nuclear waste, we should begin to phase out nuclear power. ... A Jackson administration will make the 1990s the decade to clean up the mess we made during the first 90 years of the 20th century. America can enter the 21st century with clean hands and a clean conscience. We will provide worldwide leadership and challenge the leaders of all nations to join with us in an historic effort to restore what we have plundered. And we must lead – so long as our five percent of the world's population continues to consume one third of the resources of the entire globe.

"We can restore the Earth without loss of work. My administration will put our unemployed people to work at the best job I can think of – restoring the planet. We need a new Civilian Conservation Corps, not as a make-work project, but to repair the environment. Let us mobilize our young to work for environmental restoration and the public good. ...

"It's clear that the environmental crisis has no boundaries. All of us on this Spaceship Earth are victims of chemical warfare. If a foreign power poisoned our air with acid rain, dumped toxic wastes in our water supply, left dioxin in our Earth and threatened the ozone layer, we'd see this as a threat to national security. We would be right. But

we are doing this to ourselves. And no matter who does it, it's chemical warfare and it must end. We oppose nuclear war and we must oppose environmental war. The environment is a national security issue. ...

"We need to come together. Our fight is not against the family farmer struggling to survive. It's against the chemical companies and research bodies and government agencies that promote chemical farming that exhausts the land. ... It is against the lumber companies whose clear-cutting and inadequate reforestation are despoiling some of the most beautiful land in the country. We can choose a new direction. It requires bold leadership that promises solutions as big as the problems. Bold leadership that comprehends the urgency of the situation.

"In this campaign, we have proven time and time again that, while money is power, it is the people who are powerful. This campaign, in which we have garnered success after success while being outspent ten to one, is a campaign based on hope. Today we share that hope. And at the end of my term in office, I know that I will be able to stand on these headlands and find the whales alive and flourishing. The ocean will be so clear it will still be hard to tell where the ocean ends and the sky begins. We will have spent four, or perhaps eight years improving our standard of living without destroying the standard of living for any other person or any other form of life.

"We will have begun to transform our society into one in which people live in true harmony – harmony among nations, harmony among the races of humankind and harmony with nature. Thank you."

"Amazing Grace and Chuck" is an inspiring and "subversive" film (reported to have been suppressed and virtually unshown in U.S. movie theaters) about a pro basketball player (Alex English of the Denver Nuggets) and a little league pitcher who give up what they love doing most ... for an even greater love, unintentionally inspiring a global movement of children and adults to eliminate nuclear weapons and focus on peaceful cooperation. Anyone aware of the total social-ecological-climatic crisis will need no prompting to see how the film speaks through the heart to this. Gregory Peck is great as the U.S. President – as is each one in their perfect role as the world awakens

and is transformed. Available in video stores, 1987, Tri-Star Pictures. Copies of ***TSOC*** and letters of thanks, also suggesting a sequel, have gone to Gregory Peck and Alex English.

“The more I am acquainted with agricultural affairs, the better I am pleased with them ... I can no where find so great satisfaction as in those innocent and useful pursuits ... I am led to reflect how much more delightful in an undebauched mind, is the task of making improvements on the earth, than all the vainglory which can be acquired from ravaging it.
–George Washington

The Growing Threat of Worldwide Starvation

"The law of the harvest governs; we will always reap what we sow – no more, no less. The law of justice is immutable, and the closer we align ourselves with correct principles, the better our judgment will be about how the world operates and the more accurate our paradigms – our maps of the territory – will be."

– Stephen R. Covey

While we the living may feel very fortunate that John Hamaker's predictions of worldwide famine and civilizational collapse were chronologically premature, let us realize that many millions of us did die of starvation, malnutrition and the many forms of disease emerging from malnutrition and general environmental and climatic deterioration, as humanity rushed or staggered on, semiconscious, through the 1980s and 1990s. Since climatic deterioration and the planetary neglect and abuse causing it continue worsening as we enter a new century, ***it is only logical to think Hamaker's predictions can still come true over a very near horizon***. Will we proceed with the caring, generous spirit needed to regenerate humanity and the Earth through symbiotic partnership, or muddle on in the old parasitic habits which by the natural laws of ecology lead to the death of the "host" (Earth) and thus the "parasite" (humanity)? Let's consider more relevant information, as we create the world of today, tomorrow and beyond.

From Lester Brown's ***State of the World*** 1998 chapter, "***Struggling to Raise Cropland State Productivity***," (wherein remineralization is 'conspicuously absent'):

"This extraordinarily robust world growth in demand comes at a time when the growth in grain production [increasingly fed to "livestock"] is losing momentum. As a result, during the late 1990s carryover stocks of grain have dropped to the lowest levels on record***. ...***

"But by 1950 the frontiers of agricultural settlement had largely disappeared. Almost overnight farmers made the transition to raising yields. For four decades, they lifted land productivity at a rate that easily kept up with the record growth in demand. … Since 1990,

however, the rise in land productivity has slowed rather dramatically, raising questions as to whether farmers will be able to keep up with future growth in demand***. ...***

"Losses to soil erosion are common, especially in developing countries. Kazakhstan, the largest wheat producer in Central Asia, has lost one third of its cropland to erosion since 1980***. ...***

"Fertilizer helps to ensure that plant growth will not be inhibited by any lack of nutrients. [Does this not incorrectly imply that all essential nutrients are in "fertilizer"?] The tenfold rise in fertilizer use, from 14 million tons in 1950 to some 140 million in 1990, has been the engine driving the worldwide rise in land productivity. [And overall depletion and erosion!] ...

"The slower rise in world grainland productivity during the 1990s may mark the transition from a half-century dominated by food surpluses to a future that will be dominated by food scarcity . …

"If the politics of surpluses is replaced by a politics of scarcity, the issue will not be access to markets by a small handful of exporting countries but access to supplies by the more than 100 countries that import grain. … When they reached the new low of 52 days of consumption in 1996, the world price of wheat and corn – the two leading grains in terms of quantity produced – again more than doubled. …

"A doubling of grain prices, were it to occur, would impoverish more people in a shorter period of time than any event in history. Instead of reducing the number of malnourished people from 800 million to 400 million by 2010, the goal adopted at the World Food Summit in Rome in late 1996, the ranks of the hungry would mushroom, dashing confidence in the capacity of governments to deal with this most pressing issue***. ...***

"One of the obvious conclusions of this analysis is that there is a pressing need for a much greater investment in the agricultural sector – in agricultural research, agricultural extension, soil conservation, and irrigation efficiency."

I'm sorry the author has not drawn the even more obvious conclusion that a real transformation of agriculture from a soil-exploiting business to a soil-and-Earth regenerative, health-supporting way of life showing love and respect for the current and future generations of people and our fellow creatures is needed now! Soil remineralization and complementary eco-agriculture practices are waiting to be embraced now! Depending on your definition of "malnourished," 800 million to 6 billion + people are desperate for this to occur and potentially available to support the transformation. I am. I hope the individuals in "leading" organizations such as Worldwatch Institute will also become available before compounding catastrophes throw the world into eco-climatic, socio-economic, psychological, and military chaos, violence, degeneration and famine. Then what, about 90,000 yrs. of radioactively-contaminated glacial period before another regenerated Earth ***may*** be possible? Please ponder these words:

"We are now faced with the fact that tomorrow is today. There is such a thing as being too late. Over the bleached bones of numerous civilizations are written the pathetic words: *'*Too late.*'* If we do not act, we shall surely be dragged down the dark corridors of time reserved for those who possess power without compassion, might without morality and strength without sight."

– Martin Luther King, Jr.

Then please consider some examples from 1996-2000 of "the law of the harvest" in operation all over planet Earth. What new seeds can we sow ***today***?

Evidence We're Still Moving Toward "Worldwide Starvation"

1) From Larry Acker's 'Futures – Farming – Finance Forecasts' published in recent issues of ***Acres USA***:

"We'll briefly look at several key areas that may well have to import food and/or will reduce exports. We'll consider the old Soviet Union first. There is a major drought occurring along the southern part of the entire area. The Ukraine, which is the bread basket of the old USSR, normally produced 60-65 m.m.t. of grain in the Soviet days, but is

now being hammered by drought. The officials now concede that grain production won't be over 30 m.m.t. as of this writing. I really think it will be even lower than this and that wheat imports will be necessary to avoid starvation. This spreads west into Romania, Turkey and adjoining nations. It also spreads east past the Caspian Sea into the 'New Lands' of Kazakhstan where desert locusts have devoured about everything. Even the rats are starving and they are migrating into the cities and towns to survive.

"The dryness continues on east across southern Siberia into western China and Mongolia. Mongolia had so many forest fires that one-fourth of the nation's trees were burned. The wheat crop failed in most places due to no rain last winter and spring. Cattle and goats were starving and some died, putting the nomadic herdsmen's existence in jeopardy. China is getting hit by dry and colder-than-normal temperatures on the west side to devastating floods along the eastern side. The southeastern and central parts of the country are getting raked over by typhoons as they slam into the coastal areas from the east-southeast. Typhoons Frankie, Gloria and Herb have added greatly to the misery of millions of Chinese as the Yangtze River has risen higher than any normal floods. Millions of acres of corn, soybean, rice and cotton have been flooded with most of the flooded acres being destroyed or heavily damaged. Six of the seven main soybean growing provinces have been seriously affected by both drought and floods, which mean the Chinese will have to buy soybeans. They will also need to replace much of the corn and wheat that was lost, or the population will be hungry and put the government in trouble.

"Lastly, the Indian Monsoon is erratic, but is flooding the eastern part of India along with Bangladesh and Nepal. Dhaka, the capital of Bangladesh, has been all but flooded out and millions of acres of crops have been damaged or destroyed. But western India and Pakistan have had very little rain in most places with some areas recording almost no rain at all. The nation's soybean, groundnut and cotton crops are in trouble and must have rain or will not make it. … They'll need grain also by 1997." (Sept. '96)

"We'll finish with a couple of thoughts on China. No one is talking of the terrible weather that this country has experienced this year. Early

this year, much of China was gripped by a major drought – which burned up 17.5 million acres and damaged 20-25 million more. Beijing and other northern areas had water rationing earlier this year than anytime in modern history. The Yellow River ran dry on February 15 – the earliest ever – and remained dry for a record 188 days before Typhoon Herb dumped water in the region. …

"Since early June through late August, a seemingly perpetual deluge took place with typhoons adding to the woes. Millions of acres were flooded out and the Yangtze River was out of its banks for weeks. Crops were washed away, walls were covered with mud. Disease may be a serious problem now and starvation is possible.

"What makes this significant is that the Chinese are saying nothing. They must think that nobody knows there is trouble in the country. I have seen a report by someone in the Chinese government that says that 40% of total supplies are destroyed. This means 40% of everything is gone – not just 40% of the corn or cotton crop. Grain in storage is also gone or is spoiling (which is lost as food). At least some of this must be replaced or there can be a revolution. The only way to replace it quickly is to import it. … Millions of tons of food will be needed and the U.S. is the only country that has it available. It is very likely that the transportation system suffered major damage and food couldn't be distributed – even if it was available." (Oct. '96)

"Earlier this year, I had forecasted the former Soviet Union and eastern Europe would not have a good crop season. … Well, guess what? A headline appeared in the International Herald-Tribune (of all places) stating 'Dismal Harvest for Ukraine' and was filed by the Associated Press on October 12-13. The farmers were having the worst grain harvest in decades, much worse than the 1995 record low harvest of 33.9 million metric tonnes (MMT) of wheat. The agriculture minister, Anatoli Khorishko, is estimating the 1996 wheat crop of only 25.5 MMT – the lowest in modern history and a disaster by any method of counting one can use. … Mr. Khorishko blamed the long harsh winter and the hot dry spring for the problems, and he is at least partially right. … Nothing has been said about other crops and the hot, dry spring also has to affect them.

"Grain imports are desperately needed to avert starvation, and history shows that starvation leads to revolution. Stand by, because the story isn't over." (Dec. '96)

2) 'Sudden freeze ruins Midwest crops' – "Two days of record cold in parts of the Midwest damaged peach and apple crops, and fruit farmers fought the freeze by burning diesel fuel, turning on wind machines and encasing strawberries in ice. The damage to peach blossoms in Pennsylvania could rival the 1994 winter freeze that wiped out an entire crop. … And in southern Ohio's Jackson County, orchard growers cannot find any living apple blooms on their trees. … on Thursday, record lows were felt across much of the northern half of the nation, with Charleston, W. Va., breaking a 74-year-old record at 21 degrees and Pittsburgh chilling to 18. Minot, N.D., dipped to minus 2; Muskegon, Mich., broke a 37-year-old record when temperatures fell to 14; Dickinson, N.D., plunged to 9; Miles City, Mont., reached 12; and Snowshoe and Davis, W.Va., plummeted to 8." (***San Mateo Times***, 4/11/97)

3) 'Earth Week' – "A sudden spring frost and freeze has wiped out up to 100 percent of the wine crop in the southernmost vineyards of the Cotes du Rhone and the Coteaux du Tricastin regions in southeastern France. … Parts of the the Great Plains and Canadian Prairies experienced their worst flooding in more than 500 years. The honey-bee population in Bosnia has been nearly wiped out by unseasonable snow which blanketed the country. The insects had just come out of hibernation when the heaviest late season snowstorm of this century struck earlier this month." (***S.F. Chronicle***, 4/26/97)

4) 'Earth Week' – "One of the most bitter Siberian cold fronts in decades plunged a wide area of Europe into an early winter deep-freeze with temperatures dropping to -49 deg. F. in parts of Russia. At least 50 people have frozen to death from southern England to Moscow. Icy winds blowing across the Ukraine downed trees and power lines, cutting off power to several Black Sea communities. … Across the Atlantic, a sharp cold snap hit Mexico where snow fell in some areas for the first time in 120 years. The cold is blamed for at least 60 deaths and for extensive losses of winter produce crops." (***S.F. Chronicle***, 12/20/97)

5) From Ross Gelbspan's ***The Heat Is On*** (Addison-Wesley, 1997): "In March 1996 a deadly blizzard in the western Chinese highlands prompted appeals for international aid to avert famine. At least 60,000 ethnic Tibetan herders in Qinghai province and Tibet faced starvation from storms that drastically reduced their food supply, wiping out 750,000 head of livestock. The storms, accompanied by record-setting lows of minus 49 degrees, killed 48 herders in Sichuan. … According to Chinese officials, 'This year's snowfall is four times greater than last year.'

"By March 1996, more than 20 percent of Laos's rice paddies had been decimated by five successive years of floods, droughts, and pest attacks. … UN officials estimate the country faces a shortage of 132,577 tons of rice – which amounts to 75 percent of the caloric intake of the Laotian people. One official estimated that without immediate food aid, nearly 10 percent of Laotians are at risk for malnutrition and starvation. The official noted that the country's persistent and worsening food crisis was propelled into a full-fledged disaster by last year's floods – the worst in Laos in 30 years. ***…*** The UN Food and Agriculture Organization (FAO) is reporting that 22 million people in sub-Saharan Africa are facing food emergencies. … In thirteen years 3 billion people – more than half the population of the developing world – could be cutting down trees for fuel and firewood. As displaced peasants slash and burn their already-depleted tropical forests, they will further reduce the capacity of the planet to absorb carbon dioxide and will release it into the atmosphere. … " (p. 24-25, 161)

6) 'El Nino misery felt globally' – "Freak global weather linked to El Nino is bringing a humanitarian disaster to some of the poorest people on three continents. Conservative estimates suggest the see-saw in atmospheric pressure over the Pacific, which has changed global weather patterns, may have already cost $US30 billion and caused 5000 deaths from drought, flood and long-term damage to crops. … The World Food Program says more than 27 million people are immediately at risk from food shortages in Lesotho, Zimbabwe, Malawi, Mozambique, Zambia and Botswana. More than 600,000 tons of emergency food aid is needed.

"The situation is grim in Papua New Guinea,' said a Christian Aid emergency officer, Lewis Sida. 'Crops are drying up. People are extremely malnourished from the drought, which has lasted more than 14 months in places. Hundreds of people have died in the highlands, where some communities are experiencing fire, frost and drought. Some areas have typhoid and many communities have lost their seed stocks.' The Australian Government estimates that more than 80,000 people are at 'severe risk' in PNG." (***Melbourne Age***, 2/27/98)

7) 'Arctic Misery Spreads Across Much of U. S.***' –*** "Winter cast an icy spell on the U.S. South yesterday, pushing temperatures to record lows, sending farmers into their fields to protect threatened crops. A blast of arctic air also added to the misery. In Atlanta the temperature, plunged to 19, five degrees below the date's record low, and the wind chill factor was minus 4. … Peach and strawberry farmers in Georgia and South Carolina braced for a third straight night of freezing temperatures. … In York, S. C., near the state's northern border, farmer Ben Smith estimated he may have lost more than 40 percent of his crop as a dusting of spring snow blanketed his orchards. But he held out hope." (***S.F. Chronicle***, 3/13/98)

8) 'Appeal for Emergency Food Aid for Indonesia' – "The UN World Food Program and the FAO issued an appeal from Rome April 23 for emergency food aid for Indonesia. The WFP seeks to provide 225,000 tons of rice and fortified foods to feed approximately 4.6 million of the most vulnerable Indonesians, who now have only enough food for one meal a day. … According to findings of a joint mission to the country conducted by WFP and FAO officials in March, 7.5 million people in 15 provinces will likely experience acute food shortages over the next 12 months." (***The New Federalist***, 5/4/98)

9) 'North Dakota Farmers Face Extreme Emergency' – "At Senate Agricultural Committee hearings on trade policy May 7, Kent Conrad (D-ND) emphasized to Agriculture Secretary Dan Glickman that North Dakota faces an extreme farm emergency. 'We are having a disaster there of really unparalleled proportion,' Conrad reported. 'Last year, all of the country knows that North Dakota faced an extraordinary set of disasters with flooding and fires and horrendous winter storms. But this year we are having a stealth disaster, one that very few people

hear about, one that is not very visible ... it is a disaster nonetheless,' he continued.

"Conrad had prepared a chart which demonstrated the point: 'Farm income declined 98% in the state of North Dakota, from $764 million down to $15 million' in a year's time. 'That means the average farmer had a farm income of $500.'

"Conrad cited a May 5 ***Wall Street Journal*** article reporting on the disaster of the North Plains States, and citing as contributing factors a 'massive outbreak of disease,' low prices, and the free-trade policy, 'because we have a flood of unfairly traded Canadian grain coming in to this country.' " (***The New Federalist***, 5/18/98)

10) 'Drought Sends Brazil To Brink' – "The drought is affecting nearly 10 million people in 1,236 rural towns and cities. … More than 57 percent of the crops in the eight-state region have already been lost. In much of the northeast, peasants drive skinny cattle across the cracked mud of dry rivers littered with fish bones, and some residents are trying to survive on 500 calories a day – less than the 900 calories consumed by inmates of Nazi concentration camps.

"Hungry peasants have marched on 32 towns, wielding scythes and machetes, invading city halls and looting food from school lunch programs, supermarkets and outdoor stalls. Some even block highways to rob trucks hauling goods or beg change from passing motorists. … The long dry spells have forced peasants to eat lizards, rodents, centipedes and cactus, and to scavenge in town garbage bins or loot government food depots." (***S.F. Chronicle*** 5/18/98)

11) 'Mexico's drought worst in 70 years' – "The cactuses and the cowboys expect little rain on the hard ranges of northern Mexico. But with a bad drought in its fifth year, even the cactuses are dry. The cowboys are desperate. … In hot central states, children are dying of dehydration. In the south, wildfires recently tore through dried-out rain forests and corn crops have shriveled. The dryness hasn't stopped at the border; Texas is suffering through its second drought in three years, leaving farmers in dire straits and taxing the state economy. Parched fields are catching on fire, cornfields are yellowing and soil is turning to dust.

"A severe drought in southern Mexico has contributed to wildfires that burned out of control for several months, endangering rare plant and animal species and spewing a thick haze of smoke across Mexico and the United States. …

"Crops have died, too. The Agriculture Ministry expects Mexico will need to import about 14.5 million tons of grain this year, a 17 percent increase from 1997. In Chiapas, the primary coffee-producing state, more than half of the 1998-99 crop is expected to be lost." (***San Mateo Times***, 6/27/98)

12) 'S.F. Rainfall Year Ending A Slosh Shy of Record' – "This has been the wettest year of the century in San Francisco, with 47.22 inches of rain, but it would take 2.06 inches more rain to break the old record of 49.27 inches set in the winter of 1861-62***…***. Winter rain was bad – but the spring was worse. It was the coldest, wettest May in years, with 3.92 inches of rain in San Francisco, and in Sacramento, the May rainfall hit 3.25 inches, the most May rain in 109 years. … The June rain came at a terrible time for growers: Several thousand acres of citrus, plums, apricots, nectarines, grapes and apples were pounded. The citrus crop alone in Fresno County took a $9.8 million loss from a single storm. … In Tulare County, the crop damage was $10.6 million. ... So far, according to the Farm Bureau, crops are a month behind schedule. … Overall ... spring and winter storm damage is running at about $293 million. … It's hard to imagine another tough winter in the smiling California summer, but the Golden State's climate is deceptively benign. In the past 10 years, natural disasters – fire, flood and earthquakes – have killed 303 people and done more than $50 billion in damage." (***S.F. Chronicle***, 6/29/98)

13) "The Farm Crisis – Dump NAFTA, 'Free' Trade" – "On July 29 in the Senate, and July 31 in the House of Representatives, hearings were held on the crisis in the U.S. farm sector. The name of the Senate hearing was 'Hearing on Rural Economic Crisis and Farm Safety Net.' In a break from typical practice, no misleading jargon was used. … The rate of ruination of farmers, and breakdown of the supply lines of food production in the farm states is so extreme, that without emergency intervention, we are on the way to a food catastrophe – not in some distant lands, in some distant future, but

here and now. That no banner headlines are reporting this, is part of the crisis. … More generally, over 1996-97, farm income fell in 32 of 50 states***…***.

"The Agriculture Department forecasts that 1998 net national farm income will drop below $50 billion. … Farm debt is rapidly rising to the $172-billion mark, in the range of the 1980s farm-bankruptcy period. On top of the impact of declining international trade, states are now hit by the fierce drought and heat wave in the Southwest, the wheat scab pestilence in the Northern Plains, and other regional events." (***The New Federalist***, 8/17/98)

14) 'China Hit Hard by Floods, Hong Kong $$ Collapse' – "Some 250 million people in the Yangtze Valley are affected by the floods, with at least 2,000 deaths officially, and hundreds of thousands evacuated. … The summer grain crop in China is down 11% from last year's, and the autumn harvest is also endangered, with potentially very serious consequences. Some 21.53 million hectares of land have been already affected, and 4.78 million hectares of crops destroyed. … " (***The New Federalist***, 8/17/98)

15) "Indonesia Faces 'Total Destruction,' Economists Warn" – "… 95.8 million people, 48% of the entire population, will sink below the poverty line by the end of 1998, and that 80 million people, 40%, can no longer afford food and basic goods, while 5 million face starvation." (***The New Federalist***, 8/17/98)

16) 'North Korea Reports Severe Floods, Drought' – "North Korea, its food supplies badly cut by years of floods and drought, yesterday reported that it has experienced severe flooding similar to China's and South Korea's. The secretive communist country's official media portrayed a nation swept for most of the past two months by hail, floods, landslides, tidal waves and high winds that have worsened the plight of a 22 million population already fighting to head off starvation from two earlier years of weather disasters. Motorways and railways have been washed away, rice, maize and other crops reduced by up to 60 percent and many schools shut by flooding from up to five times annual average rainfall. The rice harvest will decrease by more than 60 percent, and the yield of other crops will be cut sharply. … Describing damage in South Hamgyong province, the Korean Central

News Agency said nearly 20 inches of rain fell in an hour causing landslides that 'buried quite a few hectares of arable land and tens of kilometres of railways as well as some toll of human life.' " (***S.F. Chronicle***, 8/24/98)

17) 'Global Food Crisis: Emergency Measures Urgent' – "The occasion of the just-completed wheat harvest in North America, combined with the new reports of malnutrition and starvation in East Asia, Africa, and other points, including Mexico, shows that the world food supply system itself is currently breaking down. It doesn't work. The world monetary system crack-up is rapidly collapsing agriculture. Existing food is not reaching people in need; farmers and farm regions are being ruined at a rate guaranteeing famine-scale food shortages. …

"At the same time, across the Pacific, the latest estimated death toll in North Korea, is 2 million lives lost so far, due to malnutrition and disease. Four million children are at risk of starvation right now in Indonesia. … One member of the [U.S. House of Representatives International Relations Committee] delegation, Mark Kirk, said, **'**They are out of food. That's clear.' …

"In Russia, only some 60 million tons of grain is expected this year, in contrast to over 80 million last year, and 100 million during the Soviet command-economy years. In Africa, per capita food production has declined for 30 years. The needs are desperate. " (***The New Federalist***, 8/31/98)

18) 'Bangladesh Drowning in Floods' – "These villagers are among more than 20 million Bangladeshis whose homes have been swamped by monsoon floods that have lasted almost two months, twice as long as any other recorded. The waters have inundated more than half the country, killed more than 700 people, closed many roads, damaged more than 4,000 schools, wiped out a big chunk of the rice crop and threaten to bring deadly diarrhea and other diseases. … Relief officials worry that the need to help the victims of the epic flooding in China, the famine in the Sudan and war in the Congo has slowed the response to Bangladesh's calamity. … Torrential rains in Uttar Pradesh, in northern India, have contributed to extensive flooding there, killing more than 1,000, leaving millions

homeless and swelling the Ganges. ... Officials said yesterday that the Ganges had risen past its highest recorded level. … "(***S.F. Chronicle***, 9/7/98)

19) 'Russian Farmland Withers on the Vine' – "Black Earth country has the natural wealth to feed an entire nation. But it can barely feed itself. The result is that consumers in Moscow and other large cities are heavily dependent on imported food and deeply worried that their country's spiraling economic crisis will cut off the lifeline abroad and lead to famine. 'We are not going to stop imports,' Deputy Prime Minister Gennady Kulik reassured the public last week. 'They account for almost 50 percent of Russia's food market.' ... This year, the harvest is even smaller than normal, with grain production down 48.2 percent from 1997 due to bad weather." (***S.F. Chronicle***, 10/19/98)

20) 'Mitch Rips Heart Out Of Honduras' – "As the cruel enormity of the disaster befalling Honduras becomes apparent, no one in authority seems to want to take responsibility for fixing the mess. … There could be no argument over one thing: Honduras – even more than neighboring Nicaragua, El Salvador and Guatemala, which also suffered heavy damage – is a nation destroyed as if it had been completely defeated in war. Aside from the 6,076 dead, 4,621 disappeared and 569,000 homeless, the storm destroyed almost every important highway and rail bridge in the country. It wiped away about 70 percent of its crops – most of which were at the end of their annual growing cycle and about to be harvested." (***S.F. Chronicle***, 11/7/98)

21) 'Central American Food Supply Struck By El Nino' – "According to the United Nations Food and Agriculture Organization, five of the six countries of Central America suffered food supply problems as a result of the recent El Nino event. The total number of nations with a food emergency increased from 31 in 1997 to 37 in 1998, due mainly to the torrential rains and droughts brought on by El Nino." (***NCAR Network Newsletter***, Oct.-Dec. 1998)

22) 'El Nino's wacky weather is taking a dreadful toll on crops' – "From El Nino's cotton-soaking spring deluges to a fruit-killing Christmas freeze, with all sorts of crop damage in between, 1998 was a year of monumental havoc for California agriculture. Farmers, who

like fisherman are at the mercy of the weather but also are heavily insured, have estimated losses at more than $1 billion and counting. … Early in the year, El Nino's unceasing, unpredictable wrath led to flooding and excessive wetness that doused crops, threw harvest and planting schedules out of whack and created environments in which pests and disease flourished.

"On top of that, in late December, a four-day stretch of snow and freezing temperatures wiped out the lemon crop and delivered a crippling blow to the rest of the citrus industry. … The full toll for the state's 250 crops is far from complete. … Rural Community Insurance Services, which is one of California's six biggest providers of farm insurance, said about 4,200 claims were filed for 1998." (***S.F. Examiner***, 1/10/99)

23) 'Starving N. Koreans flee toward China' – "The North Korean refugee sobbed as he recalled the dying family he left behind: an ailing wife and two young sons, one with a bleeding stomach from eating bread made with tree bark. 'I can't eat. Whenever I look at food, I immediately see my children crying, dying before my eyes,' the gaunt, distraught former soldier said, tears rolling down his hunger-pinched cheeks. 'It's not just my kids. Everyone's children are starving to death, freezing to death.'

"With famine consuming them and their loved ones, desperate North Koreans are fleeing to China's bountiful borderlands in search of food. Often alone and on foot, risking capture and prison, the refugees have one goal: to keep from joining the army of dead created by four years of chronic food shortages.

"A U.S. congressional delegation estimated last fall that 2 million North Koreans had died from starvation or hunger-related illnesses. South Korean intelligence officials say North Korea's population has fallen from 25 million to 22 million. ...

"Refugees and Chinese-Koreans who take food to relatives in North Korea describe life there as having ground to a halt, with people begging, cheating, stealing and killing for food. … The United States, other governments and international relief agencies have poured in millions of tons of food, medicine, fertilizer and other aid since

devastating floods and drought in 1995, 1996 and 1997 broke North Korea's crumbling economy and collective farming system. …

" 'The life of North Koreans is not as good as Chinese pigs and dogs,' said a 57 year-old man, a sales manager for a defunct chemical factory and father of four. The former soldier said he saw three people executed by gunshot last year for killing vagrant children and selling their flesh at a market. South Korean aid workers who secretly help refugees in China say many report having seen people executed for cannibalism." (***San Mateo Times***, 4/1/99)

24.) 'No end in sight to costly drought in Midwest, South – "You know it's dry when Sunbelt retirees start watering the cactus. … When a wall of wildfire 10 miles wide blackens a swath of Nebraska prairie the size of Rhode Island . …

"In Texas, Gov. George W. Bush has declared a state of emergency in 170 of the state's 254 counties. His order comes nine months after a 1998 drought cost his state $10.4 billion in agriculture losses. … In Washington, Mt . Baker is poised to break the all-time North American snowfall record of 1,122 inches, or 93.5 feet of cumulative snow, that fell at Mt. Rainier during the winter of 1971-72. Reservoirs are brimming, and downstream communities and farms face late-spring flooding." (***San Mateo Times***, 4/19/99)

25) 'Earth Week' – "Many farmers in North Dakota have never been hit as badly as during the freak frost and snow that occurred in early June. The freezing temperatures killed about 75 percent of the alfalfa, decimating not only that crop but also the state's key honey output. Bees normally pollinate the alfalfa and use its pollen to make honey. Some farmers are resorting to feeding their hives corn syrup to keep the insects from starving." (***S.F. Chronicle***, 6/13/98)

26). 'Cuba Faces Code Red From Drought' – "It hasn't rained all year in Los Cerezos, or in many other farming villages of eastern Cuba. The island, which already had been having trouble feeding its people, is experiencing its worst drought since Fidel Castro took power 40 years ago. … The drought, blamed on the weather phenomenon El Nino, has destroyed 42 percent of the crops in five provinces and brought with it the danger of starvation." (***S. F. Chronicle***, 7/30/98)

27) 'Famine Threat' – "More than 5 million citizens of Ethiopia are threatened by severe drought, according to a report issued by the United Nations. In an urgent appeal to the world community, UN officials proposed the undertaking of a huge humanitarian effort to stave off the effects of the lingering and far-reaching drought. The agency warned that unless a relief plan is enacted soon, many people may die of starvation within the next six months." (***S.F. Chronicle***, 7/17/99)

28) 'North Korean Deaths Add to Rain's Toll' – "The Red Cross said rains in North Korea from Typhoon Olga hit hardest in areas near the western part of the border with South Korea, where 29 inches of rain fell between Saturday and Tuesday. … The North Korean government has not released any figures on casualties from the rain. But it says rains damaged crops in the southwest. The reclusive nation is already in its fifth year of acute food shortages caused by floods and economic mismanagement. At least 40 South Koreans died in the torrential rains." (***S.F. Chronicle***, 8/6/99)

29) 'In hurricane's wake: Plague of hungry rats' – "Hurricane Mitch, which swept through Central America last year, is being blamed for a plague of rats now threatening an estimated 300,000 people. The rats have already scavenged their way through huge areas of cropland in the country's northeast, much of which was destroyed by the hurricane nearly a year ago. Up to 95 percent of the region's food supplies have been devoured by the rats, but it is the threat of disease that is even more worrisome to the authorities and aid agencies." (***S.F. Examiner***, 9/12/99)

30) 'Worst Flood of Century Devastates Central Vietnam' – "Officials said the week-long deluge of rain had claimed more than 450 lives – mostly in and around the old imperial city of Hue – destroyed 116 bridges and washed 6,700 houses out to sea. The International Committee of the Red Cross appealed for help, saying about 1 million people were in need of food, medicine and blankets. … Forty inches of rain fell on some areas in four days." (***S.F. Chronicle***, 11/8/99)

31) 'Powerful Storm Denuded Lush Indian State' – "The cyclone that battered one of India's poorest regions nearly two weeks ago is

shaping up as one of the worst natural disasters to ever strike this nation. An estimated 10 million people lost their homes, livestock or livelihood in the storm. … With the scope of the devastation from the storm and subsequent flooding only now becoming clear, the Red Cross predicted the death toll will climb past 10,000, a severe blow to a region where many live at starvation levels even in normal times. From the air, it is obvious that something terrible happened. Orissa, one of India's greenest states, wears the color of straw. Its lush coconut and betel palms and its grand banyans are stripped of their leaves like shorn sheep. From the ground, the naked, warped arms of trees can be seen jutting out every which way amid the rueful remains of human habitation. … Apart from the sheer human misery of death, hunger and the prospect of epidemics, the damage to the region's basic infrastructure has been immense. As many as 11,000 schoolbuildings have been destroyed***. …***

"Chief Minister Giridhar Gamang, the state's top elected official, said Orissa will need at least $2.3 billion to rebuild and repair the damage. Officials said agricultural produce of the farm state could be halved***. …***" (***S.F. Chronicle***, 11/10/99)

32) 'Deadly European Storms' – "Three days of severe storms produced some of the worst weather damage Northern Europe had experienced during the past 100 years. Scores of residents were killed in storm-related accidents that stretched from Ireland to the Alps. High winds uprooted thousands of old-growth trees and inflicted widespread damage to buildings and power transmission lines in several countries. The storms are likely to cost insurers well over $4 billion, making it the most expensive catastrophe in the world last year, and possibly Europe's all-time worst insurance catastrophe. Six thousand troops were put into the field throughout France, and the national electricity company brought workers out of retirement as the country tapped all its resources in a bid to clean up and restore power to millions of homes before the celebrations on New Year's Eve." (***S.F. Chronicle***, 1/1/2000)

33) 'Cold Snap Causes China Crop Losses' – "Winter crops in China's Guangdong province have been severely damaged and northeastern Liaoning province have predicted serious agricultural losses after heavy snows, the state run Xinhua News Agency

reported Friday. In the worst cold weather in 30 years in southern, subtropical Guangdong, low temperatures plunged to 27 F from Dec. 17 to Dec. 25, blanketing most areas of the province in a rare frost. The frost damaged about 163,000 acres of fruit and vegetable crops, Xinhua reported, without giving specific crop figures. … In Liaoning's capital, Shenyang, officials said the heaviest snowfalls since 1956 had crushed greenhouses full of vegetables." (www.infobeat.com, 1/7/00)

34) 'Earthweek: A Diary of a Planet' – "The 3 million trees that were destroyed by record storms across France last month will be replaced in a huge reforestation program announced by the government. The storms' hurricane-force winds destroyed the equivalent of 1,250,000 acres of woodland. Around Paris, half the city's trees were uprooted, including historic 200-year-old trees at the Palace of Versailles. The plan will involve approximately 5,500 previously unemployed workers to begin. … At least 100 people throughout Mexico have died as a result of a bitter cold snap during the first two weeks of January ... temperatures have plunged to as low as 14 degrees. … At least five people have been killed and four others injured in snowslides in northwest China's Xinjiang Uygur Autonomous Region. The snowfall is the deepest in the lengthy history of the region. Officials report that 170 homes have been leveled and 2,000 head of livestock have been killed by the heavy snow that has fallen since the beginning of the year. … The worst Indonesian grasshopper invasion since 1968 has devastated vast areas of cropland in the province of West Kalimantan, driving farmers to financial ruin and, in some cases, even suicide. … The swarms of crop-eating insects have devoured huge amounts of grain and rice, causing fears of food shortages in the region. Environmentalists blame the plague on the destruction of nearby rain forests that were habitat to many birds, which are the grasshoppers' natural enemies." (***S.F. Chronicle***, 1/15/2000)

35) 'Earthweek' – "A devastating frost spread across western Kenya's Nandi district, killing an elderly woman and destroying more than 12,400 acres of tea. Officials said that temperatures in the equatorial tea-growing region had plunged to 14 degrees. Local tea companies believe that as much as 75 percent of their crop has been lost. The disaster has caused widespread concern among local farmers as to

whether they should continue to plant maize this season." (***S.F. Chronicle***, 2/5/2000)

36) 'Ethiopia Facing Threat of Devastating Famine' – "At least 8 million Ethiopians are likely to suffer hunger or even starvation this year, a crisis that could rival the 1984-85 famine that killed at least 1 million people, U.N. and independent relief officials said yesterday. Aid experts hope that this time, the world will not wait until television images of bone-thin children dying in the dust of another prolonged drought prompts an outpouring of help – too late for most of those suffering the greatest need." (***S.F. Chronicle***, 2/24/2000)

37) ' "Miracle" Washed Away' – "Since the civil war ended in 1992, the country of 19 million had rebounded remarkably well, its turn-around dubbed the 'Mozambique Miracle.***'***... But much of what Mozambique has managed to accomplish in the past eight years has been washed away by the worst floods seen in southern Africa in a century. Mozambique finds itself starting virtually from scratch for the second time in less than a decade, as it tries to rise from yet another calamity. … A third of all cattle have drowned and a quarter of all crops have been washed away just as Mozambique was close to producing enough food to support itself for the first time in nearly two decades. Two hundred deaths have been attributed to the floods, but aid workers and government officials believe the number will climb into the thousands, when the floodwaters recede and corpses surface from the contaminated water, spreading disease. ... The U.N. Children's Fund warned that Madagascar 'could become the next Mozambique.' " [A follow-up article notes: "Up to a million Mozambicans lost their homes, crops or other property."] (***S.F. Chronicle***, 3/4/2000)

38) 'Earthweek' – "More than 20 Kenyans in the drought-ravaged Wajir district have died of starvation during the past two weeks. Two million others are facing famine, and thousands of farm animals have died in the devastating dry spell that has persisted for three months. Farmers reported that 10,000 cattle, 25,000 camels and 20,000 goats have starved to death." (***S.F. Chronicle***, 3/18/2000)

39) 'Drought Desperation' – "At least eight monkeys were killed and 10 people left injured after a two-hour duel between starving Kenyans

and thirsty monkeys in the Somali Desert. The human population of the area has been forced to exist on relief food and water supplies for the past six months due to drought." (***S.F. Chronicle***, 3/25/2000)

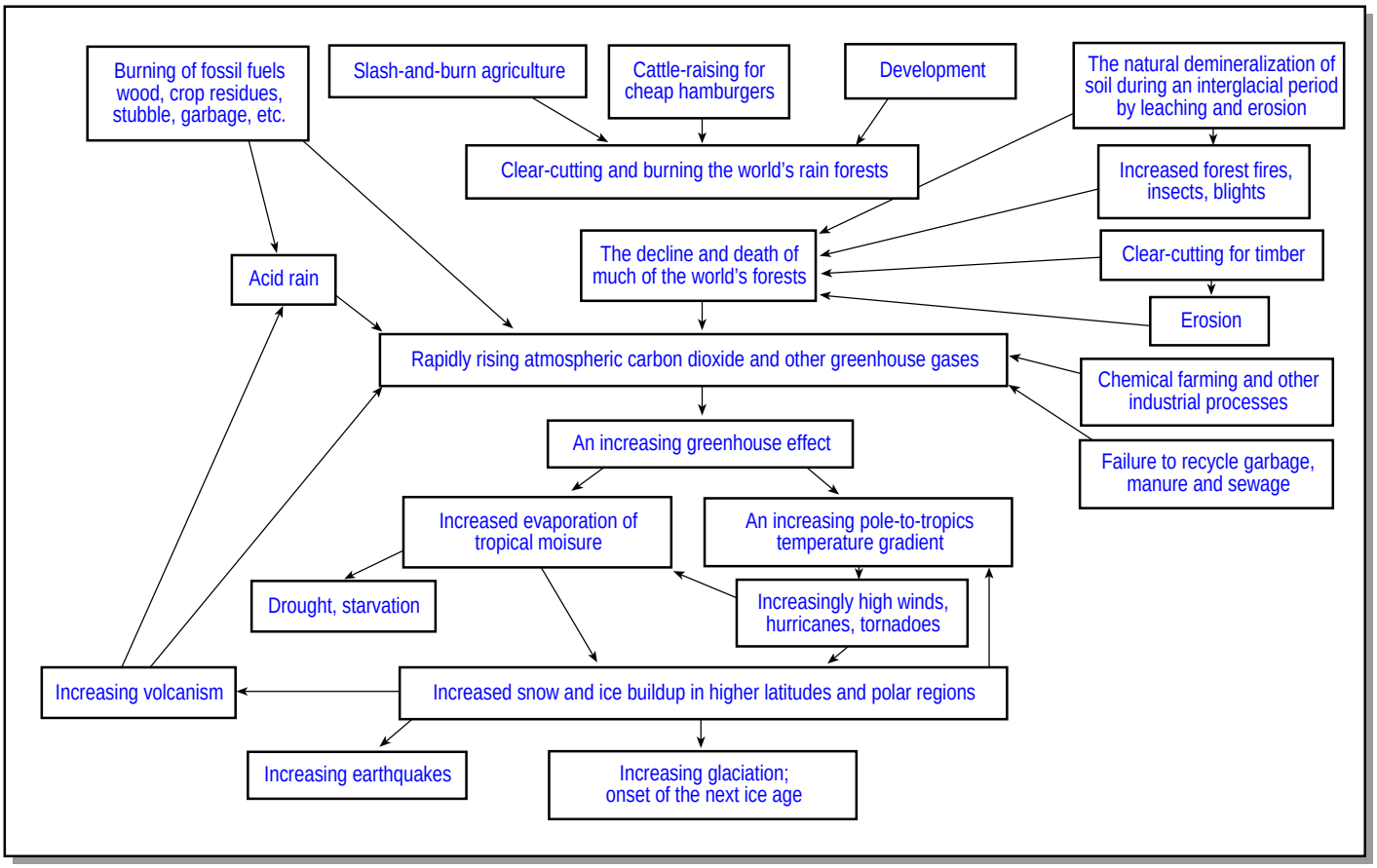
40) 'Brutal Winter Puts Mongolia's Nomads on Brink' – "From one isolated family of nomads to another, the grisly sight is the same across Mongolia's vast and frozen Gobi Desert and nearby mountains. Thickly furred, frozen carcasses of livestock are stacked waist-high near the traditional tents of their herders. More animals lie where they fell in bare pastures, all victims of the country's coldest winter in 30 years. …

"The toll could rise to 5 million animals, the office warns, and if more aid from other countries is not provided by April or May a half million Mongolians could be desperately short of food. … Harsh weather is hardly unusual in Mongolia. In the Gobi, temperatures can range from 40 below in the winter to 115 above in the summer. … But even by Mongolian standards, the past year has been rough. ["as low as -56 degrees" says 'Earthweek' of 3/18/2000]

"First came a drought last summer. That, and an infestation of rodents, killed off much of the grasses that sustain the livestock. Then severe blizzards hit early, in September, freezing many animals and leaving so much snow that the survivors could not graze." (***S.F. Chronicle***, 3/27/2000)

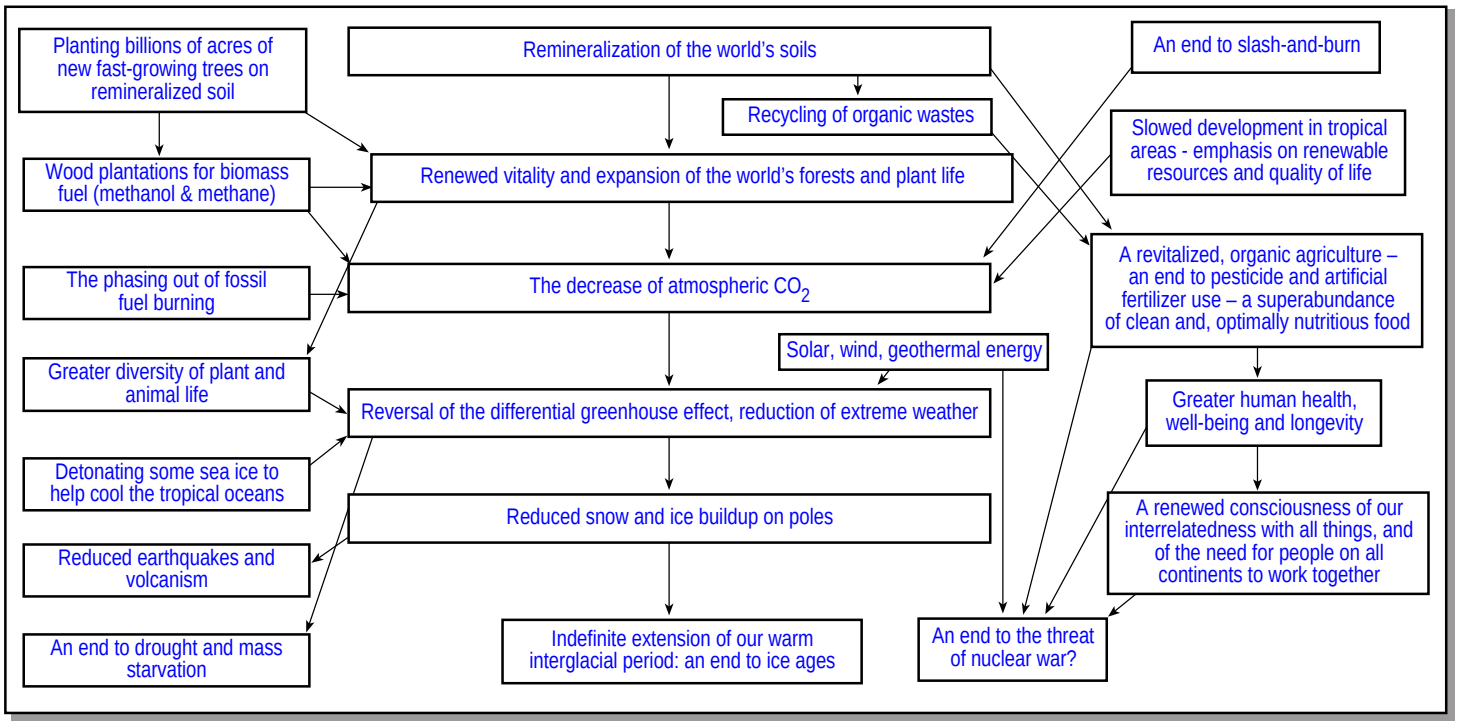
Concerning The Hamaker Thesis Of Climate Change: Much More Evidence For Those Of Open Mind And Heart

Factors that May Be Bringing on the Next Ice Age



How We Can Stop the Coming Ice Age

(If There's Still Time and We Act Quickly Enough!)



Source: ***The End***: the imminent ice age and how we can stop it
by Larry Ephron (Celestial Arts, 1988)

More on Interglacial Soil Demineralization and Retrogressive Vegetational Succession

The following study refers to the primarily interglacial depletion of three of the many biologically crucial soil minerals, shown here as compounds of potassium, calcium, and phosphorous:

"According to Hausrath, in the soil of mature pine stands there may be expected an exhaustion of K_2O only after 4,160 to 7,140 years, depending upon the site class, of CaO after 13,000 to 57,260 years, and of P_2O_5 after 7,560 to 9,800 years." (U.S. Forest Service Division of Silvics Translation 201, ***Fertilization in Forestry***, 1935)

Found in the U.S. Geological Survey library in Menlo Park, CA is the 1974 book by Burkhard Frenzel (translated from the German by A.E.M. Nairn), ***Climatic Fluctuations of the Ice Age***. It shows a simplified version given by Frenzel of J. Iversen's schematic reproduced on p. 61 of ***TSOC***. Here is Frenzel's brief summary of the retrogressive vegetational succession which Iversen detailed:

"Parallel to this was the development of vegetation and soil, which for their part also influence the development of vegetation (cf. above, pp. 51 ff.). Iversen (363) diagrammatically represented the processes at work (Fig. 53) showing that accompanying the rising temperature during the first part of the warm period was an increasing, protective plant cover. The soil was still basic to neutral
and leaching played no role. Later under the optimum temperature conditions and with a thick protective cover of forest trees, brown, somewhat acid forest soils developed, which became more strongly acid as the temperature fell, so that raised peat bogs finally became widespread. Figures 52 and 53 illustrate the basic steps in the process, ***which must be taken into consideration in any reconstruction of the climate of warm periods***." (p. 99 – emphasis added)

There is a great scarcity of evidence that climatologists in general, and paleoclimatologists and Quaternary researchers in particular, have assimilated the obvious truth of Frenzel's statement as they apparently failed to do with the original work of Iversen, and S.T. Andersen, as summarized in ***TSOC***. Perhaps this situation can still be

corrected. Please note how Frenzel's italicized words apply not only to climate models, as he implies, but to the actual "reconstruction" or restoration of a stable interglacial climate for the Earth's present and future generations. ***Soil fertility and plant life vitality and abundance*** are the obvious keys to allow for re-establishment of the "balance of Nature," in which we can play our rightful constructive ***symbiotic*** (rather than parasitic) roles.

"Franzmeier and Whiteside (1963a,b) studied a 10,000-yr-long chronosequence of Spodosols in Michigan and concluded that between 3,000 and 8,000 years were necessary for the formation of a Spodosol." Spodosols are one of the primary classes of acidified, demineralized and podzolized soils. This study gives obvious strong support for the Interglacial Soil Demineralization time frame and is noted on p. 254 of ***Soil Genesis and Classification*** by S.W. Buol et al, 1973, Iowa State Univ. Press. We also find "well-drained spodosols" in the Hubbard Brook Experimental Forest of New Hampshire, and their severely demineralized condition is noted by Professors Likens, Bormann et al: "The soils are acid (pH 4.5) and generally infertile." (Biochemistry of a Forested Ecosystem, 1977, Springer- Verlag)

"The recurrent interglacial cycle of vegetation – By 1959 the conception had been adduced of a repeated cycle of interglacial change, in which, responding to climatic amelioration, the cold cryocratic conditions at the conclusion of a glacial stage, with unstable, immature, base-rich soils and open herbaceous vegetation with a strong arctic-alpine component, were displaced by warm protocratic conditions with stable soils supporting park-tundra or open woodland with steppe elements, 'weeds and ruderals' accompanying an immigrant thermophile flora. In turn followed a warmth maximum with brown-earth soils carrying closed deciduous forest with associated thermophilous herbs: this mesocratic phase was succeeded by a telocratic one characterized by leached soils and bog formation with spread of coniferous woodland and acidic heaths, prior to the refrigeration of the next glacial stage. This concept has been subsequently modified and refined, but no one doubts its general applicability to the interglacials of temperate western Europe, and it has been made the basis of the schematic division of British interglacials by Turner and West (1968) into a sequence of sub-stages: I Pre-temperate, II Early-temperate, III Late-temperate, IV

Post-temperate. The use of these allows us to make comparison of vegetational events and floristic history between successive interglacial periods including our present Flandrian, with abundant data for the Ipswichian and Hoxnian and considerably sparser information for the Cromerian and still earlier interglacials." (emphasis added) (***British Quaternary Studies*** – ***Recent Advances***, F.W. Shotton, ed.,1978)

I have observed that since the publication of ***TSOC*** in 1982, many more books and articles and conferences have begun to openly acknowledge and even emphasize as a central context of our lives the now well-documented glacial-interglacial cycle, as well as the work of Woillard, Kukla, and Shackleton. J. Iversen, S. T. Andersen and John D. Hamaker, however, generally remain uninvited to present their contributions for the consideration of all. Contributions that merely show us how we may survive and thrive perpetually in a healthy, supportive Biosphere. (Some might prefer the term 'Gaiasphere.') Andrew Goudie's second edition of ***Environmental Change***, perhaps the best, most comprehensive book of its kind (published 1983) is a good example of the (partial!) updating work going on. In his chapter, 'The Chronology and Nature of the Pleistocene,' he says:

"During the last 0.9 million years there have been nine episodes with global climate comparable to today's. In other words, there have been nine interglacials. The interglacials only constitute about 10 percent of the time, and seem to have had a duration of the order of 10^4 [10,000] years, while a full glacial cycle seems to have lasted of the order of 10^5 [100,000] years. Conditions such as those we experience today have thus been relatively short-lived and atypical of the Pleistocene as a whole. ... Going further back the record seems less clear. Shackleton and Opdyke (1977) found from their study of Core V28-179 that glacial/interglacial cycles had been characteristic of the last 3.2 million years, but that the scale of glaciations increased about 2.5 million years ago. In all there have been about 17 cycles in the Pleistocene ***sensu stricto*** [which means "in the strictest sense" according to David P. Adam of the U.S. Geological Survey]. …

"The frequency of glaciations indicated by the deep sea core record has now been confirmed in the loessic record from various parts of

Central Europe, the USSR and China. During glacial phases aeolian silt was deposited as loess, while in warmer phases of soil stability and denser vegetation cover [i.e. the interglacials] palaeosols developed (see pp. 48-49). Kukla (1975) has from his work in Austria and Czechoslovakia found eight cycles of glacials and interglacials in the 700,000 years of the Brunhes epoch, and no less than seventeen within the last 1.6 million years of the Pleistocene ***sensu stricto***."

Further confirmation that the primary interglacial process of ***Soil Demineralization and Retrogressive Vegetational Succession*** results in an increasing ***net loss*** of plant ***and*** soil carbon to the atmospheric CO_2 pool is in the 1984 book, ***Fundamentals of Soil Science***, 7th Edition by Henry D. Foth, Professor of Soil Science, Michigan State University:

"Changes in the organic content of a soil can be separated into three phases. In young soils [MINERAL RICH], the organic matter content is increasing rapidly, because the rate of addition exceeds the rate of decomposition. Maturity is characterized by a constant organic matter content as additions are counterbalanced by losses. Old age is characterized by a lower and declining organic matter content, indicating the rate of addition is waning as the soil becomes more weathered [DEMINERALIZED]."

Although Prof. Foth follows the standard line of 'thinking' regarding the options in fertilizers ("the term fertilizer usually refers to manufactured fertilizers"), he nevertheless reveals that he and "modern soil science" are a mere half-step away from embracing the truths of soil remineralization and fertility creation. Foth tells us:

"In a real sense, all life on earth is locked in the minerals and, through weathering, nutrients essential to life are made available. It is interesting to contemplate the amount of food or lumber that could be produced from the nutrients contained in the rocks of the Andes or the Rocky Mountains. Even life in the seas awaits nutrients that are released by weathering on the land then carried to the sea by rivers." (p. 171) And this:

Perhaps, most [another soil science book estimates 97%!] of the world's soils have developed from sediments that were originally

derived from rocks such as glacial debris, alluvium, colluvium, loess, volcanic ash, and so on. Even in mountainous areas, it is common to find many thick sediments, along with steep slopes where bare rock is exposed as shown in Fig. 9-8." (p. 232)

Serious researchers wanting more evidence on ***Interglacial Soil Demineralization and Retrogressive Vegetational Succession*** can study the following:

1) From ***Climate: Present, Past and Future*** by Hubert Lamb, 1977, see Fig. 13.55, "The regular features of the climate, soil and vegetation sequence through interglacial periods in Britain, as schematically drawn by R. G. West."

2) "The subdivision and zonation of interglacial periods" by C. Turner and R.G. West, Cambridge University (Subdepartment of Quaternary Research) in ***Eiszeitalter und Gegenwart***, Vol. 19, Oct. 1968. Note Fig. 1, "Summary of the glacial/ interglacial cycle (after Iversen 1958).

3) From ***Soil and Vegetation Systems*** by Stephen Trudgill, 1977, see Fig. 8.44, "Postulated Post-Glacial deterioration of soil" – and note the state of "stabilization" inaccurately suggested for the present.

"Gene Likens and his colleagues (***Biogeochemistry of a Forested Ecosystem***, 1977) have measured the loss of minerals from the soil directly in recent studies of a temperate forest ecosystem. They found that the loss of calcium, for example, which they determined to be a precursor to severe demineralization, averages about 12.5 pounds per acre each year. Over the 10,000-year span of an interglacial period, that would amount to a loss of some 62 tons of calcium per acre, clearly an enormous depletion." (p. 23 of ***The End*** by Larry Ephron)

From "Fire and Ice" (***Annals of Earth***, Vol. X, No. 3, 1992) by Greg Watson, then Massachusetts Commissioner of Agriculture:

"In a recently published article in ***Nature***, Anne de Vernal and Gifford Miller, researchers at the Universities of Quebec and Colorado, pose a startling question. The question, 'Will greenhouse warming lead to Northern Hemisphere ice sheet growth?' appears to fly in the face of

traditional scientific wisdom regarding global climate change. … The ice cores studied by de Vernal and Miller reveal that prior ice ages began in periods when the Earth was, on average, at least as warm as it is today. Because the Arctic is so far north the warmer summers of these periods were not able to melt much ice. In fact, de Vernal and Miller hypothesize that warmer summers led to increased evaporation of the oceanic waters near the equator. Strong winds generated by the temperature gradient probably carried this moisture-laden air towards the cooler poles where it precipitated out as snow. As snow accumulated and glaciers grew, the pressure from the additional weight resulted in the outward basal expansion of the glaciers.

"Strange as it may seem at first, the above scenario comes as no surprise to a group of scientists and concerned activists who, using a 'Full Climate Cycle' model of climate change, predicted the same connection between greenhouse warming and glacial buildup as long ago as 1982. Moreover, the Full Climate Cycle's holistic representation of the Earth's climate system led this group to identify the changing mineral content of the Earth's soils as the critical link between these two phenomena. …

"Later that October [1987] I attended the 'First North American Conference on Preparing for Climate Change' in Washington, D.C. It was convened by the Climate Institute and co-sponsored by a variety of organizations and government agencies including the National Science Foundation, the U.S. Environmental Protection Agency, the World Resources Institute, and the UN Environmental Program. I found this conference memorable because I had the opportunity to speak with Dr. Stephen Schneider, the head of Interdisciplinary Climate Systems at the National Center for Atmospheric Research. After his talk on 'The Greenhouse Effect: What We Can or Should Do About It,' I mentioned my conversation with James Lovelock. I asked him if he thought it possible that Gaian negative feedback loops could counter greenhouse warming or even produce a cooling effect. Dr. Schneider confided that he felt that phenomena such as clouds and the Earth's biota functioned in a manner too complex to be accurately simulated by computer models. He felt that it was possible that they might operate as global thermostats as Lovelock had suggested.

"The events of the summer of 1988 greatly contributed to a growing conviction in the scientific community that global warming was not only inevitable but had already begun. … Interestingly, the winter preceding that eventful summer was also meteorologically significant. … Although Northern Europe was hardest hit by the cold snap, the impact was staggering in areas, such as Istanbul, Athens and Abu Dhabi, that were unaccustomed to harsh winter weather. In what turned out to be the coldest January on record in the Soviet Union extreme cold accounted for nearly eighty deaths. Three hundred and fifty deaths all told were attributed to the frigid temperatures of the winter preceding the 'greenhouse summer' of 1988. For whatever reasons, these events, which suggest that the climate system's response to humanity's experiment with atmospheric chemistry may be more complex than first imagined, did not receive much attention from either scientists or the media – at least not in the United States.

"Nonetheless, Alden Bryant was able to convince Dr. Alexander Borg Olivier, Ambassador and Permanent Representative of Malta to the UN, that it was time for the Full Climate Cycle theory to get an international hearing. Dr. Olivier was responsible for placing the subject 'Conservation of Climate as Part of the Common Heritage of Mankind' on the UN agenda. At Alden's request he sponsored a conference on 'Earth Regeneration and the Environment' which was held in the United Nations' Dag Hammarskjold Auditorium on December 9, 1988. Dr. Kenneth Watt, professor of Environmental Studies at the University of California at Davis, Alden, and I were invited to speak about the Full Climate Cycle theory. Our presentations were greeted with enthusiasm tinged with a sense of urgency, and our network expanded considerably.

"A month later, Dr. Lee Klinger, an ecologist at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, wrote to [***Remineralize the Earth*** editor] Joanna Campe. He indicated that he might have discovered the link between the evolution of terrestrial systems and glacial cycles. He wrote: 'About two years ago I came across an unpublished manuscript by John Hamaker which summarized a considerable breadth of literature in support of his hypothesis that demineralization of the globe was bringing about a rapid and sudden ice age onset. At the time I had just formulated my own hypothesis for ice age initiation and was struck by the similarity

of his work with my own ideas. ... I've proposed several atmosphere-biosphere feedbacks associated with widespread bog formation which would lead to global cooling and ice age initiation, creating climatic conditions well suited for peatland landscapes. … Several seemingly unrelated phenomena can be, at least partly, explained by succession toward bog, including forest dieback, natural acid rain, global cooling and even mass extinctions.' ...

"Moreover, 'global cooling can be initiated by the extensive replacement of forests by peatlands.' He goes on to say that, 'Short-term increases in atmospheric carbon dioxide due to the death and decay of forests could trap enough solar energy to help drive high evaporation rates.' ...

"Dr. Klinger concludes that one possible way to arrest this process would be to inoculate the soils with crushed rock to neutralize acidity and enhance fertility."

Perhaps through ***The Survival of Civilization*** Lee Klinger came to study the foundational works of Iversen and Andersen (obviously "must reading" for all ecologists and climatologists) shedding light on the Interglacial Soil Demineralization and Retrogressive Vegetational Succession. ***Scientists on Gaia***, edited by Stephen Schneider and Penelope Boston, was published by M.I.T. in 1991. Lee Klinger's chapter is titled "Peatland Formation and Ice Ages: A Possible Gaian Mechanism Related to Community Succession" and I share excerpts:

"Succession is a process whereby, in the absence of large-scale physical disturbance, biotic communities replace one another in a somewhat orderly and predictable chronosequence. The course and rate of succession can be altered or even reversed by the influence of allogenic factors. Succession, as an inherent mechanism of change in all landscapes (and perhaps also in all seascapes), has rarely been considered in discussions of possible biosphere-atmosphere interactions. …

"The conclusion that bogs may be climax [implying "stable and self-perpetuating" although clearly questionable if it truly reflects the acidic, biologically-impoverished stage of Iversen's "telocratic" prior to the next "cryocratic" stage of reglaciation] communities has been

drawn for several regions. … The only test of the bog climax hypothesis has been done in southeast Alaska (Klinger, 1988, 1990; Klinger et al., 1990). Using several independent methodologies, it was concluded that, following the early stages of primary succession, closed-canopy coniferous forests progressed to open-canopy coniferous bog forests, and eventually to moss-sedge bogs over a period of about 2000 to 5000 years. Once formed, the bogs have remained structurally and compositionally stable on the order of 3000 to 8000 years. This transition from woodland (forest-dominated) to peatland (bog-dominated) landscapes, called ***paludification***, is recognized as a widespread phenomenon that ranges from the arctic (shrubland to peatland) and subarctic to the tropics. … Pollen and stratigraphic evidence from northern Europe indicates systematic shifts from woodlands to peatlands through the course of several interglacial periods (Iversen, 1958, 1973; Andersen, 1966, 1969; West 1980).” …

Dr. Klinger has reproduced the same Iversen glacial-interglacial cycle diagram here as we did in Ch. 3. His caption has improved upon ours; Klinger says: “Iversen’s model of ecosystem change in northern Europe during a glacial-interglacial cycle. The cycle of environmental change is on the left, the cycle of biotic community change is on the right.”

And please note this:

“Where paludification [bog or marsh land formation] extends over large regions, high levels of atmospheric moisture could promote increased cloud cover, the net effects of which could cause regional cooling [or more snowfall, in any case]. Increased surface albedo may be another important cooling mechanism associated with paludification. For instance, in boreal areas, the summer albedo of bogs ranges from 12% to 16%, compared with only 6% to 8% for forests (Larsen, 1980). Concerning the possibility that these conditions could promote ice ages, it is interesting to note that virtually all Pleistocene ice sheets were initiated in areas that are presently occupied or surrounded by extensive peatlands. …

“Based on theoretical predictions and on the integration of results from numerous paleoecological and glaciological studies, a global

model of landscape dynamics has been conceptualized. This model bears close resemblance to Iversen's (1958) model of cyclic vegetation change associated with glacial-interglacial cycles (figure 28.1). Iversen's model proposes that, at mid to high latitudes, landscape succession occurs from early successional grassland or woodland during the early interglacial to later successional woodland during the mid interglacial, then to peatland during the late interglacial. These changes are accompanied by increasing soil acidity and podzolization. …

"Once the previously described positive feedbacks involving peatland-atmosphere interactions gain control, a relatively rapid onset of glaciation can occur. Glacial onset should be characterized by widespread forest dieback, especially at higher elevations and latitudes, as paludification rate increases. This short-term source of CO_2 could temporarily prevent a decline in atmospheric CO_2 during the early onset of glaciation."

To further emphasize how the research and conclusions of ecology and paleoecology support the far-reaching synthesis of Hamaker regarding soil demineralization and glacial-interglacial dynamics, consider some excerpts from ***Vegetation History*** (Kluwer Academic Publishers, 1988) edited by Brian Huntley and Thompson Webb III, another outstanding book probably few climatologists have thought essential to study:

"A knowledge of 'Vegetation History', the subject of this volume in the 'Handbook of Vegetation Science', is fundamental to the study and understanding of many ecological, biogeographical, and evolutionary problems. … During this approximately 2 My-long [million year-long] period, ice-sheets have oscillated between their maximum and minimum extents as many as 20 times, and global and regional climates have changed continuously." (from editors Introduction)

"The effect of forcing in deglaciation is beginning to be understood (Denton and Hughes, 1983), but the determinants of the apparently similar duration of one interglacial period with another are uncertain. … The concept of a cyclic development of soil and vegetation in response to [or co-determinant of!] a climatic cycle was first elaborated formally by Iversen (1958), although the concept was

already envisaged by von Post (1946) who identified 'terminocratic elements', i.e. species which characteristically occurred towards the end of cycles. Grichuk (1964) has also proposed a scheme of cyclic climatic change for interglacial epochs. Iversen (Fig. 4) showed that in glaciated regions a succession took place of (1) a 'cryocratic' stage as ice melted, characterised by frost-disturbed soils with open arctic-alpine vegetation in full sunlight (2) a 'protocratic' stage with stable but as yet unleached calcareous soils with developing pioneer woodland and increasing shade (3) a 'mesocratic' phase with brown forest soils, slightly leached and shade-casting climax broadleaved forest and (4) a 'telocratic' phase with acid podsolised soils and more open forest with heath and moorland which includes bogs. The telocratic phase represents a regression towards glacial conditions once more. …

"Iversen's scheme integrates three concepts, a cycle of increase and decrease in mean annual temperature, a cycle of progressive closing of high forest regressing to open forest with heath once more, ***and a unidirectional leaching of soil***. [emphasis added] ...

"There is not much evidence bearing on the rate of soil profile development, but Hammond (1974) has shown by the study of dated soil profiles buried by expanding peatlands in Ireland that leaching of a calcareous till took place progressively over some six thousand years to remove carbonate to a depth of 30 cm and to cause movement of clay-sized particles down the profile. In the coarsest soils this process will lead to formation of heathland as envisaged by Iversen. Extensive peatland development tends to occur late in interglacial cycles often by spread from infilled lake basins. The development of blanket peats as, for example, in western Ireland (O'Connell, 1986) or Labrador (Lamb, 1980) is a late Holocene phenomenon. In Labrador spread of peatland is considered to be dependent on precedent development of forest soils (Lamb, 1980) which requires time, several thousand years in Labrador, and fits the basic Iversen model. In the Holocene, anthropogenic factors may modify or accelerate natural processes." (p. 162-64 of the chapter, "Europe," by Prof. William A . Watts, Trinity College, Dublin, Ireland).

The 1998 second edition of Neil Roberts' excellent university-level textbook, ***The Holocene – An Environmental History*** demonstrates

that Johannes Iversen and his insights into the Interglacial Soil Demineralization and Retrogressive Vegetational Succession are not forgotten nor completely neglected by those such as Roberts adequately focused on this primary ecological process within the glacial-interglacial cycle of this Quaternary Period. Nor does he neglect the evidence and warning of Genevieve Woillard as many do:

"Given that the impact of early hominids on the natural world was rather slight, it is possible to use Pleistocene interglacials as analogues for what the Holocene world would have been like had it not been disturbed by human agency [which has mainly accelerated soil and vegetation impoverishment hence transfer of carbon to the atmosphere]. … Although there were some floristic differences between interglacials, they were minor in comparison with their overall similarity. This is all the more remarkable considering that many plant formations had to be recreated from scratch at the beginning of each warm interval. In northern Europe, Johannes Iversen (1958) proposed a simple phase model for interglacial vegetation development. The pre-temperate ***protocratic*** phase was one of immigration of tree species from southern refuges, and the first arrivals were normally the boreal taxa of birch (Betula) and pine (Pinus). During the subsequent ***mesocratic*** phase, mixed deciduous forest became established (see table 3.1). Shade-giving trees, such as oak (Quercus) and elm (Ulmus), replaced the pioneering light-demanding genera. Although the mesocratic phase was usually of longer duration than the protocratic one, it was far from static floristically. …

"Soil changes also influenced the composition of the temperate forests, especially in areas that had been subject to glaciation during cold periods of the Pleistocene (see figure 3.1). Here, leaching of weathered bases from glacial tills led to a shift from neutral to acid soils, favouring trees like spruce (Picea), which mark the ***oligocratic*** phase of an interglacial. Once established, conifers produced further soil acidification as their fallen needles created an acid mor humus (Andersen 1969). [Svend T. Andersen's key work also remembered!] The final retrogressive ***telocratic*** phase saw the replacement of mixed deciduous forest by heathland and open coniferous woods, particularly where soils were locally prone to leaching out of their nutrients. Thermophilous trees disappeared as the climate changed

from interglacial to glacial, but the order of departure was not simply that of arrival in reverse. It seems as if many deciduous trees were not even able to 'pack their trunks' and to head off towards the Mediterranean sun at the end of the last interglacial (Woillard, 1979; Bennett et al., 1991)." (p. 57-58; p. 59 includes another good version of the Iversen interglacial cycle diagram)

"Soil- and land-forming processes were subject to a similar intensity and rapidity of change during glacial-interglacial cycles. This was obviously most acute in areas which were glaciated. The soils [and rocks] of the Canadian Shield were literally scraped up and dumped in the American Mid-West every time the Laurentide ice sheet advanced southwards – a later gift from Canada to America's farmers." (p. 60)

In the book's concluding paragraph (p. 252), Neil Roberts laments the unwise and unnecessary destruction of Earth's soils, forests and overall ecological integrity and understatedly suggests increasingly dire consequences, then at last grasps for a rather odd straw of optimism as he concludes:

"But lest this book end pessimistically, let it be noted that environmental history also offers some hope for the future. Human-induced forest clearance has so far been no worse than the naturally caused ice-age deforestation of the Earth, and during the Holocene the forests – tropical and temperate – were able to reclaim most of that area within a thousand years. This was a mere speck of time for the Earth's environmental history, but can we afford to wait that long?"

Writing to thank Neil Roberts for his contributions and concern, I pointed out that the rapid forest rejuvenation characteristic of the interglacial resurrection only came ***after*** the glacial gift of re-stocked soil mineral supplies. Then of course I reminded him of "the good news" about our technological and spiritual capacities to give as generously as the glaciers, and with a much speedier enthusiasm. Is that due to our warmer, more compassionate hearts?

'Futures, Farming & Forecasts' by Larry Acker – "The November 1994 issue of ***Geotimes*** gives us our first solid hint that something is

changing [others have observed such “hints” since 1972]. Using the National Oceanic and Atmospheric Administration (NOAA) satellite data, which goes back to 1970, it has been determined that global temperatures are lower than what all the computer model programs are predicting. Incidentally, these ‘models’ are used in the global warming forecasts. The USDA Plant Hardiness Zone Map of 1995 shows a complete zone shift to the south when compared with the 1965 map that I used in graduate school. That is a 10 deg. F shift. ...

“This shift verifies a significant drop in just 30 years – a short period – especially in the life of a tree. Trees would be highly sensitive to such major changes and would be a source of reliable data for these changes. … Jim Agee, professor of Forestry at the University of Washington, verifies that oaks are being displaced by conifers because the conifers can tolerate colder climates better than deciduous trees such as oaks or maples [and tolerate more acidic demineralized soil]. The process continues throughout the inland West, due to more cold stress and also due to severe droughts. Since 1990, it is now being verified that even firs are dying from such diseases as root rot and lodge pole pines in Idaho are dying from bark beetle infestations. The stressed trees cannot fight off such invaders for very long.

“Glaciations follow a long cycle series of about 100,000 years each, and the interglacial periods (the big warm-ups) last between 11,000 to 12,000 years. ... The climate became warmer and warmer until about 4,000 to 6,000 years ago, and it has been slowly cooling ever since. This is a normal routine of the Pleistocene period. … The previous glaciation had an almost identical period about 115,000 years ago called the Eemian, which lasted 12,000 years. In that cycle, oaks were displaced by conifers. Dr. David Adam of the U.S. Geological Survey wrote of his study in Clear Lake, California that the Eemian Interglacial period ended very quickly with the hardwoods dying in about 150 years. This was confirmed by Genevieve Woillard’s writing in ***Nature*** in 1979. …

“Using this information as our guide, our calculations show that the current interglacial period is already longer than usual. If this is correct (and the recently dying firs may be a good indicator), the temperature is getting ready to have a major drop. … it will be much

colder than the present in the year 2020. By that time, Illinois will be raising spring wheat and the corn belt will be in Arkansas – 400 miles south of where it is now. There will be no oranges, grapefruits or lemons grown in the continental United States. Canada will be doing well in most places to grow oats and barley – the two shortest-season major agronomic crops in the world. Glaciers should again be growing around the world and the ocean level should be dropping. The current global warming theory will be another theory relegated to the 'dust bin of history' ". ... (***Acres USA***, May 1998)

More Support for G. Woillard, J. Hamaker, and the Present Danger of a Rapid Interglacial-to-Glacial Transition!

"We presently live in an interglacial, approaching a transition to the next glacial interval. In order to fully understand the interaction of the second-order effect of human activities upon the first-order transition from the present interglacial to the next glacial climate, we should pay particular attention to the available terrestrial and oceanic geologic records of the previous transitions from interglacial to glacial intervals, and also should reappraise their probable cause."

–Prof. Aleksis Dreimanis, Geology Dept.
Univ. of Western Ontario and the International
Quaternary Research Association

For researchers who missed coverage of this article from George Kukla of Lamont-Doherty Geological Observatory when it was presented in previous Bulletins, here again is the introduction to "End of the Last Interglacial: A Predictive Model of the Future?" – "The present interglacial is in its terminal stage (Kukla & Matthews 1972). In this context, the recent gradual cooling of the middle latitudes in the Northern Hemisphere is of special significance (Kukla et al. 1977). The shift during the last several years is accompanied by numerous record-breaking local weather anomalies such as the first snow in Miami (1977), the lowest rainfall on record for India (1972), and the first snow in living memory in the Sahara (1979). The cooling is fast enough to bring full glacial average hemispheric air surface temperatures in 300-400 years.

"Many researchers believe that the cooling is of unknown natural origin, but that it will be reversed at the end of the century by anthropogenic increase of atmospheric CO_2. This is, however, far from certain since CO_2 has been increasing for many decades without any obvious warming effect. Furthermore, the number of subtle feedbacks operating in the climate system have not been considered in the assessment of CO_2 impact. These can dampen or completely reverse the expected CO_2 warming over at least some parts of the world. Given the uncertainty, it is of utmost importance to study available records of the terminal stages of the last interglacial, the cyclic equivalent of the environment and climate which led to the last glacial stage." (in ***Palaeoecology of Africa and the Surrounding Islands***, 1980)

"In Memory of Genevieve Woillard-Roucoux" was the title of a special letter to the editor published in ***Quaternary Research*** 17, 275 (1982). It was co-authored by George Kukla of Lamont-Doherty Geological Observatory and Alan Hecht of the National Science Foundation, and it read:

"The balmy climate of the last interglacial came to a surprisingly abrupt end. That is what Genevieve Woillard's painstaking research of the Grand Pile peat bog clearly demonstrated. This year the fruitful life of the young Belgian palynologist came to an equally rapid termination. She died of cancer on July 7, 1981.

"Genevieve was well known to paleoclimatologists around the world because of the far-reaching results of her research work and because of her pleasant personality.

"Genevieve Marie-Aurelie Woillard-Roucoux was born on April 16, 1948. She received her doctorate in botanical sciences under Prof. William Mullenders at the Catholique University in Louvain in 1974, and with "La Plus Grande Distinction," the same year she married Pierre Roucoux, a university researcher.

"She was only 18 years old when her first scientific paper was published. It dealt with the use of antibiotics in fish tanks. Genevieve was an ardent aquarist and it was this hobby which led her into science. But the best known of her 28 publications (***Nature*** 281, 558-

562) deals with the pollen record in Grande Pile in France (cf. also ***Quaternary Research*** 9 (1978), 1-21). It was here, where, in a set of samples taken painstakingly one millimeter apart, she found a record of sudden displacement of the last interglacial's hardwood forest by a pine-birch taiga.

"Should a similar event terminate the recent interglacial? What exactly happened some 115,000 years ago in Grande Pile? Genevieve worked hard to find out." (conclusion of letter)

"The Last Interglacial, known as Eemian, lasted only some ten thousand years, from 125,000 to 115,000 years B. P. [Before Present] The Eemian, which has been studied using ice cores, deep sea cores and continental deposits, is so similar to the present interglacial that a detailed study of its late phase and its termination is of great interest, the more so as the ice and deep sea cores contain evidences of abrupt climatic changes not only at the end of glacial conditions but most probably [most ***evidently*** according to Woillard] also at the end of the interglacial."
–***Palaeoclimatic Research and Models*** p. 4 (1983) – Report and Proceedings of the Workshop held in Brussels, December 15-17, 1982; organized by Commission of the European Communities, Directorate-General Science, Research and Development, Environmental Protection and Climatology Division, Brussels

"The Future of the Earth – Greenhouse or Refrigerator?" is an article by Hubert H. Lamb, Emeritus Professor, Climatic Research Unit, University of East Anglia, Norwich, UK published in the ***Journal of Meteorology***, October 1984. It is the paper he gave to open the first session of the British Association, Section A (Physics), at Norwich on 11 September 1984. Since he is regarded worldwide as the most, or one of the most, knowledgeable climatologists, having studied climate and climate history for decades, I quote from his paper as an example of the growing awareness and acceptance of Genevieve Woillard's crucial findings on the speed of the interglacial-to-glacial transition phase:

"The Earth's climate is produced by energy going on all the time on the hugest scale, between the tropics and the poles. Moreover,

natural causes on their own are certainly capable of producing climatic changes of a magnitude that can only be called devastating. And there is evidence that, despite long periods of seemingly stable climate, some of the great changes of the past have taken place surprisingly quickly. The pollens deposited in what is now a peat-bog in the Vosges Mountains in eastern France indicate that, in the closing stages of the last warm interglacial period, the temperate fir and spruce forest in the region, mixed with some oak and hornbeam, was replaced by typical pine-birch-spruce forest as in Scandinavia today, within about 150 years (Woillard 1979). And within that time the really crucial climate shift may have taken no more than 20 years."

Although someone else may well have done so earlier, I did not send Prof. Lamb a copy of TSOC until Oct. '84, so he may not have read Hamaker's analysis of Woillard's findings, and the whole crisis, prior to submission of this paper. Concerning CO_2 he shows, as he has before, that he is aware that "CO_2 warming" is not to be viewed simplistically when the whole complex Earth is our 'model':

"The effects of carbon dioxide in the atmosphere seem similarly straightforward, but there may be problems that cannot be fully resolved yet in the complexity of the exchanges involving ocean and atmosphere, producing changes of cloudiness and so on. Again, it is a question of the balance between incoming solar radiation and outgoing radiation from the Earth being affected."

David P. Adam of the U.S. Geological Survey in Menlo Park, Calif. was mentioned in ***TSOC*** for his work addressing the ***energy requirements of glaciation*** (such as his 1975 paper, "Ice Ages and the Thermal Equilibrium of the Earth, II", ***Quaternary Research*** 5, 161-171) and for his agreement that the Hamaker Thesis explanation of a greenhouse-energized glaciation system is quite plausible. Now after many years of painstaking work (plus quite a while in the USGS publishing mill), U.S. Geological Survey Professional Paper 1363, ***Palynology of Two Upper Quaternary Cores from Clear Lake, Lake County, California*** by David P. Adam (with a section on dating by Stephen W. Robinson) has emerged from the U.S. Government Printing Office, Washington: 1988.

From the Abstract: “Clear Lake occupies a structural depression near the South end of the northern California Coast Ranges at an elevation of 404 m. Eight sediment cores were taken from the lake in 1973; the palynology of cores 4 and 7 is reported here. Core 4 is 115.21 m long and is interpreted to cover the entire last glacial cycle. Core 7 is 27.43 m long and covers at least the last 40,000 radiocarbon years. ... The pollen zones of core 4 are used to propose a series of informal climatic units that include the time interval from the end of the penultimate (= Illinoian) glaciation to the present. The major units proposed are (1) the Tsabal cryomer, equivalent to marine oxygen-isotope stage 6 and the Illinoian glaciation of the midcontinent; (2) the Konocti thermomer, equivalent to oxygen-isotope substage 5e; (3) the Pomo cryomer, equivalent to the oxygen-isotope stage 2 through substage 5d interval; and (4) the Tuleyome thermomer, which corresponds to stage 1 or the Holocene.

“The most severe of these changes was the cooling that occurred at the end of the Konocti thermomer, when oak pollen frequencies decreased from more than 60 percent to about 25 percent in a stratigraphic interval of only 23 cm. These sudden changes were climatic catastrophes for the ecosystems that experienced them. … The Clear Lake pollen fluctuations correlate remarkably well with those from long cores at Grande Pile in France and Tenaghi Philippon in Macedonia, as well as with the oxygen-isotope record from deep-sea cores. The sudden climatic changes require mechanisms in addition to the variations in orbital parameters of the earth that form the basis of the astronomical theory of climatic change. Some mechanism(s) must have threshold values which can trigger sudden shifts in climate.” (emphasis added) [Konocti thermomer = Eemian = last interglacial]

From the ***Correlations***:
“ ... A continuous pollen sequence was needed that would cover the entire last glacial cycle from a site closer to northern Europe. Such a site was found at Grande Pile, in northeastern France (Woillard, 1975, 1977, 1978a, 1978b, 1979a; Woillard and Mook, 1982). The Grande Pile record provides a continuous climatic sequence since the beginning of the last interglacial period (Eemian). The site is close enough to northern Europe to enable reliable correlations with the many short pollen records that cover various parts of the early

Weichselian Glaciation, and the entire sequence of climatic fluctuations provides a reasonable basis for correlation with the long Macedonian pollen record (Woillard, 1977).

“The Grande Pile record is a critical link in establishing the correlations among the relatively few, long, continuous pollen sequences from extraglacial areas and the more abundant short pollen sequences from sites near the continental ice sheets that cover at most only a few stadial-interstadial fluctuations. Many of the correlations of the Grande Pile sequence with other sequences and events have been summarized by Woillard (1977), and the correlations described in this paper draw extensively on her work.

“The correspondence between the fluctuations of the Clear Lake oak-pollen curve and the fluctuations in the other curves (fig. 30) is particularly remarkable in the lower part of the section (the Konoctic thermomer and the early Pomo cryomer [glacial]. The fluctuations in the oak curve are wide, clearly defined, and always involve at least two samples. ...

“The similarity between the Clear Lake, Grande Pile, and Macedonia pollen records during the interval correlated with oxygen-isotope stage 5 (fig. 30) is remarkable. The broad climatic changes that produced these curves must have affected at least most of the Northern Hemisphere and perhaps the entire world. If the changes that produced similar climatic curves for France and Macedonia are also found in California [as he found], then the rationale for using long-distance climatic correlations is greatly enhanced. ...

“The Clear Lake pollen record is of major importance because (1) it provides a continuous sequence through the last glacial cycle against which shorter climatic sequences may be evaluated; (2) it demonstrates that the oxygen-isotope curves measured on deep-sea cores are recording global climatic changes that also had profound effects on terrestrial vegetation; and (3) it establishes the validity of the general sequence observed at Grande Pile and in Macedonia as a paleoclimatic sequence for at least most of the Northern Hemisphere.” (emphasis added)

From the ***Discussion***:

“The Clear Lake pollen record is remarkable for its length, stratigraphic continuity, and high temporal resolution. Furthermore, it provides a climatic sequence for the early part of the last glacial cycle for an area from which no such records were previously available. … The interpretation of the Clear Lake pollen record presented here provides the basis for a substantially different view of the last glacial cycle in North America than has existed previously. The Clear Lake record faithfully follows the same series of climatic events that has been observed in northern Europe, and the conclusion seems inescapable that the same series of events must have affected at least the northern part of North America.

“A striking feature of the climatic sequence of the early Pomo cryomer is the rapidity with which most of the changes occurred. Only at the ends of the Boomli 3 and Boomli 4 thermomers [less glacial interstadials within the glacial period] are fairly slow and systematic changes observed; the other transitions appear to be quite sudden. From the point of view of the environmental status quo that preceded them, these sudden changes must have been nothing less than climatic catastrophes. Local vegetation was largely destroyed, and different vegetation grew to replace it. The nature of the sudden climatic changes raises profound biologic and climatic questions. What were the ecologic effects, and how did such rapid climatic changes come about? ... How could such changes be explained in terms of the global energy budget?" (emphasis added)

And from the ***Conclusions***:
“The period following the last interglacial at Clear Lake was characterized by several drastic climatic shifts, including both sudden coolings and sudden warmings. These shifts are interpreted as climatic catastrophes for the ecosystems that they affected. The most extreme change occurred at the end of the last interglaciation.” (Is any more emphasis needed?)

The Last Interglacial-Glacial Transition in North America (Geological Society of America, 1992) was edited by Peter U. Clark of Oregon State University and Peter D. Lea of Bowdoin College, Maine. In their Preface they say:

“In developing a comprehensive model of the ice ages, it is equally important to understand the geologic record of an interglacial-glacial transition as it is to understand the transition from a glaciation to an interglaciation. The transition from the last glacial maximum ca. 21,000 yr to the present interglaciation has been intensively studied and represents one of the best documented events of Earth's history. By comparison, the geologic record of the last interglacial-glacial transition is poorly preserved in discontinous sediments, and chronometric methods for accurately dating this interval remain elusive. Despite these limitations, there have been a number of major advances in our understanding of this transition over the last 10-15 years. Chapters in this volume represent a current and balanced description of these advances.”

When I found no focus on the question of CO_2 changes through the last interglacial and interglacial-glacial transition, I called editor Peter Lea to discuss it. He was not yet familiar with the Hamaker Thesis, but agreed that a CO_2 “spike” at the end of the last interglacial, representing widespread forest dieback and burning, could easily have been missed by the Vostok ice core studies because the sampling intervals were about 2000 years.

One chapter by George Kukla, Dorothy Peteet and David Rind is called “Wisconsinan ice-sheet initiation: Milankovitch forcing, paleoclimatic data, and global climate modeling” and, although neglecting Iversen’s and Andersen’s work, it does give some acknowledgement to Woillard including reprinting her Grande Pile pollen diagrams. Brief excerpts:

“The shift from a warm, temperate environment to colder conditions ca. 115 ka is reflected in a number of pollen records throughout western Europe (Wijmstra, 1969; Woillard and Mook, 1982; Turon, 1984; de Beaulieu and Reille, 1984; Behre, 1989) (Figs. 2 and 3). Pollen records from annually laminated deposits in Germany show that the hardwood forests were continuously present for ~10 to 11 ka [ka = 1000 year] during the last interglacial (Muller, 1965; Turner, 1975). They were then replaced by a taiga (pine-birch assemblage) at about 115 ka (Woillard and Mook, 1982; Turner, 1975; Kukla, 1980), which was in turn shortly replaced by tundra.” (p. 54)

"From the modeling results of the GISS GCM, it is clear that Milankovitch orbital forcing alone is not strong enough to initiate ice-sheet growth in the model, or to sustain it. Neeman and others (1988, p. 11, 176) suggested that climate and ice-sheet modelers 'Have usually avoided a confrontation with the possibility that the orbital forcing alone, without an amplifying mechanism which is not yet understood, is too weak to cause the ice sheet fluctuations.' " (p. 66)

George Kukla also chose to remember G. Woillard's "Abrupt end of last interglacial s.s. in Northeast France" in his 1989 article, "Long Continental Records of Climate – An Introduction" (***Palaeogeography, Palaeoclimatology, Palaeoecology*** 72: 1-9) when he says that "it seems that the shifts from one environmental mode to another occurred as fast in Greece as they did in the Grand Pile, France (Woillard, 1979) or at Les Echet, France (Beaulieu and Reille, 1989)." (p. 7)

Kendrick Taylor, a paleoclimatologist whose work we'll look at next, was not entirely joking when he said major climate change can happen faster than it takes to get out a new ice core study – about 4-5 years being expected before his next ice core study would proceed from core drilling to published papers. In our conversation (8/24/98), he said yes, it is generally agreed that CO_2 was relatively high at last interglacial's end, and that I raise a good point in stating the obvious (?) danger of our pushing the climate toward rapid change to a new climate mode – especially when that may mean another 90,000-yr. or longer glacial period. However, Dr. Taylor said no, he did not know of any climatologists/scientists advocating change in policies of energy use, reforestation, ecological regeneration, etc. "It is very difficult for scientists…" Does he think Congress is aware of the evidence for rapid interglacial-glacial climate change? "I think they're only aware of the next election," he replied. He did note that Al Gore, the presidential candidate, had invited some of the paleoclimatologists (and not just the "warming" computer modelers) like Richard Alley, Lonnie Thompson and others in for "breakfast chats." One might hope they gave him a ***healthy*** bout of indigestion and a broader basis for thinking about climate change and the health of a planet.

Perhaps Al Gore and members of Congress watched the NOVA television program aired both in 1998 and 1999, entitled "Warnings

From The Ice" in which Kendrick Taylor was one of those interviewed in Antarctica who warned that the "warming" could trigger a plunge into another glacial period. Richard Alley was also featured, explaining the 100,000-yr. glacial-interglacial cycle and where we appear to be positioned. In conclusion, the narrator repeats that a major concern now is that warming temperatures could trigger colder, icier periods. That slowly the ice is surrendering its secrets – and it is hoped the ice will tell us before its too late! That reminds me of the quote, "It is better to have a backbone than a wishbone."

"Warnings From The Ice" was also the title of a ***Time*** article (4/14/97) on the work of Taylor, Alley and co-workers, and on 9/8/97 the ***L.A. Times*** published an extensive update on their work, "Icy Clues to Climate of the Future." Important excerpts:

"Working poles apart – on the crystal crown of the Arctic icecap and on the ice domes of Antarctica – researchers are coming to grips with Earth's frozen past in order to predict its future. For scientists trying to learn how global warming may affect the climate's course, understanding the character and chemistry of the ice and snow at the planet's extremities has taken on an unusual urgency.

"The information they seek could be critical to efforts to curb the burning of fossil fuels and industrial emissions. To stave off global warming, world leaders are preparing to meet in November to prepare the first international controls on emissions of greenhouse gases such as carbon dioxide.

"Recent studies of prehistoric ice in Greenland suggest that the world's climate may be balanced on a knife's edge – subject, with almost no warning, to potentially devastating temperature swings causing disasters ranging from floods to crop failures. …

"They reveal hints that the effect of any global warming might, paradoxically, trigger cold weather severe enough to cause a global winter lasting years. The shift from the warm contemporary climate to an ice age could take less than a human lifetime.

" 'It raises the possibility that, by putting out greenhouse gases, humans may make the climate unstable and plunge us in as little as a

decade into severe cold periods,' said Kendrick Taylor at the Nevada Desert Research Institute, chief scientist for a consortium of 15 universities using ancient ice cores to investigate climate."

Further on this ***L.A. Times*** science writer, Robert Lee Hotz, focuses on the ice results from the previous interglacial, the Eemian:

"Analysis of the ice suggests that the Eemian may have ended with a gradual global warming that triggered two dramatic decades-long pulses of chill temperatures, which in turn culminated in thousands of years of glacial cold.

"The effect is more logical than it sounds. As the climate warms initially, scientists explain, there is more moisture in the air; therefore, more snow falls each winter. More snow builds up as glacial ice, which in turn reflects more of the sun's heat, lowering global temperatures dramatically. If the glaciers spread over enough of the earth, the cycle can quickly refrigerate the planet."

Todd Sowers, a colleague of Richard Alley at Penn State's Geoscience Department and fellow paleoclimatologist, is one of the more open-minded scientists to whom I've explained the Hamaker Thesis in some depth. His considered response was: "I have no major problem with it." He also agreed that it would make sense to cooperate in restoring Earth's soil minerals and vegetation to approximate conditions at the time of the fertile Climatic Optimum about 6000-8000 years ago. He didn't know how it could be done, however, with the current dominance of the fossil fuel corporations, etc. "I ride my bike to work, but how much good does that do?" asked Todd. All I could suggest was that the key may be right there in his example of individual responsibility and actions. Recall the story of "The Hundredth Monkey"; is it now ***the billionth human*** who is needed to turn the tide of eco-climatic degeneration?

Even though as a paleoclimatologist Todd Sowers was familiar with the CO_2 graphs of Shackleton, Barnola and others which came from ice core and sea floor core analyses, it was apparently not until I pointed it out that he realized: "Sure enough, there was a CO_2 rise at the end of the last interglacial!" How many scientists saw this? How many will see it now?

In early 1998 I learned of the work of Jack Sauers in Seattle, Washington, who has been a geologist since 1949 and still works as an independent consultant in geology, climatology, and agronomy. Since he is a rare "independent" (naturally ***within*** our natural reality of interdependence) let us hear some of his perspective from both published articles and Open Letters he has sent to me (since our initial 4 1/2 hr. phone conversation) and others worldwide.

From his article "New Ice Age Looms" (***21st Century***, Winter 1997-98):

"The proponents of the non-science of global warming are fighting the wrong war with their obsolescent computer models. They would be better advised to study how we are even to sustain our current agriculture, energy supply system, and shipping, when the current Little Ice Age gets further advanced. Should there be a still greater rise in vulcanism, and a drop in sunspots and solar output, as I forecast for this next century, we may see a rapid decline of temperatures into the next major glaciation.

"At the end of the Eemian interglacial, 115,000 years ago, it all happened in only 20 years. We have now used up the time of an interglacial, even if we use the figure of average time for an interglacial of 11,500 years. What we need is real, hard climatic data to track the climatic decline. My wide-ranging review of recent literature has turned up some good clues to this mystery.

"The first mercury thermometer weather station was erected in Germany, and gives hard temperature data historically. If we look at the superb little book, ***Past Climates, Tree Thermometers, Commodities, and People***, by the late Prof. Leona Libby of the University of California at Los Angeles (the wife of the nuclear scientist Willard Libby, who invented the radiocarbon dating method), we see a graph of 'Oxygen Isotope Ratios in a Sequence of German Oaks, 1350 to 1950' (her Figures 2-7, p. 39). The data come from Spessart oaks 1 and 2, and a Marburg oak right next to the mercury thermometer weather stations, against which the oxygen isotope data on cores of the oaks are rigorously calibrated.

“Those graphs show that the lowest temperature occurred at about the year 1800. Temperatures then rise to 1930, and have fallen since. The amplitude of the rise from 1800 to 1930 is 1 deg. Celsius. From weather stations in the Alps, and in the Nordic countries, we find the temperature decline since 1930 is also 1 deg. Celsius. Thus, we have to conclude that we are at the temperatures of 1800, now. Those were the lowest temperatures ever recorded in the last Little Ice Age, called by students of glacial geology, the Maunder Minimum. That is why, today, the glaciers at high latitudes are growing, and why we conclude that we are in a new Little Ice Age.

“Plants are being greatly affected by this temperature drop, including forests. A comparison of the U.S. Department of Agriculture’s own 1965 and 1990 Plant Hardiness Zone Maps, shows that Plant Hardiness Zones have moved southward by one zone, or 10 deg. F., between 1965 and 1990. …

“It has been noted extensively in the press that large numbers of trees in the West are dying from insects and disease, likely as a result of climatic stress, on trees of larger Plant Hardiness Zone numbers at the near limits of their ranges and stability fields. They advanced upwards with the warming to midcentury, but now are unstable at the higher elevations from the extreme cold, and the increased snowpack conditions. In Washington state, we had a snowpack 185 percent of normal. ...

“In Iceland, to which I sent perennial rye seed for hardiness testing, the Secretary General of the Ministry of Agriculture wrote in a letter March 10, 1997: ‘Thank you very much for your letter of 6 Feb. 1997 and the interesting information. Your conclusions are disappointing, naturally, we had been looking so much forward to Global Warming around here; in fact, we hardly can wait.’ In the Ministry’s brochure, ‘Agriculture in Iceland,’ a graph of the temperature above that of pack ice around Iceland shows that it reached a peak at midcentury, and has fallen since – as pack ice in the North Atlantic has been advancing southward with the increasingly cold northern Arctic Ocean. …

“Meanwhile, in Antarctica, a massive increase in ice volume is underway, as ice core data show. For ice volume in Antarctica, Prof.

Charles Bentley of the Center for Climatic Studies at the University of Wisconsin, estimates growth of the Antarctic Ice Sheet at 200 gigatons per year ('Antarctic Mass Balance and Sea Level Change,' ***Eos***, Dec. 14, 1993, p. 585 ff). That would produce a sea-level lowering of about 0.5 mm per year. Since 1930, that would come to about 3.3 cm, exclusive of effects from the other growing glaciers, like the one in Greenland.

"So, should we worry about the melting of the ice caps from the non-science of global warming, when the ice caps are actually growing, and sea level is falling? Since the Climatic Optimum 4,000 to 6,000 years ago, the general trend has been a falling sea level, which has left high-elevation terraces around the world, and growing ice caps. Maybe we should consider what will happen when the ports of the world will be left high and dry! And, I guarantee that they will."

From the article "New Ice Age: Interviewing Geologist Jack Sauers, Part I" (***The New Federalist***, 1/26/98):

"What edible grains will cold weather support? How do you ensure the survival of cattle on the range, amidst deep snow drifts? If these problems are not met, how many people will starve to death as the climate becomes colder? These common sense questions are not usually taken up in the discussions of alleged global warming-climate change ... but Washington State geologist Jack Sauers has not only investigated these questions, he is actively working with grain researchers and government officials to supply new, cold-resistant rye grain, as one means to help produce food as the world moves into a new ice age.

"The beauty of Sauers' approach revolves around looking for the ***why*** of observed ***physical*** phenomena, thus allowing him to unify in the mind the increase in ice mass of glaciers at both poles, the southward descent of boreal vegetation and animals, and the apparently unconnected phenomena of increased volcanic eruptions and El Nino events, as parts of a single astronomical-geologic process. …

"Q: What evidence do you have of the Earth entering a new ice age?

"A: I have indeed been working on more information, and I have more hard temperature data coming from many places in the world and on the activity of glaciers that are growing in many different places, such as Greenland, Norway, and Sweden. The Bering Glacier, the largest maritime glacier in Alaska, has advanced even more than I documented previously. It has gone down the valley 9 kilometers in the last 17 months, putting icebergs down the river that goes into Prince William Sound. The U.S. Geological Survey (USGS) has had to keep their eye on that because of all the oil tankers that come down there. The last data I have are for 1995. This is a rapidly growing glacier that covers 1,000 square miles and accumulates a lot, and now it is funnelling this accumulation down towards the ocean. …

"Dr. Anker Wedek of the Geological Service of Denmark and Greenland, working with the USGS, has put together an atlas on Greenland, of which I just received a copy. It was done in 1995, and it reports on the large number of glaciers which are surging and increasing in volume in Greenland. …

"They said that that glacier in Antarctica is indeed increasing at 200 gigatons a year. It is also increasing in elevation at about 4 feet a year. This was measured by looking at some big ITT transmission towers, which are now way down in a hole! And, as the glacier adds about 4 feet a year of ice, it's only increasing in elevation at about, actually, two-tenths of a meter a year, because of the mass outflowage. …

"In a recent ***21st Century*** article, I noted that the Quasi-Biennial Polar Oscillation Cycle had expanded to the East Coast of the United States, which would mean big storms of an expanding polar vortex down the Eastern Seaboard. It happened! People in Maine and southern Ontario now think that they are in a little ice age, literally. ...

"There are many plants and animals that will no longer be able to survive in the northernmost areas. There was a paper published in ***Nature*** in 1993 which analyzed the pollen in southern Ontario, south of Lake Nipigon, in the last 650 years. The forest there used to be a temperate forest, beeches and maples. The maples died out and gave way to oaks, then the oaks died out, and gave way to white

pines. Now the white pines are disappearing and being displaced southward, and all that's coming back is boreal forest, ***not*** a temperate forest. The boreal forest is of birches and aspen. Those are characteristic of what grows way up north in Scandinavia.

"So, in the last 650 years, southern Ontario has gone into the boreal plant zone. For them, the Holocene... is over! They can probably expect some global warming in about 100,000 years, after the ice melts that's going to cover Canada. This is the meaning of this good palynology study.

"Now, such a change happened before, in southeastern France, in the last interglacial period, the Eemian, 115,000 years ago. This was also published in ***Nature***, by Woillard. They had a temperate forest of hardwoods. Then, in the space of about 20 years – that's a pretty short time-frame – a rapid cooling took place that killed off the temperate forests. All the hardwoods died, and all that was left was boreal forest, the pine, birch, and spruce.

"The boreal plant zone, which is today about at the level of Helsinki, Finland, was displaced southward to the Vosges Mountains, in France, from 60 degrees north latitude, to 47 degrees north latitude. This happened in 20 years! Now, that would be like taking the current boreal plant zone on the north side of Lake Superior, and displacing it south to Georgia, in 20 years. That's going to happen. It'll be just like the area moved to Scandinavia."

And from "New Ice Age: Interviewing Geologist Jack Sauers, Part II (***The New Federalist***, 2/9/98):

"Q: What other evidence do you see of the Earth's climate entering a new ice age period?

"A: One hundred thousand cattle died in Bismarck, N.D. last winter, as did all the antelope in northern North Dakota, and all the pheasants. Now ***there's*** a pretty big impact – people who have cattle and farms, have a big problem. Right now there is an ice emergency in Canada and the Northeastern United States. How are you going to milk the cows, and all that sort of work in severe weather?

"Now, I really do think that it's not a very nice thing to delude people into believing that they have 'Global Warming' – I think that's the most sickening thing; I think they ought to be ashamed of themselves back there in Washington, D.C. I think our administration is doing a great disservice to the world. I'm utterly disgusted with them.

"Q: You mentioned that the absence of 'global warming' had led you to investigate both El Niños and volcanism. How do volcanoes affect this ocean-based phenomenon?

"A: First of all, not only has on-land volcanism gone up to a base level of about 50 eruptions per year, for the last 20 years – and this can be verified very easily – but at that level, at the peak of every solar sunspot cycle, volcanism rises even higher. ...

"Most of the traditional atmospheric scientists want to blame El Niño on the reversal of the trade winds down there. However, here's what happens. If you look in the Bulletin of the Volcano Network published by the American Geophysical Union (AGU), you will find that before this El Niño came along, there were three volcanic eruptions in Indonesia and New Guinea – three volcanoes were erupting on land.

"However, right when the El Niño started, the number doubled, up to five or six on land. Volcanoes continued to number five or six on land, and when that El Niño died at that (Indonesia) end, the number of volcanoes went back down to three. This means that it is very, very likely those El Niños are produced by increased submarine volcanism, heating the Equatorial Counter-current that comes eastward from that area.

"Q: You mean, because it takes a ***lot of heat*** to warm up that much ocean, and just shifting the winds won't do it. …

"A: Just shifting the winds won't do it. There's no way you could get ***that*** much heat, to heat ***that much water***, unless you've got an awful lot of ***internal*** heat coming up in that subduction zone area, where New Guinea is, where there are a lot of volcanoes."

Next, excerpts from the seven letters received from Jack Sauers from Aug.-Dec. 1999:

“The cooling over the past 650 years can be seen in the paper entitled, ‘Forest disequilibrium caused by rapid Little Ice Age cooling’, by Ian D. Campbell and John H. McAndrews in ***Nature***, 25 Nov. 1993, vol. 366, p. 336-338. ... The moisture is going now to higher latitudes to make the glaciers grow there, since annual precipitation has been rising strongly at higher latitude stations near my perennial grain test plots I planted since wheat failed in the Maunder Minimum in Europe and it was necessary to eat rye.

“Irrespective of what some might have told you, both editions of ***Volcanoes of the World*** show the rising, and steepening graphs of vulcanism since mid-century. ... If you look at the graph in ***Secrets of the Soil***, on quakes of 6M and greater, you will see that increased earth strain is thus manifested in a similar steepening graph since midcentury, and you will also see in that book a similar graph for tornados.

“In a past conversation I had with you when you phoned, you indicated that you would like to have a small amount of some of the perennial grains I have been planting in the Scandinavian countries, like Sweden, Iceland, and Greenland, as well as here and across the Northern Tier, US where I have weather station data. I’m enclosing a small amount of three types you can plant as a test plot, perhaps for comparison with those other places, here, and in the Cascades where I also have them planted. You might plant them in plots of your ground rocks of different types, to compare with some plain soil that doesn’t have it.

“I had past correspondence with the late John Sanders, co-author of ***Climate, History, Periodicity and Predictability***, and he agreed with me that ‘the Holocene Interglacial is already over’ and we have now started into the Next Major Ice Age. I thought that might interest you!

“I am trying to track the ongoing development of the next major glaciation. Winter wheat in Washington State fell to 97 million bushels last winter from 136 million bushels the year before. ... Winter wheat is 70% of world grain production. … In Russia grain-production dropped due to colder, wetter conditions in Northern Russia and a drought in the Southern Ukraine as the lower latitudes develop

droughts. The Arab lands grain production dropped by 70% so they raised the price of oil.

"Robert Felix's ***Not By Fire But By Ice*** is selling well, for the second edition, and I was on one night with him on Laura Lee's talk show and told the country that the Holocene Interglacial is – from all my interdisciplinary research of the past 50 years – over and we've started a New Ice Age. … Your view to increase productivity of agriculture through better natural fertilizers such as good ground rocks is still a good idea since precipitation is rising strongly; volcanic ash from the volcano eruptions has helped grain production in Eastern Washington but has not offset the decline in production of winter wheat. … As it continues to get colder as indicated by weather service data, balloon radiosonde data and satellite data, grain production will fall.

"Unfortunately in some areas where the temp. declines are greatest like in Scandinavia the precipitation and cloudiness is rising strongly as at the end Eemian, as shown in a graph summary of Wibjörn Karlen of Guiot et al.(p. 15 in the report of the Swedish Nuclear Fuel and Waste Management Co., entitled 'Late Quaternary changes in climate', ***Technical Report TR-98-13***, Dec. 1998, available from Box 5864, SE-102 40 Stockholm, Sweden)."

Let me note here that I obtained this report and confirmed this graph does show the rapid precipitation rise at the Eemian or last interglacial's end (5e/5d transition) as Guiot et al. originally published it in 1989 in "A 140,000 year continental climate reconstruction from two European pollen records," ***Nature*** 338: 309-313.* Significant also is not only the acknowledgement of the long-term Quaternary glacial-interglacial cycle (p. 11) but perhaps as well the beginning of an end to denial regarding the geological and ethical wisdom of the nuclear fuel (and of course weapons) "option"! From the Introduction:

"The Swedish Nuclear Fuel and Waste Management Co., SKB, is responsible for the management and disposal of Swedish radioactive waste. Most of the waste originates from the nuclear power plants. The spent nuclear fuel is planned to be stored in deep geological repositories. The repositories shall keep the radiotoxic material separated from man and environment for hundreds of thousands of

years. During this time span long cold periods with permafrost and ice sheets over Scandinavia are expected. These climate-driven changes will affect the repository. To investigate climate-driven changes and their impact on a deep geological repository SKB has carried through a paleogeological research program (Bolton et al., in progress). This report is a part of this program. Similar programs have been performed by other nuclear waste managing companies (e.g. Adcock et al., 1997)."

May we also stand up and responsibly acknowledge that such changes, if invited or allowed to proceed, will also affect nuclear power plants, weapons systems ... and every other technology and concern of human beings?

To conclude with Jack Sauers' concerns:

"I am giving up raising corn, cucumbers and squash, the climate has now deteriorated so badly here. … Your forecast of a coming Ice Age was 'right on!' "

*The graphs are on p. 312 of this article and the authors refer to "the very humid and markedly cold climate of the final part of the Eemian" on this same page.

Also consider what Columbia University's Wallace Broecker said in the late 1990s. From "The End of the Present Interglacial: How and When?" – "In 1972 Brown University's R.K. Matthews and Columbia University's George Kukla wrote a letter to then President Richard Nixon warning him that, as the present interglacial had pretty much run its course, the Earth was in danger of being plunged into yet another period of glaciation. Further, based on Kukla's studies of loess deposits in Czechoslovakia and Austria these Cassandras predicted that this transition would be an abrupt one (Kukla and Matthews, 1972). Nixon's staff passed this letter along to the State Department from whence it went to the National Academy of Sciences. Interestingly enough, the Academy then sent it to John Imbrie (at Brown) and me (at Columbia) for comment. I do not remember exactly what we said, but, as both of us were at that time enamored with the gradual ramp-like declines from full interglacial to full glacial conditions, I suspect that we attempted to defuse this dire

warning. However, had this incident occurred in 1996 instead of 1972, I certainly would have taken it more seriously. ... How do interglacials end? I lean toward the Kukla-Matthews point of view that they end abruptly. ...

"Two detailed records … suggest that the European Eemian came to an abrupt close. One is Woillard's (1978) pollen record from northeastern France (48 deg. N). As reproduced in Fig. 3, a sharp rise in the percentage of non-arboreal pollen grains from less than 15% to about 65% of the total grains marked the end of the Eemian. The other is the McManus et al. (1994) marine record from 54 deg. N in the eastern Atlantic. ... This evidence suggests that at least in the northern Atlantic basin, the end of the peak warm conditions of the last interglaciation came suddenly (Kukla et al., 1997), implying that climate jumped from one to another of its operational states. This strengthens the case that the Holocene is likely to come to an abrupt close.

… So, it appears that the length of the last interval of intense interglacial warmth was similar to that of the present interglacial. Thus, this analogy suggests that we are close to the end of the present period of peak warmth. However, enough uncertainty exists that the time remaining until the end of the present warm could be anywhere from zero to four thousand years." (***Quaternary Science Reviews*** Vol. 17, p. 689-694, 1998)

"If Climate Changes, It May Change Quickly" – "In the debate over global warming, there has been a widespread assumption that if humans are changing the earth's climate, the effects will be felt gradually and smoothly, making it easier to adapt to the change. …

"Could the pressure exerted on the climate system by carbon dioxide and other greenhouse gases trip a trigger at some point, forcing these changes on humanity suddenly rather than gradually? ...

" 'The climate system is an angry beast and we are poking it with sticks,' said Dr. Wallace S. Broecker of Columbia University's Lamont-Doherty Earth Observatory, who was one of the first to raise the alarm about abrupt climate change. 'We don't know whether it's

going to pay attention to the pokes. But if it does, it might rise up and do something we don't like.' ...

"Dr. Kendrick Taylor, a paleoclimatologist at the Desert Research Institute of Nevada at Reno, a division of the University of Nevada, says there is 'a growing awareness' that the question of climatic thresholds is serious . ...

"But the idea that thresholds exist is becoming widely accepted, and the suspicion that they may be the dominant mode of climatic change is growing. …

"In 1993, a team headed by Dr. Alley [Richard of Penn State Univ.] found that the accumulation of snow in Greenland had doubled sharply, in possibly one to three years, as the Younger Dryas gave way to warmer temperatures. In sub-Arctic latitudes like Greenland, more snow and ice accumulate in warm periods, when there is more moisture in the atmosphere, than in cold ones. ...

" 'It's kind of ironic,' Dr. Taylor said, 'but it's possible that the greenhouse warming we are likely to be producing now may lead to a warming period followed by a dramatic cold period.' " (***New York Times***, 1/27/98)

From "Quick Change" (New Scientist, 11/14/98), which is introduced as follows:

"Officials of 150 governments are in Argentina this week to fill in the crucial details of a treaty to limit global warming. Scientists are predicting what will happen if they get it wrong. Fred Pearce reports:"

"Global warming probably will not be a gentle turning up of the thermostat, as climatologists used to think, but rather a sudden switch to a new climate system. That's the stark warning from many of the world's leading climate researchers to representatives of governments meeting this week in Buenos Aires.

" 'Climate doesn't change smoothly. It happens in jumps and jolts,' says Stefan Rahmstorf of the Potsdam Institute for Climate Impacts Research in Germany. In Buenos Aires, he revealed details of a

study that builds on his prediction that northwest Europe could cool by several degrees as global warming shuts down the Gulf Stream ('Ice-cold in Paris', ***New Scientist***, 8 February 1997, p 26).

"The current has already been weakened by increased flows of freshwater into the North Atlantic, says Rahmstorf. 'There is a threshold in the North Atlantic ocean circulation beyond which the circulation may abruptly collapse. We may reach that threshold early in the 22nd century but it could be much sooner.'

" 'We used to discuss these scenarios privately. Now we are being more open,' says Stephen Schneider of Stanford University in California. If the climatologists are correct, waiting for cheaper clean-up technologies before tackling the problem of global warming would be a serious error.

"Schneider warns that the rate at which greenhouse gases are added to the atmosphere in the next few decades could be as dangerous to climate systems as the ultimate volume of the gases. Worryingly, the latest data on carbon dioxide, revealed to ***New Scientist*** by David Keeling of the University of California, San Diego, show that in the past year the gas accumulated in the atmosphere at a record rate (see Figure).

"Bob Watson, chairman of the UN's Intergovernmental Panel on Climate Change, says that the new work on sudden, chaotic climate change will form a central feature of the panel's third report, due in before 2001. Its last report in 1995 contained just two paragraphs on the subject."

I sent a letter and ***The Survival of Civilization*** to Bob Watson earlier in 1998. He did not respond – at least, not to me. The new IPCC report may tell us whether the Hamaker Thesis is yet being taken seriously by Mr. Watson et al. If John Hamaker is in fact the ecological Sherlock Holmes in all this climate sleuthing since the 1970s, let us recognize it sooner than too late. As for the Figure on the record CO_2 rate of increase, it is a graph of the Mauna Loa record showing a dramatic jump in the rate from about 1.5 ppm average from the mid-1980s to mid-1990s up to the new record up over 3.5 ppm for 1998. With ongoing soil exploitation, deforestation, fossil fuel burning and

increasingly sick, dying and burning forests worldwide, have we reached the kind of CO_2 "breakaway" stage of which Hamaker warned and tried to depict in his ***TSOC*** CO_2 curve projection? Perhaps a hopeful sign, and indicator of the Biosphere's continuing efforts to take in CO_2, is that we're somewhat below the Hamaker projection which was 380 ppm for 1995. According to ***CO_2/Climate Report*** from Environment Canada, Spring 1998: "Mean global levels in 1995 reached 360 ppmv." ***Global Change Newsletter*** No. 40, Dec. 1999, from the International Geosphere-Biosphere Programme, gives another update: "From measurements of air trapped in ice cores and from direct measurements of the atmosphere, we know that in the past 200 years, the abundance of CO_2 in the atmosphere has increased by over 30% from a concentration of 280 parts-per-million by volume (ppmv) in 1700 ***to nearly 370 ppmv as we enter 2000***." (emphasis added)

On CO_2 Rising at Interglacial's End and "High-CO_2" at Glacial Initiation

From the transcript of the NOVA television program, broadcast 1/31/84, called "Antarctica: Earth's Last Frontier":

"George Denton – The fundamental scientific problem we're attacking is the cause of ice ages. And the particular problem within this overall search is to discover why large ice sheets come and go in the past. ... Narrator – ... This equilibrium, however, may be upset by a new phenomenon. The so-called Greenhouse Effect, in which increased levels of carbon dioxide in the atmosphere cause the earth's temperatures to rise, generating potentially dangerous climatic consequences. … Some scientists contend that this warming trend will continue, and it will melt the polar ice caps, causing disastrous floods. Paradoxically, this warming could also cause the next ice age."

Is it not strange that after the sudden appearance of this last line, not a word of elaboration followed as to the source of that statement, or to how the greenhouse effect warming could cause the next Ice Age (***glacial period*** in our current Ice Age, rightly)? One would normally expect more from a NOVA program, unless some degree of

censorship was applied? A letter to the New Zealand film unit requesting elaboration brought zero response.

Next, excerpts from ***Solar Age or Ice Age? Bulletin*** No. 8 (1985), the section titled "DOES ATMOSPHERIC CO_2 RISE OR FALL AS AN INTERGLACIAL ENDS?" (p. 162-65):

Here is some further very clear evidence that the not-yet-fully-elucidated research of Shackleton and associates ***is recognized*** as dealing with most critical areas of Quaternary research: causes of past CO_2 variations, their relation to interglacial and glacial climates, and the overly hidden or 'unspoken' agenda of ***discerning the Biosphere processes which move the world from interglacial back to glacial eco-climatic conditions***. Consider these excerpts from D.Q. Bowen's editorial in ***Quaternary Science Reviews***, Vol. 3, No. 1, 1984:

"The first issue of ***Quaternary Science Reviews*** appeared in April 1982. By the end of 1984 it is planned to have published all four parts of Volume 3. ... But what of Quaternary research during this time? The brilliance of its progress continues undiminished. New discoveries and the application of new techniques promise to bring nearer the ultimate solution of many long-standing problems. That all this has taken place against a background of financial austerity and cut-backs in Government financing reflects great credit on the international community of Quaternary scholars. Yet, despite and because of this, misgivings are rightly expressed about the lack of general awareness of the importance of Quaternary research to the quality of life and future existence on this planet. … Clearly the public image of the Quaternary, of Quaternary research and of its practitioners leaves much to be desired. Let it not be thought that this perceived crisis arises only in response to prospects of further diminished funding; it is a crisis of on-going concern for the whole of mankind and one long understood by all thoughtful observers. The present funding crisis could act as a convenient catalyst to orchestrate into an effective and coherent image all of those issues which collectively concern the understanding of the full spectrum of complex mechanisms which operate on this planet. What is now clearly required is ***proper*** and effective recognition of the role of Quaternary research in the public, professional and political mind. …

"Momentous developments have taken place in Quaternary research over the last two years. Doubtless every individual would have a personal list of the most important of these and to some extent not entirely unreasonably, professional bias in terms of preferred fields of interest might dictate any choice. But the discovery that orbital forcing precedes ***major fluctuations in the carbon dioxide content of the earth's atmosphere which in turn precedes the oxygen isotope ice volume signal can have escaped nobody.*** Thus the search for mechanisms to model changes and fluxes in the carbon dioxide of the ocean-atmosphere-ice system acquires new urgency in one of the most critical of questions concerning climate and climate change, not least climate change in the future. …

"Here it may be observed that no amount of fine tuning with astronomical variables can elucidate the tempo and pattern of change within these complex systems." [emphasis added]

A very significant fact has come to light in this Shackleton and Pisias paper, "Atmospheric Carbon Dioxide, Orbital Forcing, and Climate," (published in ***The Carbon Cycle and Atmospheric CO_2: Natural Variations Archean to Present***, American Geophysical Union Monograph 32) which was not available to John Hamaker or myself up until a few days ago. It is the fact that Shackleton et al. are sampling their sea floor cores about every 3 cm as mentioned in the 11/24/83 ***Nature*** paper, and this, according to a newer paper, means that: "... since the average accumulation rate is over 5 cm/kyr [5 centimeters per thousand years], this represents an average sampling interval of a little over 500 years." They also say (p. 309):

"Finally, in order to perform various statistical tests it is necessary to develop time series with equally spaced sample intervals in time. We have linearly interpolated the raw data sets at 0.35-kyr [350 year] intervals for the present study; this is less than the actual sampling interval in a few short sections of the core ... and greater than the actual sampling interval in other parts. … For numerical convenience, statistical tests have been conducted on a subset consisting of every third interpolated data point (i.e., 326 values spaced every 1.05 kyr)."

Obviously this widely spaced sampling procedure would appear to make it very unlikely that the rapid approximately 150-yr. rise and very rapid approximately 20-yr. burst of CO_2 which Woillard's data points to would be sampled and partially detected. So the Shackleton et al. curves should be looked at with this in mind. The burst of CO_2 up to some level was probably significantly higher than the approximately 300 ppm indicated (p. 17, Bulletin 6/7). So as of now it appears the Shackleton data are only useful for showing longer-term trends such as CO_2 change over the course of the interglacial as the interglacial soil demineralization and retrogressive vegetational succession runs its course. Now, according to Shackleton et al.'s ***Nature*** article, the core samples did show them that CO_2 levels were a little higher than "the pre-anthropogenic Holocene [this interglacial] level." And they say this:

"This enhanced $C0_2$ level persisted during the early stage of glacial advance between 120 and 116 kyr." [emphasis added]

The question arises, HAVE THEY TAKEN, OR ARE THEY ABLE TO TAKE, VERY CLOSELY SPACED CORE SAMPLES OF THE LAST INTERGLACIAL-TO-GLACIAL TRANSITION PHASE TO SHOW ITS CO_2 CHANGE ? If they can do it, let us all encourage them to proceed at once.

If they can not or will not clarify this sea floor core record, there is still more than enough evidence already made available in TSOC and Supplement and Bulletins 4/5, 6/7, and this Issue 8, to justify global, cooperative, Earth-regenerative actions.

In fact, Nicholas Shackleton himself gives a brief but good summary of the great cycle by which glaciation renews the fertility of the Earth, the life on Earth re-expands interglacially in the presence of plentiful mineral supplies and re-envelopes the planet with living and stored carbon, and a gradual retrogressive loss of minerals and fertility proceeds to increasingly re-transfer carbon back into the atmospheric pool until the imbalance becomes great enough to bring back the glaciers by way of the stepped-up CO_2 greenhouse effect, and growing global albedo – as now.

An article by Shackleton was published in 1977 in the book, ***The Fate of Fossil Fuel CO_2 and the Oceans*** (Anderson & Malahoff, eds.). It is entitled, 'Carbon-13 In Uvigerina: Tropical Rainforest History And The Equatorial Pacific Carbonate Dissolution Cycles.' Here is the important summary I just referred to:

"In North America the extensive ice cover substantially reduced the area of forests during the glacial period, although well south of the ice front the change in forest cover may not have been so dramatic.

"Summarizing, it seems not unlikely that the total terrestrial plant biomass and associated humus increased by a factor of three between about 14 ka and 8 ka ago, the change being largely due to the enormous changes in tropical rainforest extent caused by a change from and to pluvial conditions, and to the reforestation of Eurasia and North America. Since 8 ka [8,000 years] ago it may have fallen to roughly two-thirds of its maximum. In some areas, man has contributed to the recent reduction.

"It is perhaps worth remarking that as the vegetation changes or is replaced by desert, essentially all the carbon, both living and in the soil, is oxidized. Only a minute fraction will be preserved to form a geological deposit. This is, of course, well known to Pleistocene geologists who need to locate these deposits to make their reconstructions."

Unless someone can show a previously unexplained means by which it could be prevented, it is obvious that the answer to the initial question must be – according to already available evidence and basic knowledge of the ecological principles to which the Biosphere conforms – ATMOSPHERIC CO_2 RISES AS AN INTERGLACIAL PERIOD ENDS. (End of ***Bulletin*** 8 excerpts)

From ***Solar Age or Ice Age? Bulletin*** No. 10 (1984):

I've been trying to find scientists in the U.S. working on the interglacial-to-glacial processes and trying to determine whether it is possible to document CO_2 change over the last 20-150 years of the last interglacial termination phase outlined by Woillard. Apparently the scientists in France, Russia and Switzerland are doing most of the work, and it is unclear to me if any U.S. scientists are seriously focusing on this, although I expect there must be some. After recently

re-reading Eric Sundquist's ***Nature*** article, 'Ice core links CO_2 to climate' (Vol. 329, 10/1/87), I called him at his U.S. Geological Survey office in Woods Hole, Massachusetts to ask him about this, pointing out the observable "avoidance syndrome" and especially emphasizing the question, "Is the last transition being given the attention it obviously deserves, are those involved conscious of its importance and the potential significance of the ice core record of the time?" As I imagined had to be the case, despite the veil usually kept well drawn over the subject, he informed me: ***"Oh yes, everyone is thinking about it."*** And he said the French-Russian group is continuing research on the i-g transition and ***may*** publish something about it at a conference next month (Oct. '89) in Germany.

There would seem no apparent reason that extremely fine/thin sections of the seafloor cores or the ice core can not be taken and sequentially analyzed across the transition phase. It is hard to believe that they are not attempting it, and perhaps results will finally be presented at the Oct. '89 conference in Germany referred to above?

In 'Vostok ice core provides 160,000-year record of atmospheric CO_2' (***Nature***, 10/1/87) the authors say that "by choosing appropriate sampling sites, ice cores ... and experimental methods[3], past CO_2 changes can be determined with high confidence by analysing the air enclosed in the pores of the ice."

We should also note the following: "A single measurement was generally performed on each of the 66 depth levels investigated. ... Although we are confident in the relative CO_2 variations measured, a systematic error could affect the absolute values. A recent comparison, still in progress, between results from the Physics Institute of Bern and our laboratory indicates that the values measured in Bern are systematically higher by about 10 p.p.m.v. The results of the comparison, when completed, will be published jointly by the two groups elsewhere. ... Based on these assumptions the difference between the age of the ice and the mean age of the air, which is dependent on accumulation rate, is evaluated taking into account the temporal changes of the accumulation rate[11]. This calculated difference varies between about 2,500 yr for the warmest to about 4,300 yr for the coldest periods.

"On the other hand, all the air enclosed in an ice sample has not been pinched off from the atmosphere at the same time but rather pore after pore over a time interval which, with the above assumptions, lies between 300 and 750 yr. This acts as a low-pass filter and means that ***each CO_2 measurement represents roughly an average value over several hundred years***. [Will this make it impossible or very difficult to identify any CO_2 bursts? – depending on how long the higher level representing interglacial collapse lasts?? What can you tell us, dear researchers?! Emphasis added.] ...

"Description. Sixty-six depth levels were investigated for CO_2 measurements along the 2,083-m core. They are spaced every ~25m from 850m depth to the bottom. Because of the presence of fractures in the upper part of the core, the spacing is generally larger above 850 m depth. With this sampling, the mean age difference between two neighboring levels ranges from ~2,000 to ~4,500 yr. The record covers the past ~160 kyr and includes the following major climatic periods: the Holocene, the last glaciation, the previous interglacial and the end of the penultimate glaciation [2 ref.s]." [Again, how easy to miss a CO_2 "burst"!]

In 'Icy clues to a carbon dioxide with climate connection' (***New Scientist***, 11/26/87): "The discoveries also have implications for future weather. The greatest concentration of carbon dioxide in the atmosphere over the period covered by [only 66 wide samplings of] the Vostok core was a little over 300 ppm, during the previous interglacial."

And finally in 'Vostok ice core: a continuous isotope temperature record over the last climatic cycle (160,000 years)' (***Nature***, 10/1/87), we should note the following:

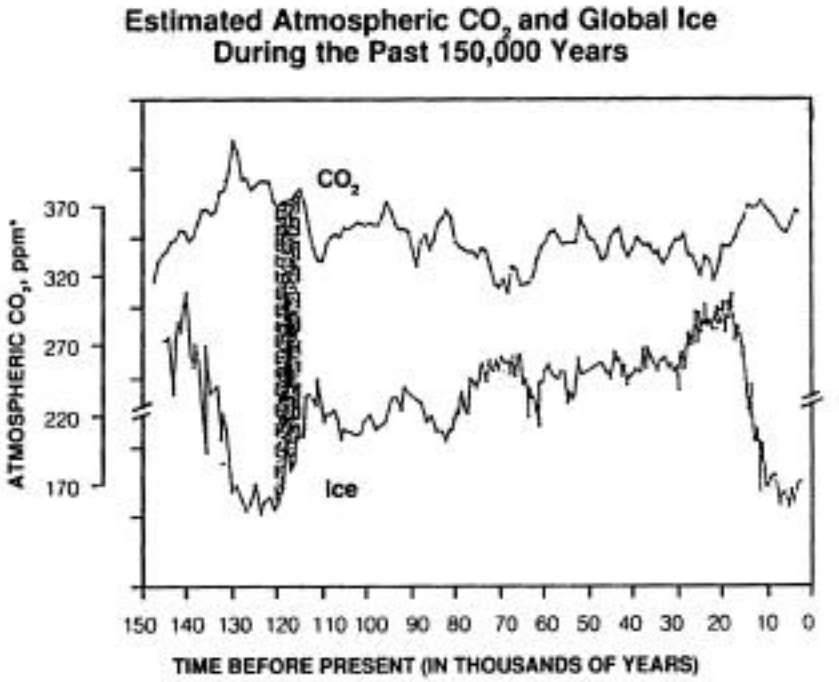
"There is in the detailed curve nothing comparable with what is recorded in the Dye 3 Greenland ice core[12], which shows at the timescale of a few decades abrupt and vigorous isotopic changes with an amplitude almost equivalent to that accompanying the Pleistocene-Holocene shift. The lack of such large oscillations in our core is far from proven, given the relatively coarse sampling we used." (p. 406) [emphasis added]

Additional excerpts from Larry Ephron's 1988 book, ***The End:***

"Hamaker's theory also seems to be supported by ocean core data analyzed by Nicholas Shackleton and his colleagues at Cambridge University, which approximates atmospheric CO_2 and global ice over the past 150,000 years (Shackleton, N.J. , M. A. Hall, J. Line, and Cang Shuxi, 1983, "Carbon isotope data in core V19-30 confirm reduced carbon dioxide concentration in the ice age atmosphere," ***Nature*** 306: 329.) In the following graph, the dip in ice volume from about 130,000 to 120,000 years ago represents the last warm interglacial period. Our present interglacial period started about 10,000 to 11,000 years ago. The general curve of the two graphs – almost a mirror image of one another – might seem at first glance to support the generally accepted view that increased CO_2 leads to warming and decreased CO_2 to cooling and ice formation.

"An interesting exception to the general shape of the two curves, however, is seen in the period between the two dashed lines – approximately the last 5000 years of the last interglacial period, which corresponds to our own time. During that period CO_2 was distinctly ***rising***, while the beginning of the largest ice buildup on the graph was taking place. The only plausible explanation for this is the cycle that has been described here, with tropical oceans overheated by a differential greenhouse effect, increased winds resulting from the increased air pressure differentials, and the movement of tropical clouds toward the higher latitudes and the poles where they precipitate as snow and ice. It is especially significant that this rise in CO_2 corresponds exactly with the later phases of the interglacial period as shown in Andersen's studies – when gradually increasing soil demineralization is known to result in the succession, loss of vitality, and finally massive death of the earth's CO_2-consuming vegetation, which finally releases CO_2 into the atmosphere in great quantities."

SHACKLETON GRAPH



The global ice proxy is the oxygen isotope record from the deep water organism *Uvigerina senticosa*; the CO_2 proxy is the carbon isotope difference between ocean surface (from *Neogloboquadrina dutertei*) and sea floor (*U. senticosa*); both from core V19-30. The CO_2 scale is placed off the graph because it is not certain what atmospheric values of CO_2 the ocean core data correspond to. I have changed the labeling on this scale slightly to represent more recent evidence for the preindustrial CO_2 baseline; and have added the vertical lines and letters.

Source: Shackleton et al. (1983). The graphs were rotated and combined from two different graphs.

Now, excerpts from ***Solar Age or Ice Age? Bulletin*** No. 10 (1989):

After careful study of over a dozen papers on the recent ice core data, especially that from the 160,000-year record from the Vostok Antarctica drilling site, I think we should look at at least three things that stand out in these researcher's work and papers: (A) Continuing avoidance of focus on interglacial termination processes – at least it is avoided in their papers, (B) Frequent reference to their work showing a "close coupling" of CO_2 and climate, and (C) The problem of "coarse sampling" and its implications.

(A) Continuing avoidance of focus on interglacial termination processes. All the way into the late 1980s? How can this be?, you may rightly ask. Why would "scientists," especially, choose to avoid

focus on and free discussion of “arguably” the most important scientific subject of the last 10,000 years and of the moment you read this? Will any of the scientists receiving this Bulletin volunteer their answers or ideas? Are we left only with speculations, such as: Have they received orders from “on high” to be quiet or very low key and indirect – especially in regards to the challenge of the Hamaker Thesis? Are they as individuals simply lacking in vision and concern for the future, deficient in the minimal “courage” it might take to “risk my scientific reputation” (and funding?) on something “so controversial”? Who has other ideas – preferably facts – as to WHAT IS GOING ON HERE?

The Dahlem Workshop on The Environmental Record in Glaciers and Ice Sheets took place March 13-18, 1988 in Berlin, Germany. The Report of that Workshop was published as ***The Environmental Record in Glaciers and Ice Sheets*** (John Wiley & Sons, 1989). Ice core study pioneers Hans Oeschger and Chester Langway were editors; the concluding paper was ‘Group Report – Long-term Ice Core Records and Global Environmental Changes,’ the group consisting of Alan Hecht, Willi Dansgaard, John Eddy, Sigfus Johnsen, Manfred Lange, Chester Langway, Claude Lorius, Michael McElroy, Hans Oeschger, Grant Raisbeck, and Peter Schlosser. The group says this:

“ ... In less than 20 years a wealth of environmental information has been extracted from only five long ice cores. Many of the major environmental questions facing society today, such as climate change due to anthropogenic greenhouse gases, can be directly studied from ice cores. Only [?] from this source can past fluctuations of atmospheric CO_2 be documented and only from this source can the combined climatic effects of solar variability and chemical change be studied in a unified way.

“Drawing on this past history and current opportunities [?], discussion in our group centered around the following questions:

1. How well documented are short-term climate changes in Greenland and Antarctica?

2. What can we learn about long-term climate changes and climate dynamics (timing, forcing functions, response, and feedbacks) from ice cores, ***including changes from glacial to interglacial intervals?*** [Yes, anything else?! ... Emphasis added.]

3. How can we reconstruct and explain past chemical conditions of the atmosphere and how does the changing chemistry affect global climate?

4. Can records of cosmogenic isotopes in ice cores be used to infer paleoprecipitation and production variations due to primary cosmic ray intensity, solar activity, and geomagnetic variation?

5. What can we learn about past changes in ice sheets from ice cores?" (p. 381)

They do point out the evidence supporting Shackleton's seafloor core finding that the last interglacial termination saw high rather than the expected low CO_2 levels; as Shackleton said: "This enhanced CO_2 level persisted during the early stage of glacial advance between 120 and 116 kyr."

The Dahlem Conference group says:

"There is a difference in the relative timing between changes of atmospheric CO_2 concentration and Antarctic climate changes, depending on whether it is an interglacial to glacial [they said it!] change or vice versa. In Antarctica, temperature changes [greater coldness] lead CO_2 [for years generally assumed to be falling if glacial cold was increasing] change during the last interglacial to glacial transition by as much as 10K/yr [10,000 yrs.], whereas changes in CO_2 and deuterium [which correlates with temperature] concentration are almost simultaneous (±2,000 years) when going from glacial to interglacial conditions." (p. 383) The Hamaker Thesis could have been considered, but wasn't, in the following:

"Milankovitch cycles are the only known major climate forcing function identified in ocean and ice cores. Yet despite the small resulting radiation changes, large climate changes occur. Thus, there are strong nonlinear and positive feedbacks in the system. In ways not

yet explained, the climate system is driven by feedbacks in CO_2, water vapor, sea ice, large-scale ocean circulation as well as albedo due to snow and ice cover changes. Ice sheet growth, once begun, may act as a driving force and become the dominant cause of climate change. Subsequent [what of prior?] changes in CO_2 may amplify the climate signal, but the exact manner and magnitude of the effect is unknown. The availability of unique records of CO_2 and methane in ice cores [potentially] allows this aspect of the climate system to be more thoroughly studied. ... The establishment of accurate chronologies in ice cores by all available means is a high priority." (p. 384-85) [DOES THAT INCLUDE FOR THE LAST INTERGLACIAL-TO-GLACIAL TRANSITION PERIOD?]

From Richard Fifield's ***New Scientist*** article (4/14/88), "Frozen Assets of the Ice Cores":

"The general impression to emerge from the Dahlem conference is that the planet Earth has reached the end of an interglacial period. The question is: how long have we got before the next glacial period? The evidence from the ice cores of Greenland is that cooling comes very quickly after an interglacial. According to Dansgaard, records from Danish peat bogs [more corroboration of Woillard!] show that it may take only a few decades for temperatures to plummet. So are we heading towards an ice age, or could the carbon dioxide and methane that we are pouring into the atmosphere stave it off with the warmth of a greenhouse effect? Some clues to the answer to these questions may be buried deep in the glacial ice." [End of ***Bulletin*** 10 excerpts]

Start of a Glacial is a 1992 book published by Springer-Verlag in cooperation with NATO Scientific Affairs Division and edited by George Kukla and Ellen Went of Lamont-Doherty Geological Observatory at Columbia University, Palisades, NY. As with most previous books and papers, the authors and editors have done an excellent job of ignoring the Hamaker Thesis and much evidence supporting it, although it is certainly not free of the latter. That the book has even appeared is quite unusual and may be significant in indicating a new 'climate of freedom' to question and break away from the constricting hold of the 'Global Warming' ideology. Neither editor Kukla nor any division of NATO has been known to publicly

give John Hamaker's climate cycle explanation a fair hearing, so it is not surprising, if disappointing, that it is never mentioned here. …

The book gives strong support for the previous estimations of Kukla and others that the previous interglacial lasted from about 127,000 to 115,000 YBP (years before present) and that we're in the very late part of the current Holocene interglacial, as noted on p. 2:

"The Holocene deciduous forests in northwestern Europe are already about 10,000 years old. In the Eemian they lasted only about 8,000 years. Measured by that standard, the late interglacial climate shift, analogous to the catathermal stage of the Eemian, is already long overdue."

It also notes the often forgotten crucial study of Genevieve Woillard (prominent in ***The Survival of Civilization***) showing the interglacial-to-glacial/deciduous-to-boreal forest transition may have largely occurred (with the help of vast uncontrolled forest fires, Hamaker noted) in as little as two decades. Again, that was her 10/18/79 study in ***Nature***, "Abrupt end of the last interglacial s.s. in northeast France."

Another most important study mentioned, of definite interest to those trying to see the forest as well as the trees (and how healthy they are, how fertile the soil is, etc.), is the Barnola et al. study, "Vostok ice core provides 160,000 year record of atmospheric CO_2" (***Nature*** 329: 408-413, 1987), showing air temperatures dropping and glaciation beginning even "while the concentrations of CO_2 remained high." (***Start of a Glacial***, p. 5) Then the 31 authors and editor Kukla conclude:

"It thus seems that the CO_2 greenhouse effect, possibly important at the start of the interglacial, played no more than a complementary role in the onset of the last glaciation."

Does this "seem" a ***scientific*** conclusion to all of you intelligent readers? Or did they mean to understate the dictionary definition of "to complement": "To provide something felt to be lacking or needed" – such as the geophysical/climatological means and mechanism to sustain the entrapment of heat energy needed to evaporate the water

and produce the clouds for glaciation? Perhaps we can request of them further clarification! This summary chapter concludes:

"The principal lesson climate modelers learned from the Mallorca Workshop is the need of realistic representation of oceanic circulation, hydrologic cycles and precipitation in the models used to predict future climates. Concerted efforts to compare and improve existing parameterization schemes are needed to improve the model performance in this area. The paleoclimatologists, on the other hand, realized the urgent need of more accurate absolute age determinations in the 50 to 150 ka [1000-yr] range and the great potential of linking the ocean with the land climate records."

I suggest that the far more urgent need is for more accurate interpretation of what we already know of all the inter-related climate and ecological cycles and, of course, a cooperative global "Plan of Action" to regenerate the Earth, withdraw the excessive CO_2 and related greenhouse effect gases, and thus naturally sustain our Holocene interglacial indefinitely. Or will we delay and delay until the … ***start of a glacial***? ! (If not already started.) Soil is mentioned on four pages of this 353 page book, but its huge importance in the climate cycle is not even hinted at.

I've now found an article by four much more daring climate researchers, the famous Nicholas Shackleton and colleagues J. Le and M.A. Hall (Univ. of Cambridge) and A. Mix (Oregon State Univ.). "Carbon Isotope Records From Pacific Surface Waters and Atmospheric Carbon Dioxide" is the title (***Quaternary Science Reviews***, Vol. 11, p. 387-400, 1992). They go so far as to say (from the Abstract):

"We have stacked planktonic carbon isotope data from three cores in the western equatorial Pacific in order to generate a new reconstruction of atmospheric carbon dioxide over the past 450,000 years. Our new reconstruction resembles that of Shackleton et al. (1983) based on data from East Pacific core V19-30, which successfully predicted features that were subsequently verified by Barnola et al. (1987) in the record from the Vostok ice core. In addition the new data confirm the discovery of Shackleton and Pisias (1985) that changes in atmospheric CO_2 lead changes in global ice

volume (oxygen isotope 18) in such a sense that CO_2 should be regarded as part of the forcing of ice volume change."

From my study of this article and the earlier ones from the 1980s (discussed in the ***Solar Age or Ice Age? Bulletins*** 8-10, 1985-1989), it appears there has been no change in many scientists' unwillingness to clearly state that it may have been the rising CO_2 level at the end of the Eemian (previous) interglacial which energized or "forced" the glacial ice volume growth. These authors do, of course, know the Barnola et al. study showing CO_2 "remained high" at the Eemian-glaciation transition, but although they say it was "leading" ice volume growth, they seem to be avoiding saying it was a ***rising*** lead, which would of course necessitate clearly facing the fact that ***the current rise*** may well be "forcing" a Holocene-glaciation transition. It is amazing that Shackleton himself showed way back in 1977 how much biomass carbon disappears from the land from the lush Climatic Optimum of about 8000-6000 YBP to the relatively depleted Biosphere of the late-interglacial present. (See his paper "Carbon-13 in Uvigerina: tropical rainforest history and the Equatorial Pacific carbonate dissolution cycles." In: ***The Fate of Fossil Fuel CO_2 in the Oceans***, p. 401-427, Andersen, N.R. and Malahoff, A., eds.)

Unlike the friendly, open, interested and considerate Genevieve Woillard, Nicholas Shackleton never once responded to letters and relevant information, questions, gifts of ***The Survival of Civilization***, Bulletins, etc. It appeared the former felt free to respond as an open-minded, 'true scientist,' while the latter was politically and/or psychologically 'shackled'! Unfortunately, the one who had published the most urgent warning of possible imminent re-glaciation within the 'mainstream' science magazines, would suddenly die of cancer in her 30s a few years later. I miss you, Genevieve!

Another significant push forward on the evolution of reasoning by climatologists and Quaternary researchers was made by Gifford H. Miller of the Institute for Arctic and Alpine Research at University of Colorado, and Anne de Vernal of the University of Quebec in Montreal, with publication of their article, "Will greenhouse warming lead to Northern Hemisphere ice-sheet growth?" (***Nature***, 1/16/92). Let us consider a few excerpts from this article and a few of the many

related articles generated in the (at least) national coverage this surprising 'new' idea received. From the ***Nature*** article:

"Here we examine the recent geological record (130 kyr to present) to obtain an independent assessment of ice-sheet response to climate change. The age and distribution of glacial sediments, coupled with marine and terrestrial proxy records of climate, support arguments that initial ice-sheet growth at the beginning of the last glacial cycle occurred at high northern latitudes (65-80 deg. N) under climate conditions rather similar to present. In particular, the conditions most favourable for glacier inception are warm high-latitude oceans, low terrestrial summer temperature and elevated winter temperature. We find that the geological data support the idea that greenhouse warming, which is expected to be most pronounced in the Arctic and in the winter months, coupled with decreasing summer insolation may lead to more snow deposition than melting at high northern latitudes and thus to ice-sheet growth. …

"Terrestrial and marine records that cover the inception phase of the last interglacial (~120 to 115 kyr BP) strongly suggest that the initial build up of continental ice occurred while terrestrial climate and sea surface temperatures were close to their interglacial optima. …

"Presumably the climate of the last glacial maximum in the High Arctic was cold and very dry, inhibiting local glacier growth, whereas the warmer but wetter Holocene climate led to ice-sheet growth. Precipitation control of glacier mass balance is well illustrated by cores through Severnaya Zemlya (Soviet Union; mean annual temperature -16 deg. C) ice caps which reveal maximum accumulation rates between 7 and 3 kyr BP, that is, during the interval of maximum northward advection of warm oceanic surface waters and moist air masses. ... Recent lowering of regional snowlines over Baffin Island, Arctic Canada and Alaska was accompanied by an increase in mean annual temperature, associated with warmer, wetter winters and cooler or unchanged summers. [As usual, the numbers of the articles' 42 concluding references are left out of excerpts]. …

"Precipitation is no doubt a determinant control in the timing and location of continental glaciations over the high latitudes (cold, dry),

where initial ice-sheet growth occurred during the inception phase of the last glacial cycle. …

"In addition, summer solar radiation at the top of the atmosphere has been decreasing since its interglacial maximum ~9 kyr ago. In the key region between 65 deg. and 70 deg. N, summer radiation is already down to the level corresponding to the inception phase of the last glaciation (Fig. 1), more than half way back to its glacial minimum.

"The geological record shows that conditions most conducive for initial ice sheet growth are (1) 'warm' oceanic surface waters during winter, (2) strong meridional atmospheric-oceanic circulation, and (3) low summer air temperature. The predicted change in the global ocean-atmosphere climate system caused by greenhouse warming, coupled with the decreasing incident solar radiation during summer at high northern latitudes, pushes the Earth closer to the conditions that led to the last episode of continental glaciation. Consequently, the possibility that increased concentrations of greenhouse gases in the atmosphere might lead to ice-sheet growth and a concomitant sea level fall (of up to 7 mm yr^{-1}) cannot be lightly dismissed."

A complementary article by Miller and de Vernal and Claude Hillaire-Marcel was published in ***Quaternary International*** (Vol. 10-12, pp. 95-106, 1991) and here we find more on the last interglacial-glacial transition:

"The global ice volume increase of the Isotopic Substage 5e/5d transition corresponds to initial ice sheet growth, which no doubt affected Arctic Canada and perhaps extended southward over Hudson Bay. However, warm optimal conditions persisted, notably in Labrador Sea, until the ice volume reached its early maximum extent (peak of Substage 5d). Relatively warm surface waters during the glacial inception probably contributed to the northward transport of warm and humid air masses favorable for precipitation and ice accumulation over circum-Arctic regions." (p. 104)

The summary article of Miller and de Vernal's work was "From fire comes ice" in ***Science News*** (2/8/92). Jim Dejien's article for Knight-Ridder Newspapers was "A Surprise twist: Global warming could lead to new Ice Age" (as found in Detroit Free Press, 1/21/92). Sylvia

Wright's short summary from the wire services was dubbed the familiar "Global Warming" for the ***San Jose Mercury News*** (1/21/92) but offers an unfamiliar opening:

"If global warming proceeds as forecast, it could cause the Northern Hemisphere's ice sheets to expand much as they did at the start of the last Ice Age, American and Canadian scientists say."

This was derived from William K. Stevens' article from ***New York Times News Service*** titled "Expansion of Ice Sheets May Be Early Sign of Global Warming." Also noteworthy in this article is the view given by John Imbrie, co-author of ***Ice Ages: Solving the Mystery***. Stevens says:

"Dr. John Imbrie of Brown University, an expert on ice ages, called the idea reasonable and plausible. But he said that there was still much to learn about the snow accumulation."

Diane Dumanowski's ***Boston Globe*** article (1/21/92) was "Greenhouse effect could increase snow: researchers" and another scientist stepped forward to affirm:

" 'Contrary to what many people might think, we could with global warming have a considerable increase in snowfall at high north latitudes,' said Mark Meier, director of the Institute of Arctic and Alpine Research at the University of Colorado in Boulder where Miller does his research."

Discover (Aug. 1992) published "Cold Comfort" by Lori Oliwenstein which gave further perspective:

"Eugene Domack of Hamilton College in Clinton, New York, and his colleagues have been studying the history of the South Polar ice cap by examining sediment cores hauled up from the Antarctic continental shelf. ... This sediment record shows that between 7,000 and 4,000 years ago, when Earth was well into the present interglacial period and the temperature around Antarctica was about four degrees warmer than it is today, the Antarctic ice sheets were growing again. 'This was surprising to us,' says Domack. 'But it is consistent with models that suggest you could warm the area by up to nine degrees

before the excess melting would surpass the increase in precipitation and snowfall due to the warmth. And this suggests that under future global warming you would have a net negative contribution to sea level from the Antarctic, rather than a net positive one.'

"Indeed, that is precisely what is happening right now, according to Charles Bentley of the University of Wisconsin. While De Vernal, Miller, and Domack have been tracking the waxing and waning of ice sheets in the historical record, Bentley and Mario Giovinetto of the University of Calgary have been monitoring the condition of the Antarctic ice sheet today, balancing data on the amount of snow falling over Antarctica against the amount of ice breaking away from the edges of the ice sheet. They calculate that the Antarctic is already sopping up enough water each year to lower the ocean two-hundredths of an inch – apparently, says Bentley, because more snow is falling on the ice cap.

" 'The warmer air is, the more moisture it can hold,' he explains. 'In Antarctica the moisture-carrying air comes in over the continent, and before it leaves again, it drops most of that moisture. So the snowfall over the continent increases as the temperature gets warmer.'

"The same phenomenon may also have been observed in present-day Greenland. Satellite data compiled by Jay Zwally and his colleagues from NASA's Goddard Space Flight Center seem to suggest that the southern two-fifths of the ice sheet that covers most of Greenland is thickening at a rate of about nine inches a year. Although the Goddard workers have no data for the northern three-fifths of the ice sheet, they note that it usually receives about half as much new snow as the southern part. If that's true – and if the satellite data are accurate, which some researchers doubt – the Greenland ice sheet could be lowering sea level as much as the Antarctic ice sheet is, around two-hundredths of an inch per year."

In reference to the Greenland ice buildup, the researcher who sent me this article added: "See Dec. 1992 issue of ***Life***. Six planes landed on the ice of Greenland on July 15, 1942. Forty-six years later, in 1988, the abandoned planes were found. They were found beneath two hundred and forty feet of ice! That's about 5 feet a year." No

doubt there can be quite a variation over the huge area of mostly white we call Greenland.

I don't know how many new computer models were inspired by Miller and de Vernal's work, but I have one early one by Rice University scientists Tamara Shapiro Ledley and Shaoping Chu showing that computer models can produce more than the standard variations on the "warming" theme. From their "Global warming and the growth of ice sheets" (***Climate Dynamics*** 9: 213-219, 1994):

"Recent research has suggested that warmer conditions, that may result from increased levels of CO_2 in the atmosphere, may induce the growth of the Northern Hemisphere ice sheets (Miller and de Vernal, 1992) through the impact of warmer temperature on the water carrying capacity of the atmosphere and thus on precipitation. In this study we examine this possibility by using a coupled energy balance climate-thermodynamic sea ice model. Results indicate that if summer ice albedo is high enough, and there is some mechanism for initially maintaining ice through the summer season, then it may be possible to have ice sheet growth under the conditions of CO_2 induced warming." (from the Abstract)

"The question of how ice sheet growth begins has been the subject of study for many years. ... While a number of these studies produced 100 ky glacial cycles, the question of the mechanisms that combine to cause an ice sheet to begin to grow is still open. …

"When the minimum land ice albedo is set to 0.65 the increase in snowfall due to the warming is greater than the summer melt, and an ice sheet begins to grow, attaining a thickness of greater than 30 m after 120 model years. Thus, under the right conditions, CO_2 warming can produce ice sheet growth."

Even ***Newsweek*** published "Return of the Glaciers" (11/23/92) and author Gregg Easterbrook takes the bold step of giving millions a glimpse of John Hamaker's concern to save civilization, although he feels John ought to be framed in an unfair and disparaging "fringe" context. Why not employ the spirit of open-minded fairness instead? Here are excerpts from this unusual article:

“After an eternity of perpetual cold, the gods finally sent warmth. Humanity, which lived a frightened childhood in a harsh world of numbing frost, now found the Earth a temperate and welcoming parent. Cave paintings, the only known records from the cold days, were quickly supplanted by cuneiform, then by numerous written languages. In Egypt, architects were executing great pyramids; Chinese astronomers were charting the heavens in impressive detail; Greek philosophers were debating the meaning of their own awareness. All was made possible by – or at least was coincident with – a sudden break in the endless, unforgiving cold.

“The historical period of humankind, from the Sumerians of around 7,000 years ago to the present, has occurred in what geologists call an ‘interglacial,’ a time when the ice cycle takes a pause. Before that came a far longer span, perhaps 110,000 years, of deep freeze. Balmy interludes are rare exceptions in ‘recent’ Earth history. And they don’t last. The current interglacial phase is drawing to a close. By the geologic clock, Earth has already started downhill toward another extended period of unforgiving cold. ... If the past is a guide, no more than 2,000 years from now vast blankets of ice will again move south to cover much of the Northern Hemisphere.

“The advent of a new ice age, scientists say, appears to be guaranteed. The devastation will be astonishing. Many of the world’s great cities will be crushed to rubble; most of the world’s agricultural breadbasket will become wind-swept tundra; countless species will fall extinct as their habitats are frozen out of existence. The Earth’s equatorial region will remain habitable: but consider what might happen when northern-latitude peoples, who hold most of the world’s weapons and wealth, attempt to move in with their southern cousins.

“What causes ice ages? Few mysteries of natural science are as vexing. ... But that [Milankovitch orbital] theory is now under question. Some scientists argue that the Milankovitch variations cannot account for climate swings as profound as a glacial crash. … Now researchers are looking for other triggers.

“At the moment, humankind is engaged in another climate experiment, adding carbon dioxide to the air by burning fossil fuels and tropical forests. This may push the greenhouse effect in the

direction of warming. And by a paradoxical theory, artificial global warming may hasten the next ice age.

“The reason is deceptively simple. Glaciers require snow as a raw material. But right now it’s so cold over most of the glacial regions that snow rarely falls, because below certain temperatures the air does not hold much moisture. ... What if an artificial greenhouse effect warms the high northern latitudes just enough for heavy snowfall to commence, but not so much that the extra accumulation melts in the summer?

“For 20 years many fringe ecologists have been asking that question. Their alarms have been based on the work of a Missouri amateur scientist and professional prophet of doom [engineer, actually] named John Hamaker. Hamaker’s ice-cycle ideas have long been dismissed by the mainstream research community as loony. But early this year two mainstream scientists found evidence to support his most-ridiculed contention. Namely: that just before the last ice age, global temperatures started nudging up, not down. ‘People are taught in high school that when the world gets cold, an ice age begins,’ says Gifford Miller, a prominent ice-age researcher at the University of Colorado. ‘The geologic record is showing us this is not so. Just before the last climate crash, temperatures got a little warmer, as they are getting a little warmer today.’

“A few years ago Miller began to find evidence that the glacial regions had, in fact, grown slightly warmer before the last deep freeze; he learned that Anne de Vernal of the University of Quebec at Montreal was coming to the same conclusion, roughly the same one Hamaker had reached. ... ‘That glaciers are cold does not mean they are triggered by cold,’ de Vernal says. ‘People tend to ignore the role of precipitation [plus, greater cloud cover and total albedo] in ice-sheet growth. In some ways it’s more important than temperature.’ ... But if the findings of Miller and de Vernal and others working in this area prove out, a new rationale for the control of artificial greenhouse gases may be created. ‘Everything we learn about past ice ages teaches us that the climate is more sensitive than first thought, and we just have no idea what kind of damage we are doing today by tampering with it,’ says Miller. ...

"Hamaker, for his part, sees no reason to wait for disaster to strike. 'We've already got the warning signs of advancing glaciation,' he says. 'The only hope is to remineralize now, before the cold becomes irreversible.'

"Remineralize? Hamaker believes that finely ground rock dust, such as that deposited by retreating glaciers, should be dropped on the forests, etc. of the world. This would activate the tree-growth spurts that accompanied the end of the last ice age, returning the carbon balance of the atmosphere to a benign level. The mainstream research community considers this idea, well, loony, too. But wouldn't you grind a few rocks to stave off a frigid doomsday? Your descendants might. Or you might start looking for a few acres in Central America before the land rush begins." (end of article)

In a good conversation with the open-minded Gifford Miller (3/15/00), I learned from him that there was surprisingly little response to his and Dr. de Vernal's ***Nature*** article, and that long-time "global warming" proponent Stephen Schneider had a critical letter to ***Nature*** published soon after which Miller did not have opportunity to respond to from his Australia research project at the time. Although he was not aware of current major high latitude glacial advance he agreed that current lower latitude ice melting from drought and overheating could be indicating a shift to a more glacial circulation mode. He also said he thought the physics of the Hamaker Thesis were fundamentally sound.

A March 11, 1999 ***Nature*** article by twelve scientists from the Climate and Environmental Physics group at University of Bern, and Scripps Institution of Oceanography in La Jolla, California provides additional convincing evidence that CO_2 rises over the latter part of the interglacials, and supports the general paleoecological models of Iversen, Andersen and Hamaker centered on the Interglacial Soil Demineralization and Retrogressive Vegetational Succession. The article is "Holocene carbon-cycle dynamics based on CO_2 trapped in ice at Taylor Dome, Antarctica" by A. Indermühle et al., and I encourage its reading by all scientists and others interested in how the methods of science can help show us how Nature works.

The authors ice-core CO_2 measurements give us a historical perspective of CO_2 change in this interglacial reflecting the post-glacial revitalization of the Biosphere/Gaiasphere and subsequent gradual devitalization leading directly to the next glacial – or Homo sapiens-guided – revitalization period. Summary excerpts:

"Here we present a high-resolution record of CO_2 concentrations as measured in air bubbles trapped in an ice core from Taylor Dome, Antarctica, covering the entire Holocene. The record shows a decrease of the CO_2 concentration from 268 p.p.m.v. at 10.5 kyr BP (the end of the transition from the last glacial to the Holocene) to 260 p.p.m.v. at 8.2 kyr BP. During the following 7 kyr, the CO_2 concentration increased almost linearly to ~285 p.p.m.v."

This steady rise over the last 7,000 years is close to the earlier Shackleton estimate about land biomass falling about one-third over the last 8,000 years. The almost linear CO_2 increase changes, of course, to a rapid non-linear rise near the start of the 20th century. The authors also discuss some data from Byrd Station suggesting CO_2 may have been drawn down near 245 p.p.m. in the vast land re-colonization phase of the early interglacial. Hamaker suggested it might have dropped quite low. Some estimates of carbon exchange is given in gigatons:

"A cumulative biospheric uptake (solid line/shaded area in Fig. 3b) of 110 ± 47 GtC between 11 and 7 kyr, and a release of 195 ± 40 GtC between 7 and 1 kyr, is obtained."

From their concluding ***Discussion***:

"The global carbon cycle has not been in steady state during the past 11 kyr. On the basis of our model estimates, we suggest that the observed variations … over this period are caused by a combination of growth and decay of terrestrial biomass, and an increase in global mean SST, possibly with a contribution from the marine calcite cycle.

"The biospheric uptake of carbon between 11 and 7 kyr BP is consistent with expectations based on vegetation regrowth and soil build-up on areas initially covered by ice sheets, as well as a climatic development towards the mid-Holocene optimum."

The authors do not even begin to inquire into the relationship between the rising CO_2 and the next glacial period now due and very probably starting, but I hope they will if I can give them this book, as I'll attempt to do with most if not all the people mentioned herein. Afternote: On 6/30/2000 I called one of the above ***Nature*** article authors, Martin Wahlen of Scripps. In the few minutes he could give he said they're still working on refining their ice core analysis techniques and haven't fully clarified what occurred at the Eemian interglacial termination. He said he wasn't sure if the soil/biomass depletion and high CO_2 were the primary catalysts for interglacial termination, but did say he knew the evidence from Hermann Flohn and others suggesting a current interglacial deterioration. Also, he knew of the soil remineralization movement and agreed it is an intelligent way to replenish soils and bring down CO_2 levels.

More Evidence of "Low-Latitude Warming" and Intensified Hydrologic Cycle

"Dr. J. Murray Mitchell, senior climatologist with the National Oceanic and Atmospheric Administration (NOAA) also predicts a rise in temperature due to carbon dioxide. ... The immediate effects of warmer temperatures would be to increase the evaporation from the oceans, adding moisture to the atmosphere and increasing snowfall in higher latitudes, Mitchell said." (***Detroit Free Press***, 7/10/77)

"No, folks, the ice age isn't upon us" – "Four of the past six winters have been harsh across large parts of the United States. Does that mean something dreadful is happening to the climate, the early signs of an impending ice age perhaps? Climatologists wince at such suggestions. ... [H]ere are three reasons not to get worried about that: … While the higher latitudes across the United States and Europe were experiencing a cold winter of 1982 the lower latitudes (below 25 degrees) around the globe were sweltering in unusual heat. 'There has been a tendency of the low latitudes to be anomalously warm for some years,' says Hurd Willett, a grand old man of meteorology, emeritus professor at MIT. San Juan, Puerto Rico, for example, has been systematically breaking its records for high temperatures. So the temperate latitude cold is perhaps not

even the most interesting aspect of the winter of 1982. 'The outstandingly significant thing about this past winter,' says Willett, 'was this warmth at the low latitudes.' " (***Science News***, May 1, 1982)

From ***The Global Climate*** (1984), Richard C. Houghton, editor:

"The highly nonlinear relation between temperature and water vapor pressure make evaporation and associated latent heat transfer to the atmosphere most sensitive to small changes in temperature where the temperature is highest." (C.E. Leith of NCAR, p. 22)

"A Summary of Climatic Events During the Period September to November 1985"- "The autumn season in the Northern Hemisphere ended with extremely cold conditions extending from Alaska to the Great Plains of the United States. Below normal temperatures were experienced here and over most of Europe. This extreme cold, which made November colder than December in many parts of the United States, led to record snowcover (as measured by satellite since 1966) over North America and Eurasia. ... Despite these excesses of snow and severe cold temperatures the mean hemispheric temperatures were near normal for November and near normal for the autumn season (1951-70 reference period). Warmer than normal temperatures over western Siberia and many tropical and sub-tropical areas cancelled out the extremes of cold elsewhere. [Emphasis added to remind readers how misleading and dangerous is the practice of equating "climate change" with "mean temperature change," as most of the "climatologists" concentrating on their mathematical computer models seem to be doing.] (***Climate Monitor***, 9-11, 1985)

"Europe's Wild Weather: By Air Mail From U.S." – "The hurricane-force winds that have ripped Western Europe three times in the last six weeks, killing more than 140 people and costing perhaps a billion dollars in damage, marked the return of a weather phenomenon that had not often been seen in the last two decades. … Big storms of increasing intensity and frequency are expected by some climatologists as a result of the greenhouse effect, a warming of the earth's surface caused by a buildup of carbon dioxide and other gases that trap heat in the atmosphere. Storms are driven by heat, and more heat generally means more energy in the storms. … In

most years, storms that develop in the mid-Atlantic reach full intensity there, and turn far weaker by the time they approach Europe. But this year the temperatures in the Arctic were colder than usual, and temperatures in the tropics abnormally warm.

" 'We really don't know the basic physical causes' [?] of these abnormalities, said A. James Wagner, a meteorologist at the National Weather Service's Climate Analysis Center at Camp Springs, Md. Whatever the cause, the greater-than-normal contrast in temperatures produced a stronger jet stream: at one point it reached a velocity of 230 mph. 'To my knowledge, that is about as fast as it's ever been observed in the Atlantic,' Mr. Wagner said." (***New York Times*** 3/5/90)

Prof. Hermann Flohn wrote the chapter, "Recent climatic evolution as scenario for abrupt palaeoclimatic events?" for the book ***Klimageschichtliche Probleme der letzten 130000 Jahre*** (G. Fischer, 1991). He tells us:

"Since 1965 the average tropospheric temperature (200/850 hPa layer) above all equatorial stations has increased by 1 deg. C in 20 to 25 years. Simultaneously the water vapour content above the equatorial Pacific and some other equatorial stations has increased by 20 to 30%. This fast evolution, accompanied by a regionally varying increase of wind speed, moisture gradient at the air-sea interface and evaporation, may serve as a conceptual model of abrupt palaeoclimatic changes." (from the Abstract)

This is the first time I've seen the current abrupt climate change being suggested as a model for palaeoclimatic change! He elaborates on the above in the main text:

"Recent investigations (Krahe et al., 1987; Hense et al., 1988) have shown that the relatively weak (CO_2-induced) warming of the tropical oceans – about 0.7 deg. C in the last 80 years – was correlated with increasing evaporation, through a simultaneous increase of the saturation deficit of marine air and of wind speed. …

"Above the Equatorial Pacific this has led to an unexpected but significant increase in water vapour in the layer 3 to 6 km, up to 30%

during the period 1965 to 1984 (Krahe et al., 1987) (Fig. 4). At one representative station (Majuro) a stepwise increase of water vapour in the whole column 0 to 9 km reaches 20% during the same period. In the tropics, a rising H_20 content leads to more intense convective activity, more rain and thus to an increased release of latent heat with a peak at 6 to 8 km. This warming has now been observed averaged for the layer 1.5 to 12 km, at all tropical stations, reaching 1 deg. C during the last 20 to 25 years only. … In contrast to most model results, its consequence is an increase in the temperature difference between equator and pole and in the intensity of the atmospheric circulation (Fig. 5); this may also explain the observed increase of wind speed."

More from Prof. Hermann Flohn, one of the world's best-known meteorologists, from the Meteorological Institute, Univ. of Bonn, Germany. His in-depth weather and climate studies have resulted in a most interesting article giving further strong support for the Hamaker Thesis. It is called "Physical 3D-Climatology From Hann to the Satellite Era," p. 9-20 in the 1993 American Geophysical Union book, ***Interactions Between Global Climate Subsystems***, G.A. McBean and M. Hantel, eds. Consider these abbreviated excerpts from his concluding section on 'The Role of Water Vapor in Climate and Climatic Change':

"The vital role of water vapor – more exactly: of its latent heat – in 3D-climatic change is as yet not always sufficiently recognized. A. parallel evaluation of maritime surface data (COADS) in the Tropics and of near-homogenous 3D-analyses of the Northern Hemisphere, together with tropical radiosonde and satellite data, led to the result that the effect of 'global warming' – most probably triggered by CO_2 and other 'dry' greenhouse gases – is substantially magnified by the role of water vapor in 3D-circulations. … An observed increase of tropical water vapor content in the middle troposphere by nearly 30 percent (Fig. 10) ... is accompanied by: 1) an increase of the zonal average evaporation of equatorial oceans (Lat. 10 deg. S – 14 deg. N) of nearly 16 percent, equivalent to 15-20 Watt/m2 (Fig. 110); it diminishes poleward of Lat. 30 N, but does not disappear, 2) an increase of precipitation in most land areas, except the subtropical belt Lat. 5 deg. to 35 deg. N ... 3) an intensification of oceanic mid-latitude cyclones ... along with a rather drastic increase of winter

gales above the Pacific and the Atlantic ... 4) a hemispheric (Lat. 20-90 deg. N) increase of surface and tropospheric … winds in the order of 0.4-0.7 m/s, and. …

"These evolutions led, since the 1960s, to a growing intensity of three of the four large-scale, thermally forced circulations: the Hadley cell, the Dove-Ferrel cell and the zonal Walker circulation, while the evidence for the seasonal monsoon cells is not sufficiently conclusive. … These investigations … lead to two important conclusions:

a) the climatic system is now in a state of disequilibrium, with substantially increasing fluxes of energy and water between ocean and atmosphere,

b) the longitudinal and regional variations are so large that latitudinal and global averages cannot give more than a first order approximation.

"At present, a large portion of the discussion of the 'global warming' is limited to surface temperature, which played a primary role in climatology at the time of Hann and before WW II. But now, after 60 years of evolution of physical climatology, this limitation appears to be obsolete, to say the least. We have to deal with climatic processes in three or better yet, four dimensions, with all parameters which have been measured over many decades. ...

"Our results, briefly discussed here in this Chapter, are internally coherent. A feedback via water vapor and hydrological cycle, with increasing intensity of atmospheric circulations of potential and kinetic energy – all this can be observed under our very eyes." [emphasis added].

"Tropical Trouble – Two decades of Pacific warmth have fired up the globe" – "In seeking to explain why temperatures have hit the red zone, several researchers blame Earth's waistline. They propose that something within the tropical ocean belt, especially the Pacific, has caused a warming of the entire globe during the last 2 decades. The same tropical heat wave may explain why precipitation patterns have

changed dramatically across much of the planet during the same period.

" 'There was a big change in the climate in the mid-1970s. A lot of things changed, and you can make a coherent case for it being forced from the tropical Pacific, by sea surface temperature changes in the tropical Pacific,' says oceanographer Nicholas E. Graham of the Scripps Institution of Oceanography in La Jolla, Calif. …

"Even before the 1990s, however, unusually balmy conditions persisted in the Pacific. Historically, El Niños recur every 3 to 7 years; the intervening periods are sometimes punctuated by a cold spell known as La Nina. While these coolings do not follow every El Niño, temperatures normally tend to see-saw above and below normal. Yet that pattern fell apart in the mid-1970s, when the Pacific's equatorial thermostat stuck on warm. Since then, five El Niños have brewed, but only once did the ocean cool off to a certified La Nina. …

"Such results should intrigue meteorologists, who have seen hints of decreasing precipitation over equatorial land areas and are now beginning to document increases over the tropical ocean. In the last 40 years, and especially since the late 1970s, precipitation has declined across much of Indonesia, south China, India, and Africa. …

"According to Graham's modeling work, a warming of the tropical ocean can explain most of the broad precipitation and temperature changes observed globally in the last 20 years. But it fails to answer the obvious question: What warmed the tropical oceans?

" 'I have no idea,' Graham admits. 'But I know some bogeyman words,' he says with a chuckle.

"That fearsome term is greenhouse warming, created by increased atmospheric concentrations of carbon dioxide and other heat-trapping gases. …

"Whatever the cause of past climate changes, Karl [Tom of National Climatic Data Center] says, Graham's model raises some important questions about how future warming will affect precipitation. If global temperatures continue to march upward, precipitation amounts

should also climb around the world. But according to Graham's study, the most recent burst of global warming [should read tropical warming?] actually dried equatorial land areas - a result that causes Karl to wonder about future droughts.

" 'When you talk about this global warming issue, changes in precipitation are far more important and significant than changes in temperature,' he says. 'It's simply that people have been frustrated by the observations, and it's a more difficult quantity to study, so you haven't heard as much about it.' " (***Science News***, 3/11/95)

"New support for Theory of Global Warming" – "New evidence linking the recent warming of the Pacific Ocean's surface waters with records of melting glaciers high in the Andes shows that temperatures in the tropics are higher now than they have been for thousands of years, scientists say. ... Climate researchers at the government's National Oceanic and Atmospheric Administration in Boulder, Colo., and the Scripps Institute of Oceanography in La Jolla are publishing the results of their new study today in the scientific journal ***Nature***. According to Henry F. Diaz of the federal agency's Climate Diagnostics Center and Nicholas E. Graham of Scripps, average sea surface temperatures in the tropical Pacific have risen by a full degree during the past century. … The two scientists agreed that the rise in ocean temperatures has caused major increases in moisture within the tropical atmosphere. ...' (***S.F. Chronicle,*** 9/12/96)

"Storm Warmings" – "There are signs that global weather patterns have already begun to shift ... The continental US experiences 20 percent more blizzards and severe rainstorms than it did before 1970, as well as 10 percent more winter precipitation, according to a 1995 study by the National Oceanic and Atmospheric Administration's Tom Karl. … Researchers discovered that average waves in the North Atlantic were 50 percent higher in 1993 than they were during the 1960s; storm waves averaged 10 percent higher." (***YES! A Journal of Positive Futures***, Winter-'97-98)

"The Invisible Hand" – "As human activity warms the earth, El Niño grows more violent. Are we doing this to ourselves? ... Warmer air temperatures, ironically, may ultimately not be the most significant aspect of global warming. According to the U.S. Global Change

Research Program, 'Widespread increases in the intensity of the hydrologic cycle may have more immediate and far-reaching ecological and socioeconomic impacts than elevated temperature alone.' ...

" 'The climate system is a giant heat engine,' explains Nathan Mantua, a climate researcher at the University of Washington who focuses on the Pacific. 'An excess of energy comes in at low latitudes relative to the high latitudes; winds and currents try to wipe out this imbalance.' The workings of this engine shape the earth's standard weather patterns. The most prominent effect of solar energy striking the earth is not to heat the atmosphere but to evaporate water from the surface of the ocean. …

"While El Niño blows cold and wet in California, it causes drought in India, Southeast Asia, Brazil, and parts of Africa. Besides devastating agriculture, the disruption of normal rain patterns sets the stage for huge fires such as those last year in Australia, Indonesia, and Amazonia. Should El Niño conditions persist, entire regions could see their natural features radically altered and economies shaken to their root." (***Sierra***, May/June 1998)

Prof. Isamu Kayane is with the Institute of Geoscience, University of Tsukuba, Japan. He is a member of the Scientific Steering Committee for BAHC (Biospheric Aspects of the Hydrological Cycle), and Chair of the National Japanese Committee for the IGBP (International Geosphere-Biosphere Programme). I first learned of his work in the IGBP's March 1996 ***Global Change Newsletter*** which published his article, "Interactions between the Biospheric Aspects of the Hydrological Cycle and Land Use/Cover Change."

Prof. Kayane is well aware of the computer model predictions of "global warming." Then why is his deepest concern that we may be bringing on another glacial period? Could it be because he knows of the glacial-interglacial cycle, and because he is an expert in hydrology, the movement around the Earth of water and energy in their various forms and cycles? His article mentioned above begins:

"The global climate system redistributes energy from lower to higher latitudes. The energy surplus in the lower latitudes, whose boundary

corresponds roughly to 35 deg. latitude North and South, results from the latitudinal gradient of the Earth's energy budget."

Later, after noting how much longer are glacial than interglacial periods, he says:

"Thus the global climate system seems to be more stable when the Earth has a huge volume of water locked in ice sheets in polar regions than under the present condition with ice sheets existing only on Antarctica and Greenland. It is therefore possible that the present global warming may act as the trigger of the next glaciation. If the interglacial is indeed a brief, unstable period for Earth, then we should be very careful not to risk triggering the shift to the next glacial period through anthropogenic activities."

And further on:

"The effects of global warming on the water cycle have appeared predominantly in the tropics. The present trend of increasing sea surface temperatures in the tropical ocean will almost certainly continue in the future, and the effect of the associated intensified energy and water cycle will gradually propagate to the middle and high latitude zones. Abnormal weather events, such as severe floods and droughts, reported recently from all over the world, may well be results of global warming, although the anthropogenic contribution to the increase in sea surface temperatures remains the subject of ongoing research."

Like a growing number of scientists aware how much damage has been done, and how strong is the momentum of ignorance, Prof. Kayane concludes this good article by suggesting we not only conserve but actively work to create a healthy Biosphere for humanity and, by implication, our fellow interdependent species:

"Although land occupies only 29% of the Earth's surface, it is the only surface which can be influenced directly by humans [direct pollution, drift-net fishing and rock dust nourishment of the ocean surface come to mind as contrary examples] in the interest of preserving the Earth system, provided that regional as well as global consensus is obtained. If changes in the land-use pattern alter feedback

mechanisms affecting the global climate system, through the changes in fluxes from the land surface, then humans in their decision-making that affects the global land-use pattern, should follow criteria that will preserve, or more actively create, a global environment as appropriate as possible for mankind."

After writing to Prof. Kayane to thank him for his concern and to offer him ***The Survival of Civilization***, I received his response (10/16/98):

"Thanks for your xerox copies on a new ice age. I did some work on global warming, and am almost confident it has occurred. But global warming doesn't mean that the temperature will increase everywhere all over the world in the same way. The sea surface temperature in the northern Atlantic Ocean has decreased as my previous papers show.

"My anxiety is if the present global warming triggers a new glacial. So I am very much interested in your book ***The Survival of Civilization***."

He enclosed his previous paper and it further confirms that the Hamaker differential heating/cooling explanation not only makes sense but is occurring:

"It is worth noting that SST [sea surface temperature] increase is predominant in the tropical oceans, but the SST in the Atlantic Ocean north of 30 deg. N was remarkably decreased, probably because of the increase in cloud cover due to the increased transport of water vapor from the low latitude zone. The effect of global warming [or better termed "intensified greenhouse effect"?] on the SST and the air temperature are different from region to region: the temperature decreases in some regions and increases in others. This is also true for changes in precipitation pattern.

"The SST has markedly increased in the low latitude oceans during 1930-1989. The global energy and water cycle should have intensified in response to the increased SST. …" (Isamu Kayane et al. in "Regional Hydrological Responses to Global Warming" in ***Global Environmental Research*** Vol. 1, No. 1&2, p. 11-18, 1998)

Always willing to give TSOC to open-minded scientists (among others), I sent it airmail on 11/2/98 and next heard from Prof. Kayane via letter on 12/10/98. In it he said:

"Thank you very much for sending me John Hamaker's enthusiastic book, ***The Survival of Civilization*** and other materials concerning the glacial. I agree with you that John is a kind of genius. At least for me, he is the only person presenting the hypothesis that increase in the atmospheric concentration of CO_2 may cause the next glacial. He also mentioned that the load of continental ice sheet to the crust causes volcanic activities and then emits CO_2 to the atmosphere, that is new to me. His proposal to mineralize Earth is interesting too. … I am planning to have a workshop on WATER next year in Japan. One session will be for my question, 'Will global warming trigger the start of a glacial?' I presume changes in the global water cycle is an important process to trigger the glacial, so this session should be one of the workshop. If my proposal is accepted I would like to invite you to the workshop. Your presentation should be something related to John's hypotheses."

Perhaps Prof. Kayane's example of open-minded concern and responsiveness will be an inspiration to the thousands of scientists, and billions of others, who've yet to hear of the Hamaker Thesis or did hear of it but didn't give it serious study and fair consideration. (The workshop he mentions has been delayed until 2000 it appears.)

On Increasing Evaporation and Cloud Cover

"Understanding the Earth system and, in particular, its climate, remains one of the major intellectual challenges faced by science. The processes influencing climate, the mechanisms through which they act, and the responses they generate are, in general, as complex and poorly understood as they are important."

–Paul Mayewski (Climate Change Research Center, Univ. of New Hampshire) et al. in " 'Major features and forcing of high-latitude northern hemisphere atmospheric circulation using a 110,000-year-long glaciochemical series" (***Journal of Geophysical Research***, 11/30/97)

"U.S. weather waxing cloudy" – "William Seaver of Virginia Polytechnic Institute in Falls Church and James E. Lee of the MITRE Corp., a nonprofit systems engineering company in McLean, Va., compared the number of cloudless days in 45 U.S. cities during two periods, 1900-1936 and 1950-1982. Cloudless days were defined as those in which an average of 10 percent or less of the daytime sky was obscured by clouds, haze, smoke or fog. The study used data collected by U.S. National Weather Service observers.

"An increase in cloudiness in the middle third of the United States has been documented by Stanley Changnon and his colleagues at the Illinois State Water Survey at the University of Illinois in Urbana-Champaign, but according to several meteorologists, Seaver and Lee are the first to show the trend for the nation as a whole. …

"Of the 45 cities checked, the only one to get sunnier was Ft. Worth, Texas, but the increase from 7.4 to 7.5 was barely enough to be significant, Lee says.

"And at the Fourth Conference on Climate Variations in Baltimore last week, Val L. Eichenlaub of Western Michigan University in Kalamazoo presented data showing an increase in cloudiness in Michigan. Grand Rapids, for example, was 75 to 80 percent sunny in the late 1930s and early 1940s but dropped to about 65 percent in the 1970s.

"While the studies have shown a trend toward cloudiness, they don't explain why the change is occurring. … For Michigan, Eichenlaub says, other data indicate that the polar weather front has been shifting southward, and this could be pulling in more storms and clouds." (***Science News***, 3/28/87)

"Is the Greenhouse Here?" by Richard Kerr in ***Science*** (2/5/88) restates and elaborates on very important research supporting the Hamaker Thesis:

"Raymond Bradley of the University of Massachusetts and his colleagues reported that in their record of Northern Hemisphere precipitation over land since 1850, precipitation remained fairly steady since before the turn of the century until about 1940. Then it

began rising in the zone between 35 deg. and 70 deg. N and falling between 5 deg. and 35 deg. N but remained steady within 5 deg. of the equator, where data coverage is generally poor. ... Along these same lines, P. Krahe, Hermann Flohn, and A. Hense at the University of Bonn have found a 'remarkable' increase in the amount of water vapor over the Indo-Pacific region during the past 20 years. At all five of the selected radiosonde stations within 10 deg. of the equator, the temperature has risen about 0.05 deg. C per year. Each warming trend is statistically significant at the 95% level. At four of the five stations, total water and relative humidity have increased dramatically between altitudes of 3 and 6 kilometers, rising 10 to 20% and more in absolute terms. [My emphasis, not that any should be needed!]"

"Clouds gather over terra firma" – "A seven-year research project has shown that cloud cover over land has increased globally by around 10 percent [the percentage Stephen Schneider suggested would be enough to bring on a glacial period – ***Coevolution of Climate and Life***, p. 216] since the turn of the century. The study, by Ann Henderson-Sellers, a geographer at Macquarie University in Sydney, identified the steady rise in cloud cover. Two dramatic increases occurred between 1935 and 1950, and from 1965 to the present day. She undertook most of her research at Liverpool University in Britain and examined records dating back to 1900. Her findings, announced this week at the 26th Congress of the International Geographical Union in Sydney, add to fears that the Earth is heating up through the greenhouse effect – the trapping of solar radiation by clouds and pollutant gases [they forgot to say "global warming"]. … The findings reflect observations by the Bureau of Meteorology in Melbourne, which last year showed that cloud cover over Sydney had been increasing slowly since 1950." (***New Scientist***, August 25, 1988)

"Cloud-Hidden Secrets" by Mark Nathaniel Mead – "Many scientists seem convinced that increasing amounts of CO_2 and other greenhouse gases will eventually warm the Earth, but they are equally certain that today's computer models simulations – the very data-generating gizmos upon which their predictions are based – are still far too sketchy to grasp the true magnitude of the problem. Models are always less than reality. And when such constructs are meshed with actual observations of ocean-to-atmosphere dynamics, any talk of a pronounced warming trend suddenly seems all but

ludicrous. At the heart of this perplexing situation lies a single well-known phenomenon: clouds.

“Satellite photography shows that clouds, on any given day, cover about half of our planet. Besides quenching Earth’s biological thirst from time to time, clouds help cool the planet by reflecting sunlight back to space. In effect, they block much incoming sunlight from reaching and warming the Earth. That’s why cloudy days are invariably cooler than sunny days during the same general time of year. …

“Another compelling study was published in the Sept. 10, 1987 issue of ***Nature*** by four German scientists of the Max-Planck Meteorological Institute and the Meteorological Institute of the Univ. of Hamburg. The researchers provided elaborate calculations indicating that all previous models of the greenhouse effect were in error. They concluded that the ‘negative feedback’ effect of increasing cloud cover (albedo) in the atmosphere would supersede the greenhouse warming. ***Nature’s*** summary: ‘With increasing CO_2 concentrations the cooling effects of cloud optical properties will dominate over the greenhouse effect.’

“More recently, in the Jan. 6, 1989 issue of ***Science***, a research team led by V. Ramanathan of the Univ. of Chicago’s Department of Geophysical Sciences presented a preliminary report on cloud observations by two satellites in the Earth Radiation Budget Experiment (ERBE). Clouds, they found, exert a major cooling influence on the globe: an impressive 13.2 watts per square meter, i.e., that much potential heat is barred from the global greenhouse. For comparison, computer models predict that a mere 4 watts per square meter in heating from a doubling in CO_2,) should eventually warm the globe by 3 deg. C more (and that would be a huge rise in temperature; by contrast, last year, NASA scientists said a rise of only 0.8 deg. C had occurred over the last 100 years.) …

“Interestingly, Ramanathan’s group did acknowledge that during past glaciations, changes in the ‘cloud-radiative forcing’ (forcing solar energy away from Earth), together with shifts in cold ocean currents,‘ … could have significantly amplified oceanic cooling and continental

glaciation.' What they fail to consider, however, is that clouds may have been the seeds to the glaciation process in the first place.

"For all its technological brilliance, modern science remains a victim of its own 'flat earth' worldview, a linear, mechanistic perspective which seriously undermines the integral, self-regulating nature of the global climate system. Meanwhile civilization may be standing in the ominous shadow of another 100,000-year Ice Age. As responsible beings we can no longer afford to cater to the cloud-free projections of a 50-year warming trend. Failing to adopt intensive restoration measures could spell global suicide by the year 1995." (***Soil Remineralization***, Summer 1989)

"Pinning Down Clouds; Scientists ponder the role of clouds in climatic change" – "The more climatologists look at clouds, the more they realize they really don't know clouds at all. ... 'There is no consensus on how clouds will affect the greenhouse warming,' confirms David Randall of Colorado State University. All clouds, he says, act to some extent as 'reflecting blankets,' simultaneously cooling the earth by reflecting incoming sunlight back into space and warming the earth by preventing heat from escaping [not to mention cooling by precipitated snow and ice]. Different clouds combine these properties in different proportions. Stratus clouds, which are dense and low-lying, have a net cooling effect because their albedo, or reflectivity, is relatively large. Wispy, high-flying cirrus clouds, because they are semi-transparent to incoming sunlight but block infrared radiation emitted by the earth (as do greenhouse gases such as carbon dioxide), have more of a warming effect. Beyond these essential facts, much remains unknown. What happens when cirrus clouds overlie stratus clouds, for example? 'We don't have a handle on that yet,' Randall says. 'There is a tendency to avoid messy problems at this point.' " (***Scientific American,*** May 1989)

Consider this revelation from the January 1992 ***Popular Science*** article, "That Hole in the Ozone Layer":

"Last June, scientists from the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado and University of Wyoming said a major climate change may have occurred in Antarctica in the past 10 to 12 years. Their

conclusion was based on a recorded change in ozone levels together with an increase in cloudiness over the South Pole. They report that surface ozone at the South Pole during December through February decreased 17 percent from 1986 to 1990, while cloudiness over the Pole has increased approximately 25 percent since about 1980. These changes are distinct from the seasonal ozone hole. But the researchers consider it 'noteworthy' that all three began within a fairly short time frame – 10 to 12 years ago."

Is "noteworthy" a strong enough word in regard to a 25% cloud cover increase in only 13 years?!

Global Changes in the Perspective of the Past (1993), edited by J.A. Eddy and H. Oeschger, is the Report of the Dahlem Workshop on Global Changes in the Perspective of the Past held in Berlin, Dec. 8-13, 1991. Noteworthy excerpts:

"However, the major climatic fluctuations (such as glacial inception, deglaciation, and the Younger-Dryas cold interval) are most probably a result of nonlinear mechanisms within the coupled climate system (atmosphere/ocean/ice/continent /biosphere) which have not yet been uniquely identified." [The editors had been given ***The Survival of Civilization*** but appear to ignore the "nonlinear mechanism" for glacial inception as "uniquely identified" by John Hamaker.] (p. 195)

"From a somewhat different perspective, we note that the role of the tropical oceans is frequently neglected in considering the influence of ocean circulation on climate, in spite of the very large surface area which they cover. .. . Small changes in the tropical oceans may nevertheless be rather effective agents of climate change; for example, the climatic effect of the most important greenhouse gas (H_20) increases exponentially with temperature, and the effect of phase transformation (a release of the heat of condensation) adds to the greenhouse effect. … The Quaternary ice core described in Fig. 19/11 (Flohn, this volume) provides information beginning from about 50 years prior to the most marked glacial advance of the Little Ice Age (following A.D. 1550) and documents a large increase of precipitation with an Atlantic moisture source. … This sequence of events might be taken to suggest that tropical ocean evaporation

played a leading role in initiating the glacier response in the first half of the 16th century. (p. 251)

“Experience over the last 40 years has shown that a small increase in tropical ocean temperatures (on the order of 0.5%) leads to a marked increase in precipitable water in the atmosphere and oceanic evaporation, both on the order of 20%. These increases have been triggered, as a natural feedback, by anthropogenic input of ‘dry’ greenhouse gases (such as CO_2, CH_4, N_2O, O_3, and the chlorofluorocarbons) and lead, via an increasing tropospheric temperature gradient equator-pole, towards rising baroclinic processes in the atmosphere and an intensification of the atmospheric circulation and tropospheric winds (Flohn et al. 1990) [That article is: “Recent changes of the tropical water and energy budget and of mid-latitude circulations” from ***Climate Dynamics*** 4:237-252.] (p. 312-313.)

“The changes now taking place – tropical warming on the order of 1 deg. C over 25 years in the mid-troposphere, increase of evaporation and water vapor content in the Tropics by 15-20% over 40 years, simultaneous intensification of the atmospheric circulation above the oceans by up to 50% in 25 years – are of the same time scale and roughly the same magnitude.” (p. 345)

“Study says pollution may be changing Earth’s clouds” – “Researchers think smog is creating clouds where none existed, and increasing the brightness of normal clouds. That in turn reflects sunlight and heat back into space, potentially cooling the planet. ‘It’s unlikely that would be enough to force us into an ice age [why is it unlikely?] but it’s certainly likely to cool the climate significantly,’ says project scientist Phil Durkee. ‘The best models we have seen indicate this could be on the same scale as what has been predicted for global warming [frequently 3-9 deg. C mean temperature change] – only in the opposite direction,’ he says. … ‘If you can change the aerial distribution of clouds by 3 percent,’ said Durkee, ‘you can offset the entire global warming prediction from the doubling of carbon dioxide.’ ”

The graph of the previous article showed a cloud cover increase of about 12% from 1900 to 1990. Climatologist Stephen Schneider has

said that a 10% cloud cover increase could cause a shift from interglacial to glacial conditions. “Unlikely” nevertheless remains the preferred psychological presumption! (***San Mateo Times***, 8/10/94)

“Not warming, but cooling” – “Planet Earth is becoming hazier and the wide blue yonder is increasingly being blotted out by clouds. The problem is not just aesthetic. Low cloud and layers of dust and pollution spreading across the northern hemisphere are blotting out the sun. They block out heat so effectively that global warming has been put into reverse in many of the world’s most populous countries, according to new calculations about to be published. Climatologists who spent the past decade warning about global warming are fast reaching the conclusion that cooling poses just as big a threat. But it will not simply cancel out warming. Instead, they see the atmosphere simultaneously being pulled in two different directions by powerful changes to its basic physics and chemistry. It is likely to show increasing signs of stress and unpredictability as a result. … Over most of the land areas of the northern hemisphere, as well as in the southern hemisphere over Australia, the amount of rain cloud has increased during the 20th century, according to recent studies. In the US, cloud cover has risen from about 48 per cent in the first three decades of the century to around 58 per cent since the mid-1950s (see Graph). Similar data have been published for the former Soviet Union, and research soon to appear in the journals ***Geophysical Research Letters*** and ***Atmospheric Research*** reveals increasing cloud cover in China and parts of Europe.

“But in addition to the immediate effect, which is to counteract global warming in many parts of the planet, cooling from aerosols is also changing the vital processes of heat and energy distribution within the atmosphere that drive climate. As well as altering the balancing of heat between night and day, it is also shifting balances between the tropics and temperate lands and between the surface and upper layers of the atmosphere. Incorporating these effects into climate models makes it harder than ever to predict how the atmosphere will evolve. For instance, because the cooling is concentrated near sources of air pollution at middle and high latitudes in the northern hemisphere, it increases the temperature difference between these regions and the tropics. This is the opposite to what is predicted by greenhouse models, but fits in with temperature changes that have

actually been observed over the past few decades. This change in the flow of heat on a global scale could have far-reaching effects. It could, for instance, trigger increasing storminess in the middle latitudes – something already apparent in the weather record. … [emphasis added]

"Research by Mai Pham and Guy Brasseur, also from the NCAR, comes up with substantially greater cooling figures, which suggest for the first time that global cooling, rather than warming, may be the most immediate threat in the coming decades for the majority of the world's population. In a study to be published later this year in the ***Journal of Geophysical Research***, Pham and Brasseur find that cooling from sulphates [and surely clouds and the sum of all solar radiation-blocking aerosols from natural and man-made sources] is swamping global warming over the whole of Europe, the eastern US, half of Russia and most of China and the Far East." [The graph on p. 41 showing the rising cloud cover and falling temperature is quite dramatic and revealing.] (***New Scientist***, 7/9/94)

From ***Beyond the Warming***: ***The Hazards of Climate Prediction in the Age of Chaos*** by Antony Milne (Prism Press, 1996):

"Further, very little attempt is made to examine what is happening in the remaining seasons in order that global trends can be properly put into context. Extreme temperatures for short periods mean little. The onset of an Ice Age is determined more by a series of milder, but more snowy winters, with average or cool summers, so that the ice stays on the ground longer throughout the season, and the northern ice sheets gradually creep southwards as the years pass. Cool spring temperatures are the deciding feature in this scenario, and any later summer heat must be prolonged and continuous, year after year, to melt the ice in its tracks. One of the significant features of postwar years has been the evidence of long-drawn-out cool springs in the northern hemisphere in the last 25 years, with later hot spells being erratic or short-lived. Furthermore… winters in both hemispheres were becoming dramatically unpredictable in ways associated with the past onset of Ice Ages. Mild winters interspersed with extremely frigid ones. Severe British winters have increased in frequency in the past 18 years compared with only five between 1940 and 1978. ...

North Pole atmospheric records show no signs of a warming even after 40 years of study." (p. 13)

"Furthermore, over much of the northern hemisphere, and centres of population such as Australia in the south, raincloud cover has increased substantially. In the US it increased by nearly 50 per cent in pre-war years, about 60 per cent since the mid 1950s. Similar data have been published in ***Geophysical Research Letters*** for cloud cover in China and regions of Europe. ... They (volcanoes) seem seriously to affect higher latitudes as well, and it is said that pollution over the Arctic is acting like a giant sunshade, cancelling out the expected warming in the region, according to data from 22 monitoring sites. Over the past 40 years Arctic sunlight has decreased by 15 per cent. The cooling could be yet further exacerbated when particulate matter becomes good condensation nuclei and helps create water droplets that make up clouds. The more aerosols the smaller and brighter the droplets, and the more reflective they are the more they perpetuate a cooling. … Whereas the evidence for a warming is an abstract and uncertain one, the evidence for a cooling is much more tangible. Most people in industrialized societies can see with their own eyes the pollution haze that seems to hang in the near horizon virtually all the year round." (p. 45-47)

"Some scientists are suggesting that perhaps similar climatic reversals – from warm to cold – are happening now. Broecker's theory, originally formulated in 1989, was recycled by himself and his co-scientist Claes Rooth, acting director of the Co-Operative Institute for Marine and Atmospheric Sciences in Miami, in 1994. Rooth said a flip in circulation could slow down the Atlantic northward circulation, and this could bias the CO_2 warming in the south, or eliminate or reverse the warming in the north. What is worrying is that this seems to be happening – the next ice age may arrive sooner than we expect. Several different groups of scientists seem to be saying this." (p. 93)

From CO_2/Climate Report issued by the Canadian Climate Centre Atmospheric Environment Service (Spring '98): "This issue of CO_2/Climate Report provides such a synthesis of some 700 scientific papers relevant to the climate change issue that have appeared within the peer reviewed literature in 1996. ... Despite the importance

of the Arctic region within the climate system, poor understanding of cloud feedbacks in this region has resulted in inadequate performance of climate models in simulating the Arctic climate. … Transient experiments with a coupled climate model indicate that increasing CO_2 concentrations can generate differential surface heating over the tropical Pacific and cause corresponding changes in precipitation patterns much like those of an El Niño event (Fig. 2). While this similarity complicates the detection of the CO_2 forcing signal, it also implies that recent Pacific warming could be linked to CO_2 forcing, not natural variability."

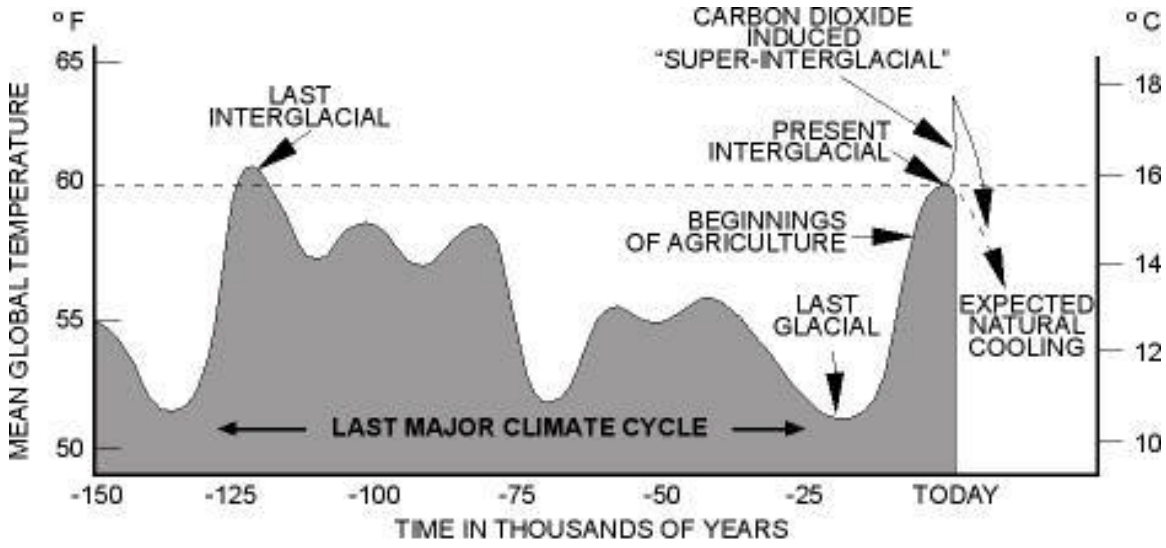
Atmospheric scientist Tony Beesley, at the Univ. of Washington, Seattle, studied cloud cover data from Russian ice stations which monitored cloudiness from 1950 to 1991 (then went out of business). He informed me by phone (8/25/98) that over the last 8 years, 1984-1991, winter cloud cover in the Arctic jumped 13% from 44% to 57%. His suggested cause: "Probably from more storms."

"Is The Weather Getting Worse?" – "Now in the heart of hurricane season, the U.S. still reels from drought and record-breaking heat. … In May, tornadoes in Oklahoma and Kansas with record winds up to 318 mph leave 49 dead and $1 billion in damage. Washington state gets what is now the official world's record for seasonal snowfall, with 95 feet falling on Mount Baker this past winter. … Is it getting wetter? Yes. Tom Karl at the National Climatic Data Center has found that much of the middle and upper latitudes of the earth – most of the U.S., Canada and Europe – show increases of up to 20% this century. Most of that is due to an increase in very heavy precipitation events. As global temperatures increase, one theory goes, more water evaporates from the oceans. The increase in water vapor results in heavier precipitation." (***S.F. Examiner & Chronicle*** 8/27/99)

More Evidence of Snow-Ice-Glacier Growth and High-Latitude Cooling And/Or Glacierization – Further Warning Signs of a New Glacial Period?

To begin, here is the widely printed graph suggesting that a carbon dioxide induced "super-interglacial" might be expected, at least temporarily, to override the "expected natural cooling" of a new glacial

cycle, along with my comments from one of the ***Solar Age or Ice Age***? Bulletins of the late 1980s. The evidence following strongly indicates that this hoped for grace period is one gift Nature may be unwilling to give humankind. Might an inspired and giving humankind still be able to ***earn*** the gift of a re-stabilized interglacial climate in a regenerated Biosphere?



-found in *The Climate of Europe: Past, Present and Future; Ice Ages: Solving the Mystery;* and other publications

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The graph reflects a most dangerous and unfortunately prevalent case of 'wishful thinking' (or worse?) even now apparently dominant in the scientific community at large. I think it originated in a 1977 government publication by J. Murray Mitchell, a head climatologist at NOAA – who, strangely enough, in that same year was quoted as saying that the immediate effects of CO_2-induced heating would be to increase evaporation, adding moisture to the atmosphere and increasing snowfall in higher latitudes (p. 110-111 in ***Bulletin*** 6/7).

From ***Newsweek*** (10/5/81): "Common sense says that such a warming will melt the ice sheets and raise sea levels. … But it is also possible that the warmer air would have a completely opposite effect: since it can carry more moisture, it could increase the snowfall on Antarctica and make the continent grow. Scientists can run computer models on these possibilities until the next ice age, but they won't

really know how CO_2 affects Antarctica's 7 million cubic miles of ice until they understand how it did so in the past. 'Nature doesn't pay attention to our models,' says Todd [Edward Todd of National Science Foundation]. 'To get answers to whether Antarctica is growing or shrinking, you have to go down there and make measurements.' …

"By measuring the volume of trapped bubbles, scientists can tell how thick the ice sheet was in the past. The technique is simple: more or bigger bubbles imply higher atmospheric pressure and thus a thin ice sheet with a surface near the ground. Applying this rule, French glaciologist Dominique Raynaud and Ian Whillans of Ohio State University found that the ice has grown about 725 feet thicker since the end of the last ice age. 'We think that by raising temperatures, CO_2 makes more snow fall over Antarctica and increases the rate of accumulation on the ice,' says Whillans."

"Captain Steve Gomes, Ice Master of Canada's second largest icebreaker, ***John A. Macdonald***, says he found more ice in the Arctic this year than he has ever seen. Ice has been particularly bad off Newfoundland for the past two years forcing oil rigs to move off of their sites several times and isolating communities such as Fogo Island for long stretches. 'This is my 15th trip to the Arctic and I've never seen it so bad.' Gomes puts little credence in the scientific theory that a greenhouse effect may be causing the ice to recede." (***Ottowa Citizen***, 11/29/84)

"Greenhouse effect cuts no Antarctic ice, expert says" – "Contrary to expectation, the Antarctic ice sheet seems to be growing instead of melting, a polar research expert reported Wednesday. Charles Bentley, director of the University of Wisconsin's polar research center, said field observations during the last decade indicate the Antarctic ice sheet is growing and is likely to be removing water from the sea rather than adding to it. The ice sheet in Greenland also is growing, Bentley told the annual meeting of the American Association for the Advancement of Science here. [Philadelphia] … Many scientists had reasoned that part of the greenhouse effect was causing polar ice to melt and raise ocean levels, but Bentley said that doesn't appear to be as direct or as important a factor as was thought. 'Runoff from melting ice is not a major consideration in the

Antarctic,' he said. 'Right now, the ice never really gets warm enough to melt.' " (***Chicago Tribune***, 5/29/86)

"Scholar says warmth may bolster glaciers" – "Although a worldwide warming trend is under way, a scientist says the change may actually increase the size of glaciers in southeast Alaska. Maynard Miller, a dean of the University of Idaho and director of its Glaciological and Arctic Science Institute, is back in Juneau for the 41st year to collect data from the 1,500-square-mile ice field that sits above the capital city. Miller operates 18 camps, stretching from the Lemon Glacier eastward to Canada. They are staffed during the summer by his students. ... Miller says the warming trend is pushing warmer maritime air farther inland in winter, over the top of the coastal mountain ranges all the way into Canada. That is keeping the drier, colder arctic front farther north, warming Panhandle temperatures, but increasing rainfall. The added moisture and slightly warmer winter temperatures are generating greater snowfall at higher elevations in the zones that spawn larger regional glaciers. That should cause them to begin notable advances, Miller says. Miller says the Taku Glacier near Juneau is a case in point. Long-range trends seem to indicate the glacier soon should halt its advance and begin to retreat. But Miller says he expects it will continue to grow, fueled by greater precipitation being dumped at the top of the coastal divide. He says he expects the glaciers that run into Canada also will start to expand significantly. He says the snow line in recent years has been much lower and heavier on the Canadian side of the ice field." (date not included with clipping, however an almost identical article, also sent to me by an Alaska correspondent and entitled, 'The earth is warming; Juneau may get colder,' appeared in the ***Juneau Empire***, 7/10/86)

"50 Alaska glaciers reportedly moving" – "Hubbard Glacier, which has choked off an inlet and trapped dozens of seals and porpoises, is only one of 50 Alaskan glaciers on the move, U.S. Geological Survey scientists said yesterday. There are five times more glaciers pushing forward now than at any time in the recent past, including two ice masses that began their surge last week. Specialists can't explain why. [Another good title for a book or film on the coming glacial period.] 'We have more than 50 in some state of fast motion,'

glaciologist Larry Mayo of the USGS Fairbanks office said. 'Usually we have only 10 in any given year.' " (***Boston Globe***, 9/17/86)

"Sea Level Changes: An Enigma" – "Whether sea level is now rising is an enigma, according to Mark Meier, a glaciologist from the Institute of Arctic and Alpine Research at the University of Colorado (Boulder). ... Meier repeatedly emphasized the large uncertainties in all present sea level change estimates and suggested that there actually may be a lowering of sea level that is caused by an interior thickening of Greenland and Antarctic ice sheets." (***Eos***, 68: 2, 1/13/87)

"Glacier scientist keeps tabs on worldwide trends from ice field" – "The world may be warming instead of cooling like it should be, but that isn't stopping the Taku Glacier south of Juneau from continuing an amazing advance. That, in a nutshell, is some of the news gleaned from eight weeks of scientific work this summer atop the Juneau Ice Field by noted glaciologist Maynard Miller. ... The 65-year-old professor, who has been studying the world's climate from atop North America's fifth largest ice field for 41 years, said he was startled by this summer's results. ... He said last year well over 200 feet of snow must have fallen in the 220-square-mile area that gives birth to the Taku Glacier, between 4,300 to 5,500 feet above sea level. He said the Taku, while spreading out at its face, currently is advancing about 500 feet a year. While the glacier is melting rapidly at lower levels, the huge surplus of snowfall at higher elevations – 120 feet of ice this year – will overpower the melting. And he said the surges of ice now forming will be working their way down the glacier for the next 30 years, prompting an accelerating growth of the glacier's face well into the next century. …

"Miller said that as a result of the warming [differential surface heating] trend ... more clouds and moisture are being produced over the Pacific Ocean [and all others subject to intensified greenhouse effect heating and evaporation]. He said that moisture is falling at lower elevations in the form of rain, and at higher elevations it is coming in the form of snow.

He said that, and the fact that the process is shifting the boundary between colder interior air and warmer ocean air farther inland, helps

account for the continued retreat of low-level glaciers [which get most publicity and are pointed to as evidence for "global warming"], like the Mendenhall Glacier. He said it also accounts for the advance of higher-spawn glaciers like the Taku and Yakutat's Hubbard Glacier. ... The glaciologist said the key question now facing scientists is whether the greenhouse effect may short circuit itself by increasing the globe's cloud cover sufficiently to reflect enough energy back into space to shift the balance back toward producing a cooling trend. 'It really is a very complex equation and all we can do is increase our research and monitor the trends,' said Miller, noting an increase in drought conditions in the Pacific Northwest may be the result of the shifting of Southeast's weather front boundary farther inland." (***Juneau Empire***, 9/2/87)

"Iceberg is more than a mere chip off the old block" – "An iceberg about 155 kilometres long, 40 kilometres wide and 275 metres thick has broken loose from Antarctica, the American National Science Foundation reported yesterday. ... Icebergs regularly break away from Antarctica, but the latest one represents two to three times the normal amount of ice that breaks free in a year. ... The Ross Ice Shelf, a giant sheet of floating ice from which the iceberg broke off, extends down from the rocky mainland and is about three times the size of Victoria. The ice shelf itself is moving out to sea, pushed by two glaciers on the mainland, and 'as the tides and the waves and the movement continues, those chunks break off and float out to sea,' Mr. Zumberg [president of the Univ. of Southern California and "an expert on the Antarctic icefields"] said." [emphasis added] (***Melbourne Age*** 11/7/87)

Excerpts from three letters sent by Boudewijn Weperif, a correspondent In Sweden: "It seems so clearly right what you anticipate. In Karlstad [west of Stockholm at about 59 deg. N latitude] here we have had the coldest summer since records began in the 1850s. In Finland every crop has failed, except a little oats coming through now. Yet nobody seems overly concerned, or very few. We have put a ton of local 0-2 mm rock dust on part of a spruce plantation and on our small garden, and a friend is doing a pot test this week." (10/5/87) "I have sent information to a Prof. Anders Rapp at University of Lund. He and another have come out with an Ice Age conclusion based on the Gulf Stream slowing and cooling. When I

spoke with him on the telephone, he said he had not heard of Hamaker! I suggested he send you material and order the book." [I gave him the book.] (1/16/88) "John Pohlman ["the main TV weatherman"], to whom you sent TSOC, has just come out tonight on RAPPORT, the main news bulletin saying that there is good evidence of an encroaching ice age, that could happen suddenly. Winter temperatures in the north are down 6 to 7 deg. C [?!] from 1931 to 1941 averages, he said, and lower in the south also. Summers were definitely hotter then, also. The same pattern applies to Iceland and No. America, he said. ... He looked a happier man coming out with the truth! But nothing on remineralization." (4/15/88)

"Growth of Greenland Ice Sheet: Interpretation" – "An observed 0.23 m/year thickening of the Greenland ice sheet indicates a 25% to 45% excess ice accumulation over the amount required to balance the outward flow. … Increasing ice thickness suggests that the precipitation may be a characteristic of warmer climates in polar regions. [from the Abstract] ... The relation between precipitation changes and temperature changes in polar regions is of central importance to understanding current and future behavior of the ice sheets. In polar regions, enhanced precipitation is associated with warmer temperatures because of the greater transport of moisture in warmer air (24, 25). ... An increase in precipitation and temperature should cause an immediate positive change in the mass balance and a gradual steepening of an ice sheet, which would continue for many years as the ice flow responded to the driving stresses." (***Science***, 12/22/89)

"Geese in the Global Greenhouse" – "Each year, as winter eases its chilly grip on the landscape, hundreds of thousands of snow geese leave their seasonal haunts in the southern United States and congregate for the long flight back to the Canadian north. …

"Robert Jefferies, a botanist at the University of Toronto, has found that for most of the past decade heavy snowfall and sun-obscuring cloud cover have conspired to delay the Canadian snowmelt and interrupt the birds' migration. In the 1980s, Jefferies says, the snow line was 90 to 150 miles south of where it was in the 1970s on May 15, which typically marks the start of the nesting season. As a result, when the geese arrive, the northern shores of the bay are still under

snow. Immense gaggles of geese accumulate at its southern shores and remain trapped there for up to several weeks. …

"Climatologists are still debating if the recent changes in weather patterns are a temporary aberration or the beginning of a long-term trend. Jefferies notes that some computer models of the greenhouse effect for Canada suggest that dense cloud cover will continue to delay the springtime snowmelt." (***Discover***, April 1990)

In November, 1991 an additional study confirming Antarctic snow and ice buildup, "Evidence from Antarctic ice cores for recent increases in snow accumulation," was published in ***Nature*** (11/7/91). A key quote from the four Australian authors, from the Abstract:

"We find a significant increase in the accumulation rate following a minimum around 1960, leading to recent rates that are about 20% above the long-term mean. If this recent increase is widespread, as suggested by shorter-term data from across a large part of Antarctica, the positive imbalance (5-25% of the mass input) shown in recent studies of the ice sheet's mass budget may have existed only since the late 1960s. We estimate that this increase in accumulation rate should contribute to a lowering of sea level of 1.0- 1.2 mm per year."

I don't see anything in their analysis addressing the possibility of an accelerating rate of accumulation.

"A House of Cards" – … Why isn't the sea rising? Because many glaciers are growing, not melting. Researchers have identified places where ice is in retreat; most are tropical or relatively small glaciers that may have been melting since the end of the Little Ice Age. In the Arctic and Antarctic locations where the major ice masses reside, net glaciation may be increasing. A researcher named Jay Zwally surprised the climate business two years ago by showing that the central glaciers of Greenland have grown in the very years that global temperatures got higher.

"Glaciers get bigger while temperatures get higher – impossible. No, perhaps inevitable. In the zones that adjoin the North and South poles it's so cold that snow, the raw material of glaciers, rarely falls. Increasing temperatures might cause more precipitation, but not

enough additional melting to counter the buildup. This could mean more of the world's water locked up in ice." (***Newsweek***, 6/1/92)

"Savage winter heralds a new Ice Age over Great Lakes" – "Great Lakes? Try Great Ice Fields. Winter's arctic siege, remarkable for its intensity and duration, has turned vast stretches of the nation's five inland seas into ice-covered, wind-swept plains. Portions of the Great Lakes commonly freeze over in the dead of winter. But the ice hasn't been this widespread or thick since the late 1970s. … Ice covered more than 90 percent of Lake Superior and Lake Huron last week, according to the National Ice Center run by the Navy and the National Oceanic and Atmospheric Administration. That's not unusual for Huron, but Superior, with its vastness and depths reaching 1,335 feet, seldom has more than two-thirds of its surface covered. … Measuring ice cover is no easy task. The primary tools are satellite photography – often hampered by clouds – and aerial observation by the Coast Guard, which lacks the time and resources for complete inspections." (***Detroit News***, 2/6/94)

"Iceberg Severity off Eastern North America: Its Relationship to Sea Ice Variability and Climate Change" – "Most GCM (general circulation model) simulations (IPCC 1990) suggest that continuing anthropogenic increases in atmospheric greenhouse gas concentrations will lead to overall global warming. …

"The more than two decades of cooling and ice advance recently observed in Davis Strait and adjacent areas does not resemble expectations based upon the above-noted equilibrium and transient simulations. … In the former case, however, warmings of 2 deg. to nearly 4 deg. C were also predicted in the Baffin Bay and Davis Strait areas, which have been the centers of the recent regional cooling. Somewhat weaker warming was likewise anticipated on the Labrador shelf and on the Grand Banks, where cooling also has been observed. …

" … Direct and indirect measures of the DSII [Davis Strait Ice Index] suggest that regional ice severities have been at or near maximum twentieth century values for slightly more than two decades, with large regional ice extents and cold temperatures being particularly characteristic of the last decade. … On decadal timescales, high

(low) regional ice extents tended to be associated with increasing (decreasing) global temperatures. As well, the available data suggest that the opposite signs generally associated with temperature trends in, alternatively, the area west of Greenland and in the rest of the Arctic since at least 1961 (Walsh 1993) are also apparent in the corresponding 1953-90 mean annual sea ice extent trends.

"Clearly, if recent data are representative of a regional response to global warming, that response has been toward lower temperatures and higher ice extents, producing conditions comparable to those prevailing before the anomalous global cooling period. This response differs considerably from the warming and ice retreat that have been anticipated by most recent GCM simulations." (***Journal of Climate***, Sept. 1994)

"Glacier Fluctuations in the Southern Alps of New Zealand Determined from Snowline Elevations" – "Preliminary analysis of 452 determinations of end-of-summer glacier snowline altitudes (ELAs) made over 17 yr on up to 47 glaciers show good correlation with major climatic events, and conform well with fluctuations of glacier termini when reaction times are taken into consideration. With snowline altitudes used as surrogates for annual mass balance values, there is a recent trend to increased mass balances, i.e. a climate 'cooling,' which follows a long period of predominantly glacial recession. … The current resurgence of the more active glaciers should continue in the near future." (from the Abstract) (***Arctic and Alpine Research***, Vol. 27, No. 2, 1995)

"Ice Age Relived on the Island of Rügen" – "Cold as this winter has been so far in Europe, two geologists say it was the winter of 1995-96 that saw a 'mini-ice age' in the northern reaches of Germany. Konrad Billwitz of the University of Greifswald (Mecklenburg-Vorpommern) and Birger Tinz of Berlin's Humboldt University report in the latest issue of ***Geo*** magazine that the Baltic island of Rügen had its coldest winter of the past century and a half last year, experiencing a total of 126 days with temperatures below the freezing point. During the cold spell, harsh storms hit the southern coast of the island and battered it with huge ice floes. Like glaciers, the thick sheets of ice pushed trees, rocks and soil out of their way." (***This Week in Germany***, 1/24/97)

In his 2/2/97 ***Science*** article, “Rapid Sea-Level Rise Soon from West Antarctic Ice Sheet Collapse?,” Charles Bentley (Geophysical and Polar Research Center, Univ. of Wisconsin, Madison) discusses the West Antarctic ice streams and says that “9 out of 10 exhibit a positive or near zero ‘mass balance’ (mass in, by snow accumulation, minus mass out, by ice flow).”

“Third successive winter with large ozone loss in the Arctic stratosphere” – “For the third winter in succession, record low temperatures in the Arctic’s lower stratosphere, coupled with the presence of manmade pollutants, have resulted in extensive chemical destruction of the ozone layer. The latest European research, sponsored by the European Commission’s Environment and Climate Programme and national agencies, has found evidence of up to 40% ozone depletion in the Northern Hemisphere. …

“Analyses of stratospheric temperature data shows that the stratosphere during March 1997 was by far the coldest on record. The average monthly mean over the Pole was some six degrees lower than the previous minimum average. These very low temperatures in the Arctic springtime for the third successive year give rise to the concern that they may be part of a longer-term trend.” (***European Commission Environmental Research Newsletter***, June 1997)

“Atmospheric Circulation and Variations in Scandinavian Glacier Mass Balance” – “ … the largest glaciers at the Norwegian coast have advanced since the late 1980’s (Haakensen, 1995). The more continental inland glaciers of Norway and Sweden have halted a retreat going on since the 1920s and are now accumulating mass (World Glacier Monitoring Service, 1994).” (***Quaternary Research*** 47, 29-36, 1997)

There is obviously a great need for better and more comprehensive monitoring of snow and glacier ice fields worldwide so we can better see where we stand in any effort to restore short- and long-term balance. Some perspective on this need comes from Mark Dyurgerov and Mark Meier, “Mass Balance of Mountain and Subpolar Glaciers: A New Global Assessment for 1961-1990” (***Arctic and Alpine Research***, Vol. 29, No. 4, 1997):

“There are only about 40 glaciers with continuous mass balance measurements for more than 20 yr, but more than 100 with 1 to 5 yr of mass balance records. (Abstract) … These mass balances for 257 glaciers represent many of the regions on Earth with extensive glacier cover, except for the Karakorum, Tibetan Plateau, Kunlun, Southeast Pamir and Hindu Kush, Koryakskiy Range, and South and North Patagonia Ice Fields. Mass balance data are very scarce (or have only short term records) for some regions, such as the Mackenzie and St. Elias Mountains, Alaska Range, New Zealand, Siberian mountain ranges, Himalaya, Russian Arctic islands, local glaciers around the Greenland and Antarctica ice sheets, Subantarctic Islands, Iceland, Pyrenees, and Andes. … There are insufficient (or even no) mass balance measurements in three regions with very maritime climate conditions and extensive glacier cover: Chugach/St. Elias and Coast Mountains (glacier area about 22 x 10^3 km^2), Alaska Range and Wrangell Mountains (about 23 x 10^3 km^2), Patagonian ice fields and Tierra del Fuego (about 21 x 10^3 km^2), Iceland (11.26 x 10^3 km^2), and New Zealand (860 km^2). ... There are few mass balance data available in many other mountain ranges, as has been indicated in Table 2. ...

“ … mass balance measurements have not been carried out on the largest sub-polar ice caps; those larger than 8 x 10^3 km^2. According to Meier and Bahr (1996), the total area of these glaciers is around 180 x 10^3 km^2, or about 27% of the global glacier area.”

“Dead Trees and Shriveling Glaciers as Alaska Melts” – “Scientists [most of whom, unfortunately, are looking too narrowly for “global warming” evidence] employing laser instruments have confirmed that many [?] of Alaska’s hundreds of glaciers are retreating. The warmer atmosphere, which holds more moisture, has produced more snow to feed the glaciers, but longer, warmer summers have in many [?] cases melted them even faster than the heavier snows can build them up. At this time of year, countless streams run full and chalky with tiny rock particles pulverized to dust by the glaciers. … Over thousands of miles, big patches of forest are drowning and turning gray as the ground sinks under them and swamp water floods them. …

“Along the Fairbanks-to-Valdez stretch, entire mountainsides of spruce forest, prime timberland that used to be part of the magnificent taiga, the vast boreal forest of conifers that rings the world’s northern latitudes, are dead and gray. The trees have been weakened by climate-related stress, then killed by spruce bark beetles whose population, scientists say, has exploded in the higher temperatures. ‘It has moved into high gear in the last six or seven years,’ said Dr. Glenn P. Juday, a forest ecologist at the University of Alaska. ‘It’s just rolling through the forest.’ [One photo of dying forest is captioned: “Besieged forests – Many trees are sinking into swamps and drowning as permafrost melts. Heavy snows have snapped the tops off others.” The link between heavier precipitation and soil swamping, like the soil fertility – tree health connection, seems to be ignored here.] ... The warming has been most pronounced in winter.

“Scientists are not certain how much of the regional warming relates to overall warming of the globe, if any. Some of it, they say, is clearly the result of a change in prevailing patterns of atmospheric circulation, beginning in the mid-1970s, which generally redirected the flow of warm air from the Pacific toward Alaska. ...

“On a clear morning a few miles southwest of Fairbanks ... Dr. Juday knelt on the floor of the Bonanza Creek Experimental Forest, a long-term ecological research reservation. … ‘We’re talking about the cream of the crop – the very best forests we have in interior Alaska,’ Dr. Juday said. … Normally, the snows at that latitude are light and fluffy. But recently they have become heavier, apparently a result of the changing climate. The weight of two especially heavy snowfalls in the late 1980s and early 1990s broke off the tops of trees. ‘There was an incredible outbreak of insects following that, and they attacked the trees,’ Dr. Juday said as he pointed out two topless spruce giants. … ‘These trees are in real trouble,’ Dr. Juday said. ‘We’ve got a sick forest here.’

“Farther south, much of the forest is more than sick; it is dead or dying. In a broad swath stretching 300 or 400 miles along the state’s southern tier, from the Kenai Peninsula south of Anchorage past the spectacular Chugach Mountains north and northeast of here, chunks of landscape have turned red (freshly killed) or gray (long dead). Spruce bark beetles are the killers, and they are ‘basically eliminating

the forest canopy,' said Jerry Boughton, who heads the United States Forest Service regional forest health program, based in Anchorage. A third to half of Alaska's white spruce have died in the last 15 years. …

Alaska has more than 1,000 glaciers, big and small, and together they make up the fourth-largest collection of ice in the world, after Antarctica, Greenland and the neighboring Queen Elizabeth Islands of the high Arctic. … Recent mapping of a sampling of nine glaciers, said Dr. Harrison [Univ. of Alaska], has revealed that all have thinned substantially at lower elevations, probably because of increased melting in the summer. But at higher elevations, most of the glaciers have thickened, probably because of increased winter precipitation." [emphasis added] (article by science writer William K. Stevens, ***New York Times***, 8/18/98)

"The Invisible Hand" – "From 1973 to 1993, notes [NCAR's Kevin] Trenberth, atmospheric moisture over the United States increased by 5 percent per decade. In 1995 the National Climatic Data Center found that precipitation over temperate regions of the Northern Hemisphere had increased 10 percent over the past century, while extreme rain and snowstorms have gone up 20 percent." (***Sierra***, May/June '98)

"Faraway pollution fouls once-pristine North Pole" – "Santa Claus has little reason to make merry this festive season: His reindeer are dying, he is increasingly exposed to gender-bending chemicals, and his home is dissolving. … But the warming is already playing havoc with wildlife. In recent years the number of caribou on Bathurst Island has fallen by more than 95 percent – from 24,320 animals in 1961 to 1,100 last year. The blame laid by scientists sounds paradoxical: increased snowfall. But that's because of the rise in temperature – normally it's too dry and cold to snow. The deer find it harder to dig through the deeper snow to find the moss and lichens they eat, and so they starve." (***S.F. Examiner***, 12/22/98)

From ***Riddle of the Ice: A Scientific Adventure Into The Arctic*** by Myron Arms (Doubleday, 1998):

"As I stood at the edge of the precipice gazing out at the ice, I realized there was also something else that was bothering me –

something far more important than my disgruntlement over our thwarted sailing plans. It had started with a remark that one of the ice forecasters had made during a telephone conversation a few days earlier – a speculation, really, that the massive influx of sea ice along this coast might somehow be connected to the warming of the Earth's atmosphere and that, as such, it might be a signal of much larger changes taking place in the climate system of the Arctic – possibly in the climate system of the entire planet. (p. 4)

"The ice my shipmate and I had seen from the cliffs overlooking Chateau Bay – the ice that had stopped ***Brendan's Isle*** some six hundred kilometers south of her intended destination – had remained throughout most of that region some four to six weeks longer than it should have, even in the worst ice year. Climatologists had started describing it as the most severe summer ice conditions along the eastern coasts of Labrador and Newfoundland since the beginning of modern record keeping, nearly eighty years before. …

As a result, the ice in July and August 1991 had shut down almost every activity that required heavy materials or fuel along a thousand kilometers of the Labrador coast. The ice had made a shambles of the inshore fishery, too, forcing boats to remain in harbor and destroying nets and traps. Everywhere on the coast the story had been the same: frustration and hardship. An entire summer lost. The worst ice year in any living person's memory. A disaster. A terrible catastrophe.

"Ironically, as we'd sailed ***Brendan's Isle*** north from the east coast of the United States in early July, neither I nor anyone else on board had received the slightest warning about the ice we were about to encounter. On the contrary, we'd just come from a part of the world where a heat wave was going on – the fifth in as many summers. There was a drought, too, and another bad crop year. The grass had been turning brown in June, even before we'd left our home river on Maryland's eastern shore. The leaves on the oaks and locusts and maples along the riverbanks had been stunted and curling at the edges.

“There had been talk in the newspapers and on TV about climate change, global warming. Most of this was media hype, I knew – weather talk. …

“ ‘Global warming, my ass,’ I’d muttered one afternoon as ***Brendan’s Isle*** proceeded northward along the coast of Newfoundland, heading toward Chateau Bay. How could anybody be talking about global warming with an anomalous mass of sea ice out there blocking an area as long as the entire eastern seaboard of the United States? (p. 6-8) ...

“The first surprise was the discovery that the entire geographical region between eastern Canada and western Greenland – the so-called Labrador Sea/Davis Strait/Baffin Bay (or LDB) area – was out of step with the predictions of virtually every General Circulation Model of Earth climate. According to the GCMs, the ice cover in the Arctic should have been receding and air temperatures should have been increasing as global atmospheric CO_2 also increased. Across most of the Arctic (and throughout the region when considered as a whole), this was indeed the case [incomplete and contradictory data make this statement questionable]. But in the LDB area [long thought to be a primary center of glacial period initiation] just the opposite seemed to be happening. According to recent satellite and groundstation data, the LDB area had been functioning with an opposite sign at least since 1978, with the ice cover growing and mean air temperatures falling.” (p. 14)

And shouldn’t we hear the viewpoint of an elder resident of the “LDB” region, a fisherman: The winter is become too cold of late. The ice stays in the bays too long. Birds that used to come and nest in June – they don’t come now until July. The capelin that once run up the bays in May and June now run in July and even August. The winters come too early. And there ain’t near as much snow, but much more cold and frost.

“Twenty year ago a man and his crew started fishing in these parts by April, maybe early May. Now, even in a good year, we don’t get out until June. And the ice is still too heavy, water still too cold.

"Something's happening, that's sure. The scientists ain't telling us what – maybe they don't know. But I knows. We that lives here knows. I've fished this gulf every summer for fifty-five year. And I knows. Something's wrong. Something funny's going on and they ain't telling us what it is.' " (p. 80)

And author Myron Arms' conclusion: "We are in a race against ourselves, struggling to understand a highly complex system. As signs of changing climate patterns around the Earth continue to grow, the search for a definitive climate signal that will catalyze our collective response becomes ever more urgent. Perhaps such a signal will someday emerge from the Arctic ice. Perhaps it already has." (p. 247)

"Prediction of reproductive success and failure in lesser snow geese based on early season climatic variables" was authored by the earlier-noted Robert Jefferies and colleagues in 1998 (***Global Change Biology*** 4, 3-16) and the ***Abstract*** begins:

"The North American mid-continent population of lesser snow geese … breeds in coastal areas of the Hudson Bay Region. Breeding success is highly variable, particularly during recent decades. The availability of long-term data sets of weather and the breeding success of geese allowed us to determine whether climatic variables in spring and early summer (May-June) are reliable predictors of different attributes of the reproductive biology of snow geese. A large region of strong anomalous cooling in north-eastern North America has been the dominant anomalous climatic feature since the mid-1970s."

"Summer may not come this year for Alaska's Lost Lake" – "Almost 2,000 feet high in the Kenai Mountains, Lost Lake barely emerged from winter's embrace late last summer, and now there is speculation that the lake once known for its big rainbow trout may remain locked in ice through this year. The trout are history now. They became victims of what biologists call winter kill – the gradual depletion of oxygen beneath the ice of a lake frozen too long. As for this lake, no one knows what the future holds. 'It wasn't snow-free until the end of July last year,' said Irene Lindquist of the U.S. Forest Service in

Seward, Alaska, and 'we think there's more snow there now than there was last year.' …

"Last year was a heavy snow year on the eastern Kenai Peninsula ... but it can't begin to compare with this year. Seward this winter saw a record 214 inches of snow. That's almost 18 feet – more than 4 feet in excess of the previous record of 164 inches and nearly three times the normal 74.7 inches." (***The Oregonian***, 5/2/99)

Claire L. Parkinson is an ecologically concerned and conscientious scientist, a leading researcher in the Oceans and Ice Branch, NASA/Goddard Space Flight Center in Greenbelt, Maryland. In a phone call (3/17/00) she said she certainly does agree with my perception of how the media (and not a few scientists) overemphasize the evidence on areas of ice retreat while ignoring important areas of ice growth, including the Arctic sea ice record she had published in the ***Journal of Geophysical Research*** on 9/15/99. A few words from Claire from her article, "Recent sea-ice advances in Baffin Bay/Davis Strait and retreats in the Bellingshausen Sea" (***Annals of Glaciology*** 21, 1995):

"In this period of high interest in climate change and the potentially disastrous alterations that human activities could be precipitating, it is particularly important that a balanced picture be provided. If nothing else, this will lessen the chances that the reporting of truly significant changes (whether gradual or abrupt) will be diluted because of too many earlier false cries of 'fire,' or, in this case, 'ice disappearance.' Because sea-ice decreases conform easily with a concept of climate warming, the short-term, seasonally dependent sea-ice decreases in the Bellinghausen Sea can be taken out of context and highlighted as supposed evidence of global warming. It is important to keep in mind that over the course of the satellite record available so far, all several-year periods show some regions experiencing ice-cover increases and others ice-cover decreases."

Claire has, since the early 1990s, expressed her concern that our overall monitoring of sea and land ice changes and trends is inadequate to provide us a full picture of what is really happening. One would think that by now (March 2000) the worldwide cooperative

effort to obtain a full picture would be a major undertaking of the U.S. and many countries ... but is it?

More "Non-Global Warming" Information and Perspectives Lending Further Support For The John Hamaker Synthesis

"Is the Earth cooling or warming? The correct answer is, always has been, always will be, BOTH. ...in general terms however, the mechanism commonly called Earth's 'weather machine' is simple and straightforward. It is a giant heat pump gathering warmth near the equator and distributing it by liquid and gas working fluids which circulate between the equator and the poles." (pp. 33-35 ***The Cooling***, Lowell Ponte, 1976)

From ***Winters of the World – Earth Under The Ice Ages*** (1979) by Brian John:

''On page 34 it was noted that glaciers can grow as a consequence of climatic warming. This apparent paradox has to do with the fact that for their growth glaciers require abundant moisture rather more than low temperatures, so that moist cool conditions are more favorable for the inception of an icesheet than are cold dry conditions." (p. 52)

"The onset of the last glaciation was, when seen in the context of geological time, a dramatic event. However, the speed of ice build-up poses its own special problems. … The paradox of the last glacial inception is how to build icesheets at the rates suggested by the geological evidence. The rates are such that more moisture needs to be pumped into the areas of ice-sheet growth, and this in turn implies that in such areas temperatures may not have declined; they could even have risen." (p. 192)

"Observed and Predicted Effects of Climate Change on Wolverine Glacier, Southern Alaska" – "A small but hydrologically significant shift in climate occurred during the study period of 1967-1981 in the glacier-clad mountains of southern Alaska. Air-temperature and glacier snow-and-ice balance measurements taken continuously show that air temperature increased abruptly in 1976 and was

accompanied by substantial glacier growth. This measured relationship is contrary to the generally accepted hypothesis that glaciers diminish as climate warms. [from the ***Abstract***] ... The surprise is that glacier melting did not increase sufficiently to offset the increased snow precipitation during these warmer years. ... The results from the Wolverine Glacier study suggests that other glaciers may also respond to major changes in climate in a similar, complex manner. Therefore, the generally stated precept that 'glaciers shrink with warming climate' cannot be substantiated in detail. A CO_2-induced warming of climate may at first produce strong growth of Wolverine Glacier and an unknown number of other glaciers. This glacier growth would partly compensate for or exceed the expected recession of other glaciers and thus reduce or even reverse the generally anticipated rise in sea level. Furthermore, the analysis suggests that even large ice sheets such as Greenland and Antarctica may respond in surprisingly complex ways to rises in global air temperature. We suggest that general global warming could produce a worldwide mixture of glacier growth and glacier thinning with nonsynchronous advances and retreats rather than a simple worldwide recession." (Larry R. Mayo and D.C. Trabant of U.S. Geological Survey, Fairbanks, Alaska in ***The Potential Effects of Carbon Dioxide-Induced Climatic Changes in Alaska***, Misc. Pub. 83-1 of School of Agriculture and Land Resources Management, University of Alaska-Fairbanks, 1984)

"Carbon Dioxide in Context" – "... We have heard much high-quality science and scholarship and plenty of diverse data which reveals that the task of understanding the extent and significance of atmospheric carbon dioxide will surely be difficult and probably slow. The problem and it does appear to be one, is extraordinarily complex, and has so far yielded little to the combined intelligence and skills represented by the people gathered here over the past two days. No basis for synthesis of our meeting exists, and if one were possible I would not be the man for the job. The best I can do is to offer some ideas about the context of our investigations, to raise some questions that have not so far been addressed, and to suggest some next steps that might be taken. ... For all the sophisticated testimony we have heard, I am yet astonished at the amount of reputable scientific opinion, currently available, that has not been mentioned or considered at this conference. … There is also a substantial difference of opinion within

the scientific community which seems to have been totally overlooked [as at most conferences since] in the presentations at the conference. There is a reasoned body of opinion supported by substantial data suggesting that the earth is cooling, not warming, and that we are possibly on the verge of a new glacial period. Lowell Ponte's book ***The Cooling*** (Prentice Hall, Englewood Cliffs, New Jersey, 1976) presents one such scenario, and John Hamaker and Don Weaver, ***The Survival of Civilization*** (Hamaker-Weaver Publishers, Burlingame, CA 1982), offer yet another version of global cooling [largely energized by the intensifying greenhouse effect surface-heating of our 73% water-covered planet]. These analyses suggest not only changes in ocean levels and agriculture, but also increases in earthquake and volcanic activity as continental weights change. The timetable suggested for these changes is in decades, not centuries or millenia. Human and animal population changes or migrations would surely accompany such shifts, not to mention enormous social, cultural, and political upheavals. I wonder if we have overlooked such possibilities by limiting ourselves to the relatively modest question, 'Is Alaska getting warmer?' " (Joseph W. Meeker, concluding the 1984 University of Alaska Conference on "The Potential Effects of Carbon Dioxide-Induced Climatic Changes in Alaska.")

Iben Browning was a climatologist and futurist who, like Hamaker, had a very inventive and world-encompassing mind. He held 66 patents and authored books such as ***Climate and the Affairs of Men*** and ***Past and Future History: A Planner's Guide***. Some of his comments, first from his ***USA Today*** interview of 1/23/85:

"I consider this freeze a major disaster for the Florida citrus industry. … A number of producers will go bankrupt. … The entire agricultural community in the United States is in extreme distress, and that's partly a reflection of this general trend in the weather. Over the long term, there are several famines that will diminish the world population – massive crop failures in Russia, China. Migrations are also a consequence. … It's getting cooler. The glaciers are growing almost everywhere in the Northern Hemisphere. Canada, the second greatest wheat exporter on earth, is having problems. In 1982, the year of the great volcano, El Chichon in Mexico, Canada had a frost

on Aug. 19 that killed 90 percent of all the wheat north of Calgary. All the theories that say it is going to get warmer are just theories."

And from ***Wealth***, Winter 1985:

"Toledo, Ohio, had an 11-year running average 195-day growing season in 1930; now they have a 120-day season. In 1956, the southern portion of Russia, where most of the Soviet grain is grown, had a 100-day growing season. Now, our satellites show snow as late as the middle of June and as early as the middle of August in that area, meaning they have a 60-day growing season for 95-day wheat. …

Since 1972, we have lost four million square kilometers of land to 12-month running average ice cover – that's 3.8 percent of the entire land mass of the Hemisphere. As the ice continues to advance, by 2010, Canada will grow no grain."

Dr. Viktor Kovda was, in the 1980s, head of the Scientific Council on Problems of Soil Science and Reclamation of Soils within the Academy of Sciences of the USSR. Excerpts from letters written to ***Secrets of the Soil*** co-author Chris Bird and to Don Weaver:

"Dear Christopher, Please excuse my delay in answering your kind letter of last summer. I got that letter as well as your book ***The Secret Life of Plants*** and a collection of references on climate, all of which are of the greatest interest to me. Many thanks for this kindness of yours.

"As a soil scientist, I am much involved in both ecological studies and problems concerning current climatic trends. I am fully informed concerning the existing prognosis of global warming influenced by a growing CO_2 concentration in the atmosphere. Observations by Soviet scientists in the USSR have compelled me to believe that, on the contrary, it is cooling which has taken place over the most recent period, 15-20 years. The signs of permafrost shifting southward, some shortening of the growing season and the increased severity of winters as well as the freezing of northern seas are the valid arguments for me.

"It may be a question of a periodic fluctuation (like those that have taken place in the past) or it may be the beginning of the next glaciation. This is a matter for research and discussion. But there are no signs of a forecasted warming and that is definite. This statement of mine has been published in Russian and English several times, namely that cooling goes hand in hand with an increase in arid lands as can be now observed practically everywhere. (1/3/85)

"Dear Donald, I am most grateful to you for your letter, for the manuscript and for the copy of your wonderful [***Solar Age or Ice Age***] ***Bulletin*** No. 8 sent to me recently. The ***Bulletin*** is of extreme interest, very informative and most useful for every ecologist. The collected information in these documents definitely confirms your-our (including myself) ideas on growing cooling (and aridization) of the Earth in current period of the epoch. The mechanism of cooling suggested by Dr. Hamaker and by you (increased evaporation of ocean waters, transport of clouds toward polar regions, increased snowfalls and ice formation, increased Albedo and movement of ice masses from poles to neighboring territories) I consider as fully applicable and valid. In regard of CO_2 global management I have published 2-3 times earlier my advice and suggestions: reforestation of land, increase of humus content of the arable soils and increase of agrobioproductivity of land by means of rational agriculture. … Remineralization and liming of exhausted and particularly of acid soils will be most useful in that sense." (11/5/85)

12/31/85 report by Don Weaver: "Last night on Ted Turner's 'The Weather Channel,' cable 13 here, one Vince Miller came on with a taped segment (which I've seen repeated at least 5 times) on the greenhouse effect. He said that some scientists think it could melt the ice caps and flood the coasts, etc. But then he said ***however***, other scientists think that the warmer atmosphere would hold more moisture, resulting in more clouds to reflect solar radiation back to space, and, since the polar regions are like deserts in terms of precipitation, the increase of clouds would drop more snow there, which might expand the ice caps and bring on a new ice age. Graphics showing the coastal flooding scenario, then the heavy cloud cover reflecting sunlight, falling snow and a globe with expanding ice sheets (down into the temperate zones) accompanied the narration.

Either way, Vince Miller concluded, the consequences are scary and cause for concern.

Is Ted Turner, who has received TSOC, Bulletins, letters, and who had John Hamaker on his Superstation Ch. 17, responsible for this first (to my knowledge) such public 'educational brief' on the greenhouse-glaciation danger? Or is this Vince Miller's initiative? Or is another group or agency or part of the government sponsoring this to gradually introduce the public to this story, the Big Story of glacial climate change – and the necessity of our re-establishing the global balance of nature? ? ?

"The increased CO_2 in the atmosphere during the 'Industrial Era' has not caused a warming or 'greenhouse' effect as had been predicted. Perhaps the increase in particles in the atmosphere and other factors have nullified the effect of the CO_2. Only when data from as many different scientific disciplines as possible are considered can an adequate systems model be made to predict the future. If we are again to have a mini 'glacial period' in the late 20th and early 21st centuries, the relocation of large human populations must be planned in advance in an orderly fashion if we are to avoid wars for food and water. The regions with favorable climates are already overpopulated and in many places facing major drought periods. …

"This latter condition can be expected to continue at even a more rapid rate during the remaining part of the present century and into the next, if the mean annual temperatures continue their downward trend. Freezing temperatures and snow cover are being experienced much further south during the winters in Florida and other Gulf Coast states, as well as in Mexico, compared to similar periods of time in the 1950s and 1960s. The timber lines of the Alps and other high mountains in the Northern Hemisphere have dropped in altitude considerably since the mid 1960s.

"At present many politicians and even many earth scientists, as well as the average citizens and business executives, do not wish to engage in serious historical paleoclimatic studies for fear the facts or truths discovered would apply to our erratic weather conditions of today and the results would be harmful to an optimistic portrayal of the future, and the growing economy would be adversely affected. A

serious depression might follow. Fortunately there are private citizens, professional people, scientists, educators, leaders of industrial corporations, and others who are anxious to learn if any reliable data can be obtained about long-term climatic trends. The disasters which happened to past civilizations are more likely to be prevented if we are able to establish a reliable, well documented climatic model which the governments of the world would consider. [Schultz has since been sent ***TSOC***.] Many interdisciplinary working groups are needed to solve many of the world's stratigraphic and correlation problems in order to see how the paleoclimatic information correlates world-wide, at least in the Northern Hemisphere. This has been one of the aims of several working groups of TER-QUA (Institute for Tertiary-Quaternary Studies), a Division of the Nebraska Academy of Sciences. Climate has always had so much to do with the affairs of mankind, as well as for an understanding of the formation of the earth." (C. Bertrand Schultz and Marian R. Schultz, TER-QUA, Lincoln, Nebraska 68588 – paper presented at the annual meeting of the Society for General Systems Research, May 27, 1986 in the session entitled, "Applying Systems Theory to the Problem of World Peace: A Case Study of Glacial Cycles and Climate Change.")

"Hardiness Zones Remapped" – "The hardiness-zone maps that gardeners are accustomed to seeing in nursery catalogs no longer are reliable planting guides in many parts of the United States. The climate in North America has been growing colder, and in some areas the change in temperature patterns has been great enough to make a real difference to gardeners and landscapers.

"According to a report published by Meteorological Evaluation Services Incorporated (MES), a consulting firm located in Amityville, New York, more than 60 percent of the National Weather Service's stations have reported record low temperatures for the past twenty years, and almost half have recorded alltime lows since 1973. These changes have prompted MES to redraw the boundaries of the hardiness-zones. …

"The most significant differences between the old and revised hardiness-zone maps can be found in the Southeast and the West. For example virtually all of Florida used to be in Zone 9, but now the northern part has been reclassified as Zone 8, reflecting the hard

freezes that have hit the state's citrus orchards in recent years." (***Country Journal***, June 1986)

"The widespread acceptance of the 'Greenhouse Warming Theory' is one of the most curious tales in the history of science. This idea has been pushed at the public in Sunday Supplements, television 'science' documentaries, and in numerous magazine articles. It has appeared with increasing frequency in the scientific literature since about 1976. Since June, 1986, there has been a vigorous and apparently carefully orchestrated effort to propagandize the idea of global warming in newspapers, newsmagazines, and, most intriguingly, the newsletters of civilian action organizations, particularly environmental organizations. As one might expect with all this media attention, Government has awarded large amounts of money to researchers who would publish evidence in support of the greenhouse warming theory. Indeed, for the last decade, only those scientists supporting this theory have received any money from Government to do research on climate or weather. [I do not know if this is 100% correct, but so it appears.] What makes all this so curious is that there isn't a shred of evidence that the world is warming [as a whole, he means; he supports the Hamaker differential heating-and-cooling explanation]: indeed, all available evidence suggests that every part of the greenhouse warming theory is incorrect or incomplete and that the world is cooling rapidly. Even more curious, the evidence for global cooling isn't just in the form of esoteric, highly technical data … newspapers and television are full of evidence for global chilling [and extremes of all kinds as predicted by Hamaker since the 70s]." (Professor of Environmental Studies and Zoology Kenneth E.F. Watt of Univ. of Calif. Davis in "The Strange Tale of the 'Carbon Dioxide Greenhouse Warming of the Earth': The Expanding Influence of Politics in Science," ***Earth Regeneration Society Special Paper No. 673***, 12/86)

"Stronger hurricanes feared" – "Some future hurricanes may pack up to 60 percent more punch if humans keep pouring carbon dioxide into the atmosphere, a new study says. ... A warming in ocean surfaces increases the amount of heat energy that can be fed into a hurricane through evaporation, he [Kerry Emanuel of MIT] said. Evaporation can occur only until the air becomes saturated, and warmer ocean surfaces allow more heat to be transfered before saturation takes

place, he said . … the link between sea surface temperature and greater intensity of hurricanes 'is well known and supported by many previous studies.' [Richard Anthes, director of the National Center for Atmospheric Research] Hurricanes also could become more frequent in response to ocean and atmospheric warming, he said." (***Austin-American Statesman***, 4/5/87)

"A Scientist Despairs" accompanied the feature article, "The Cooling, Part 2" in ***Solstice***, Dec. 1987. The scientists involved are George Kukla and Irving Kaplan, and their exchange may be of more than historical interest to re-publish here:

"The research of George Kukla, a climatologist at Lamont-Doherty Geological Observatory, has provided a number of key links in the emerging Cooling scenario. His work with loess deposits in Czechoslovakia in the 1960s revealed the existence of ten [and later 17] prior ice ages. … Below are excerpts from personal correspondence between Dr. Irving Kaplan and Dr. Kukla, following Kukla's participation in a U.N. presentation on climate in January of 1977.

"***Kaplan to Kukla***: 'Although I consider you to be, probably, the world's leading climatologist, I must make a few comments on points which are mainly omissions. Despite the fact that you were the principal convenor of the Brown University conference on climatic change in 1972, and that you and other participants in this meeting were the first to notify governments of the danger from the climate, it appears that the presentation at UNITAR [United Nations Institute for Training and Research], on January 7, 1977 falls within bounds of the same message given to the media by at least four scientists during the last 3 or 4 months [i.e., on the warming of the greenhouse effect]. My comments are therefore aimed at your discipline, or a segment of it. ...

'I understand the scientist's need for detachment, and his need for decisive evidence. However, the scientist is embedded in the person, and can never become fully detached except as the person becomes pathological. ... The probability of climatic disaster in the very near future is great, and the scientist must communicate the danger as a person. …

'If waiting for better evidence will be responsible for the loss of substantial life and property, society may hold the scientist guilty of malfeasance – or worse, criminal charges. Since quick technological remedies are available to the knowledge of science ... law and ethics may find you culpable. ... '

"***Kukla to Kaplan***:" I understand the desperation which you, dedicated researcher and sensitive human being, feel in front of a scientific community reluctant to sound an alarm of an impending climatic catastrophe. Six years ago when my data showed the present interglacial coming to an end, and I realized the potential hazards for the human race, I too felt concerned. Centuries ago with such news one might have become a prophet, mounted a camel, and tried to push Tuaregs out of the Sahel. But today with almost everyone skeptical to scientific predictions, who would take me seriously? Would you?

'So as you know, together with R. Matthews and several other colleagues, I convened a conference at Brown University to critically check the data. This took time. However, the resulting report sent out with personal letters to the leaders of our country and the U.N. has had its impact. Our government has reacted in a serious and highly responsible manner. Could you think of a better course of action to have followed?' " Kukla later added: "We are still next to ignorant of how our climate system works." Soon after ***The Survival of Civilization*** was originally published in 1982, he ordered a copy at Lamont-Doherty. Since then "mum" seems the word in force. Well-known and widely-respected climatologist Reid Bryson of the Institute for Environmental Studies, Univ. of Wisconsin-Madison, another frequently unafraid to discuss "cooling" and glacial-interglacial cycles, may have explained alot of the "mum" in his letter of reply (11/30/83) to Kathleen Clement of Earth Regeneration Society when he wrote:

"Dear Ms. Clement: You write a difficult letter to answer! Your letter was loaded with very perceptive observations and questions, so that my instincts as teacher put great pressure on me to provide some partial answers and some guidance.

"However, a complete reply would lie somewhere between a monograph and a full-length book! One picks up quite a few ifs, ands, and buts in 35 years of research on climatic change.

"You spotted George Kukla's backing off the 'when will the present interglacial end.' George is very bright, but by nature and background a survivor. He told me he had taken so much 'flak' from the establishment that he wasn't going to fight it anymore. He still does, but with ridicule. I have had a member of the NAS [National Academy of Sciences] Committee on Atmospheric Sciences tell me 'on behalf of the committee' that I should stop saying the things I was saying, too. I found that he could not identify a single thing I had said in the scientific literature that was objectionable, it was what reporters said that I said that bugged them. I told them where to go – and now I'm as 'non-person' as Khruschev with the establishment."

"Experts Toss Stones at Greenhouse Theory" – "A number of prominent weather experts are challenging the theory that the Earth is in for a disastrous change in climate because of the so-called greenhouse effect. According to this theory, discharges of carbon dioxide and other gases into the atmosphere are warming Earth so rapidly that droughts, floods and the biggest weather changes in recorded history are just around the corner. But according to Reid Bryson, a pioneering professor of meteorology at the Univ. of Wisconsin, the theory that Earth can expect major climate changes 'is based on flawed data.' If anything, the worldwide climate over the past 40 years is getting colder, not warmer, he said.

"James Goodrich, whose 30 years in meteorology includes a stint as the chief climatologist of the state of California, agreed. Goodrich said 90 percent of the temperature measurements that indicate a warming trend were taken in cities – which he called 'urban heat environments.' His own research in California showed that although average temperatures in places like Los Angeles had increased four degrees over the past few years, temperatures in rural areas, which make up 96 percent of the state's land, had either stayed the same or gone down. ...

"Kenneth E. F. Watt, a professor of zoology and environmental studies at the Univ. of Calif. at Davis, goes even further. He called the

greenhouse ["warming"] theory 'the laugh of the century,' and 'a puff piece blown up in the media.' [Unfortunately Watt's counter-explanations based on the Hamaker Thesis apparently don't make it through the "filters" in articles like this one.] ... According to Watt, all but 270 of the 11,600 weather stations reporting data to the National Weather Service in the United States are in cities or at airports. Examination of weather records taken at assorted rural locations throughout America show that average temperatures taken in the 1940s were higher than the average taken in the 1980s. ...

"Bryson, a pioneer in the field of meteorology ... believes the world's climate is gradually becoming much colder and may result in another Ice Age in 1,000 years or so. [He seems unwilling to acknowledge what Hamaker and Woillard and others have shown about the rapid interglacial termination processes.] ... Much of the scientific establishment in the United States tends to accept the greenhouse theory, which has been popularized in magazines, on television [such as Ted Turner's planned 9/23/89 "documentary" entitled "CAN POLAR BEARS TREAD WATER?" which "will reach 52,000,000 American households via TBS Superstation"; he has yet to accept the opportunity to air "Stopping the Coming Ice Age"] and in newspaper accounts. The theory is based on weather data [and non-factual estimates and projections] fed into computers and extrapolated from there. ... Curt Covey, a physicist and a specialist in climate [mustn't we all strive to be "specialists" in ***Ecology***?] at the Lawrence Livermore National Laboratory, is one of those who believe the greenhouse theory is accurate.

" 'It is a simple idea,' he said. 'The gases from these human activities have increased and they trap the infrared radiation and tend to train more heat on the [73% water-covered!] planet. It is very straightforward.' ... 'The question is not how good the data is but how good is the theory,' Covey said. 'I think in this case, the basic theory is pretty solid.'

"Bryson, however, does not put much weight in a scientific consensus behind any particular theory. 'The scientific consensus once was that the Earth was flat,' he said. 'A hundred years ago it was that you couldn't smash atoms. I hate to see scientists go off half-cocked like this.' " (***S.F. Chronicle,*** 8/20/88)

After reading ***The Survival of Civilization*** and follow-up ***Solar Age or Ice Age?*** Bulletins, Dr. Larry Ephron of Berkeley began an effort to help alert the world by creating the very good video and book, "Stopping the Coming Ice Age" and ***The End: the imminent ice age and how we can stop it*** (Celestial Arts, 1988). Through these and additional outreach efforts through his "People For A Future" organization, Larry made a valiant effort to make a difference before his sudden death, seemingly from exhaustion, at age 52 in late 1990. About 6,000 copies of both video and book were distributed and brought the Hamaker Thesis to many more people including via television. Unfortunately, the book went out of print soon after his passing and has not been re-published. Here are a few significant excerpts from ***The End***:

"In 1976, after 30-plus years of cooling with the CO_2 curve rapidly accelerating every year, members of the National Academy of Sciences, meeting in closed session with government officials in Washington, DC, issued a report that stated that the warming theory of carbon dioxide represented 'the best model available ... a consensus of prevailing scientific opinion.'

"In May 1977 the American Geophysical Union held a convention in Washington. One of the meetings was a joint presentation by Wallace Broecker, a geochemist, and William Nordhaus, a member of the President's Council of Economic Advisers, who discussed the energy and climatic implications of the recent decision by the OPEC oil-producing nations to dramatically raise the price of oil and cut off shipments to the West. It was suggested that there might be a shift toward more use of coal, a high carbon fuel that produces greater quantities of CO_2 than oil or gas. Nordhaus said that the government believes the climate is warming, and that it was leaning toward the warming theory of CO_2 – though this was not 'official policy.'

"Irving Kaplan – formerly a Navy scientist and a consultant to the UN, Club of Rome, and the Center for the Study of Democratic Institutions – was present at that meeting and says that every scientist he talked to after Nordhaus's speech had gotten the message: warming research would be funded by the government and cooling would not. The warming theory had become the 'unofficial policy' of the

government. And the government provides more than 90% of the money for climate research in the United States.

“Some thought the government’s interference in scientific research in many fields was becoming quite pervasive. The following is from ***Sanctuary***, the magazine of the Massachusetts Audubon Society (hardly a radical organization), September 1984, quoting Orie Loucks, director of the Holcomb Research Institute at Butler University in Indiana:

‘Government and industry are controlling what gets published in scientific journals by “sandbagging” the review process ... it’s like the 1950s when McCarthyism was rampant and you didn’t dare say certain things. Today we cannot get certain things published. … In the past, if you had a hypothesis and a reasonable amount of evidence to support it, you could publish it. … It starts with the big industrial lobbies. … ’

“The ‘unofficial’ shift in emphasis to climatic warming was noticed as far away as England by H. H. Lamb. In a 1985 letter to Kenneth Watt at the University of California at Davis, Lamb said that even British research had been affected, and he believed the directive had come from Washington. He noted that there was no evidence that could account for such a shift. And he said he believed there were political pressures behind it similar to those which had put off research on acid rain for many years.” (p. 97-98)

“We’ve got a big job. John Hamaker calls it the greatest effort ever undertaken. It’s certainly right up there with wars and nuclear arms races in the amount of money, effort, and organization that would be involved.

“We have to begin by spreading 3 tons of finely ground gravel dust on almost every acre of some 9 million square miles of forests and jungles: 5.7 billion acres, 17 billion tons of dust. Rock around the clock. (In areas where the soil is already very acid, one part limestone should be added to every three parts dust.) And more dust on millions of square miles where forests could grow, and then plant them. Wetlands – marshes, bayous, and swamps – should also be remineralized. (The three or four tons per acre is an approximate

figure. In areas where the soil has already become extremely acid, five or more tons may be needed – some will go toward buffering the soil, some toward restoring very weakened trees.)

"The first pass will stop most of the dying. Then we have to go back and do it again and again, to the limit of our vision and will, until we have spread enough gravel dust to completely rejuvenate the world's vegetation, and it brings down the excess CO_2 in the atmosphere. Helmut Snoek, the Bavarian scientist who has experimented with remineralization for almost 30 years, says, 'In all cases where we have applied rock dust on areas of damaged forest … forest-death was over – it didn't exist anymore!' He cites the more than 50 years of research at the University of Zurich." (p. 131)

Larry Ephron had two Letters To The Editor outlining the Hamaker Thesis published by ***The New York Times*** in the late 1980s. One was titled, "New Ice Age by 1995?" and concluded: "We know how to reverse the greenhouse effect: stop clear-cutting the earth's remaining forests, reduce fossil-fuel burning dramatically in favor of nonpolluting energy sources, plant billions of acres of new fast-growing trees and remineralize much of the earth's forests with rock dust. There may be time to stop the cycle, if we recognize the problem right away and act quickly." (7/25/88)

Hubert Lamb of England, Europe's "dean" of climatology, in his 1988 book, ***Weather, Climate & Human Affairs***: "The recent cooling of the northern hemisphere means, for example, that the latest ten-year average (since the mid- 1970s) temperatures in England are 0.25-0.3 deg. C below the 1930s and 1940s level, mainly because of cold springs. The winters have also been generally colder than the earlier twentieth century peak around 1920. In Iceland and the east Atlantic-European sector of the Arctic, the deterioration is greater and has affected agriculture as well as the ranges of fish and bird species. In Europe, the glaciers have mostly ceased their long recession and gone over to advance since about 1965, as illustrated in the case of Switzerland in figures 11.2 and 11.3.

"There are other developments which are very hard to reconcile with the concept of a world warming under the influence of carbon dioxide. Using the hemispheric maps published each month in the ***Berliner***

Wetterkarte and Grosswetterlagen Europas, issued by the Deutscher Wetterdienst, Frankfurt am Main, a count year by year of the number of months in which most of the Arctic area north of latitude 70 deg. N showed temperatures above or below the 1931-60 average yields the figures in table 11.1. This reveals a more than four-to-one preponderance of colder months in the Arctic from 1960 to 1986 compared with the previous 30 years. Prof. H. Flohn of Bonn published a similar series covering the years from 1949 to 1978 based on more precise analysis of the upper air temperature over all the Arctic regions north of 65 deg. N. He found an almost identical result from analysis of the upper air temperatures everywhere north of latitude 50 deg. N (see diagram in Lamb 1982, p. 259). The temperature prevailing after 1961 never approached the levels maintained in ten of the previous 13 years. There may have been a suggestion in these figures that the Arctic has been coldest [everyone paying close attention?] in, or just after, the years when the equatorial Pacific has been warmest: a suggestion in keeping with the correlation between the Southern Oscillation and anticyclones in high latitudes which was first noted many years ago. …

“The present writer [Lamb, continuing] has drawn attention to the remarkable incidence around the world of seasons with great extremes of one sort or another since 1960 (Lamb 1982, p. 257): up to 1986 the cases marked by extremes of cold outnumbered the extremes of warmth by about two to one. And in the centre of the North American continent, at one sample station where the temperature records have been closely analysed, namely, West Lafayette, Indiana (Agee 1982; cited also by Watt 1986), a similar trend is seen.” (p. 179-181) ...

“The Earth’s climate is produced by energy exchanges going on all the time on the hugest scale, between the tropics and the poles. Moreover, natural causes on their own are certainly capable of producing climatic changes of a magnitude that can only be called devastating. And there is evidence that, despite long periods of seemingly stable climate, some of the great changes of the past have taken place surprisingly quickly. The pollens deposited in what is now a peat-bog in the Vosges Mountains in north-eastern France indicate that in the closing stages of the last warm interglacial period the temperate fir and spruce forest in the region, which was mixed with

some oak and hornbeam, was replaced by typical pine-birch-spruce forest as in Scandinavia today perhaps within about 150 years (Woillard 1979). And within that time, the really crucial climatic shift to a colder regime may have been even more rapid. Similarly, in the ending of the warmest postglacial times only 3000-4000 years ago, all across Canada the forest retreated rapidly some 200-400 km from its northern limit and, helped along by lightning and fires among the dead wood, was replaced by tundra within about a century (Nichols 1980).” (p. 334) …

“The precise effect of the carbon dioxide, and particularly of increasing the carbon dioxide, in the atmosphere cannot be fully resolved by theoretical modelling because of the complexity of the exchanges between the atmosphere, ocean and ocean-bed, and the biosphere, and the secondary effects of changes in cloudiness. It is agreed that the last-named may be very important, not least because of the possible latitude distribution of the changes.” [Merely alluding to the threat of glacial re-initiation, apparently.] (p. 339) …

A few more lines from this excellent book from Prof. Hubert Lamb:

“The argument used by Idso for a cooling effect of carbon dioxide increase is derived from observation of the coincidence between the global, or at least northern hemisphere, cooling observed from 1946 to about 1980 or after with the most rapid increase of carbon dioxide. This argument may not be valid if other variables were responsible, more than counteracting at that time the widely expected CO_2 warming effect. The evidence of recent cooling, noted in Chapter 11, is quite strong.

“On the other hand, there are also signs that the eager search in many laboratories for verification of the expected carbon dioxide caused warming of the climates may have been pressed too hard. There is danger in the situation where scientific research is richly funded by interested parties – parties, for instance, whose own support may be affected by the outcome of the coal vs nuclear fuel debate and all those other debates surrounding the future of nuclear technologies. The most dispassionate among the informed commentators agree that it is not possible to show any conclusive evidence yet for carbon dioxide warming. Indeed, the growth of the

Alpine glaciers, the predominance of cold over warm extremes (see Ch. 11 and, for example, Agee 1982) in North America and Europe during the years of remarkable variability of climate since 1975, the occurrences of snow and killing frosts in low latitudes both north and south of the equator, the continued colder regime in Iceland and shorter frost-free seasons in Canada and northern Europe, and the continuance of temperatures in England averaging below the earlier twentieth-century level, all seem to be preferentially overlooked. [emphasis added]

"There is unfortunately room for error and misjudgement in the preparation of temperature series which attempt to present averages and trends for the whole Earth, a whole hemisphere or even a whole latitude zone. A large number of temperature-observing stations on land are increasingly affected by artificial sources of heat, particularly from urban growth, as first surveyed by Dronia (1967) and again drawn to attention in work drafted by Prof. K. E. F. Watt of the University of California at Davis (personal communication, 13 February 1985). Similarly, many sea-temperature measurements are now made in the engine intakes of ever bigger ships. And temperatures derived by sensing from satellites have their margins of error. Efforts have, of course, been made to adjust for and eliminate these sources of error. But this introduces an arbitrary element, and it may still be open to question how far such adjustments have been correct. Some of the resulting temperature series are hard to reconcile with the indications we have noted of a continuing colder climate than that before 1960, at least in the northern hemisphere. (p. 340-341) …

"Another way of looking at the climatic events of recent years is to see them in the framework of the longer-term glacial-interglacial cycles. ... Analogy with the duration of previous interglacial warm climates, such as the present, has suggested to Woillard and others, especially botanists, that the Earth may now be at or close to the beginning of the final, cool-temperate stage of the present interglacial – a natural change perhaps sufficient to 'swamp' any climatic warming tendency from the products of human activity [especially when they re-inforce the 'swamping' process], whether over the next 200 or 2000 years. As the end of the last interglacial approached, a drastic stage may have been introduced by just one very dry, hot

summer, analogous to 1976, which killed many of the firs at Grand Pile. This is an interpretation of our present situation which some suggest may have as much to do with the widely reported death of trees in Europe and North America in recent years as acid rain. It is also quite reasonable to suppose, from the evidence of past climates, that the succession of extreme summers and winters in North America and Europe since 1975 may be a signal of serious climatic change. ... The knowledge that we now have as a result of climatic studies contributes strongly to the dawning appreciation of our responsibility to care for the future of the environment which the Earth provides for mankind, for the animal kingdom and for the plant world." (p. 350-351)

And from Dr. J. Marvin Dodge, climatologist and publisher of ***Western Weather*** ("Long Range Forecasting") in his 1/21/89 'Weather Outlook – Winter 1989':

"Our weather is becoming more erratic and more variable. The general long-term trend is toward cooler and wetter conditions for most of the U.S. Climatic belts are shifting toward the equator. Colder, drier arctic conditions are moving southward in Canada. The Sahara is shifting southward, pushing the Sahel southward and intensifying the desert conditions in the previously cultivated regions.

"During the last ten years the Great Lakes have been at their highest level in history. Great Salt Lake caused panic in Utah as it filled. During the summer drought the doomsday people talking about the 'Greenhouse Effect' pointed out that four of the eight hottest years [extremely dubious due to 'urban heat island effect' inadequately accounted for, limited and imbalanced geographical/latitudinal station distribution to ascertain "averages" for globe or certain regions such as polar, etc.] ever have been in the '80s. They didn't point out that seven of the eleven coldest years have occurred in the last fifteen. The entire Midwest, Lake States and several other parts of the central U.S. set record low temperatures for three weeks in the fall. Both Minnesota and Utah had the greatest November snowfall in history. Temperature records taken in cities are misleading because cities are heat islands. (One exception – Palm Springs, California, has cooled down. There are so many golf courses, sprinklered lawns and swimming pools in this desert area that the average temperature is

decreasing.) While temperatures in the urban heat islands have been increasing, the urban areas make up less than five percent of the land area. In the 95% or more of the country which is rural, temperatures have been decreasing."

Joanna Campe reports that she attended a talk on "global warming" by Richard Houghton of Woods Hole Laboratory in Massachusetts on 8/14/89. In her discussion with him after the talk he said yes he thought the Hamaker differential greenhouse explanation may be correct, especially with the recent studies showing the generally dominant cooling effect of clouds. A large percentage of scientists will probably concede this now, but how many will be concerned enough to bring it into public discussion? Will the free-thinking scientist (and everyone) please stand up?

"Climate Change – A Different Perspective" – "The promise of a grace period of half a century before we will be confronted with major consequences of the greenhouse effect, is offered by the mainstream climatologists that provide us with their 'global warming' scenario. Considering soaring CO_2 levels, the increasing droughts of the past decade and insufferable temperatures in places as far apart as Athens and New Delhi, one wonders why the warming of the northern hemisphere amounts to only 0. 2 deg. C [questionable] over the last one hundred years. Obviously, there are areas that are cooling to compensate for the heating up in others. The Hamaker theory explains these discrepancies. A shift of precipitation to higher latitudes is showing up as early as 1966 in Alberta records. As a consequence, increased albedo at higher latitudes reduces ground level warming. The increase of the temperature differential between high and mid latitudes causes more rapid air movement to equalize these differences. Inrushes of cold waves brought killing frosts to Florida, driving the citrus belt a few hundred kilometers south. Global warming theorists promised us extended growing seasons. ... Global food shortages over the next decade as a consequence of more erratic climate behavior and deteriorating soil conditions are more than likely. The organic and inorganic carbon cycle explained by Hamaker also offers the remedy: Phasing out of fossil fuels and global reforestation [and remineralization, of course] to stabilize the climate that allowed world populations to prosper. The big question is: Will we be able to muster the political will for this unprecedented

global effort before it is too late?" (Eckhart Stoyke of the Edmonton Public Schools Centre for Education, paper presented to the Conference of the Canadian Solar Society, Winter '89)

"The Greenhouse Effect May Be Mostly Hot Air" – "Weather and rain are on a lot of Americans' minds these days. ... Skepticism of the greenhouse theory runs rampant in the scientific community [by now, one would hope so]. The voices of dissent have been mostly silent, though, because of the natural reluctance of scientists to dismiss new claims without investigation and deliberate analysis. One not so inhibited, however, is Reid Bryson, a professor of geology, geography, meteorology and several other related disciplines at the University of Wisconsin at Madison. The 69-year-old self-proclaimed curmudgeon is a towering figure in the climate field, well-known not only for articles in ***National Geographic*** and his 'Seventies book classic, ***Climates of Hunger***, but also for a large body of academic work. To Bryson, the memorable Senate testimony of NASA's Hansen [in which he asserted his "99% certainty" that "global warming" has begun] was a 'phenomenal snow job' and the greenhouse theory 'a triumph of sociology over science.'

"According to Bryson, a number of problems exist with the world temperature data used by researchers at NASA and elsewhere as evidence of global warming over the past century. For one thing, there are large gaps in the geographical coverage of the readings, including the vast reaches of the south Pacific and south Indian oceans [not to mention polar and sub-polar regions]. In his testimony last June, Hansen confidently asserted that 1988 was likely to be the warmest year on record barring any 'remarkable and improbable' cooling over the remainder of the year. Well, the tropical Pacific Ocean did cool drastically even as he was speaking. An enormous cold front also settled over a remote area of Siberia as large as the Great Plains. So did 1988 set a global heat record? It depends on what data set one looks at and which 'experts' one consults. 'People's myopia about climate occurrences is amazing,' huffs Bryson. ...

"Bryson is also disdainful of the global-climate computer models of NASA and other research groups. And indeed, these models have stumbled in a number of respects. ... 'The models also claim that far-

northern latitudes should warm the most because of diminished heat-reflecting ice and snow cover, and yet Alaska had record cold this winter,' Bryson observes. 'So here we have the new computer models, which neither back test nor explain contemporary weather patterns very well, being used by the researchers and the media to make 50-year weather forecasts. The models, in my estimation, are just mule muffins.' " (***Barron's***, 2/27/89)

From "The Most Dangerous Game" by Larry Ephron, published by People for A Future in 1989: "Rain and snowfall have been substantially increasing in the earth's temperate latitudes for the past 30 to 50 years. And decreasing in the Northern Hemisphere tropics for almost as long (Ref.s: "Precipitation fluctuations over Northern Hemisphere land areas since the mid-19th century," ***Science***, 237:171, 1987 and "Precipitation fluctuations over global land areas since the late 1800s," ***J. of Geophys. Research***, 94 (D1): 1195, 1/20/89).

"These long-term trends are obviously what one would expect from a century-long greenhouse effect. Yet nobody has been willing to make a clear connection. Though the authors of these studies point out that the increased precipitation is 'consistent with' a greenhouse warming, they argue that we can't be sure that's the cause – because the measured trends don't entirely match the projections of the computer models! Ray Bradley, one of the leading authors of these precipitation studies, maintained this position in a conversation with me even after the computer models had been discredited. …

"Isn't the greenhouse effect eventually likely to melt the polar ice caps, raising sea level and flooding coastal cities all over the world, as we've been told by leading scientific spokesmen? Quite the opposite seems to be happening.

"An expedition recently located two U.S. bombers and six fighters that had crashed on the Greenland ice cap in 1942. Pilots often reported sighting them during the 1950s, until they were covered by snowfall. After a seven-year search they were discovered in 1988 under 260 feet of ice, still intact. So 260 feet of snow and ice must have accumulated in at least some parts of Greenland during the last 35-40 years. (***S.F. Examiner***, 8/4/88)

"A 115-foot radio antenna was erected at the McMurdo Station on Antarctica in 1965. In 1989 only fifteen feet of it was still above the surface: 100 feet of snow and ice had accumulated there in the last 24 years.

"In 1987 an enormous iceberg the size of the state of Rhode Island broke away from Antarctica. Some scientists suggested it was evidence of global warming from the greenhouse effect. But James Zumberg, president of the Univ. of Southern California and an expert on the Antarctic icefields, said it had been pushed out to sea by two increasing glaciers on the mainland. Dorothy Hall at NASA/Goddard confirms that the Antarctic ice sheet is increasing in size. ("Assessment of polar climate change using satellite technology," ***Rev. of Geophysics***, 26:26, 1988)

"Fred Wood recently looked at all the available data on glacial movement and found that between 1960 and 1980, the proportion of observed glaciers found to be advancing worldwide increased from 6% to 55%. ("Global alpine glacier trends, 1960s to 1980s," ***Arctic and Alpine Research***, 20:404, 1988 – The finding is based on the approximately 1% of the world's glaciers that are monitored.)

"The greenhouse effect seems to be doing two opposite things to high latitude glaciers. Glaciologist Maynard Miller has been studying Alaska's ice fields for more than forty years. He says that the increased precipitation caused by the greenhouse warming produces more rain at lower elevations, which tends to melt lower-level glaciers. But at the same time it is creating much more snowfall at higher elevations, so the high glaciers are rapidly increasing in size and advancing. He said snowfall during the winter of 1986-87 at Alaska's Taku glacier was 50% greater than the previous 40-year record. And there was 60 times more ice accumulating on top of the ice field than was melting at the glacier's face. (***Juneau Empire***, 9/2/87)

"The U.S. Department of Energy also recently agreed with this perspective. In a May 1989 publication, "Atmospheric Carbon Dioxide and the Greenhouse Effect," the authors wrote of Antarctica: 'While air temperatures will probably warm, they are unlikely to warm

enough to melt ice except at the edges. In most places, warming air will probably carry more moisture, which will then precipitate as snow. Moisture to form the new snow deposited on this enormous continent would come from the oceans and could thus lower sea level. (Office of Basic Energy Sciences, Office of Energy Research, p. 30) …

"Robert Balling and Sherwood Idso analyzed temperature change in the United States from 1920 to 1984, controlling for population increase. ("Historical temperature trends in the United States and the effect of urban population growth," ***J. of Geophys. Res.,*** 94 (D3): 3359, 3/20/89.) They found that winters had cooled by almost 7 deg. F (3.88 deg. C) in just 60 years. …

"Geographer Russell Thompson reports that the frequency of cold winters has increased dramatically in Great Britain. Looking at the ten coldest winters between 1940 and 1988 (based on measurements at Reading), he found that five of them had occurred in the last ten years – a frequency of about 1 in 6 extremely cold winters before 1978, 1 in 2 since then. ("What's wrong with the weather?", ***New Scientist***, 3/24/88, p. 65) ...

"Steven Young, Director of the Center for Northern Studies, says, ' … evidence suggests that another episode of glaciation is probable, and perhaps imminent.' (***To The Arctic***, p. 140) The Dahlem Workshop on The Environmental Record in Glaciers and Ice Sheets concurred. Held in Berlin in 1988, it brought together a prestigious group including Alan Hecht, Willi Dansgaard, John Eddy, Chester Langway, Claude Lorius, Michael McElroy and others. Summarizing their findings, Richard Fifield wrote ("Frozen assets of the ice cores," ***New Scientist***, 4/14/88):

'The general impression to emerge from the Dahlem conference is that the planet Earth has reached the end of an interglacial period. The question is: how long have we got before the next glacial period? The evidence from the ice cores of Greenland is that cooling comes very quickly after an interglacial. According to Dansgaard, records from Danish peat bogs show that it may take only a few decades for temperatures to plummet.'

"The climatic consequences of a greenhouse effect – increasing temperature differences, higher winds, the transfer of moisture to higher latitude land areas and the buildup of ice sheets and glaciers – is the ***only*** part of Hamaker's theory that is at all controversial in science. The climatic changes that have been occurring in the past half century strongly support it. And as most climatologists discover the importance of clouds in the greenhouse process, it is becoming less controversial every day.

"It is also supported by what we know about the ice age, especially the transition from interglacial to glacial conditions about 100,000 years ago. In a recent editorial in ***Science***, Philip Abelson cited an observation by John T. Andrews that at the end of the last warm interglacial period, the major Northern Hemisphere ice sheets advanced during a period when warm ocean water was prevalent in their vicinity – water that could have evaporated easily to provide the moisture to build them. ("The arctic: A key to world climate," ***Science***, 243:4893, 1989)

"William Ruddiman and Andrew McIntyre of Lamont-Doherty went even further. They said that a warm ocean next to a cold land mass – such as is currently found in the middle north latitudes and was present during the first half of the last two periods of major ice sheet growth, is 'an optimal configuration for delivering moisture to the growing ice sheets.' ("Warmth of the subpolar North Atlantic ocean during Northern Hemisphere ice-sheet growth," ***Science*** 204:173, 1979) A greenhouse effect seems the most likely cause of that abnormally warm ocean water. … [Plus ocean floor tectonic intensification accompanying land ice buildup?].

"In the last few years scientists have been able to estimate both the amount of carbon dioxide in the atmosphere and the extent of glaciation during the past 150,000 years – by looking at changes in the tiny fossils found at different layers of deep cores brought up from the bottom of the ocean. One of the most striking things about this data – as well as very similar estimates based on cores taken from Antarctic ice – is that it shows quite clearly that the amount of carbon dioxide in the earth's atmosphere was ***rising*** during the first 5,000 years of major ice buildup that ushered in the last ice age. This is unexplainable by and completely at odds with the more conventional

notion that the ice ages may have been caused by decreasing carbon dioxide, which would presumably cause cooling.

"Ann Henderson-Sellers reports that the earth's cloud cover has increased about 10% since the turn of the century. ("Clouds gather on Terra Firma," ***New Scientist*** 8/25/88) A few years ago Stephen Schneider wrote, 'It is conceivable ... that about a 10 percent sustained change in cloud cover ... could bring on … an ice age.' (Schneider and Randi Londer, ***The Coevolution of Climate and Life***, 1984, P. 216)"

On May 1, 1989 Larry Ephron produced a paper called "Some Frequently Asked Questions About The Ice Age Theory." One of the questions he addressed was: "Why haven't more mainstream climatologists endorsed the differential greenhouse effect and this theory of the Ice Age cycles?" From his answer:

"University and government scientists tend toward skepticism or at least caution about new theories, for a number of reasons. Most of their work is supported by government grants, which could be jeopardized by statements that might appear foolish. There is also a great deal of competition in science, for prestige and for grants; there may be much more than intellectual risk in supporting a competing theory. And scientists, being human, have a natural attachment to their own ideas and research programs.

"Competitiveness might be expected to be much more pronounced when a challenging theory comes from outside the field entirely, as this one does. John Hamaker's book was virtually ignored by the profession, and the two times it was cursorily reviewed it was not only trashed but misrepresented, his actual ideas badly garbled. One can find no more clear evidence of an emotional, defensive response rather than an intellectual one.

"My own experience has been similar. Not a single one of the eleven prominent proponents of the Milankovitch theory (the only competing explanation of the major ice age cycle, discredited for several years now by prominent climatologists not associated with it) whom I wrote to, even deigned to reply. More importantly, Stephen Schneider, director of interdisciplinary studies at the National Center for

Atmospheric Research in Boulder, a frequent public spokesman and a relative generalist in the field, did finally reply after six months with his comments on a well-documented article of mine, but when I answered his criticisms and provided some very new data, he never replied again.

“We have recently gained some support from two young climatologists in prestigious institutions. Lee Klinger is also at NCAR (Schneider brought him there), where he has been doing research and writing articles on soil and vegetation as precursors of climate change. He came across Hamaker’s work two years ago, and writes that he ‘was struck by the similarity of his work with my own ideas.’ He says that Hamaker’s work is the closest to his own of anything going on in climatology.

“Skip Walker at the Institute for Arctic and Alpine Research at the University of Colorado is studying loess (glacially ground rock dust) and its effects on soil and vegetation change. He also finds Hamaker’s work quite interesting and useful – and says that there are few open-minded people in climatology.”

Larry’s concern for human health and survival led him and his Institute For A Future (later People For A Future) to purchase an educationally forceful full-page ad in the West Coast edition of ***The New York Times***. It included coupons to sign and send to Congressional representatives which said: “The greenhouse effect is destroying our agriculture. Please make this your highest priority, and do everything in your power to quickly and substantially reduce the level of greenhouse gases in the atmosphere, increase farm productivity and stockpile food, as described in ***The End***.” (This book and his video, “Stopping the Coming Ice Age,” were given to every member of Congress.) Another coupon was addressed to the head of PBS television imploring them to: “Please show the Institute For A Future’s documentary film about the climate crisis, “Stopping the Coming Ice Age,” at the very earliest opportunity, in prime time, and with sufficient publicity to insure that it is widely seen.” Although much open-minded response was generated, nothing of significance was evident from Congress and PBS. Within a year the heroic-hearted Larry Ephron would suddenly die in bed, cause unclear, at age 52.

Editor John Mann in Solstice (March/April ’89):

“Brain-Numbing Repetition. At this point, virtually all writings on the subject continue casually to allude to ‘global warming’ as if it were an undisputed, self-evident truth. Like the school dietician’s ‘Balanced Diet’ or the doctor’s ‘Annual Checkup’, ‘Global Warming’ is repeated with such brain-numbing regularity that even thinking readers are discouraged from any serious examination of what the phrase means. For the record – in case you missed it in our earlier writings – what is called ‘global warming’ is very possibly not global at all. What is quite likely happening is that the greenhouse effect is causing a ***primarily tropical and sub-tropical warming***, resulting in a geophysical reaction of ***polar and sub-polar cooling***, with the ‘temperate’ zone caught in the middle, experiencing extremes at both ends of the spectrum. … Hence this February, one edition of ***The New York Times*** carried these two headlines: ‘Arctic Air Sends Readings As Low As -52,’ and ‘British Report Highest Worldwide Temperatures in Nearly a Century’ – ***on the same page***.

“Science-speak? With the evidence of serious cooling as well as warming impossible to credibly ignore, a disconcerting new trend in science-speak has emerged. Increasingly, researchers are beginning to acknowledge the presence of a cooling effect, and then proposing that such an effect may ***offset*** the Global Warming, with a possible result of no change at all. On close inspection, this turns out to be as plausible as the proposal that a balanced diet of both amphetamines and barbituates is a recipe for stability. Nonetheless, we may be hearing more of this sort of ‘Two-Wrongs-Do-Make-A-Right’ version of climatology. For one thing, quite a few prominent ecologists have already aligned themselves publicly with the theory of Global Warming, and the psychological discomfort of having to acknowledge a premature commitment to a possibly shaky position may well be more than some public figures can comfortably manage.

“Ultimately, it almost doesn’t matter whose theory is the correct one, nor whether the greenhouse-to-glaciation scenario is widely embraced [except its compelling urgency cannot rationally be ignored]. For in either case – global warming or snowblitz – the set of appropriate responses is practically identical. Most of the fundamental physical strategies of the ‘Hamaker prescription,’ as we

have called it, have already won positions on the global policy agenda: a halt to deforestation and accelerated reforestation; a drastic curbing of fossil fuel use, through increased energy-efficiency and rapid deployment of alternative fuels; and a wholesale cut in use or release of other 'greenhouse gases' such as CFCs. And while the Global Warming cadre has been slow to accept the imminence of Hamaker's timetable, this too is changing.

"One crucial factor in the Hamaker scenario stands alone, however. The role of soil minerals in the glacial-interglacial cycle, and the urgent call to remineralize, have no place in the Global Warming arena. Other than economic, political and psychological inertia, this is the one vital ingredient whose lack would likely cause all current proposals to fall short of success. For example, the city of Los Angeles planted one million trees in anticipation of the 1984 Olympics. An admirable effort – but within several years, most of them had died. Broadcasting finely crushed gravel dust would seem to be the critical link in the climate equation, the 'philosopher's stone' for geopolitical alchemists seeking to change global disaster into golden opportunity."

"The Greenhouse Effect Is a Fraud" – "Contrary to prevalent news reports, many highly respected U.S. scientists emphatically state that the so-called Greenhouse Effect [as "global warming"] is a hoax and that the behavior of the news media in perpetrating this fraud is completely irresponsible [especially In suppressing or censoring other views such as Hamaker's]. ... These scientists, some of whose comments are excerpted here, also express frustration at the news media for refusing to publish the statements of responsible scientists on the subject. Dr. Kenneth Watt of the University of California at Davis, for example, recently gave a 3-minute interview to a CBS reporter debunking the Greenhouse Effect [Watt supports the Hamaker Thesis], which was to be aired as part of a half-hour special. The reporter received a telephone call from CBS headquarters in New York and was ordered to erase the interview and destroy any other tapes of scientists who refuted the network's Greenhouse policy line. The backup for the media comes from a small group of individuals who have been invited to Capitol Hill to present their 'evidence' that the Greenhouse Effect is influencing ["warming"] climate." (***21st Century***, March-April 1989)

Also from ***Remineralize the Earth*** (Winter '91) from "Don Weaver Update":

"The only other news I'll pass on now is in the class of 'hearsay.' If true it confirms a long-held suspicion of John Hamaker, myself and others, and explains a great deal of the 'silent response' to our attempts to initiate open discussion and debate. The total climate crisis and threat of reglaciation, as well as the lack of discussion generally, and the continuing inundation of the 'public mind' with (repeat after me) 'Global Warming,' ignores the abundance of facts contrary to that pseudo-paradigm!

"A man in Southern California recently discovered the 'Stopping the Coming Ice Age' film while turning the television dial. He called People for a Future to order a copy, plus the companion book, ***The End***. He said he'd heard about the danger of a new glacial period, and had been very concerned since about 4 months prior to seeing the film and hearing the Hamaker Thesis. He says a friend and colleague told him he had spoken about this climate shift danger with a top scientist at a major U.S. institution. The scientist supposedly said that he and scientists generally ***were not allowed to discuss this publicly***, and he thought the overheating of the tropics and transfer of moisture to the polar system, initiating a glaciation, was already well established and likely irreversible. The man who called People for a Future said he'd try to learn more about this if he could.

"Clearly 'hearsay' can be stranger than fiction... but is this also the truth? I wish I could tell ***Remineralize the Earth*** readers and everyone for certain, one way or the other."

Another example of an article's title being somewhat misleading and at a glance supportive of the "global warming" concept is one from the German publication, ***Amerika Woche*** (10/2/93): "Am Nordpol Schrumpft das Eis" or "At the North Pole the ice shrinks." It says that although it is difficult to ascertain a trend from satellite weather pictures, meteorologists from Freie Universitat Berlin think the ice in the European Arctic Ocean is shrinking at a rate of 1% or more a year. As we read the whole article carefully, we discover that it is not

really more “global warming” evidence but in fact brings us, again, face to face with the whole Hamaker Thesis. From the article:

“It is not yet completely clear to the scientists what causes the diminishing of the ice. The causes are very difficult to understand when one considers the frequent cold spells in Alaska and North America. According to the U.S. measurements, the ice sea between Greenland and Alaska has become about 5 deg. C colder since 1950; there the ice cover is increasing. Also the Scandinavian weather station reports in the winter a clear cooling trend which seems to contradict the expected greenhouse effect. The air temperatures above the European ice sea have practically remained the same during the observation period (since 1969). The currently accessible data of the Soviet Hydrological Services, which have been collected since 1954 on numerous drifting ice floes, even show a cooling down in autumn of 4.1 deg. C and in winter of 2.4 deg. C.

“Prof. Mangreb Geb of the FU Berlin Workgroup on Weather and Climate Development explains the observed phenomena by the increased temperature of the tropics. There since 1977 the average annual temperatures close to the ground have increased by 0.5 deg. C. The consequence would be that more warm Atlantic water, for instance from parts of the Gulfstream, is pressed into the Norwegian Sea where it is mixed with Arctic cold water. The north Arctic Ocean is today on the average 1 deg. C warmer than 10 years ago.”

No discussion of increased cloud cover and snowfall in the region. Thanks to Renate Hageman for translating and sending this article.

“The Ice Age Cometh?” – “Whatever happened to global warming? Scientists have issued apocalyptic warnings for years, claiming that gases from cars, power plants and factories are creating a greenhouse effect that will boost the temperature dangerously over the next 75 years or so. But if last week is any indication of winters to come, it might be more to the point to start worrying about the next Ice Age instead. After all, human-induced warming is still largely theoretical, while ice ages are an established part of the planet’s history. The last one ended about 10,000 years ago; the next one – for there will be a next one – could start tens of thousands of years from now. Or tens of years. Or it may have already started. …

"Climatologists once thought the world eased into ice ages, with average temperatures in parts of the Northern Hemisphere falling 15 deg. over hundreds or thousands of years. During long, frigid winters and short, cool summers, snow piled up much faster than it could melt, and mile-thick sheets of ice gradually covered much of the planet's land surface. After 100,000 years or so, scientists believed, the glaciers made a dignified retreat, stayed put for about 10,000 years and then began to grow again. ... The transition from warm to frigid can come in a decade or two – a geological snap of the fingers. Says Gerard Bond, a geophysicist at Columbia University's Lamont-Doherty Geological Observatory: 'The data have been coming out of Greenland for maybe two or three decades. But the first results were really so surprising that people weren't ready to believe them.' …

"Nobody knows what other factors might help trigger climate shifts, and how sensitive they are. 'It scares us,' says Alley [Penn State's Richard]. 'We know that there are times when climate is very delicately poised. We know that for the past 8,000 or 10,000 years, it hasn't flipped over. But we don't really understand it well enough to say whether it's really stable or whether we are on thin ice.' So to speak. … " (***Time***, 1/31/94)

Let us also note the 1994 book by H.J. de Blij (and co-authors) who is Distinguished Professor of Geography at Georgetown University and Popular Geography Editor of ABC's Good Morning America. ***Nature on the Rampage*** is published by Smithsonian Books, Washington, DC, and I was drawn to its descriptive flyer when I read:

"If you believe that an enhanced greenhouse effect is making the Earth warmer, please read ***Nature on the Rampage***. My advice is to consider another possibility – a return to colder temperatures preceded by a period of climatic extremes. Are the recent Blizzard of the Century, last year's unprecedented Midwest floods, and the bitter 1994 winter signals that another ice age lies ahead?"

I called Dr. de Blij and left the message that I shared his concern about a new glacial period and wondered if he knew where I could find a copy in my area to read before I completed this writing. I was grateful to find one on my doorstep the next day! I'd call that moving

at an ‘anti-glacial’ pace. There isn’t space for a lengthy review but it is a beautifully done book of 224 pgs., 200 color photos, 25 historical black and white photos, etc. Having read it cover to cover I did find it gives one a clearer picture of the connections between “rampaging” people and Nature, and I’d recommend this $30 book at least for every library. (The flyer is from Smithsonian Books, POB 500, Williston VT 05495.) Let’s all consider these words from Dr. de Blij ending the section, ‘An Icy Future?,’ and concluding his first chapter:

“Nature, however, may have something else in store for our planet. … In just the past several years, we have seen the number of weather extremes grow: an unprecedented drought in Africa, the flood of the millenium ... and a 1994 winter so bitter that visions of a new ice age swept the warnings of greenhouse warming off the front pages. If these are indeed nature’s early warnings of an environment reversal, the following pages illustrate what lies ahead. In the context of the Holocene, our works have been tested only slightly by nature’s whim. In the perspective of a full-scale return to glaciation, we have not been tested at all.”

“Weatherwatch, January 1994” – “The first month of 1994 contributed memorable pages to the geophysical record books of the United States, from both below and above the surface of the earth. … The thermal contrast across the country was extreme all month. In the Northwest, Washington had its second warmest January in 100 years, as did Idaho. But in the Northeast, New York and Maine had their coldest January in 100 years. … In Canada: From Ontario to the Atlantic Coast this was the coldest January in more than a hundred years; in several places it was colder than any other month on record. … Despite the cold, record-high snowfalls occurred in east-central British Columbia, central Alberta, southern Saskatchewan, and New Brunswick. The upcoming summer’s peach crop in southern Ontario has already been hard hit, with 40 percent of the buds in the Niagara area and 100 percent of those in the Windsor area destroyed. ... Except for the high Arctic, mean temperatures for all of Canada were substantially below the seasonal average. The greatest departures were found in a band from the southern Yukon to northwestern Alberta, where means were nine degrees below normal.” (***Weatherwise***, April/May 1994)

"Spatial and Temporal Variations of the January Circumpolar Vortex Over The Northern Hemisphere" by Univ. of Virginia climatologists Robert E. Davis and Stephanie R. Benkovic – "Temporal and spatial variations of the Northern Hemisphere's circumpolar vortex are analysed for each January from 1947 to 1990. … The northern vortex has occupied a more expanded position since the mid-1960s. … In toto, these results indicate that the January circumpolar vortex has expanded over the past two decades. (from the ***Abstract***) …

"A comparison of the circulation patterns depicted by the composite maps with the time series of component scores identifies the following temporal trends:

(i) intensification of the Aleutian Low and increased ridging over western North America; (ii) more pronounced ridging over western Europe and Scandinavia and a slight strengthening of the Icelandic Low; (iii) lower geopotential heights over eastern North America and the Atlantic; (iv) a net expansion of the circumpolar vortex. … The increased frequency of north-westerly flow aloft results in more frequent intrusions of cold, polar air masses in the south-eastern USA and lower winter temperatures. … Concurrently, increased cyclogenesis would be anticipated along the coastal baroclinic zone as strong thermal gradients become frequent along the mid-Atlantic coast. … Comparable changes are observed over western Eurasia as well. … Overall, the circumpolar vortex at 50-kPa has moved equatorward an average of 133 km since 1965. …

"Although all general circulation model (GCM) regional temperature forecasts differ under doubled carbon dioxide scenarios, there is overall agreement that the Northern Hemispheric polar regions should warm much more rapidly in winter relative to the tropics. However, little empirical evidence of warming over the Arctic has been found. … Our analysis indicates that, contrary to this scenario, the Northern Hemisphere's circumpolar vortex has expanded and meridional circulation has been more dominant over the Western Hemisphere." (***Intern'l Journal of Climatology***, Vol. 14, 415-428, 1994)

"Climatic Implications of an 8000-Year Hydrogen Isotope Time Series from Bristlecone Pine Trees" – (***Summary Abstract***) "Tree rings from three dendrochronologically dated bristlecone pines were analyzed

for stable hydrogen isotopic composition. These trees give a continuous time series from 8000 years ago to the present that indicates the presence of a post-glacial climate optimum 6800 years ago and a continuous cooling since then. The qualitative agreement between this record and records from other sources, such as ice cores, pollen, and treeline fluctuations, indicates that these climate changes were global. This record can serve as a reference for other climate indicators throughout the past 8000 years." (***Science***, 8/19/94)

"Global Warming: Narrowing the Debate" by F. Kenneth Hare, Univ. of Toronto Professor Emeritus in Geography, appeared in ***EcoDecision***, Winter 1996, a publication of the Canadian Global Change Program. In his concluding section on 'A new job description for climatologists,' one cannot but think of John Hamaker's insights and wonder if the world will 'catch up' to them while time may still remain to wholly and sanely act in natural response. Excerpts:

"To be a climatologist, then, to work on global warming and to judge the validity of the predictions now being made, requires much more than a degree in physics or mathematics, and much more than the ability to make statistical inferences, though these are still necessary. A wide range of skills is needed. Usually, though, that is provided by the familiar interdisciplinary panel or research group, which is how the IPCC [International Panel on Climate Change] has worked.

"But we also need individuals within whose heads a synthesis of the disparate evidence can be brought together. For global warming is not just a rise of surface temperature; it is a many-sided shift of equilibrium between and within the components of the global environmental complex, and in the environment with which human society must come to terms. Committees cannot do the necessary synthesis without the sparks of genius that are struck within individual minds and somehow master the meaning of the whole. …

"It is the fate of the prophet to make obvious what has been obscure. Gradually, we are catching up with him."

'Cooling From Warming' – "Oddly enough, the climates of Europe and the east coast of North America could actually grow ***cooler*** in response to global warming, according to a new study. Right now,

these areas are warmer than other places at similar latitudes because currents in the Atlantic Ocean shuttle warm tropical water north. This conveyor belt for heat, though, may be more susceptible to breakdowns than previously thought. The study shows that extra rain and snowfall in the north could shut it down entirely. Climate models predict that such precipitation will be one consequence of global warming from extra carbon dioxide in the atmosphere." (***Earth***, April '96)

"The Coming Ice Age – Why Global Warming Is a Scientific Fraud" is a Nov. 1997 Special Report of 21st Century Science Associates in Washington, DC. Brief excerpts:

"It is sufficient to point out a few anomalies to call the whole global warming conjecture into serious doubt:

*Since 1980, there has been an advance of more than 55 percent of the 625 mountain glaciers (Austria, Switzerland, Italy, Iceland, United States, and Soviet Union) under observation by the World Glacier Monitoring Group in Zurich. [I've seen conflicting data on this in the 1990s.] (From 1926 to 1960, 70 to 95 percent of the monitored glaciers were in retreat.)

* The Greenland ice sheet and snow buildup in Antarctica have recently advanced.

* The limit of the citrus-growing region in the U.S. Southeast has moved southward, and the U.S. Department of Agriculture has revised its hardiness zones southward.

"Moreover, the recent global temperature increase has occurred over tropical regions. … Any competent scientific discussion of the global warming conjecture would have to be located in the context of the secular tendency toward an ice age. The global warming case has not been put forth as science, however. … This is not science but intellectual dishonesty bordering on fraud." (p. 44-45)

"Analysis of certain plant species in the United States give an interesting picture. For example: It used to be possible to grow citrus fruit in the southeast region of America as far north as the Carolinas.

Now oranges will not ripen north of Orlando, Florida. In Florida, there have been 24 'Arctic breakouts,' that is, episodes of severe killing frosts in the last 30 years. There had been only 6 in the previous 50 years.

"Further, in 1990 the U.S. Department of Agriculture put out its first revised hardiness report for commercial crops since 1965. Taking temperature data from 14,500 measuring stations, the new map shows that the area where crops can be grown without certain danger of a killing frost has moved 100 miles south in the last 50 years. …

"Yet the supporters of the global warming theory are adamant. Here is what Dr. Stephen Schneider of the National Center for Atmospheric Research says: 'We need to get some broad-based support, to capture the public's imagination. That, of course, entails getting loads of media coverage. So we have to offer up scary scenarios, make simplified, dramatic statements, and make little mention of any doubts we may have. Each of us has to decide what is the right balance between being effective and being honest' (***Discover***, Oct. 1989, p. 47)." (p. 81-83)

"Global climate science fails credibility test" – " … According to the same study, nine out of 10 climatologists agree that 'scientific evidence indicates variations in global temperature are likely to be naturally occurring and cyclical over very long periods of time.' Fully 86 percent disagree that reducing carbon dioxide emissions to 1990 levels – the cornerstone of President Clinton's plan – would prevent rising temperatures. In fact, a plurality (39 to 33 percent) say that 'evidence exists to suggest that the earth is headed for another glacial period' rather than a period of global warming." (***San Mateo Times***, 12/5/97)

"Scientists Fear Telling Truth on Global Warming" – "Many scientists 'are afraid to speak up because they are afraid of losing their federal grants,' if they disagree with global warming, declared Fred Seitz, the respected former head of the National Academy of Sciences." (***The New Federalist***, 12/8/97)

On 12/17/98 I had a one-hour phone conversation with one of the best-known of the so-called "contrarian" climatologists, Patrick

Michaels of University of Virginia who teaches “ecological climatology” there and is also the Virginia State Climatologist. I’d read his 1992 book, ***Sound and Fury: The Science and Politics of Global Warming*** and wanted to discuss with him his book – which includes evidence on cloud cover buildup and cooling and shows more contrasts between computer model predictions and observational data – and the Hamaker Thesis and whether he thought it had been given fair consideration by the climatology field. He like many had been given books, videos and other supporting evidence on the Hamaker Thesis, but he admitted to not having given it a full and fair investigation – which isn’t naturally just a “one-person job” when you realize its importance. Now Patrick Michaels tries to be open and outspoken and claims to be committed to “scientific honesty” just as I, as an “amateur” scientist /ecologist, claim to be and that is why I’ve always called for refutations of Hamaker’s Thesis by anyone who can provide one. Michaels quotes Thomas Jefferson at the very beginning of his book: “Honesty is the first chapter in the book of wisdom.” So after we’d had nearly an hour of open and lively inquiry and debate on the changing climate, soil demineralization and retrogressive vegetational succession, greenhouse gases and the collapsing carbon cycle and human responsibility for the Earth, Professor Michaels gave me what I assume was his totally honest assessment of the state of climatology. He told me: “If you really want to know the truth, we (the climatologists) are all full of shit.”

In any case, how far must we each go to become full of honesty and open-minded concern for the present and future Earth?

“Some like it cold” – “ ‘Some say the world will end in fire, some say in ice,’ wrote Robert Frost, who held with those who favor fire. So do today’s media, which give plenty of ink to research that shows the Earth is getting warmer but none at all to evidence pointing the other way. The other way? You probably didn’t know there is debate in academia about the matter. …

Balling [climatologist Robert at Arizona State Univ.] has been traipsing about the globe looking into the nature of climate for the past 20 years. He has discovered that since 1918 the average temperature at Mount Wilson, Calif., has dropped by 3 degrees F. … If the earth is getting warmer, then the Arctic should be getting

warmer, too. It isn't, says Jonathan Kahl, an atmospheric scientist at the University of Wisconsin-Milwaukee. Kahl found that in the past 45 years temperatures there in the winter and fall, taken by balloon-borne instruments, have fallen by 2.5 and 4 deg. F." (***Forbes***, 6/14/99)

"Earth Regeneration Society publishes new book" – "On September 23, 1997, the Earth Regeneration Society, Inc. sent the first announcement of their book ***Broken Planet – Broken Systems: 15-Year Climate Stabilization Program for Humanity*** to all U.N. members, all members of the United States Congress, and 500 U.S. individuals and organizations. The book lays out targets for climate stabilization by individual country. It was published and publicized to serve as a key international document for the Kyoto conference and the subsequent climate negotiations closing out this century. ***Broken Planet – Broken Systems*** is the first publication to offer climate stabilization targets for each country's review. The book attentively includes goals and targets for all countries large and small, rather than omitting less developed economies from participation in the process of global climate stabilization." (***Remineralize the Earth***, Spring 1998)

The following excerpts from ***Broken Planet – Broken Systems*** may demonstrate the closest (to my knowledge) humanity has come to a serious Congressional response to the threats revealed by John Hamaker's Thesis. Congressman Dellums' bill, even with repeated efforts, apparently did not progress very far in the 1990s. With Rep. Dellums now retired, will any other members of Congress truly respond to the increasingly obvious crisis at hand?

REDUCE ATMOSPHERIC CO_2 (CARBON DIOXIDE)
SOIL · FOREST · ENERGY · WORK

March 18, 1992

To all Delegations of the United Nations:

Action toward climate stabilization is in process throughout the world. We are writing to each of you asking for your support in bringing focus to this work.

In the United States Representative Ronald V. Dellums introduced the "Emergency Climate Stabilization and Earth Regeneration Act of 1992" (HR 4154) into the House of Representatives on February 4, 1992. This is the first document in any government setting forth structure (the amount of atmospheric carbon dioxide to reduce globally over the next 15 years), the emergency nature, and certain organizational procedures for U.S. participation in a global climate stabilization effort.

The enclosed statement from the International Society for the Systems Sciences (ISSS), meeting in Sweden June 1991, presents a central theme for UNCED: S = 170*15. The continuation of food crops in the temperate zones of this earth (survival, S) depends primarily on reducing the atmospheric carbon dioxide from over 355 parts per million (ppm) back to the approximate level of 280 ppm in attempting to stabilize climate (170 billion tons) within the next 15 years. The estimate of 15 years reflects the accelerating destruction of crops, forests, buildings, utilities, transportation and human life from climate extremes.

We are asking for your support, particularly that S=170*15 should be made the central focus of the June 1992 meeting of UNCED in Brazil, and in the years to follow.

Human society is reaching a point of no return in climate change, expressed primarily in rapid destruction of crops through increasing extremes of heat, drought, freezing, storms, flooding, earthquakes, and general destabilization. We strongly urge all delegates to resolve details of an agreement and to move rapidly toward a climate stabilization policy. It is important that all countries develop their own carbon dioxide budget (CO/2 reduction plan) so that they can participate in international development of a world carbon dioxide budget through the United Nations.

Sincerely yours,

Alden Bryant

Alden Bryant, President

1442 A WALNUT STREET NO. 57, BERKELEY, CA 94709, USA · (510) 525-4877 VOICE · (510) 540-1057 FAX

Emergency Climate Stabilization and Earth Regeneration Act of 1992 -- brief discussion of bill. H.R. 4154

We call for a CO/2 budget for our country, and will cooperate with all other countries to do the same. A CO/2 budget is a work plan, showing the impact of every part of our lives on the CO/2 level. You plant forests, you take out CO/2. You improve the mineral quality of the soil and thereby the enzyme, microbial content, and you grow healthier crops (for human health) no longer needing pesticides, crops withstanding drought, freezing and pests much better -- no longer needing pesticides which poison people, the soil and the water supplies.

A CO/2 budget is an economic plan for a country, or a region within a country. This is a work plan reaching out across a range of jobs: in reforestation, in remineralizing soil, in building alternative energy technology systems (to replace the use of fossil fuel), in conservation and pollution cleanup. This is also a call for full employment in the U.S., for retraining, for transition to increased soil, forest and energy work. This is a call for protection of human and other life and reconstruction of our society and our environment, in the face of increasing extremes of climate change.

A CO/2 budget also means adequate housing, food, health, education, political participation, and racial and social justice for all our people or the work on non-toxic pollution cleanup and climate stabilization can not go forward at the speed it must. We won't make it in time. Snows are coming further south and staying longer than before.

THIS BILL IS DIFFERENT FROM ALL OTHERS. IT PROPOSES TO:

1. Call for a national CO/2 budget (full employment work plan) for the U.S.

2. Call for a work plan designed to reduce the CO/2 level in the U.S., and take a responsible role in reducing the CO/2 level in the world as a whole. The goal is global climate stabilization.

3. Prepare an analysis of CO/2 impact from all economic activities in the U.S. and set CO/2 reduction goals for the U.S. (both quantity and time).

4. Measure climate change impact, the losses from all climate extremes, over a past period (ten years) to more fully understand the increasing rate of destruction.

5. Establish CO/2 councils, from Federal down to City to insure broad labor, industry and general citizen participation, planning and implementation of CO/2 budget work plans.

It is essential, therefore, to pass this bill IMMEDIATELY to get work going on the scale needed. This will be our approach in the campaign to follow, and we look forward to a compelling public demand as increasing numbers of people become aware of the nature and speed of climate change.

September 3, 1992

Ronald V. Dellums
8th Congressional District, California

August 18, 1992

"The American dream is Nature's nightmare"
protesters' chant at the Rio Conference
-June 6, 1992

Dear Colleague:

President Bush's lack of commitment and leadership at the Earth Summit in Rio last month exemplifies his indifference to environmental and related social concerns. It is now up to Congress to enact sustainable policies that will address these issues. As a result, I again draw your attention to H.R. 4154 "The Emergency Climate Stabilization and Earth Regeneration Act of 1992".

A major provision of the legislation will establish a CO_2 budget to assist the global community in reducing both long-term and newly created atmospheric CO_2 within the next 15 years.

A 15-year limit is crucial if the effort to cut climate destabilizing levels of CO_2 is to have any positive long-term effect. Under this legislation, the United States would finally contribute to a global effort to reduce atmospheric carbon dioxide by one fifth of its current level.

Environmentalists are praising the legislation as a comprehensive initiative to help reverse the United States' negative impact on the environment. H.R. 4154 calls for a program that integrates social, economic, environmental, employment, and conservation strategies. The bill will increase employment in agriculture, forestry and energy technology so as to promote a viable pollution cleanup and climate program.

The U.S. must be held accountable for our contribution to the environmental turmoil of modern day society. H.R. 4154 would make the U.S. a leader in the ratification of a comprehensive ecology and social policy plan designed to secure and perpetuate livable climate conditions. For more information, or to become a co-sponsor, please call Charles Stephenson at (202) 225-2661.

Sincerely,

Ronald V. Dellums

Ronald V. Dellums
Member of Congress

102D CONGRESS
2D SESSION

H.R. 4154

To provide for participation by the United States in a climate stabilization program.

IN THE HOUSE OF REPRESENTATIVES
FEBRUARY 4, 1992

Mr. DELLUMS introduced the following bill; which was referred jointly to the Committees on Interior and Insular Affairs, Rules, Ways and Means, Agriculture, Energy and Commerce, Merchant Marine and Fisheries, Foreign Affairs, Science, Space, and Technology, and Education and Labor

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A BILL

To provide for participation by the United States in a climate stabilization program.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

This Act may be cited as the “Emergency Climate Stabilization and Earth Regeneration Act of 1992”.

SEC. 2. FINDINGS.

(a) DEVELOPING GOVERNMENT AWARENESS OF RESPONSIBILITY FOR CLIMATE CONDITIONS.—In 1969 Congress recognized both the seriousness of climate change

and the responsibility of the Federal Government to develop domestic and foreign policies to contribute to the preservation of the environment. The findings of congressional policy and responsibility in the National Environmental Policy Act of 1969 (42 U.S.C. 4331) and its enforcement led to further identification of the problem in the National Climate Program Act of 1978 (15 U.S.C. 2901) and its enforcement led to the Global Climate Protection Act of 1987, which found "the global nature of this problem" and the need for "vigorous efforts to achieve international cooperation aimed at minimizing and responding to adverse climate change." Section 533(a) of the Foreign Assistance Act (22 U.S.C. 262) provided the following: "It is the policy of the United States that sustainable economic growth must be predicated on the sustainable management of natural resources. The Secretary of the Treasury shall instruct the United States Executive Directors of each multilateral development bank (MDB) to promote vigorously within each MDB the expansion of programs in areas which address the problems of global climate change." Section 534(b)(1) of such Act provided the following: "In order to achieve the maximum impact from activities relating to energy, the Agency for International Development shall focus energy assistance activities on the key countries, where assistance would have the

greatest impact on reducing emissions from greenhouse gases."

(b) HISTORICAL DATA ON CLIMATE CHANGE PROBLEMS.—Congress recognizes that basic information on climate change was developed in 1975 by the United States Committee for the Global Atmospheric Program, National Research Council, Washington, D.C., which issued a report "Understanding Climate Change" which included data on the rising carbon dioxide and curves of glacial cycles for the last 900,000 years.

(c) ACCELERATING PLANETARY CLIMATE CONDITIONS.—(1) The Congress finds that existing laws have not produced sufficient climate stabilization effort because human technological activity is accelerating the rate of carbon dioxide buildup in the atmosphere. The net result of this buildup is to speed up the greenhouse effect, leading to shifts of global climate, whether global warming and/or increasingly extreme and variable weather conditions. If these shifts continue, destruction of lives and property and, according to geological evidence, transition past the point of no return can follow. It is the consensus of a majority of workers in the field of ecology that we are now in a period of ecological destabilization that, given the time and effort needed to stabilize climatic conditions, constitutes an ecological emergency. Serious debate must

be held on the earth-atmosphere system producing climate change, on defining the goals to bring about climate stabilization, and on the best ways of achieving these goals.

(2) For purposes of paragraph (1)—

(A) the term “destruction of lives and property” refers to the world-wide effects a carbon dioxide-induced climate shift is having upon agriculture and the technology base; and

(B) the term “point of no return” refers to the point past which the shift of climate into destabilized conditions is no longer humanly controllable.

(d) PROGRAM NECESSITY.—(1) The Congress also finds that, because the earth is already into the transition into seriously destabilized conditions, and that soil, forest and climatic changes are already occurring (such as abnormal weather patterns), a coordinated, international, emergency climate-stabilization program is imperative. This program should reduce from the present 356 parts per million to 280 parts per million or less atmospheric carbon dioxide to levels low enough to prevent this rapidly accelerating transition. Climate stabilization can be accomplished through a program of ecosystem regeneration which reestablishes balance between atmospheric carbon dioxide and other gases which interact to influence atmospheric conditions. A significant means to reestablish this

balance is large-scale soil remineralization, which supports the regeneration of planetary vegetation and significant natural carbon sinks, which remove atmospheric carbon dioxide. Additional and essential means of climate stabilization include reforestation, saving swamps and estuaries, and rapid and extensive reduction of fossil fuel consumption through conservation and development of alternative energy technology.

(2) For purposes of paragraph (1)—

(A) the term “soil remineralization” means adding rock dust, with appropriate proportions of minerals and trace minerals, to the soil to support the growth of microorganisms and plant life that transforms atmospheric carbon dioxide to carbon and oxygen; and

(B) the term “program of ecosystem regeneration” means a program of sufficient magnitude and of such timing as to permit climate stabilization before climate conditions preclude action. This includes major reductions in activities that produce carbon dioxide such as fossil fuel consumption; and in activities that impair natural mechanisms for removing carbon dioxide from the atmosphere, such as forestry practices that reduce forest acreage beyond minimal requirements for fuel and building mate-

rials. It also involves replacing improper agricultural practices that deplete the soil, such as excessive use of petrochemical fertilizers, pesticides and herbicides, with methods of sustainable agriculture that enhance soil fertility.

(e) TIME PERIOD TO ACCOMPLISH OBJECTIVES.—The Congress also finds that the key time period for accomplishing the purposes of this Act is 10 to 15 years, with implementation to begin as soon as possible.

SEC. 3. PURPOSES.

(a) OVERALL PURPOSE.—The purpose of this Act is to establish a process whereby the Congress and the President of the United States shall cooperate in a national and international program to—

(1) reduce heat, drought, and subsequent famine and forest fires, tornadoes, and to decrease the freezing extremes, snow buildup, flooding, cloud cover, and storms in the winter;

(2) promote regeneration of the earth through reforestation, soil and ocean remineralization, conservation, and alternative energy technology development;

(3) maximize our food and agricultural security through research on soil remineralization and other environmentally sound, sustainable means that in-

crease the health and hardiness of crop plants and their resistance to climatic extremes and pest infestation; and

(4) assist in the creation and development of a secure, environmentally sustainable way of life that is consistent with long-term climate stabilization.

(b) SPECIFIC MEANS.—(1) Reduction of carbon dioxide is to be accomplished by the following means:

(A) A program to plant fast-growing mixed species of trees on suitable land, in the United States and/or other regions, especially in climatic and geographical regions that foster rapid tree growth, to consume additional carbon dioxide from the atmosphere.

(B) A program to revitalize the soils of existing forests and newly forested areas with finely ground mixed gravel dust, plus finely ground limestone on soils that have already become very acidic, to increase the growth of plant life so that it will more quickly consume atmospheric carbon dioxide. The Congress notes that the effectiveness of rock dust in substantially increasing the health and growth of plant life is supported by extensive research, and by the well-documented role of glacially-ground rock dust in restoring soil fertility.

(C) more fitting waste management policies, such as the composting of urban solid waste and the depositing of this material back into the soil in the region near which it is generated;

(D) environmentally and climatically sound waste-management policies, including the remineralizing and composting of urban solid wastes and wastes from animal feedlots and the depositing of this material back into the soil in the region near which it is generated;

(10) employment and community requirements of the program, including—

(A) training and retraining people to be employed on soil, forest, and energy projects; and

(B) maintaining the stability of local communities so that people working on the program can continue to reside in the locale in which they were residing before beginning such work; and

(11) the implementation of Articles 2.3 and 2.4 of the Charter of the United Nations (requiring the settlement of international disputes by peaceful means) and Articles 55 and 56 of such Charter (pro-

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moting higher standards of living, full employment, and conditions of economic and social progress and development).

SEC. 5. ORGANIZATION.

(a) CONGRESSIONAL COMMITTEES.—The Speaker of the House of Representatives and the President pro tempore of the Senate shall take steps to establish, through the rulemaking procedures of the Senate and the House, a Joint Committee on Climate Stabilization for the purpose of carrying out oversight activities with respect to the climate stabilization program established pursuant to this Act.

(b) ESTABLISHMENT OF FEDERAL COUNCIL.—(1) The Council on Climate Stabilization and Earth Regeneration is hereby established as an independent Federal agency responsible directly to the President.

(2) The President shall appoint 24 members to the Council, with the advice and consent of the Senate, from various political, labor, business, ethnic, environmental, scientific and other backgrounds, including one representative each from the National Governors Association and the National Council of Mayors, to assure the proper implementation of the program carried out under this Act.

(3) The Council shall review and report directly to the President concerning the implementation of the pro-

[End of Bill H.R. 4154 excerpt]

More "Isolated" Weather and Climate Extremes – Or More Warning Signs of Another Global Interglacial-To-Glacial Transition?

Here are a few of many possible examples noted since ***The Survival of Civilization*** was first published in 1982:

"The Freeze of '83 ... and the Effects; A Major Shift in Florida's Citrus Belt" – "The citrus growing region of Florida is undergoing a major shift in its borders. For the first time since 1899, the growing line is moving southward – largely as a result of the Christmas freeze of 1983, a disastrous period of three days that set new records all across the state and especially in the northern reaches of the citrus belt. … In the first fifty years of this century, Florida's climate experienced a pronounced warming trend, reaching an average annual temperature of 70 degrees in 1950 at Jacksonville. Since that time, however, the average annual temperature has moved downward nearly 3 degrees F, culminating in the extreme cold of December 1983. Florida was not the only state to suffer from the severe cold of December 1983. It was the coldest month on record for the entire United States." (***Weatherwise***, 12/84)

"The Sunshine state feels a chill" – "There was a time not so long ago, said George Winterling, a meteorologist for a Jacksonville, Fla. , television station, that he used to enjoy visiting the orange groves that were 50 miles or so south of Jacksonville. It's not something he has done lately, and for a compelling reason: 'They're not there anymore,' he said. ... In fact, Florida's citrus crops have been subjected to four freezes in the last five years, and, according to Winterling, there has been a cooling trend under way for the last 35 years. The result: The heart of the citrus-growing district has migrated substantially southward. In the last 35 years, however, the mean temperature in Jacksonville had dropped 3 degrees before this winter, according to Winterling. That is roughly the difference between the mean temperatures of Amarillo, Texas, and Philadelphia. … In fall 1983, a government report suggested that as a result of the so-called greenhouse effect the climate of Florida eventually would migrate northward, that the planet would undergo a long-term warming trend.

Looking at what has happened in Florida recently, it may be easier to believe just the opposite." (***Philadelphia Inquirer***, 2/3/85)

"England in chaos after storm blitz" – " LONDON: Britain has begun a huge clear-up operation after the worst storm in three centuries blasted southern England killing at least 13 people. A further six people died as torrential rain driven by gale force winds pounded the Netherlands, France, Spain and Portugal. London was completely blacked out for the first time since World War 2. … The Royal Botanical Gardens at Kew were devastated. About a third of the famous collection of exotic shrubs and trees – some of which had stood there for hundreds of years – were torn from the ground." (***Melbourne Sunday Press***, 10/18/87)

"Alaska in deep freeze; Machines disabled by record readings" – "Strange things happen when it gets 40 below zero. ... But the state shivered into its third week of cold on Monday, and the mercury began to drop again. Early morning temperatures ranged from 50 below zero in Fairbanks to 61 below in Nenana and 60 below at Fort Yukon. Alaska almost certainly has broken U.S. cold records – minus 80 at Prospect Creek, Alaska, on Jan. 23, 1971 – several times and in several places during the cold spell, meteorologists said. Military officials volunteered the coldest unofficial report – minus 88 near an air base at Galena, west of Fairbanks, but the official record still was in place. [As the seemingly "official" simplistic theory of "global warming" was still in place.] Winter war games involving 26,000 troops from the United States and Canada were curtailed, and Canada withdrew altogether after one of its planes crashed in a blinding ice fog, killing eight of the 18 people aboard. Gov. Steve Cowper declared an emergency – freeing disaster funds and putting the Division of Emergency Services on 24-hour duty to make sure dozens of villages had food and fuel." (***S.F. Examiner***, 1/30/89)

"Dateline: 12/28/90 – Central California Frozen Groves and Fields" – "'Whatever Happened To Global Warming?' is today's column by Jon Carroll in the ***San Francisco Chronicle*** after the past week of "all-time" record cold temperatures, resulting in a thorough devastation of a major California and U.S. crop – navel oranges – with lesser but significant damage to avocados, other citrus, a variety of vegetables, flowers, ornamentals and cold-sensitive trees.

“Other effects included thousands of bursting frozen pipes, many million gallons of water lost as the fifth year of California’s drought moves on into 1991, a major burst of wood and fossil fuel burning to compensate for the cold, and a few more deaths among the growing number of shelterless people across the state, country and world.

“The cold waves are working toward southern Arizona, Texas, and Florida, too, as should be expected with reports of record rains, cold and blizzards.

“News has been trickling in from Eurasia also the last few months. A very wet and cold August and September ... in the USSR apparently did major damage to the potato harvest and it would seem much more damage was done based on later weather reports and stories of food shortages and rationing in Leningrad and other cities.

“Perhaps now Jon Carroll will be inspired to read or re-read the copy of ***The Survival of Civilization*** sent him a few years ago. Perhaps many of the millions who’ve been given the opportunity to consider the Hamaker Thesis will more clearly see the ‘writing on the wall’ and take the positive steps Nature requires of us.

“Will the future climate ‘programmers’ respond to the growing severity of pre-glacial weather extremes with some new thinking and ‘real world’ focus? Or will they remain unwilling to disengage from their ‘doubled CO_2’ computer models and their beloved but ill-conceived child, ‘Global Warming,’ regardless of mere facts to the contrary?

“Facts such as 18 deg. F in San Jose and Santa Cruz, 18 deg. F in Fresno, 14 deg. F in Orland (Sacramento Valley navel orange region), 14 deg. F here in Burlingame, 11 deg. F in Sebastopol, 5 deg. F in Point Reyes (a little north of San Francisco), 0 deg. F or less in upper parts of northern California.

“One final interesting fact for now: the remineralized lemon tree here has stayed dark green and healthy looking whereas the Orland citrus trees shown on TV had severely curled and damaged leaves. Could the minimum $500 million lost by orange growers be better spent on ‘prevention’?!

"One trusts that ***Remineralize the Earth*** readers are already conscious of the global implications of this, as well as with the billions of dollars spent to prepare for war to protect ecologically obsolete energy systems. (To the 'humanitarian' argument, the question was raised: would the U.S. be building up the 'Desert Shield' if Kuwait's main export were broccoli?)

"Let us express and build peace and health from the ground up – from 'soil to psyche' – with the awareness that ecological thinking and reverence for life are the keys to a regenerated humanity and Earth. But please don't take my word for it – question and see it for yourself." (Don Weaver in ***Remineralize the Earth***, Winter 1991)

"Winter drops in 6 weeks early" – Record low temperatures. Snow measured in feet that is piled into waist-deep drifts by razor-edged, gusty wind. Ice-encrusted roads that look like lunar landscapes and feel as rough as cobblestones. But it's still autumn, pre-Thanksgiving. The first day of winter is still six weeks away. … The blizzard, dubbed a 'megastorm' by the National Weather Service, dumped more than a foot of snow a week ago in parts of North Dakota, more than 2 feet in the Twin Cities of Minneapolis and St. Paul, and 3 feet at Duluth. So much snow has never fallen that early in the season since record-keeping started. … Some farmers will have to wait until spring to get into the fields to harvest the last of their crop – or lose it altogether. County extension agents in North-Central Minnesota say up to 40 percent of the corn crop was still in the fields when the blizzard hit." (***Johnson City Press***, 11/9/91)

From "Another Year of Extreme Weather" by Don Weaver (***Remineralize the Earth***, Winter 1993-94):

1) 'Eastern Pacific Hurricanes' – "The 1992 hurricane season in the eastern North Pacific Ocean was record breaking in more ways than one. The 24 named storms broke a record of 22 set in 1985, and the 27 tropical cyclones broke a record of 26 set in 1982. The year's total of 14 hurricanes was two shy of the record set in 1990 but easily greater than the seasonal average of 10 (calculated since 1966, when routine weather satellite surveillance began). And eight of the hurricanes were Category 3 or stronger on the Saffir-Simpson scale.

… One hurricane, Tina, lasted 24 days – longer than any other North Pacific tropical cyclone on record." (***Weatherwise***, Feb./March 1993)

2) 'Tornadoes Hit New Heights' – "Severe weather in 1992, on the strength of two huge outbreaks, racked up a total of 1,293 tornadoes, far more than the old record of 1,133 set in 1990. The amazing total was largely the work of a record summer launched by a June 15-16 outbreak of 123 tornadoes – second only to the Super Outbreak of April 3-4, 1974. The June total of 399 was the most tornadoes ever recorded in a single month. ... 20 tornadoes in California surpassed the state's annual record of 14 set in 1978. … " (***Weatherwise***, Feb./March 1993)

3) 'The Year of Killer Weather – Why Has Nature Gone Mad?' asks the cover and feature story of ***Life***, Sept. 1993. The article begins: "This is how weird our weather has been: The three most damaging climatic disasters in U.S. history happened in the past 12 months. First, Hurricane Andrew devastated south Florida last September. Then, on March 12 a giant blizzard – which the National Weather Service calls 'the single biggest storm of the century' – swept from Florida to Maine, releasing more snow, hail, rain and sleet than any other storm since 1888. Finally, the relentless rain flooding the Midwest brought on what may be the costliest weather disaster of all. 'Taken together the storms do make one wonder if there are pattern shifts occurring in our climate,' says Elbert Friday, Director of the Weather Service. What's more, Friday will say what most meteorologists won't: El Niño, the mysterious heating of the eastern Pacific Ocean, is altering weather this year, while global warming may be causing other disturbances. … Is our weather changing irrevocably? Friday says, 'We just don't know for sure. There is no consensus yet.' "

4) In the last double issue of ***RE***, many more weather and climate events were reviewed. This could easily be done again here if not for space limitations, but as ***Life*** notes above, 1993 continues to be full of 'killer weather' not just in the U.S. but worldwide, including record cold and floods in Europe; flooding and landslides in Nepal (worst national disaster ever); wettest and coldest summer in large areas of U.S.; record early freezes; crops in Canada damaged; floods in China destroying 500,000 acres of crops, hail severely damaging 370,000

more; a ‘snow-out’ of the September 13th Colorado Rockies baseball game in Denver; earliest snow ever in Texas on 10/29/93, and, as I type this on 11/1/93, record cold and snows in the Eastern U.S. with ‘unheard of’ snow in Atlanta, Georgia. Record drought and extensive crop damage in the Southeast U.S. also ‘complemented’ the flooded areas further north and east and the cool Central and West-Central U.S. and Canada.” [End of ***Remineralize the Earth*** excerpts]

“Nature Farming Rice Crop Succeeds Despite Record Cold Summer: Story is Front-Page News in Japan” – “November 1, 1993: the front page of Japan’s major daily ***Asahi Shinbun*** carries the story complete with color photo of how Nature Farming rice survived the disastrously cold summer in Japan, which nearly wiped out conventional crops. This year’s rice crop was the lowest recorded in nearly a century; one of the main reasons the Japanese market was finally opened to imported rice. … According to the newspaper article, Nature Farmer Nakamura measured soil temperature daily during the growing season, finding that Nature Farming soil temperature remained 1-3 deg. C higher than normal. His farm experienced no crop decrease during the cold summer, whereas neighbor Ozawa lost 600 kilos per hectare in yield. In the Tohoku region (northern Honshu Island), some farmers experienced total crop failure, while Nature Farmers managed to harvest 60-80% of their yearly average. Dr. Nakai [of Shizuoka University, completing 3-yr study of conventional and Nature Farming] commented that, ‘As the rice blossomed, it was unusually cool, but Nature Farming rice managed to survive, comparable to a strong man bending in the face of adversity.’ ” (***World Sustainable Agriculture Assoc. Newsletter***, Dec. ‘93-Feb. ‘94)

“Weather Highlights” – “After a record 32 typhoons struck the Philippines in 1993 the first tropical storm of the year hit the central portions of the country on January 5. Over 35 deaths were reported in the province of Albay. …

“Madagascar was struck by the ‘Cyclone of the Century’ on January 31, which arrived from the western Indian Ocean. Wind speeds within the cyclone were estimated by weather officials at a staggering 220 mph (350 km/h). As many as 70 died, and a half million people were left homeless. Almost three-fourths of the nation’s rice fields were destroyed.” (***Weather Watcher Review***, March/April 1994)

"Southern Chills" – "Record-breaking cold weather descended over Brazil, taking the lives of at least 10 people and causing severe frost damage to the country's coffee export crops [and what food crops?] . Temperatures plunged to 19 deg. F. in some locations, making it the severest cold snap since 1975. A bitter antarctic chill blew over Australia, producing the coldest night in the country's history. The official temperature at Charlotte Pass, New South Wales, reached a record minus 8 deg. F." (***S.F. Chronicle***, 7/2/94)

"Summer (June-August) 1994" – "Of the 48 contiguous states, 31 received below median seasonal amounts. … In addition, the nation as a whole had the driest summer in 100 years." (***Weekly Climate Bulletin***, 9/21/94)

"The Big Dry" – "Australia's worst drought in memory, dubbed 'The Big Dry', is not only killing crops and livestock, but threatens an entire way of life. Increasing numbers of outback dwellers are packing up and heading for the bright lights of Australia's coastal cities. Farmers with land handed down through generations have found themselves with no crops to sell and huge overdrafts to pay. Meanwhile, in Queensland and New South Wales, stretches of tinder-dry forests ignited into huge blazes during another difficult week for firefighters in the parched coastal region." (***S.F. Chronicle***, 10/8/94)

From the March/April 1998 special issue of ***Weatherwise*** on "The Weather of 1997":

"Between April 4-15, unusually frigid air covered much of the country, establishing over 300 daily-record lows. On the 9th, Cincinnati, Ohio, saw thermometers dip to 15 deg. F, its lowest April reading ever. On the 11th-13th, a severe freeze damaged some wheat in the central and southern Plains. In Russell, Kansas, readings dropped to 14 deg. F on the 12th, setting a new April record. … Guam takes it on the chin when the eyewall of Supertyphoon Paka passes right across the island's airport. A wind gust of 236 m.p.h. is recorded, seemingly setting a new world record, but a team of investigators soon dismisses the report as instrument error. … Flooding caused enormous death and destruction in central Europe and East Africa, while summer drought wilted crops in East Asia and Central America.

... The Moscow region endured nighttime temperatures of -20 deg. C (-4 deg. F) to -30 deg. C (-22 deg. F) on the 15th, 16th, and 17th [of December]. The official Moscow reading of -29 deg. C (-20 deg. F) on the 16th broke a record for the date set in 1902. The cold reportedly killed 23 people in the Russian capital, 25 in Poland, 13 in Romania. … Sunrise was only days away as the crew at the South Pole prepared to divide the ante on the winter's lowest temperature. That is until September 15, when the mercury plummets to a frosty -113 deg. F, the South Pole's lowest September reading ever!

"The 1996-97 snow season will be remembered for record-breaking totals in the northern Plains, upper Midwest, across portions of the Northwest, and along the shores of the Great Lakes. The record-setting snowfall in the northern Plains also set the stage for devastating spring floods. Fargo and Bismarck, North Dakota, both reported more than 100 inches of snow during the snow season, a first for each city."

"Tornadoes! The 1996 Season" – "There were 1,150 tornadoes across the United States in 1996, marking the seventh straight year with an annual total over 1,000." (***Weatherwise***, April/May 1997)

"January 1997" – "On the 19th, a hard freeze struck Florida's central peninsula, with sub-freezing temperatures noted as far south as Dade County, southwest of Miami. Although the freeze caused some icing on oranges, most of the fruit was salvageable. ... Florida's winter fruit and vegetable crops did not fare as well, however. In central areas, lows dipped to 25 deg. F in Plant City and 26 deg. F in Orlando. Freeze durations reached nine hours as far south as Ft. Myers in southwestern Florida. Dade County incurred as much as one-third of the reported $300 million damage to fruit and vegetables." (***Weatherwise***, April/May 1997)

"Futures, Farming & Forecasts" – "Cold air arriving early in the spring has been a problem, especially in Europe. A major snowstorm had developed and blanketed areas such as Bosnia, Albania and even some of Romania in mid-April. The problem with this storm, the heaviest late-season snowstorm of the century, was that it most likely killed off the honeybee population. These insects had just come out

of hibernation and were quite vulnerable. It is quite likely that many crops will fail because there will be few bees to pollinate them.

"In France, a sudden spring frost and freeze plunged into southeastern France quite unexpectedly, and caught grape growers unprepared to protect the grape plants. Temperatures dropped as low as 19 deg. F and wiped out up to 100% of the wine crop in the southernmost vineyards of the Cotes du Rhone and the Coteaux du Tricastin regions. It had been quite warm early in the spring and the vines were flowering up to three weeks earlier than normal. This made the worst freeze in decades even more damaging. We aren't the only ones in the world that have weather problems. The weather really is erratic and volatile." (***Acres USA***, June 1997)

"Record Blizzard Stuns Colorado" – "The blizzard that blew through the Rockies and onto the Plains on Saturday left as much as 50 inches of snow in the Colorado Rockies, 22 inches in parts of Denver and 35 inches in the city's suburbs. It was Colorado's biggest October snowfall on record." (***S.F. Chronicle***, 10/27/97)

From ***National Review*** (12/31/97): "Global warming has been particularly active this week, dumping up to ten inches of snow in the Deep South and even dropping snow in areas of Mexico that haven't had any in a century."

"Northeast Shivers as Crews Rush To Fix Lines" – "An army of repair crews from as far away as Hawaii battled yesterday to repair an electric system in northern New England and New York state that was left in tatters by last week's ice storm. … 'This is the biggest disaster of this kind that has ever hit this state,' Maine Governor Angus King said." (***S.F. Chronicle***, 1/13/98)

"Shasta no slouch as a climb" – "It looks like the Himalayas and the Roof of the World. But this is the way it is now at Mt. Shasta, as well as in the rest of California's high country, still buried in a deep freeze from a winter like no other this century. … It is like this all along the crests of California's Sierra and Cascade ranges. At Mount Lassen east of Red Bluff, there is a record 26 feet of snow at the parking lot for the Lassen Summit Trail, and even with snow-removal crews working 10 hours per day, every day, it's a 50-50 bet that Highway 89

through the park will be open by the Fourth of July." (***S.F. Chronicle/Examiner***, 6/21/98)

"Torrential rainstorms produced unprecedented flooding across a wide area of Eastern Europe from Ukraine to Hungary. Ukraine's western Carpathian region was one of the hardest hit areas, with more than 100 towns and villages flooded by days of heavy rainfall. Officials say the threat of further flooding could last another month. One of the most intense winterlike storms on record roared across the Northern Plains and the upper Midwest, producing a rare combination of tornadoes, blizzard conditions and hurricane-force winds. Long stretches of interstate highways were closed by snowdrift. All-time low barometric pressure records were reported across the region due to the winterlike cyclone, including a reading of 28.41 inches of mercury in Austin, Minn." ("Earth Week", ***S.F. Chronicle***, 11/14/98)

"Hurricane season called deadliest in past 200 years" – "This year's Atlantic hurricane season won't soon be forgotten, an onslaught of storms that left a staggering trail of death and destruction across Central America and the Caribbean. Six of the named storms – including the season's monsters, Georges and Mitch – affected the continental United States and caused millions in damage. … And more of the same is possible next year, said pioneering hurricane forecaster William Gray at Colorado State University in Boulder, Colo. … Gray, who underestimated this season's activity, said the last four years have been the most active ever for hurricanes in the Atlantic basin. He expects even more hurricanes in 1999." (***San Mateo Times***, 11/30/98)

"Stranded TV Crew Plucked From Frozen Arctic Island" – "While snow squalls whipped across the desolate Arctic landscape, a Russian helicopter emerged from the dusky winter light yesterday and rescued a TV crew that had been stranded on a remote island for weeks by bad weather. … The temperature on Wrangel Island has been around minus 20 degrees. 'We were filming polar bears and other animals,' Nikita Ovsyannikov told Russian television channel NTV. 'On October 15, we completed the work, and a flight was ordered to take us back. But this year, the weather conditions were very unusual: heavy, long cyclones, the weather was constantly bad,

with powerful blizzards. So the flight couldn't arrive,' he said. … Weather in Russia's Arctic has been particularly severe this year." (***S.F. Chronicle***, 12/2/98)

"More than 100 people have died from record low temperatures gripping Eastern Europe during an unusually cold November and early December. Temperatures have reached a record minus four degrees F in Moscow, where the death toll has risen to 39. Poland has seen more people freeze to death during the past three weeks than the entire previous winter." ("EarthWeek", ***S.F. Chronicle***, 12/5/98)

"An arctic cold front brought icy temperatures to northern Sweden, Norway and Finland as well as parts of Russia, claiming one life and shattering several long-standing temperature records. One person froze to death on Russia's Kola Peninsula after temperatures reached -68 degrees, the coldest recorded in the area for 100 years. The temperature in Lapland, Sweden, hit a 137-year low of -60 degrees." ("Earth Week", ***S.F. Chronicle***, 1/30/99)

"Wave of Avalanches Hits Central Europe" – "Tons of snow tumbled down upon a small village in the Austrian Alps yesterday, killing at least eight people and leaving up to 30 missing. It was one of dozens of avalanches to strike Central Europe as the region endured its worst snowfall in 50 years. [Which often means: since careful records began 50 years ago and thus may be a much older record.] Tens of thousands of travelers were stranded in train stations, traffic jams and isolated resort towns across France, Italy, Switzerland and Austria as the avalanches buried homes, roads and railways." (***S.F. Chronicle***, 2/24/99)

"An outbreak of tornadoes, unprecedented in the history of Oklahoma, tore through the heart of the state and parts of neighboring Kansas and Texas. Officials reported that the twisters claimed at least 44 lives, including 38 in Oklahoma, five in Kansas and one in Texas. Nearly 900 people were injured. More than 4,000 homes were destroyed by the twisters' winds of up to 260 mph." ("Earth Week", ***S.F. Chronicle***, 5/8/99)

"Rare snowstorm blankets Mideast" – "Snow lay thick on the domes of the mosques and churches of Jerusalem's Old City and on the battlements of the ancient wall that surrounds it. … And in the Negev Desert, where snow has not fallen for half a century, Bedouin awoke to find a thick white layer on the backs of their camels, sheep and goats. … The storm began Thursday and dropped about a foot of snow on many parts of Israel, Lebanon, Jordan and Syria. It blocked roads, stranded cars and cut power lines. … In the West Bank, Israeli soldiers and Palestinian police cooperated in rescuing hundreds of Palestinians and Jewish settlers whose cars were stranded." (***San Mateo Times***, 1/29/2000)

"Alaskan Roadkill" – "More than 470 moose in central Alaska have been killed by trains and automobiles this winter because of record-breaking snowfall in the region. The moose have been plodding through snow as deep as 10 feet. … They are unable to forage beneath the deep snowpack and wander into towns in search of food." (***S.F. Chronicle***, 2/19/2000)

"Alaskan weather creating killer avalanches" – " … This was one of at least 33 major avalanches that have struck south-central Alaska in recent weeks, a cycle of fury and danger that, even by the standards of a state where awesome natural power is continually on display, has been extraordinary. The massive slides, two of which have been a mile wide, are a product of an unusual weather pattern of thawing and freezing that created virtual shelves of ice on mountaintops earlier this winter. By late January, extremely heavy snowfalls were accumulating on those glacial shelves, creating conditions for what one state expert described as 'hundred-year avalanches.' " (***San Jose Mercury News***, 2/20/2000)

On the Questionable Value of Computer Climate Models – Will They Prove To Be Useful Tools or Only Fatal Distractions?

A meeting of the American Association for the Advancement of Science was held in New York City in May 1984. After Stephen Schneider and Roger Revelle had presented their ideas about the "global warming" coming at us to the climate section group, AAAS

member Fred Wood of the Earth Regeneration Society was allowed to make a short presentation. He told the climate group that the computer modeling efforts, now so heavily depended on for "predictions," are invalid because they fail to fulfill the basic completeness test of General Systems Research. (Fred is also a member of the Society for General Systems Research.) He further pointed out that the models specifically failed to incorporate an increased CO_2 – increased evaporation – increased glaciation relationship, or in any other way take into account the threat of imminent glaciation and all the evidence pointing to it.

This "heresy" was apparently more than Schneider and Revelle could sit still for, as they reportedly jumped from their seats, rushed for meeting chairman Frank Press (AAAS chairman as well – sent TSOC by Hamaker as noted in ***Bulletin*** 4/5), and demanded further time for "rebuttal." Revelle then reintroduced computer model "expert" Schneider, who quickly tried to put to rest arising doubts by restating their "confidence" in the computer predictions, and by saying there is no need to worry about glaciation as it is "thousands of years away." Why does he contradict what he said in his early 1984 book, ***The Coevolution of Climate and Life***: "For example, scientists find that interglacial periods – such as the current one – typically last about 10,000 to 12,000 years. This is an important finding because it implies that, since our present interglacial has already lasted about 10,000 years [over 10,800 according to Reid Bryson and other serious students of glaciation], the earth could be due to slide down to the next ice age. Only by digging out the paleoclimatic evidence – in Africa and elsewhere – can scientists determine when and how interglacial periods ended."

From ***Time*** magazine, 10/19/87:

"A three-dimensional model, for example, requires more than 500 billion computations to simulate the world's climate over one year. Not surprisingly, the earliest models in the 1960s were hopelessly simplistic. The earth's surface was often reduced to one continent with one ocean, fixed cloud cover and no seasons. But as computing power grew, so did the complexity of climate modeling. Continents were added. So were mountain ranges, deeper oceans and surface reflectivity.

"Even so, climate modelers admit, building a completely realistic mock earth is an impossibly tall order. 'You divide the world into a bunch of boxes,' explains Michael MacCracken, an atmospheric scientist at Lawrence Livermore National Laboratory. The size of the geographic box – the degree of detail called for – limits the model. Smaller grids dramatically increase the number crunching power required. 'The state of the art would be to get down to small areas so we can say what's going to happen in Omaha,' says Livermore's Stanley Grotch. 'The models just aren't that good yet.' Why, then, do scientists trust them? How do they assess their accuracy? 'You compare them with reality,' explains Princeton Climatologist Syukuro Manabe. ... A major drawback of computer models is that the various data do not necessarily behave as a system. Coaxing ocean currents to interact with the atmosphere is no small matter. For starters, oceans heat and cool far more slowly than the atmosphere. 'We've had a hard time coupling the two [of many in the Biosphere] systems,' admits Manabe. 'Even though the atmospheric model and ocean model work individually, when you put them together, you get crazy things happening. It's taken us 20 years to get them together, and we're still struggling.' "

Climate Shocks: Natural and Anthropogenic by Soviet climatologist Prof. Kirill Kondratyev was translated from the Russian and published in the U.S. and elsewhere in 1988 by John Wiley & Sons. Former NCAR Senior Scientist William Kellogg says in the Foreword, "To say that this is an unusual book would be an understatement on several counts. It is an extraordinary ***tour de force*** of scientific writing, covering as it does an enormous panorama of facts and theories about climate change and nuclear war. It contains summaries and critical analyses of a wide range of relevant research in both the Soviet Union and the western world, a scholarly achievement that is unmatched, to my knowledge. It will be certain to fascinate scientists who have been working in this broad area by presenting a number of stimulating new ideas about the factors that influence climate, past and future – ideas that for the most part have not been much publicized outside the Soviet Union." Some thoughts of Prof. K. K.:

"... Despite numerous efforts in numerical modeling of CO_2's climatic impact, the level of understanding of the problem still remains

insufficient. Until now, all studies [not quite all] have demonstrated a well-known scenario: an increase in carbon dioxide concentrations intensifies the greenhouse effect, which, in turn, leads to a global climate warming. It has been known for some time, however, that this simple scenario is a crude approach to estimating the greenhouse effect due only to CO_2 and is far from realistic. Many unsolved problems connected with different aspects of the physics of climate change remain, particularly as they concern considerations of the effects of oceans and clouds. [Unfortunately this author too seems to miss many opportunities to address the requirements for glaciation and obvious links to "the greenhouse effect." Trans-cultural mental blocks?] (p. 19-20) ... No doubt, a climate model cannot be considered reliable if it is unable to reproduce accurately the observed annual change of cloudiness and Earth's Radiation Budget (ERB) components. (p. 22) ... One of the principal drawbacks of existing climate models is their neglect of the cloudiness-radiation interaction as one of the most important factors governing the dynamics of the climatic system. For this reason Thompson and Schneider believe that at present the conclusions about the impact of cloudiness on the sensitivity of climate to an increased CO_2 concentration must be treated as preliminary. Even the sign of the possible impact of CO_2-induced cloud variations on surface air temperature is unknown. If one assumes, for example, that there would be even a small increase in the amount of cloud cover, then, with an increase in CO_2 concentration, it would lead to an increase in the Earth's albedo and to a climate cooling, since an increase in the cloud cover causes a decrease in the Earth's radiation budget." (p. 26)

"Greenhouse effect perplexes forecasters" – "Climate forecasters have a lot of chutzpah. First they blow today's weather forecast, by 10 degrees. Then they bet their reputations on predictions that the world will warm up 3 to 8 degrees in the next century. If you're skeptical, that's reasonable, says Stephen Schneider, a U.S. climate expert who has been warning for years about the coming of the greenhouse effect. When some of his colleagues claim that a particular country is going to turn into a desert and another into an oasis, don't believe them, he says. No one's computer models are that good, and the models frequently disagree. But while there's no way to tell the details for sure, Schneider maintains, the gases that

civilization is spewing into the atmosphere inevitably will trap the sun's heat and distort the world's climate [as if it is not already happening!]. Some places will warm up. Others will cool [note the gradual "evolution" of the orthodox greenhouse effect theory]. Some will dry, some will flood. All that's certain is this: The weather is going to change. Unpredictably.

" 'There's bound to be lots and lots of surprises,' Schneider says. Despite their caution, Schneider and his colleagues ... say the effects on the western United States could include harsh winters, early spring floods and long summer droughts." [The "real world" seems to be giving the computer models a serious challenge for their attention now! And their predictions are starting to match Hamaker's! Can we soon agree and begin cooperation on "beyond research" work, i.e. Earth Regeneration Work?] (***San Jose Mercury News*** 1/3/89)

"How to Fix the Clouds in Greenhouse Models" – "Climate researchers are convinced that increasing amounts of carbon dioxide and other greenhouse gases will eventually warm Earth noticeably, but they are equally certain that their current computer models cannot be trusted to predict the precise magnitude of that warming. The models are still too unrealistic. ... A recent study points up how far the models have to go before they get a handle on these cloud feedbacks. An unprecedented intercomparison of 11 greenhouse models, which was conducted by the models' creators and is headed by Robert Cess of the State University of New York at Stony Brook, shows that although the sensitivity of current models to climate forcing such as greenhouse gases varies by a factor of 3, the same models without clouds are in excellent agreement. 'The models aren't bad except for the clouds,' says Cess. ... Researchers are not even sure whether the real world cloud feedback will be positive or negative, much less what size it will be. 'You have every right to be very, very skeptical of the results' of today's models, says Michael Schlesinger [TSOC recipient] of Oregon State University, himself one of the leading American modelers. 'But this is the best that we're doing.' " (***Science***, Jan. 6, 1989)

A climate change analysis project led by Ann Henderson-Sellers of Australia's Climatic Impacts Centre at Macquarie University in Sydney, and colleagues, is described in "The MECCA analysis

project" (***Global and Planetary Change*** 10, 1995) and shows us that some more progressive scientists are moving beyond the parroting of the "global warming" concept. From the ***Abstract***: "A primary focus of the second phase of MECCA [Model Evaluation Consortium for Climate Assessment] and of the MECCA analysis team is to increase understanding of the uncertainties associated with numerical climate model predictions and to evaluate the propagation of uncertainties derived from predictions of greenhouse-induced climate change through impacts models into policy development." [emphasis added]

"The Dark Side of Science (I) – Is There Greenhouse Warming?" – "Precise measurements have indicated that the atmospheric carbon dioxide has increased significantly since the last century, and is likely to be doubled during the next century. Such an increase could cause, according to several computer-modelling studies, an increase of a few degrees of global temperatures. That has been the establishment view, but one scientist at the Berlin Conference used a different set of software, and he came up with a contrary conclusion. The greenhouse warming, he said, is to cause the increase of atmospheric cloud cover, and its albedo effect is to over-compensate for the greenhouse warming. The net result is global cooling." (50-year scientist Prof. Kenneth J. Hsu, author of ***The Great Dying*** and featured in ***Global View Monthly***" sometime in 1998)

"Computer models have long indicated that climate change may bring much more severe storms along with sharper contrasts in temperature in the decades to come. Those conditions could be similar to the recent unprecedented winter and early spring weather in North America." (from "Earth Week", ***S.F. Chronicle***, 4/11/98)

Why So Little Consideration of the "Urban Heat Island Effect?"

Consider the following:

Prof. Kenneth E.F. Watt (Evolution and Ecology Dept., Univ. of Calif., Davis) has produced a Summer '99 update of his paper, "Climate in the 21st Century: Is The 'Global Greenhouse Theory' a Reliable Predictor?" Important excerpts:

“I. The Popular Vision Scenario – Most readers will be aware that, since 1988, a theory concerning the likely climate in the 21st century has received a great deal of publicity: the ‘global greenhouse warming theory.’ The theory is often accompanied by pronouncements that all scientists competent to have an opinion on such matters support it. In fact, over 17,000 scientists, including this writer, have signed a petition to the effect that they do not support it. …

“The biggest problem with the global greenhouse warming theory is that it may be entirely an artifact due to naiveté in interpretation and statistical manipulation of thermometer readings. It has been known for a long time that the immediate environment of cities is warmer than that of the surrounding countryside, simply because of the waste heat coming out of residences, vehicles, and manufacturing plants. Further, the temperature excess of cities over the surrounding countryside decreases with decreasing population size and density down to the lowest measured sizes and densities. It is also understood that the appearance of global warming can be deceptive. There may be no apparent warming at all, or even cooling where there are few or no people. Thus, the only statistically unbiased technique for measuring climate change is to use thermometers remote from cities.

“Curiously, only one person appears to have explored this subject thoroughly: James D. Goodridge (1992) [Ref.: “Urban bias influence on long-term California air temperature trends.” ***Atmospheric Environment*** 26B: 1-7], the former California State Climatologist. The question he asked was, ‘How is the appearance of long run temperature change affected when we split all the weather stations in a region into subgroups based on human population size?’

“There are 112 California weather stations for which air temperature trends are available over the period 1910 to 1989. Goodridge split these California weather stations into groups, on the basis of the population size of the county in which each weather station was located. Then, for each of the groups he computed the average annual temperature change in deg. F. over the period 1910 to 1989. His results are summarized in Fig. 2, where it can be seen that the

appearance of global ‘greenhouse warming’ is entirely due to local waste heat in cities. With multiple variables operating in any human and/or Biospheric system, one must of course be careful about attributing one effect “entirely” to one cause. In counties with small populations (less than 25,000 people per county), there is a cooling trend. Further, there is a clear relation between the degree of cooling or heating and the county population density over the entire range of county populations.

“This is an astonishing result. It argues that the temporal trend in air temperature perceived in any region is largely determined by the size of the human population surrounding the thermometers for which the records were analysed. If air temperatures over long periods are being measured by thermometers in areas with high human populations, those thermometers are largely recording the increase in waste heat produced locally as human activity and industrialization intensify.” [End of excerpt]

“Space images track how big cities change the weather” – “NASA researchers using satellite imaging have found the urban heat ‘islands’ created by city and suburban sprawl are creating their own weather, as well as cutting biological productivity. ‘Urbanization and suburbanization are creating more than domes of hot air, they’re impacting and even creating their own weather patterns over and around them,’ said Dale Quattrochi, a geographer at NASA’s Global Hydrology and Climate Center in Huntsville, Alabama, during a presentation Tuesday before the American Association for the Advancement of Science annual meeting.

“Cities and their surroundings are dominated by asphalt and concrete, with relatively little green to shade buildings, block solar radiation and cool the air, allowing urban centers to become much hotter during the day than rural areas and to store and release heat at night. This can keep nighttime temperatures in cities up to 12 degrees F. warmer than outlying neighborhoods.” (***S.F. Examiner***, 2/27/2000)

More Proof of Worsening Global Weather/ Climate Extremes and Damage

"Recent weather wild: USDA" – "The nation's weather has been on a rollercoaster ride since the late 1970s, compared with the previous 20 years or so, says the Agriculture Department's chief meteorologist, Norton Strommen. ... Further, Florida's citrus crop has been devastated by four freezes in the last five years. 'We've been keeping records since 1895, and never have we recorded four severe freezes in five years,' Strommen said. … " (***AP***, 3/29/87)

"Disaster costs are growing" – "Natural disasters have cost the federal government nearly $120 billion in relief funding since 1977. A Senate report released Wednesday showed the costs to taxpayers of earthquakes, fires, floods and hurricanes have steadily spiraled as more places are declared presidential disaster areas." (***Detroit Free Press***, 3/16/95)

"U.S. Climate Tilts Toward the Greenhouse" – " ... Only when unsettled weather becomes a persistent trend can it say anything about global change. Now Thomas Karl, senior scientist at the National Climatic Data Center in Asheville, North Carolina, and his NCDC colleagues have found such a pattern – a sign, they say, that the U.S. climate has turned toward a greenhouse regime in the past 15 years.

"By combining data on summer droughts, wet winters, drenching rainstorms, and other weather extremes expected to grow more common in a warmer climate, Karl and his colleagues have come up with the Greenhouse Climate Response Index, a handy one-number guide to the state of the U.S. climate. As they report in the premiere issue of ***Consequences***, a journal of global change, the index has been stuck at a high level ever since the late 1970s, suggesting that chance variation may not be enough to explain the unusual weather of recent years." (***Science***, 4/21/95)

"Natural Catastrophes At Record High For 1995" – "Natural Disasters caused a record US $180 billion worth of damage during 1995. According to figures released by Germany's Munich Reinsurance, the company recorded nearly 600 natural catastrophes in 1995, including the Kobe earthquake (US $100 billion), compared with 580 in 1994, the previous record year. Deaths from natural disasters topped

18,000 compared with just over 10,000 the year before." (***The Australian***, 12/29/95)

From The Survival Center (POB 234, McKenna WA 98558) "Millennium 2000 Report":

"By October 1995, the National Climatic Data Center in Asheville, North Carolina, had published a report on billion dollar weather disasters. The report lists seven major disasters in the ten-year period 1980-1990; then a dramatic increase occurs. We are only halfway through the 1990-2000 period and Hurricane Opal was violent disaster number 14. This is double the number of disasters for the entire previous ten-year period! Four years remain before the year 2000 and one wonders how high that number may go." (From about Jan. 1996)

"Gore Links El Niño to Global Warming" – "Vice President Al Gore took advantage of a federal summit on El Niño disaster preparations here yesterday to link the growing frequency of the weather-bending phenomenon to global warming. While federal disaster planners announced stepped-up efforts at preventing catastrophe this winter, Gore noted that the severity and frequency of El Niños, a cyclical warming of the eastern Pacific Ocean, has increased dramatically since the 1970s. …

"FEMA Director James Lee Witt described the initiative as a fundamental shift in the agency's focus. 'Our goal, starting with this summit, is to change the way America prevents and prepares for disasters. We've got to break the damage-repair-damage-repair cycle,' Witt said. Under the agency's pilot program, called 'Project Impact,' FEMA will spend $30 million this year working with businesses and local government in seven cities, including Oakland, to reduce the costs and consequences of weather and other disasters.

"The initiative is part of a broader program of prevention that the agency is undertaking this year in an attempt to reduce the $14 billion in federal money that goes toward disaster relief. Witt said the cost of disaster relief is growing with the increasing severity and frequency of natural disasters." (***S.F. Chronicle***, 10/15/97)

"Climate Change: What Do You Think?" – " … In recent years, the damage cost of natural disasters worldwide has grown dramatically – from $5 to $10 billion per year in the 1960s, to about $55 billion per year, lately. Federal aid for disasters has soared from less than $500 million per year through most of the 1980s, to 3-4 times as much in the 1990s. In fact, the 10 most costly natural disasters ever in the United States have all occurred within the past 10 years." (***Johnny Ipil-Seed News***, Winter '98)

"1998 costliest year ever for U.S. disaster agencies" – "Mother Nature showed her wrath like never before in 1998, making this year the costliest ever for disaster relief across the nation, according to the American Red Cross. The Red Cross had spent nearly $162 million in 239 disaster relief operations in 42 states and Puerto Rico as of Nov. 17, officials said Tuesday. Florida topped the disaster charts, requiring the national Red Cross to assist 52 local chapters in 21 disaster relief operations. Also in double digits was Texas (19 disasters), New York (14) and California (13).

"'1998 is going off the top of the scale for major disaster operations,' said John Clizbe, vice president for disaster services at the Red Cross. … The year also was among the worst for the Federal Emergency Management Agency, which had responded to 66 presidential disaster declarations as of Sept. 30. ... This year, FEMA's disaster costs so far are $1.94 billion. …" (***S.F. Examiner***, 11/25/98)

From ***Extreme Weather and Climate Change***, a document from Environment Canada's Atmospheric Environment Service prepared by David Francis with Henry Hengeveld, Senior Science Advisor on Climate Change (1998):

"Is the world's weather becoming more extreme? ... The number of extraordinarily severe floods, storms, and other weather calamities that have occurred within the past 15 to 20 years would seem to suggest that such events are becoming more common. ... For all of the 1960s insured losses from windstorms amounted to $2.0 billion (in 1990 U.S. dollars) worldwide. By the 1980s that figure had crept up to $3.4 billion for the decade. In just the first three years of the 1990s, however, it leapt to $20.2 billion. Before 1987 a billion-dollar

insurance loss from climate events was rare, but between Jan. 1988 and Jan. 1997 there were 23 such events in the United States alone. …

“Data from Munich Re, one of the world’s largest re-insurance firms, show that direct economic losses (in 1992 U.S. dollars) from natural disasters worldwide increased by a factor of 43 between the last half of the 1960s and the first half of the 1990s.

“ ... a tendency towards more extreme precipitation is apparent across much of the land area of the Northern Hemisphere. Heavy rainfalls have increased in Japan, the United States, the former Soviet Union, China, and countries around the North Atlantic rim. Canadian records also reveal a trend towards heavier precipitation since 1940, although the increase has been mainly confined to the North. …

“The world could be in the early phases of a fundamental shift towards a climate in which extremes of many kinds are more prevalent. ...

“ … climate models indicate that a warmer atmosphere will increase the amount of moisture transported into the middle and high latitudes of the Northern Hemisphere. Thus, these areas will be exposed to more rain and snow, and it is there that increases in heavy precipitation are likely to be most noticeable.

“The ecological impacts of extreme weather on natural and agricultural ecosystems should not be overlooked either. Events such as the 1998 ice storm in eastern Canada or the 1987 wind storm in southern England, for example, weaken or destroy millions of trees which, in their healthy state, provide food and habitat for wildlife and a sink for absorbing carbon dioxide. Droughts increase the risk of forest fires and hasten the dieback of forests weakened by other stresses. Floods wash away scarce topsoil and often diminish the productivity of agricultural lands. Losses from individual events may not be an insurmountable problem, but over time and in combination with other impacts, the cumulative effect of severe weather on ecosystems could be considerable.

"Food security presents a particularly worrisome problem, given the continuing growth of the world's population and the levelling off in production of key foodstuffs such as wheat and rice. Increased crop damage from droughts, floods, and storms could make famines not only more frequent but far more difficult to deal with."

"Record Year For Weather-Related Disasters" by Janet Abramovitz and Seth Dunn was a WorldWatch Institute ***Vital Signs Brief 98-5*** and issued as a News Release picked up by many newspapers, etc. (11/27/98) Excerpts:

"With one month to go, 1998 has already set a new record for economic losses from weather-related disasters [Dec. saw the big California freeze]. According to preliminary estimates by the Worldwatch Institute, storms, floods, droughts, and fires caused at least $89 billion in economic losses worldwide during the first eleven months of the year. The 1998 preliminary total represents a 48 percent increase over the previous record of $60 billion in 1996 – and far exceeds the $55 billion in losses for the entire decade of the 1980s. … During the first three-quarters of 1998, the U.S. insurance industry alone had weather-related claims of more than $8 billion – three times the claims in 1997.

"The direct human impact of this year's weather-related disasters has also been staggering. An estimate 32,000 people have been killed, and another 300 million – more than the population of the United States – have been displaced from their homes or forced to resettle because of extreme weather events in 1998. Among the most severe 1998 disasters:

* Hurricane Mitch, the deadliest Atlantic storm in 200 years, caused an estimated 11,000 deaths in Honduras, Nicaragua, Guatemala, and El Salvador. Preliminary damage estimates are $4 billion in Honduras (equal to one-third of its GNP) and $1 billion in Nicaragua. … About 95 percent of the crops were destroyed in a nation where nearly two-thirds of the workers are employed in agriculture. …

* The costliest disaster of 1998 was the flooding of China's Yangtze River, which resulted in 3,700 deaths, dislocated 223 million people, inundated 25 million hectares of cropland, and cost $30 billion. …

Historical records show that in earlier centuries flooding was a once every 20 year event; now floods happen 9 out of 10 years.

* Bangladesh suffered its most extensive flood of the century in the summer of 1998. Two-thirds of this low-lying nation at the mouth of the Ganges and Brahmaputra rivers was inundated for months, 30 million were left temporarily homeless, 10,000 miles of roads were heavily damaged, and the rice harvest was reduced by two million tons. Damage estimates exceed $3.4 billion. …

* Other parts of the world were also struck by devastating weather-related disasters in 1998. An ice storm in Canada and New England cost $2.5 billion in January, bringing down thousands of miles of power lines and wiping out the sugar maple industry in some areas. Floods in Turkey in June caused $2 billion in damages, and floods in Argentina and Paraguay cost $2.5 billion. Some 10,000 people were killed by a cyclone in India in June, while vast fires in Siberia burned over 3 million acres of forest.

“The ‘hand of man’ can be seen in many of these disasters. The loss of forests and wetlands, which normally intercept rainfall and allow it to be absorbed by the soil, permits water to rush across the land, carrying valuable topsoil with it. As the runoff races across deforested land, it causes floods and landslides strong enough to wipe out roads, farms, and fisheries far downstream.

“Paradoxically, the lack of trees also exacerbates drought in dry years by allowing the soil to dry out more quickly [and the land to ‘globally warm’?]. The record-breaking fires in Indonesia and Brazil in 1997 and 1998 occurred in tropical forests that are normally too moist to burn. But when fragmented by logging and agricultural clearing, these forests dried out to the point where deliberately set fires were able to spread quickly out of control. …

“Unless ravaged nations and yet-to-be-ravaged nations rebuild along a path of sustainable development that emphasizes restoring and maintaining healthy ecosystems, they risk even greater exposure to the devastation of unnatural disasters in the future.

"The need for healthy ecosystems is further underscored by the accelerated climate change projected by scientists in the coming decades, due to the failure to reduce greenhouse gas emissions. This is likely to lead to more severe storms, floods, and droughts in many regions. Munich Re, one of the world's leading insurance companies, issued a report in late 1998 suggesting that in the years ahead, large areas of the world, including the southeastern United States and Indonesia, may become virtually uninsurable."

Note: "This year's damage was also far ahead of the $55 billion in losses for the entire decade of the 1980s. Even when adjusted for inflation, the 1980s losses, at $82.7 billion, still fall short of the first 11 months of this year." (***S.F. Chronicle***, 11/28/98)

"Global Warming and the Insurance Industry" – "Adjusted for inflation, damage incurred from hurricanes thus far this decade has already reached the cost of all such losses in the 1970s and 80s combined. 1992's Hurricane Andrew set a new record with a $30 billion loss. A larger weather disaster in a more developed area – well within the realm of possibility – could conceivably create losses in excess of $100 billion. Such a loss would wipe out reinsurance funds globally.

"Franklin Nutter, President of the Reinsurance Association of America, had warned that 'the insurance industry is the first in line to be affected by climate change … It could bankrupt the industry.' His comments were echoed by Gerhard Berz of Munich Re, the world's largest reinsurance firm: 'There is no longer any doubt to us that a warming of the atmosphere is causing an increased likelihood of storms, tidal waves. … floods and other extreme events.'

"Some firms are moving beyond such warnings to recognize the links between extreme weather, global warming and increased CO_2 emissions. This is evidenced by the industry's significant representation at events such as the December 1996 Oxford Solar Investment Summit in Great Britain. Swiss Re, the world's second largest reinsurance firm, has invested $2.75 million in SunLight Power International. At the Kyoto summit the following year, executives representing more than 70 insurance companies advocated a plan of action: 'The capital resources of both the public

and private sectors should work in synchrony to promote alternative energy generation and use.' " (Early Spring 1999 ***Auto-Free Times***)

"Are We Approaching the Abyss?" – "Are we as a species approaching some kind of abyss or not? … An entirely different group of famous scientists state that global warming will trigger a sudden and catastrophic cooling of the planet. … Is it possible the transition was accomplished in 20 years – a blink of the eye in geological time? I telephoned the National Oceanic and Atmospheric Administration (NOAA) for a printout on natural disasters over the past 20 years in the U.S. that caused over a billion dollars in damage. Their report shows that between 1980 and 1990 there were eight major disasters with Hurricane Hugo, disaster number eight, ending the first half of the past 20-year period. By 1995, only the first half of the next 10-year period, natural disasters doubled, tripled and then quadrupled, as Hurricane Opal hit land in October '95. Since Opal, the NOAA list shows eighteen more disasters ending with Hurricane Floyd in September '99. From 1980 to 1990 there were 8 disasters. From 1990 to this past September there have been 36 which are statistically significant, and I wonder if we are inhabitants of a transition period like lemmings with a dark fjord in our future." (Richard Noone in ***Atlantis Rising***, Feb. 2000)

More Evidence of Glacial-Tectonic System Intensification?

Readers of the earlier Bulletins may recall John Hamaker's linking of the dramatic ocean surface warmings associated with "El Niño" events to ocean floor tectonic processes including release of superheated molten material. A few years later comes a "new theory" about this, as summarized in the following two article excerpts:

"Study Says Lava May Cause El Niño" – "Government geologists studying the violent activity that keeps the Earth's crust in constant motion proposed a new theory for the dramatic and sometimes deadly warming of the seas known as El Niño. ... Now Herbert R. Shaw and James G. Moore of the U.S. Geological Survey in Menlo Park have a theory that may explain the onset of El Niño events. Their account is published in the current issue of ***EOS***, the weekly

publication of the American Geophysical Union. According to Shaw and Moore, large lava flows erupting through rifts in the Earth's crust beneath the Pacific can transfer much of their intense heat to the ocean currents that normally flow from west to east around the equator. ...

Geophysicists have long known that the floor of the Pacific is covered by huge moving plates of the Earth's crust. Deep cracks between many of the plates allow molten rock to surge upward from the hot viscous region of the asthenosphere, or upper mantle. The entire Pacific is one of the most active seismic regions in the world, and earthquakes can release great surges of volcanic material from the rifts beneath the sea. The lava flows emerge at temperatures of more than 2,100 degrees, and recent submarine lava flows discovered near the Hawaiian Islands cover nearly 9,000 square miles.

Shaw and Moore calculated that a single truly monstrous flow of 100 cubic kilometers of hot lava erupting continuously for up to a month through a two-mile-long rift in the seabed of the Pacific would cause a major temperature rise across a huge area of the ocean and bring on a full-scale El Niño. That quantity of lava would be enough to bury all of San Francisco under a molten rock layer a half-mile thick. Although submarine lava flows as big as that are uncommon, smaller ones frequently occur, and a series of them could account for a similar level of ocean warming, the geologists said." (***S.F. Chronicle***, 11/25/88)

"Magma flows blamed for El Niño events" – " … Herbert Shaw and James Moore, from the US Geological Survey in Menlo Park, California, say that far more lava is erupting on the bottom of the Pacific than previously thought. They base this assertion on recent sonar images of the ocean floor off Hawaii and along the East Pacific Rise, which runs from the Gulf of California past Easter Island off Peru.

"We believe that there is enough lava and magma produced to tip the delicate balance of atmospheric and oceanic circulation patterns in the tropical Pacific,' Moore said last week. 'This is a coupled system – all these things are probably interrelated.' ... Recent research by Daniel Walker, a seismologist at the University of Hawaii's Institute of

Geophysics, adds weight to the claims of Moore and Shaw. Walker has found that between 1965 and 1987, the number of earthquakes around Easter Island increased with the onset of an El Niño event." (***New Scientist***,12/10/88)

Not by Fire but by Ice (Sugarhouse Publishing, 1997) by Robert Felix is another intriguing book warning that a new glacial period may be imminent or may have started. The author didn't have the insights of ***The Survival of Civilization*** to draw upon while writing it (we traded copies in 1998) but like Hamaker he argues that a sustained intensification of the evaporation-precipitation cycle is needed to build the vast ice sheets and glaciers. While giving surprisingly little consideration to the growing intensified greenhouse effect as a primary means to evaporate water, he strongly backs Hamaker's contentions that ocean floor tectonic-volcanic release of magma and gases and accompanying extreme heat can support "El Niño"-type ocean warmups and resultant weather chaos. "Weather chaos" obviously defines an interglacial-to-glacial transition period. Having an open and intelligent mind, author Felix agreed to more fully investigate the Hamaker Thesis, and agreed too that regardless of the various differences of thinking about climate change, it would be wise for humanity to remineralize, re-green and stop abusing the Earth. He said in his next talk to farmers and others he'd inform them about remineralization. Now a few fascinating excerpts from ***Not by Fire but by Ice***:

"Water vapor levels are rising! Using balloon-borne water-vapor detectors, Samuel Oltmans and David Hoffman of NOAA's Climate Monitoring and Diagnostics Lab in Boulder, Colorado, tracked water-vapor concentrations in the stratosphere from 1981 to 1994. Water-vapor levels are rising rapidly, they found, 'about one percent per year.' (***Nature***, 9 Mar 1995) No wonder we're seeing ever larger floods! (p. 190)

"You can make the case, agrees oceanographer Nicholas E. Graham of Scripps Institute of Oceanography, that sea temperatures do affect the climate. The recent warming trend in global temperatures has been driven almost entirely by increasing tropical sea temperatures, said Graham. Warmer ocean temperatures 'cause increased evaporation and increased precipitation, thereby heating the

atmosphere through the release of latent heat.' (***Science***, 3 Feb 1995) (p. 191)

"Ice ages not only end abruptly, they begin abruptly too. … When the Eemian Period ended, it ended suddenly, said Geneviéve Woillard of the Université Catholique de Louvain. Vegetation in the peat bog changed 'radically' and warm-weather trees completely disappeared. The change occurred 'in less than 20 years.' … The change from one kind of forest to the other occurred so rapidly, said H.H. Lamb, in ***Climate, History and the Modern World***, that the time elapsed was less than the error margin for radiocarbon dating. The current elm disease in Europe and North America, Lamb noted, may be part of a similar pattern. The next ice age 'could quite well be imminent.' (p. 194-95)

I should mention that Robert Felix also makes an extended case that declining magnetic field strength and a likely magnetic field reversal may be key factors in our present and future viability as Earth participants. You'll need to read the book to consider his evidence and arguments. Continuing:

"Sobering indeed. If the 1980s were one of the worst decades of volcanic devastation ever recorded … and if 80% of all volcanic activity occurs underwater, imagine what's happening in our seas! Massive floods in the making! … How many miles of basalt must pour into our seas, and how far must our magnetic field decline, before we acknowledge that we have a problem on our hands? [Isn't Honesty asking humanity to acknowledge all its problems and potential problems, and Integrity asking us to cooperate to find and apply all the best of the real, constructive, most natural and Earth-Regenerative solutions and preventative actions?] (p. 202)

"India, Chile, Indonesia, Bolivia, Turkey, New Guinea, Japan, Greece, Mexico, Burma, Sumatra, China, Ecuador, Columbia, the Philippines, parts of Texas, parts of the U.S. East Coast, and much of the U.S. West Coast from Alaska to California, have seen escalating earthquake activity.

"Indeed, California may be the harbinger of things to come. 'The pace of earthquakes throughout the Los Angeles region is increasing

ominously,' said seismologist Kate Hutton. Southern California has been struck by 24 temblors of magnitude 5 or greater since 1932. Eight of them since 1987. 'The reason for the increase in activity is a mystery.' (***Seattle Post-Intelligencer***, 18 Jan 1994) (p. 203)

"Annual precipitation has increased steadily in Europe and the Soviet Union since the mid-19th century. In the United States, precipitation has increased 'markedly' in the last 30 years alone. (R.S. Bradley, ***Science***, 1987) In the years since Bradley wrote those words, precipitation has increased even more. … Our glaciers are growing! It's one of the best kept secrets in the world today. Field observations over the past 20 years show that the Antarctic ice sheet is growing, said Charles Bentley, director of the Univ. of Wisconsin's Polar Research Center. Greenland's ice sheet is also growing, said Bentley.

"Satellite measurements confirm Bentley's findings. Measurement of ice sheet elevations by satellite altimetry show that the Greenland ice sheet is growing thicker in both the ablation (melting) and accumulation zones. 'Present accumulation rates (about eight inches per year),' said N.J. Zwally of NASA, 'are larger than the long-term average.'

"Think about that! More than five million square miles of Antarctica and 700,000 square miles of Greenland – an area twice the size of the continental United States – are covered by ice. Adding eight inches of ice per year to such a vast area is a major accomplishment.

Robert Felix also maintains a website – http://members.aol.com/iceagenow/ – from which follow a few short excerpts available on 1/5/00:

"Last winter, Moscow shivered through the coldest December since 1882. Last winter, Guadalajara saw its first snowstorm (16 inches) since 1880. Last winter, it snowed in Mexico City. Last winter, it snowed in Louisiana. And Alabama. And Mississippi. Two winters ago, Spokane suffered the snowiest December on record. Two winters ago, all-time record low temperatures were set in several parts of the Upper Midwest, including Illinois, Iowa, Minnesota, and Wisconsin. According to the Midwestern Climate Center, 'this

appears to be one of, if not the, coldest weather events of the 20th Century.' " …

"The winter of 1998/99 has been the rainiest winter on record in Seattle. In January 1999, Toronto was smothered by the worst snowstorm in its recorded history. In January 1999, Chicago was smothered by the second worst snowstorm in its recorded history. In January 1999, many parts of the United States saw record low temperatures, including South Carolina, North Carolina, Illinois, Mississippi, Louisiana, Alaska, and Maine. Temperatures in Allagash, Maine, fell to minus 55 deg., the lowest ever recorded in the state. Parts of Alaska endured the longest cold spell in recorded history.

"In January 1999, Finland, Sweden, and Norway suffered the worst cold wave of the century, with temperatures plunging to minus 60 deg. F. It was so cold that mercury thermometers froze. Alcohol-based thermometers were the only ones to function properly. In January 1999, 163 tornadoes hammered the United States, more than three times the previous January record. … This is global warming?"

Thank you for your concern, Robert Felix, and your willingness to express it publicly and call for total public awareness of the climate change dangers. I'll close this sharing of your work with the quote you used at the start of your last chapter, from Professors John and Katherine Imbrie who wrote ***Ice Ages: Solving The Mystery***:

"During the past two million years, no interglacial lasted more than 12,000 years. Most lasted only 10,000. Statistically speaking then, the present interglacial is already on its last legs, tottering along at the advanced age of 10,000 years."

Closer to 11,000 years now as I noted in Chapter 3, ***TSOC***.

Wait, one more quote from p. 142 of ***Not by Fire but by Ice***:

"Some scientists dismiss the El Niño/underwater volcanism theory as absurd. But it was given a strong boost by oceanographer Dr. D. James Baker, administrator of the National Oceanic and Atmospheric Administration, who highlighted it at a recent symposium as a

possible explanation. New research, partly funded by NOAA, reveals that underwater volcanism is 'one of the strongest and least understood forces on earth, producing a vast heating of the seas equal to that of 3,000 big nuclear reactors.' (From "Hot Vents in the Sea Floor May Drive El Niño," ***New York Times***, 25 Apr 1995, by William Broad.)"

A letter (8/11/98) to me from ***Not by Fire but by Ice*** author Robert Felix says:

"As you know, it's much more politically correct to believe in global warming, so reviews and endorsements have been slow in coming. However, I have received a few, and from some very credible sources. Enclosed is a partial list.

"You and I may be coming at this from different perspectives, but I firmly believe that our ultimate conclusion, that the next ice age could begin any day, will soon be proven correct. Good luck in your endeavors."

Of the comments he has received, I think one should be noted as it is from one of the few others besides Hamaker who thinks ocean floor tectonic activity is a prime cause of El Niño. It comes from Dr. Louis Thompson, well-known climatologist and now Professor Emeritus, Iowa State University, who wrote:

"I just finished reading your well-documented, fascinating and shocking book. I found it easy to agree with you. The last El Niño was the strongest on record. I think it had to be [caused by] underwater volcanic eruptions."

"Seabed Eruption" – "A huge undersea volcano off the Pacific Northwest coast is erupting with such force that it is rattling seismographs from California to British Columbia. Scientists say they can hear the eruption of the Axial Seamount volcano with submerged acoustic devices, but can only guess at what dramatic events are unfolding nearly 5,000 feet below the ocean's surface. A team of scientists has rushed to the area to drop a variety of instruments to measure the eruption and collect water samples from the deep. The seamount is known to give off enormous plumes of scalding, mineral-

rich water that create a thriving habitat for creatures able to survive the high temperatures and crushing pressures at that depth." ("Earth Week", ***S.F. Chronicle***, 2/7/98)

"The Impact of Volcanic Eruptions on Worldwide Weather" by geologist Gerald Kuhn concludes his interesting article as follows: "Between 1947 and 1977, we enjoyed one of the most benign, quiescent, and storm-free periods, going back to the year 1550. It now appears that the Earth has entered a period of increased volcanic activity, much greater than all previous decades of the present century combined. What is required is an interdisciplinary effort, not just to monitor effects, but to use the historical knowledge, some of which is reported here, to try to understand the relationship of volcanic activity, weather, and climate." (***21st Century***, Winter 1997-98)

US Department of the Interior
US Geological Survey

Number of earthquakes located worldwide from 1985 to 1996 by the USGS/NEIC

Magnitude	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
8.0 to 9.0	1	1	0	0	1	0	0	0	1	2	3	1
7.0 to 7.9	13	5	11	8	6	12	11	23	15	13	22	20
6.0 to 6.9	110	89	112	93	79	115	105	104	141	161	185	150
5.0 to 5.9	1674	1665	1437	1485	1444	1635	1469	1541	1449	1542	1327	1126
4.0 to 4.9	4281	4476	4146	4018	4090	4493	4372	5196	5034	4544	8140	8558
3.0 to 3.9	1764	1942	1806	1932	2452	2457	2952	4643	4263	5000	5002	4521
2.0 to 2.9	935	1169	1037	1479	1906	2364	2927	3068	5390	5369	3838	2065
1.0 to 1.9	97	153	102	118	418	474	801	887	1177	779	645	267
0.1 to 0.9	0	0	0	3	0	0	1	2	9	17	19	1
Unknown	4240	3218	2639	3575	4189	5062	3878	4084	3997	1944	1826	2155
Total	13115	12718	11290	12711	14585	16612	16516	19548	21476	19371	21007	18864

More on "Greenhouse Warming" and the Evolution of Climatological Thinking

Stephen Schneider, long-time editor of ***Climatic Change*** and public spokesperson (on "Nightline" TV program, etc.) from his position at the National Center for Atmospheric Research and, more recently, Stanford University, is perhaps the most visible proponent of the "greenhouse warming" theory and the mathematical computer models upon which it is based. Largely ignoring the Hamaker Thesis in public forums and in ***Climatic Change***, aside from publishing some unfounded critical comments by science writer John Gribbin and a more thoughtful response by Swiss physicist Pierre Lehmann defending Hamaker's views, it appeared Dr. Schneider was unwilling to allow Hamaker a say. Perhaps he had already given up on creative solutions to the climate crisis, as he seems to reveal in the dedication of his 1989 Sierra Club book, ***Global Warming: Are We Entering the Greenhouse Century?***:

"To Adam and Rebecca, in the hope that their generation will be more creative in adapting to the greenhouse century than mine has been in preventing it."

In addition to this strange passing on of responsibility to his children and their generation for the current and previous adult generations' shocking exploitation and neglect of the Earth, here are some of his interesting comments on the Hamaker Thesis from his "***Fire or Ice***?" chapter and back Notes:

"One postulated surprise is the arrival of another ice age [he should specify another glacial period within our current ice age] before the year 2000 as a result of greenhouse gases.[33] [ref. ***The Survival of Civilization***]. This doomsday prediction has been pressed by two very passionate individuals, John Hamaker, a mechanical engineer who formulated the idea, and Don Weaver, an organic farmer [ecologist-gardener-concerned individual more accurate] who became his disciple ["one who learns"], and their followers who formed groups with names such as the Earth Regeneration Society and the Institute for a Future. These groups call for the construction of billions of

dollars worth of rock-grinding equipment to produce mineral dust to remineralize the soils. The essence of their theory is that during an interglacial, the enhanced productivity of the forests and agriculture depletes the soil of minerals, thereby allowing atmospheric CO_2 to build up as the productivity of the world's ecosystems declines with declining mineral content. The CO_2 buildup – and here is where most atmospheric scientists that I have talked to think this theory is way off base – leads to an ice age in as little as 100 years! …

"In any case, in dealing with a system as vast and complex as the earth's climate, speculations of all sorts are difficult to rule out absolutely.[35]

To back Notes Ref. 35:

"Therefore, I certainly would not deny that the Hamaker-Weaver hypothesis has some mathematical chance of being valid. [Could one of the powerful NCAR computers estimate it?!] However, my scientific judgment (intuition, really) is that the probability of this scenario is small. Nevertheless, I do agree with Hamaker and Weaver that climatologists should not parochially ignore the potentially important interactions between the atmosphere, oceans, ice, biosphere, and soils. I also applaud their contribution of the soil demineralization issue to the already long list of possible internal influences on the glacial/interglacial cycles."

I wish this suggestion of respect extended to initiating more open forums on these topics so we could all more deeply explore the truths and creative solutions at hand.

A 12/10/93 letter from Michael Glantz, Head of the Environmental and Societal Impacts Group at National Center for Atmospheric Research includes these comments:

"Dear Don: Thanks for your letter with an article from John. I wanted to address your perception about my involvement in the global warming boat (as you call it). I assess the wide range of views on the topic, including the outlying ones. I am not a global warming fanatic (nor a global cooling one) but am interested in assuring that the scientists cannot get away with selective inattention. As a result, I am

in constant conflict with the global modeling community at NCAR and with the IPCC bureaucracy. … I do sense that there is a misleading course being pursued but have chosen to combat it in my own way (as you have chosen yours)."

Is NOAA prepared to support and help coordinate the Earth Regeneration effort? One thinks it possible in reading NOAA's National Climatic Data Center Mission Statement from their Jan. '97 Products and Services catalog:

"NCDC's mission is to manage the Nation's resource of global climatological in situ and remotely sensed data and information to promote global environmental stewardship; to describe, monitor and assess the climate; and to support efforts to predict changes in the Earth's environment. … "

From Dave Edwards' editorial in ***The Ecologist*** (Jan./Feb. '97) titled "Hot Air: Global Warming and the Political Economy of Threats":

"Action to combat global warming has been minimal. The British Energy Conservation Trust has received only a tenth of its planned funding. British Energy Minister Tom Eggar cites accidental pollution cuts as justification for opposing other measures, while Eileen Clausen, the U.S. Assistant Secretary of State for environmental issues, admitted the obvious truth that governments were 'in disarray' over climate change, there was 'no clear policy direction', and 'little thought' had been given to implementing and enforcing any policies. …

"To his credit, Roy Greenslade of ***The Observer*** commented in July 1996 on the failure of the press to cover global warming. Referring to British Environment Secretary John Gummer's declaration at the June 1996 IPCC gathering that 'Global climate change needs global action now. The alarm bells ought to be ringing in every capital of the world', Greenslade wrote, 'I thought ... this is sure to be big news in the morning. I imagined the front page stories, the feature articles and the leaders.' It was not to be. …

"The reality has more to do with the corporate nature of the media, their parent companies and advertisers and is a shocking indictment

of the notion that we in Britain or the United States have a free press. Before the world is submerged in meltwater, it seems sure that we will already have long since drowned in banality and half-truths." [Including the half-truth of only "warming"?!]

"1,500 Top Scientists Plead For Global Warming Curbs" – "Nearly 1,500 of the world's top scientists, including a substantial majority of the living Nobel Laureates in science, issued an urgent call yesterday for the nations of the world to take strong, binding steps toward curbing global warming. … The scientists' call for action, initiated by the Union of Concerned Scientists, said the world's leaders must adopt 'legally binding commitments to reduce industrial nations' emissions of heat-trapping gases significantly below 1990 levels in accordance with a near-term timetable.' (***S.F. Chronicle***, 10/1/97)

"Earth Summit Begins With a Scolding" – "General Assembly President Razali Ismail opened Earth Summit +5 with a gloomy assessment of progress made since the first Earth Summit five years ago in Brazil and a stern exhortation to the assembled presidents and prime ministers to start doing better. 'We continue to consume resources, pollute, spread and entrench poverty as though we are the last generation on Earth,' said Razali, Malaysia's ambassador to the U.N. 'We as a species, as a planet, are teetering on the edge, living unsustainably … and may soon pass the point of no return.' ... Vice President Al Gore, in brief remarks welcoming summit delegates, warned of rising sea levels, severe drought and other threats posed by global warming. 'We must act,' he said, without spelling out how." (***S.F. Chronicle***, 6/24/97)

After reading the 319-pg. magnum opus ***Ice Sheets*** (Oxford University Press, 1998) by Terence J. Hughes, long-time glaciologist at University of Maine's Institute for Quaternary Studies, I called the author to thank him and talk. He agrees, as do some number of Quaternary researchers, that "the coming glaciation" should be the priority concern over the popular warming scenarios. As he notes in the book (p. 286): "Modeling inception of the Arctic Ice Sheet must include mechanisms for increasing precipitation, lowering snowlines, and thickening sea ice." To those who've read Hamaker, Terry Hughes' descriptions of "the cloud machine," "the ice machine," "the dirt machine," and "the dust machine" will be appreciated. He thinks

that current satellite and other monitoring programs are inadequate to warn us if another glacial inception is underway – that at the current pace it could be another 10 years until a high-latitude Early Warning System is operational. No scientist I've spoken with has thought that current monitoring systems were adequate for this purpose. No one seems to share anything close to the sense of urgency which a careful study of Hamaker and supporting evidence naturally impart! I hope TSOC and this new volume will reach every conscious person and concerned scientist and will be given that careful study. ***Ice Sheets*** closes:

"This book is one step on a long road leading to an understanding of abrupt changes in ice sheets, sea level, and climate. It is one of the most exciting and important roads that scientists travel. Few other roads have signposts warning of more serious hazards to the social, political, and economical fabric of humanity."

Even strong advocates of simplistic "global warming," such as Lamont-Doherty's geochemist Wallace Broecker who was predicting a "carbon dioxide-induced super-interglacial" to supplant the next glacial in his late-70s and early-80s writings, have more recently re-oriented their thinking to include the complex and dangerous likelihood of a carbon dioxide-induced glacial period. To what degree the Hamaker Thesis has been a positive influence is unclear, but it seems not enough. The new thinking of Broecker and others has focused largely on the theory that the increased high-latitude precipitation expected (and measured) from greenhouse overheating may (along with icebergs or ice melt) dilute the Atlantic Ocean surface water enough to shut down the natural "thermohaline circulation" bringing warm Gulf Stream waters north to keep much of Europe and Asia temperate, and could thus initiate a new glacial.

As I pointed out in letters to Dr. Broecker and others, this theory and Hamaker's are not mutually exclusive, but Hamaker's emphasis on the entire interdependent chain of causal Biospheric links and the resulting high-latitude albedo increase via growing cloud cover and precipitated snow and ice gives us a more wholistic explanation of "the glacial process" which cannot sanely be ignored. Dr. Broecker and others have generally continued to avoid sharing their response with this concerned "layman."

I'll quickly review some of the articles showing some of the new thinking – which one hopes will evolve into some even newer and better thinking, fast.

"In the Ebb and Flow of Ancient Glaciers, Clues to a New Ice Age" – "The climatic history of the last half-million years is largely a history of ice and cold, punctuated every 100,000 years or so by brief, glorious intervals of unusual warmth called interglacials. [One would think long-time science writer William K. Stevens knows the glacial-interglacial cycle extends back 2.5 million years, so why does he say only .5 million?] If nature takes its course, scientists say, the current interglacial – the one in which human civilization developed – should begin to end within the next 2,000 years or sooner. But nature may not take an unaltered course.

"Unprecedented concentrations of heat-trapping carbon dioxide in the atmosphere could extend the present interglacial by a millenium or more and transform it into a 'super-interglacial' with average global temperatures higher than any seen in the last million years, say a number of scientists who study the advance and retreat of the great glaciers. …

"In the last decade or so, scientists have made great strides in understanding the causes and workings of the great glacial cycles. But how much the globe will warm up is a matter of intense argument, and some glaciologists who believe that a super-interglacial is on the way say it may not last long enough to delay the world's turn to a new ice age. How all this will play out is one of the major questions faced by the interrelated sciences of glaciology and climatology.

"The present interglacial is 10,000 to 13,000 years along, and scientists say that in at least the last half-million years, no interglacial has ever lasted longer than 12,000 years. …

"Whether the carbon-dioxide fluctuation is a cause or an effect of warming and cooling is an unanswered question of the chicken-and-egg sort. 'One of the really fundamental problems to be solved is why the carbon dioxide changes, because that clearly is involved in this ice-age change,' said Dr. Imbrie. 'Nature herself has been changing

carbon dioxide substantially, and a Nobel Prize question is why that happens.'

"In one way or another, he and other scientists believe, the Milankovitch cycles probably influence the way the ocean circulates, setting in train a complex chain of climatic interactions, involving carbon dioxide, ice, air temperatures, clouds, vegetation patterns, dust, atmospheric methane and a host of other factors.

"Studies of ocean sediment indicate that in glacial times, carbon dioxide is transferred from the upper waters of the ocean to the depths, said Edward A. Boyle, a planetary scientist at the Massachusetts Institute of Technology, in a paper at the American Geophysical Union in San Francisco last month. One consequence, he said in an interview, is that the ocean becomes more alkaline [from remineralization via the very dusty glacial atmosphere] and draws more carbon dioxide from the atmosphere. …

"The Milankovitch cycles may also cause the pattern of ocean currents to change abruptly, altering the global distribution of heat, say Wallace S. Broecker, a geochemist at the Lamont-Doherty Laboratory, and George H. Denton, a geologist at the University of Maine. They believe this sudden flip, in which the ocean-atmosphere system drastically reorganizes, sets off glacial periods and interglacials.

"Dr. Broecker and Dr. Denton say a global 'conveyor belt' of ocean currents now carries warm air to the North Atlantic, warming the northern latitudes and preventing glaciers of ice-age scale from developing. Studies of the ancient climate seem to show that the conveyor belt ceases in glacial times, the scientists say. …

"The end of the interglacial and the beginning of the gradual decline into ice-age cold may also come with relative suddenness, Dr. Broecker says. 'The way I would count this interglacial,' he said, 'it's already 13,000 years along,' and the onset of the decline is overdue. 'You can say we're approaching that precipice now,' he added. ... 'We're living in a system that can do strange things,' he said. 'Small forcings have produced large things, and to say a priori that this gas

[CO_2] can't produce large changes is just bloody insanity.' " (***New York Times***, 1/16/90)

Seven years later we pick up an Associated Press article published on the Internet (11/27/97) and titled:

"Researcher: Greenhouse gases could chill Europe" – "Currents flowing like rivers from pole to pole and from ocean to ocean help keep the Earth's weather in a steady state, but the buildup of greenhouse gases in the atmosphere is threatening this circulation and could dump Europe into a deep freeze, a researcher says. The dependable pattern of ocean circulation is a key factor in controlling the Earth's weather and keeping it predictable, said Wallace S. Broecker of the Lamont-Doherty Observatory of Columbia University in Palisades, New York. ... 'We live in a climate system that can jump abruptly from one state to another,' said Broecker. By dumping into the atmosphere huge amounts of greenhouse gases, such as carbon dioxide from the burning of fossil fuels, 'we are conducting an experiment that could have devastating effects,' he added. 'We're playing with an angry beast – a climate system that has been shown to be very sensitive,' explained Broecker. …

"Without the current, said Broecker, 'Europe would be in a deep freeze' with average winter temperatures dropped by 20 degrees F. or more. The climate of Dublin or London would be like that of Spitsbergen, Norway, which is 600 miles north of the Arctic Circle, he said."

The next day (11/28/97), ***Science*** published Broecker's 7-page article on this topic, "Thermohaline Circulation, the Achilles Heel of Our Climate System: Will Man-Made CO_2 Upset the Current Balance?" Early on Dr. Broecker asks:

"Might the ongoing buildup of greenhouse gases in our atmosphere trigger yet another reorganization of the climate system? Were this to happen a century from now, at a time when we struggle to produce enough food to nourish the projected population of 11 to 16 billion, the consequences could be devastating."

And were this to be happening now, when over 6 billion mostly malnourished people are confused as to how to live in constructive relationship with our planetary life-support system?

I feel responsible to ask that question and another that others have also put forward: To what extent does fossil fuel company grant money going to institutions such as Lamont-Doherty, Scripps Institute of Oceanography, and others – as is noted in their annual reports and other publications – affect the quality and ecological rationality of the work produced? Is it really scientific or rational for Dr. Broecker in this article to unequivocally state: "The buildup of the greenhouse gases CO_2, CH_4 and N_2O in our atmosphere is bound to continue for more than a century. … While previously we [?] thought in terms of doubling the strength of the CO_2 content of the preindustrial atmosphere, current thought is moving toward a tripling." Could such thinking actually be, in Dr. Broecker's earlier words, "bloody insanity"?

Let us give Dr. Broecker credit for this statement about the computer modellers' long-time primary tool, the GCM or general circulation model: "The failure of general circulation models to spontaneously reproduce the abrupt changes in temperature and rainfall pattern so clearly recorded in the geologic record for the last glaciation sends a strong message that these models are somehow deficient."

Here is another noteworthy scientific statement: "That abrupt changes in climate have occurred during interglacial as well as glacial periods is clearly documented. Not only did a brief but pronounced cold event occur in the early Holocene (see above), but it has been shown that the last major interglaciation (that is, the Eemian) was terminated by a brief but intense cold period in the northern Atlantic region. This cooling shows up in the marine record as a sudden resumption of ice rafting and a sudden return of the cold water species N. pachyderma left coiling (49) and in the continental record as an abrupt demise of tree pollen (50)." His reference 50 is our palynologist friend Genevieve Woillard! Now perhaps if we could inspire Dr. Broecker to make a careful study of the work of Johannes Iversen and Svend Th. Andersen, he could better see the rationality of the Hamaker synthesis and the Hamaker "prescription" of global cooperative Earth Regeneration ***now*** – so that a century from now a much healthier and more enlightened humanity will thank us for our sanity and courage.

From the concluding ***Summary***:

"Through the record kept in Greenland ice, a disturbing characteristic of the Earth's climate system has been revealed, that is, its capability to undergo abrupt switches to very different states of operation. I say 'disturbing' because there is surely a possibility that the ongoing buildup of greenhouse gases might trigger yet another of these ocean reorganizations and thereby the associated large atmospheric changes. …

"So what do we do? Everyone would agree that the smaller the CO_2 buildup the less the likelihood of dire impacts. But we are hooked on cheap energy and the demand for it continues to grow. Furthermore, no viable and acceptable option to fossil fuels has yet been devised."

Let us note here that there are tens of thousands if not millions of farmers in this country and worldwide who could inform Dr. Broecker it is viable to grow excess carbon out of the air and produce liquid, solid and gaseous biomass energy "cheaper" than the immense costs of continuing a conscious addiction to so-called cheap energy from fossil fuels and nuclear. Especially when neglect to accomplish such an ecologically and economically sane energy transformation on a speedy, recognition-of-present-emergency basis may be guaranteeing the near-future non-viability of crops, farms and societies worldwide due to increasingly harsh climatic "reorganizations"! Let us all, including the intelligent minds in the Dept. of Energy, the fossil fuel companies, farmers and farming corporations, and government leaders, think long and hard with love of Life on which are the viable and acceptable options.

Although disagreeing with some of Dr. Broecker's thinking and statements, I want to point out that he is at least making some effort to "sound the alarm" and propose some suggestions such as developing hydrogen fuel cells by reacting fossil fuels with steam and capturing the CO_2 at its source. He makes no comment on Hamaker's recommendation for alcohol-powered steam engines but he does agree with Hamaker when he says "we must strive to develop an energy supply that does not load the atmosphere with CO_2 ." Since he thinks the fuel cell technology might double the cost

of energy and believes “such a transition in energy-generation technology would require at least 50 years to implement” as of this 1997 article, I’ll invite him to reconsider the idea of employing millions of farmers and tree growers to get busy within one year harvesting the current atmospheric carbon load as simultaneously they re-load the soil with minerals, carbon and erosion-halting ***life***. Doesn’t this option look inherently excellent and better with each passing year of Biospheric and climatic deterioration? We may thank John Hamaker and Nature for this option. Does anyone have a better (or complementary) idea?!

“Warming’s Unpleasant Surprise: Shivering in the Greenhouse?” – “Wallace Broecker is worried about the world’s health. Not so much about the fever of global warming but about a sudden chill. … The data pouring in from ice cores and marine sediments are only fueling Broecker’s fears – and worrying many of his colleagues too. At a conference last month in Snowbird, Utah, researchers heard overwhelming evidence that the so-called ‘conveyor belt’ current that warms northern Europe and adjacent Asia has repeatedly slackened and at times even shut off during the past 100,000 years, in concert with dramatic climate shifts around the hemisphere. And computer models suggest that, ironically, the greenhouse world’s moister air could also squelch the conveyor belt.

“A sudden cooling of the Northern Hemisphere, even by only a few degrees on average, could throw a monkey wrench into the societal works. Farmers may have to contend with unseasonable cold, drought, and floods [like now only worse, and worse and …] – an unsettled climate that could jerk one way and the other from year to year. Says glaciologist Richard Alley of Pennsylvania State University in University Park, ‘Humanity would continue [barring nuclear self-extermination?] but a lot of us would be very unhappy.’ ...

“No one knows for sure what’s at the root of these climate swings, but shifts in ocean circulation are a leading candidate.

“Broecker’s worry is that greenhouse warming will kick the Holocene conveyor into its next big flip. This time, however, the villain is not expected to be melting glaciers alone. Instead, the warming would deliver more freshwater to high latitudes by increasing the load of

water vapor that the atmosphere can carry from lower latitudes. The far North Atlantic would then receive a torrent of freshwater flowing into it from rain, snow, and swollen rivers." [What else could that increased snow and cloud cover produce?] (***Science***, 7/10/98)

"Ice-cold in Paris" – "To Northern Europeans shivering in the grip of an unusually icy winter, global warming might suddenly seem an attractive proposition. How pleasant to bask in a balmy Mediterranean climate without ever leaving home. Dream on. Evidence now emerging reveals a risk that global warming could plunge most of Europe into a big chill lasting hundreds of years, bringing with it effects that could be felt right around the world. …

"So we can take no comfort from the current global warming scenarios, which tend to show a smooth gradual warming over the next century. We simply don't know why our present climate is much more stable [formerly?] than the climate of the past, and whether this stability will continue in the face of global warming. Though the models suggest the effect of global warming might be less drastic and rapid than past changes, it could simply be that present models don't yet capture the physics of abrupt climate change. … Geochemist Wally Broecker of Columbia University has a blunt way of putting it: 'We are playing Russian roulette with climate and no one knows what lies in the chamber of the gun.' " (***New Scientist***, 2/8/97)

"Quick Change" – "Global warming probably will not be a gentle turning up of the thermostat, as climatologists used to think, but rather a sudden switch to a new climate system. That's the stark warning from many of the world's leading climate researchers to representatives of governments meeting this week in Buenos Aires.

" 'Climate doesn't change smoothly. It happens in jumps and jolts,' says Stefan Rahmstorf of the Potsdam Institute for Climate Impacts Research in Germany [who authored previous "Ice-cold in Paris" article]. … The current has already been weakened by increased flows of freshwater into the North Atlantic, says Rahmstorf. 'There is a threshold in the North Atlantic ocean circulation beyond which the circulation may abruptly collapse. We may reach that threshold early in the 22nd century but it could be much sooner.' …

" 'We used to discuss these scenarios privately. Now we are being more open,' says Stephen Schneider of Stanford University in California. If the climatologists are correct, waiting for cheaper clean-up technologies before tackling the problem of global warming would be a serious error.

"Schneider warns that the rate at which greenhouse gases are added to the atmosphere in the next few decades could be as dangerous to climate systems as the ultimate volume of the gases. Worryingly, the latest data on carbon dioxide, revealed to ***New Scientist*** by David Keeling of the University of California, San Diego, show that in the past year the gas accumulated in the atmosphere at a record rate (see Figure). [The Mauna Loa graph shows a dramatic jump from an average of 2 ppm increase per year from 1992-1996 up to about 3.3 ppm in 1997 and 3.7 ppm in 1998.]

"Bob Watson, chairman of the UN's Intergovernmental Panel on Climate Change [and recipient of TSOC in 1997], says that the new work on sudden, chaotic climate change will form a central feature of the panel's third report, due in before 2001. Its last report in 1995 contained just two paragraphs on the subject." (***New Scientist***, 11/14/98)

Next a quick look with excerpts at University of Washington neurophysiologist and author William H. Calvin's January 1998 article "The Great Climate Flip-flop" in ***The Atlantic Monthly*** with its cover showing sunbathers on a beach with palm trees, blissfully unaware of icebergs drifting near on the horizon. Under the article's title, the cover warns the large readership: "Global warming could, paradoxically, cause a sudden and catastrophic cooling." Unfortunately, I sent Dr. Calvin ***TSOC*** and a letter only after this article was published. Article excerpts:

"One of the most shocking scientific realizations of all time has slowly been dawning on us: the earth's climate does great flip-flops every few thousand years, and with breathtaking speed. We could go back to ice-age temperatures within a decade – and judging from recent discoveries, an abrupt cooling could be triggered by our current global-warming trend. Europe's climate could become more like Siberia's. Because such a cooling would occur too quickly for us to

make readjustments in agricultural productivity and supply, it would be a potentially civilization-shattering affair, likely to cause an unprecedented population crash. What paleoclimate and oceanography researchers know of the mechanisms underlying such a climate flip suggests that global warming could start one in several different ways.

“For a quarter century global-warming theorists have predicted that climate creep is going to occur and that we need to prevent greenhouse gases from warming things up, thereby raising the sea level, destroying habitats, intensifying storms, and forcing agricultural rearrangements. Now we know – and from an entirely different group of scientists exploring separate lines of reasoning and data – that the most catastrophic result of global warming could be an abrupt cooling. …

“The back and forth of the ice started 2.5 million years ago, which is also when the ape-sized hominid brain began to develop into a fully human one, four times as large and reorganized for language, music, and chains of inference. Ours is now a brain able to anticipate outcomes well enough to practice ethical behavior, able to head off disasters in the making by extrapolating trends. …

“There seems to be no way of escaping the conclusion that global climate flips occur frequently and abruptly. An abrupt cooling could happen now, and the world might not warm up again for a long time: it looks as if the last warm period, having lasted 13,000 years, came to an end with an abrupt, prolonged cooling. That’s how our warm period might end too. …

“Now only Greenland’s ice remains, but the abrupt cooling in the last warm period shows that a flip can occur in situations much like the present one. What could possibly halt the salt-conveyor belt that brings tropical heat so much farther north and limits the formation of ice sheets? ... More rain falling in the northern oceans – exactly what is predicted as a result of global warming – could stop salt flushing. So could ice carried south out of the Arctic Ocean. … Increasing amounts of sea ice and clouds could reflect more sunlight back into space. …”

I apologize for neglecting to give Prof. Calvin ***TSOC*** with its "Earth Regeneration Scenario" before he wrote this article (I think I offered it to him after reading his ***The Ascent of Mind*** years earlier), as it might have been included as a vital "pro-active" scenario we can envision for a living, healthy, cooperative planetary future. Instead one feels the relevance of the saying, "Where there is no vision, the people perish"! More from Prof. Calvin:

"Futurists have learned to bracket the future with alternative scenarios, each of which captures important features that cluster together, each of which is compact enough to be seen as a narrative on a human scale. Three scenarios for the next climatic phase might be called population crash, cheap fix, and muddling through.

"The population crash scenario is surely the most appalling. Plummeting crop yields would cause some powerful countries to try to take over their neighbors or distant lands. …

"This would be a worldwide problem – and could lead to a Third World War. … Present-day Europe has more than 650 million people. ... If Europe had weather like Canada's, it could feed only one out of twenty-three present-day Europeans. …

"A cheap-fix scenario, such as building or bombing a dam, presumes that we know enough to prevent trouble, or to nip a developing problem in the bud. …

"A muddle-through scenario assumes that we would mobilize our scientific and technological resources well in advance of any abrupt cooling problem, but that the solution wouldn't be simple. Instead we would try one thing after another, creating a patchwork of solutions that might hold for another few decades, allowing the search for a better stabilizing mechanism to continue. …

"A remarkable amount of specious reasoning is often encountered when we contemplate reducing carbon-dioxide emissions. … Only the most naive gamblers bet against physics, and only the most irresponsible bet with their grandchildren's resources. To the long list of predicted consequences of global warming ... we must now add an abrupt, catastrophic cooling. Whereas the familiar consequences of

global warming will force expensive but gradual adjustments, the abrupt cooling promoted by man-made warming looks like a particularly efficient means of committing mass suicide. … Our goal must be to stabilize the climate in its favorable mode. … We have to discover what has made the climate of the past 8,000 years relatively stable, and then figure out how to prop it up."

W. H. Calvin concludes there, leaving us with a powerful quote by W.H. Auden:

Those who will not reason
Perish in the act:
Those who will not act
Perish for that reason.

Also arising out of concern for the increasingly obvious planetary energy imbalances, and the recent publicity that "global warming" might trigger "global cooling" and interglacial's end, is ***The Coming Global Superstorm*** by "top-rated radio talk-show host Art Bell and #1 ***New York Times*** bestselling author Whitley Strieber" which was published in December 1999. The book jacket says: "A spirited call to action, ***The Coming Global Superstorm*** is a careful and impressively researched examination of the best of modern environmental science in the most compelling and necessary book of the millenium." And that the authors "offer a wealth of viable solutions to this mammoth challenge to humankind. But the 'wait and see' approach perpetuated by oil and chemical companies must be abandoned first."

My understanding was that Art Bell, at least, had in recent years received ***The Survival of Civilization*** and had discussed it on the air with one of his more popular guests, Wayne Green, who includes ***TSOC*** in his public service educational booklist he calls "Books You're Crazy If You Don't Read." So I was surprised to read the 255-pg. ***The Coming Global Superstorm*** and find no evident understanding of the Hamaker Thesis which I'd hoped they would at least "steal" and offer to their interested worldwide audience. I wrote to both of them while awaiting their book from the library to remind them of the Earth remineralization and regeneration-based solutions to most or all of our local and global problems and offered them this new volume when out. Others have begun a campaign to urge them

to understand Hamaker's explanation of the climate crisis and the most essential viable solutions he recommended.

Whitley's dedication or prayer at the start of their book suggests that genuine concern and sincerity motivates these men: "May the children of tomorrow look back on our era as the one where the healing of the earth began." Their willingness to add their voices to the challenge of Earth-destructive business-as-usual and call for worldwide adoption of solar and minimal CO_2-emitting technology of all kinds is commendable, and the book stimulates the brain to fuller comprehension of what losing our interglacial climate would entail. I'm not sure that the world's climatologists and other scientists will read the book as it seems to leave out any and all scientific references on which it is based. It appears to draw from the theory of Broecker and others that "global warming" may trigger shutdown of the normal Gulf Stream flow into the North Atlantic, as well as some of the papers on the Greenland ice cores indicating surprisingly quick shifts to more glacial conditions, and, as best I can surmise, the paper from R.B. Alley et al., "Holocene climatic instability: A prominent, widespread event 8200 yr ago" (***Geology***, 6/97). It indicates a distinct cooling of less than a century occurred then and may have involved such a North Atlantic thermohaline circulation change – whether it resulted in the kind of 6-week or longer "superstorms" described in the intended factual and intended fictional portions of Art and Whitley's book is not suggested by Alley et al. They do say, in reference to the freshwater dilution thought prerequisite to a shutdown, that "enhanced high-latitude precipitation and sea-ice melting in response to projected warming might cause an increase of similar magnitude in freshwater flux to the North Atlantic."

They (Bell & Strieber) do recognize the significance of increasing cloud cover to support glaciation, and they recognize the long-term Quaternary interglacial-glacial cycles. They see the need for greater available energy to generate "superstorms" and glaciations, and they see some of the scientific record of previous rapid transitions. They emphasize the worldwide accelerating deterioration of climate and environment, and point out that 6 billion lives may be at stake as we decide now whether to cooperate in a revolution for Life's preservation and regeneration or allow the forces of destruction within us and around us to determine our fate.

I just want to share a few of the authors' words from ***The Coming Global Superstorm*** and let you read the entire book if you choose:

"Whether humankind will be among the victims of its own destructive presence on earth we don't yet know. Certainly, we must all do whatever we can to prevent that, and prevention begins with understanding – not only of the true nature of what is happening, but also of what our role might be in changing the situation for the better." (p. 124)

"The logical question is, What can we do to transform ourselves from a natural disaster into a blessing?" (p. 166)

"We are, in fact, taking a great chance with a tremendous danger. So why don't scientists warn of the danger? Why don't they raise the alarm? The two of us are amateurs. We don't think we're wrong, but serious scientific work has to be done before we can be sure of our ideas. … It is scientists who must make the predictions on which changes in social policy depend.

"The problem is that scientists can't predict future weather, not with enough certainty to enact the kind of dramatic policy changes that are needed if we're right. So we're in trouble. Scientists might think that sudden climate shift is a danger. But unless they can provide us with a model that proves it, nothing will be done on a governmental level.

"For decades, it has been hoped that a reliable model of large-scale climate change would be developed. But model after model has failed to provide real-time results that are convincingly predictive." (p. 216-17)

"The oil industry maintains a propaganda machine called The Global Climate Coalition that spends big money to spread the 'wait and see' message. The National Coal Association does the same. The National Petroleum Institute retains a public relations firm to help defeat taxes on fossil fuels. The NPI alone – just one part of the fifty-four member Global Climate Coalition – spends nearly as much as all the major environmental funds put together.

“OPEC, the consortium of oil producing nations, has joined with big oil companies such as Arco, Exxon, Sun, Shell, and Unocal to spread the word that fossil fuel emissions should not be controlled.” (p. 218)

“The fuel industry, backed by foundations with deep pockets, maintains a cadre of individuals with university degrees who skillfully drain the issue of all sense of crisis. Congressional conservative Republicans offer staunchly partisan support, dismissing all talk of this universally important issue as ‘liberal’ posturing. Of course, it really has nothing to do with political ideology. The issue should never have been politicized in this way. It is an issue above politics. …

“The American public has been misled into taking a ‘wait and see’ attitude, one which amounts to a gigantic gamble, a test of the ability of nature to tolerate punishment.

“Unfortunately, the situation has not been helped by the inability of our scientific institutions to respond to the problem with the kind of decisiveness and clarity that is demanded. Even as we see massive climate change all around us, science itself is trapped in this devastating but unavoidable debate about its predictive abilities.” (p. 219)

“The problem goes deeper even than the lack of good models and the tools to use them. Even the way science is organized is detrimental to aggressive and clear prediction. Science is divided into thousands of very narrow specialties, for which reason findings tend to be reported in isolation. This means that, while individual pieces of information may be persuasive, they are rarely integrated into a big picture. The result of this is that enormous questions such as whether the planet is moving toward another sudden change in climate don’t get the kind of clear and unambiguous answers we need in order to act. Without an irrefutable model around which to organize this data, there appears to be plenty of room for debate.” (p. 220)

Will the Hamaker Thesis, based on the synthesis of invaluable scientific facts and principles from many excellent researchers and disciplines, stretching the broad boundaries of the integrative science

of Ecology, prove to be the irrefutable model upon which we can agree and from which we can wisely act?

Those who wish to encourage these gentlemen to discuss the Hamaker Thesis on their apparently worldwide radio programs and websites could communicate to: Art Bell, POB 4755, Pahrump NV 89041 or artbell@mindspring.com or fax: (775) 727-8499. Whitley Strieber, 5928 Broadway, San Antonio, TX 78209 or whitley@strieber.com.

The March/April ’99 issue of ***The Ecologist*** was a special issue on “Climate Crisis”; unfortunately, its intelligent authors mainly adopted the “global warming” misconceptualization to approach the topic, despite past efforts to encourage expanded thinking as demanded of any “ecologist.” Still, it is worth reading for the facts and perspectives it does contain. The article by Simon Retallack, “How U.S. Politics Is Letting The World Down” may be of greatest significance. The cartoon near the beginning is a black (as in oil) humor classic, showing six representatives of Exxon Oil Co. surrounding Bill Clinton with charts and graphs (e.g., “Emission Controls Necessary To Halt Global Warming”) to make their case that: “In conclusion, Mr. President, we at Exxon feel that human survival may simply not be economic.” Then consider the author’s words under the section, ‘The polluters’ Congress’:

“From the perspective of the White House, Katie McGinty [Chair of the White House Council for Environmental Quality until. Nov. ’98] claims ‘opposition on doing anything on climate change comes from those on Capitol Hill who do the bidding of polluters on every environmental issue.’ The Republican Congress’ behavior is damned by every single environmental campaigner. Bruce Rich at Environmental Defense Fund (EDF) describes it as ‘troglodytic,’ Annie Petsonk, also at EDF, as ‘outrageous,’ and Brent Blackwelder at Friends of the Earth as ‘light years behind, back in the Neanderthal Age ... a hundred times worse than the Administration.’ Blackwelder depicts most members of Congress as ‘know nothings.’ It’s ‘the Flat Earth Society that’s been running the House and Senate in the Republican Party,’ he says. Jennifer Morgan at World Wildlife Fund even believes Congress is ‘to the right of most of the business in this country,’ which is truly saying something. She describes it as

'completely irresponsible; short-sighted, inaccurate; driven by politics; driven by money; and driven by self-interest. …'

"The general atmosphere in which Congress treats this issue is one of hysteria. According to Daphne Wysham, research fellow with the Washington-based Institute for Policy Studies and coordinator of the Sustainable Energy and Economy Network, 'Climate change is like the new Communism: I've been told by people in the Treasury Department that we cannot mention the words climate change in our language to Congress on appropriations for the World Bank; if we do it will be struck from the record.

"The Republicans in particular have waged a systematic war of attrition with the Administration over almost every single piece of meaningful legislation to reduce greenhouse gas emissions, and because they are in the majority, they have nearly always won. … Al Gore describes Congress' attitude to the issue as one of 'know nothing, do nothing, say nothing.'

Later in the article, Retallack says: "However, the U.S. public is no longer with Congress on this issue. People can see that the climate is not the same as it has always been. According to a poll released in October 1998 by the World Wildlife Fund, 57% of Americans believe climate change is already happening, 79% support the Kyoto agreement to reduce greenhouse gases, and over two-thirds think the U.S. should act now, ***unilaterally*** to reduce CO_2 emissions, ***regardless*** of what scientists think."

In his digging for words of truth and his objections to the stupidity in the status quo, Retallack reminds me of Hamaker. You, too, may appreciate his concluding lines:

"The actions of the American political elite to date, however, give little indication that they have any appreciation of the urgency and revolutionary nature of the task that lies before them. The following remarks ring all too true: 'Minor shifts in policy, marginal adjustments in ongoing programmes, moderate improvements in laws and regulations, rhetoric offered in lieu of genuine change – these are all forms of appeasement designed to satisfy the public's desire to believe that sacrifice, struggle and a wrenching transformation of

society will not be necessary.' It was no long-haired extremist who wrote these words. It was Al Gore, in 1992.

"What ever happened to Gore's call to arms? If he and Clinton truly appreciate the dangers that lie ahead and the opportunities too, why continue to allow the shortsighted conservative economists and corporate chiefs to dictate such a painstakingly slow pace of change? Where is the level of commitment, leadership and courage that is required to take on the vested interests? Governments, surely, exist to defend the interests of all the people – not just business executives – a principle the Republican Congress in particular seems either to have forgotten or to treat with complete contempt. Too obsessed with ensuring that their corporate cheques keep coming in and with getting into an artificial frenzy about Presidential sex and other such trivialities, too stupid and myopic to understand what climate change means, all the signs are that Congressmen's heads will still be in the sand when the tide comes in. If the U.S. oil giants continue to use their unparalleled wealth to block a transition to a sustainable economy, they might as well be filing their own bankruptcy suits, for the biosphere is one thing that cannot be bought or negotiated with. Should they choose to ruin themselves by continuing to ignore that the difficulties of changing will pale into insignificance compared with the costs of not changing, they are free to do so. But both the political and corporate leaders seem to forget that they are not alone on this planet: they all have children. It is for them, if for no other reason, that they should set aside their fear of change, and with strong leadership from the highest officeholder in the land and the unsung heroes of the environmental movement, they and the public can be made allies of reform and severe climate change can be averted."

The International Geosphere-Biosphere Programme (IGBP): A Study of Global Change of the International Council of Scientific Unions (ICSU) has been studying for close to 20 years, but as with many science organizations and programs it tended to avoid involvement with social and environmental policy or recommendations. Giving ***TSOC*** to some key individuals within IGBP did not seem to matter. Now in March 2000 I've learned that the 35,000 member American Geophysical Union has stepped forward to begin advocating ecological responsibility and reduction of greenhouse gas emissions. Also, that NOAA Chief James Baker and the head of the UK

Meteorological Office wrote a joint letter to newspapers (and ?) saying the climate change situation has become “critical” and it is time for humanity to begin responsible action. I called Tom Pedersen of the IGBP to ask him about this trend and whether they were considering any such public recommendations. Tom is the Chair of IGBP’s Past Global Changes (PAGES) Core Project, and Professor of Oceanography at University of British Columbia, but he’d not yet heard of the Hamaker Thesis and as an oceanographer had not learned about the Interglacial Soil Demineralization and Retrogressive Vegetational Succession. I promised him this new volume ASAP.

Tom said it was interesting I asked about IGBP stepping into the broader social-political arena. He had just attended the IGBP meeting in Mexico in early March and indeed they’ve just decided to start preparing policy statements to begin warning the public and our political representatives of “the perils” we face of rapid climate changes and their likely near-term irreversibility. He agreed that could mean another 90,000-yr. glacial period. If Tom Pedersen’s genuine concern and open-mindedness is becoming the common attitude throughout the scientific community and much more of an awakening humanity, then our chances for responding quickly and wisely have vastly improved. Where there is intelligent life, there is hope. Tom also noted that presidential candidate Al Gore has been talking regularly with Wallace Broecker and other paleoclimatologists concerned with rapid climate change. Will Al Gore prove to be the first to offer ecologically realistic leadership in the face of the awesome challenges and great transformative possibilities? I thanked Tom Pedersen for his time and assistance and his work for positive change. “You’re more than welcome,” he replied. A kind thing to say also to the regenerating Earth as it thankfully springs back to abundant fertility and health with our intelligent, generous assistance.

Following are the three Appendices described on p. 13. References are listed in the Bibliography of ***The Survival of Civilization***.

Appendix I (2002)

More on the Hamaker-Designed, Patent-Free, High-Pressure Autogenous Gravel Grinder

(Don Weaver)

For the benefit of those individuals, companies, industries, and countries concerned with the regeneration of soils, humanity and the Earth, and who might be able to help perfect and produce John Hamaker's grinder design—or a better one—the following is provided.

In Chapter 2 of ***The Survival of Civilization***, Hamaker referred to the gravel grinder he had designed and patented, and to the prototype he built. His U.S. patent 3,552,660 was granted January 5, 1971. It expired in 1991. The Canadian Intellectual Property Office tells me his Canadian patent 900930, expired in 1989, is available at their patents database: http://cipo.gc.ca, or call (819) 953-3382. The U.S. Patent Office (website: www.uspto.gov; phone: 1-800-972-6382) can provide copies of the U.S. patent papers, or you may request an imperfect 8-page photocopy from me (Don Weaver, POB 620478, Woodside CA 94062; e-mail: earthdon@yahoo.com). I also have a 3-page paper of John's from the year he filed his patent, 1969, which could be helpful to machinery designers and engineers. He titled it, "High Pressure Autogenous Grinder - Operating Variables."

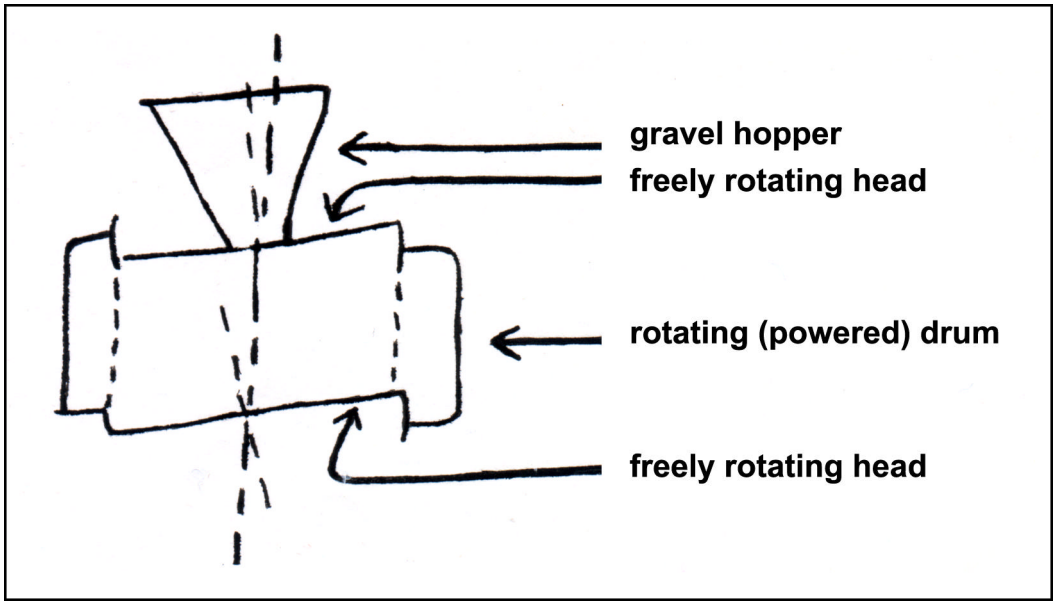
In 1985, hoping to further encourage interest in and understanding of his grinder, then being satisfactorily tested in California by engineers associated with the Earth Regeneration Society, John wrote the descriptive paper with accompanying photos just ahead. I'll add one more good photo of the grinder chamber producing dust, then again let Julius Hensel sound a final word, a pure and simple clarion call for integrity, reaching from the 19th Century European birth of the remineralization movement to the 21st Century ecological imperative calling that movement—calling all of us—to a worldwide maturity.

Since John Hamaker is no longer with us to provide a word of preface to re-introduce his paper, I'll suggest we consider again his words from ***The Survival of Civilization***, Chapter 2:

“If remineralization is to be effective in the short time available to us, some form of small, efficient grinder must be mass-produced. [He also thought that grinders should be built in larger sizes as needed, such as for stationing at gravel pits. - DW] We need millions of units here and abroad. . . . And perhaps the world may come to realize that it is far better to use its brains instead of its armaments.”

Description and Photos of Hamaker Gravel Grinder

(U.S. & Canadian patents only) December 27, 1985



The grinder is a very simple machine as shown in the sketch above. There are, however, design details learned from experience with a small unit which the writer will share with any designer assigned the task of building a prototype.

The volume encompassed by the two heads and the dashed lines is the grinding chamber. All gravel in the chamber is compelled to be in constant motion. Constant motion is required to prevent compaction. Gravel outside the zone of constant motion compacts into a concrete-like protective wall lining the inside of the drum.

The heads should have a ribbed grid on them so the depressed areas will compact and protect the heads from wear.

The basic principle is to use gravel to grind gravel—not to crush or abrade between metallic surfaces.

The pressure developed inside the drum depends on the resistance to movement by the mass of gravel. Thus the pressure increases with the size of the grinding chamber. It can only be determined with any degree of accuracy after the machine is built. My preliminary guess is that a proposed prototype farm grinder with a diameter of 3.5 feet and a depth of 3/4ths the

diameter would generate no more than 50 pounds per square inch (psi). At 50 psi very light weight construction relative to existing crushing and grinding equipment is possible, thus lending itself to mass production with standard machinery.

As the gravel is ground, water is used to remove the dust. The “milky” water exits around the annular clearance space between the lower head and the drum. It goes into a pump sump, is pumped out into a centrifugal separation tank, and distributed still under pump pressure. The oversize particles are returned to the hopper with enough water to keep the dust moving down through the mass. The water with suspendable size particles goes to a storage pond where the dust settles out. The pond overflows back into the sump. The clearance around the top head should be fenced so water can be introduced to flow down the sidewalls to keep a liquid condition and easy flow out of the machine at the lower head clearance.

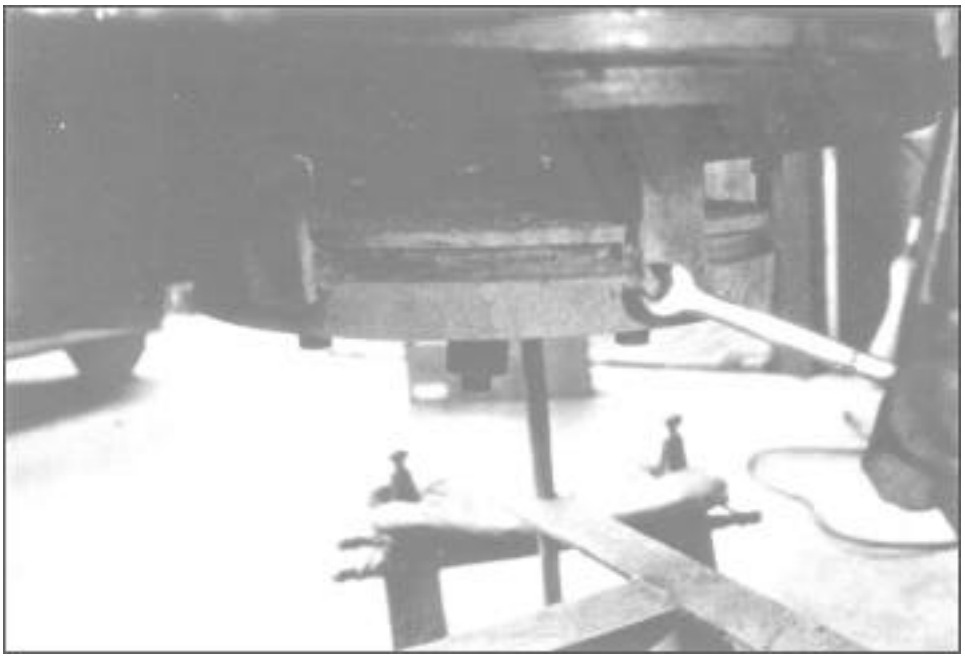
Dust should be handled wet or damp from the time it is produced until it is distributed and ploughed into the land to avoid worker lung damage and loss of dust. Another person who has operated the grinder tells me that it will produce dry dust with no problems developing. However, dry dust requires high horsepower pneumatic conveying and expensive storage equipment. A fractional horsepower rubber lined pump and some hose is all that is required when water is used. Open storage is satisfactory.

The five pictures with this description of the grinder are of a very small unit I made to establish the fact that it works in accord with the patent description and to gain useful information for building a prototype farm grinder.

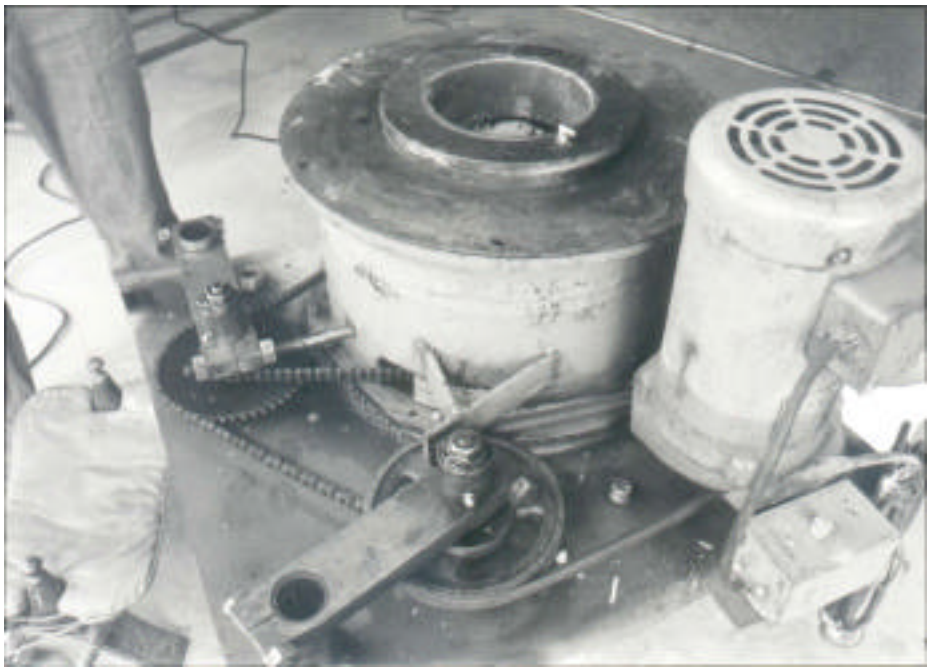
Picture No. 1 is the complete grinder with dust collection pan, top head and hopper.

Picture No. 2 is looking down into the 6” diameter grinding chamber.

Picture No. 3 shows the top head.



Picture No. 4 shows the bottom head set at
an angle to the bottom of the drum and housing.



Picture No. 5 is a good example of bad design—a horizontal chain drive.
It was used here because it gave speed reduction
and speed change at low cost.

The drive for the grinders is an open question. I would build the grinder and find out what torque is required to turn the prototype. Then I would compare a multiple “V” belt drive against a ring gear drive. The dusty atmosphere of a farm or gravel pit would make it difficult to provide clean lubricant for a ring gear. On the other hand, “V” belts require more frequent replacement and that carries a problem of interference with the framework supporting the bearings for the drum and two heads. A ring gear of good material with oversize teeth will last many years under adverse conditions.

Another unanswered question is what percentage of the output is over 200-mesh size? The oversize will gradually scour (abrade) the lower head and drum surfaces as it leaves, resulting in increasing clearance between them. It is my impression that the percentage is small and that it would be a matter of years before the oversize passing through the clearance space makes the recycling burdensome. At this point, a replaceable outer ring on the lower head would eliminate any problem.

The only energy loss in this grinder is machine friction. The efficiency therefore is far better than for the tumbling mill grinders, which spend their energy largely in lifting the load. While the machine loads are relatively low at ± 50 psi, the point contact between pieces of gravel is very high. Abrasion under that pressure produces dust in a hurry. That the rate of production of dust increases with pressure can be demonstrated by abrading two stones together.

In principle, this grinder is the one that Julius Hensel asked the German government to have designed and built in 1893. Had they done so, our survival would not now be threatened.

John D. Hamaker

Hamaker autogenous grinder chamber
showing gravel grinding itself to dust inside rock wall

“What is lacking at present is that the manufacture of Stone Meal should be undertaken by men of scientific attainments who at the same time have sterling honesty, so as to make it certain that farmers will actually receive what is promised and what has proved itself to be so useful hitherto. . . . The whole subject is of such immense importance for the common welfare that it is my wish to see this work placed into hands that are thoroughly reliable. I but point the way for the benefit of the human race.”

—Julius Hensel
in ***Bread From Stones*** (1893)

Appendix II

Supplementary Perspectives to Chapter 3 of *The Survival of Civilization*

- **J.C.C. Romans, Macaulay Institute for Soil Research** published "The Origin of the Indurated B_3 Horizon of Podzolic Soils in North-east Scotland" in 1962. In it he reveals the extensively demineralized state of Scotland soils, and shows that these soils were, during the Climatic Optimum, rich brown forest soils supporting elm, hazel, alder, etc. The now deeply "podzolized" and partly cemented soils primarily support a low-growing acidic "raw humus turf." (Romans, 1962)

- **G.W. Dimbleby, Forestry Department, University of Oxford** published ***The Development of British Heathlands and Their Soils*** in 1962. In it he tells us that the principle of ongoing soil degradation operates throughout interglacials, and that today we face a situation of severe deterioration. Yet here is a man who did a bit of experimentation to discover if this actually is such an "irreversible" process, as J. Iversen termed it. (This we'll consider later in our look at forest remineralization research.)

  Dimbleby notes the fact of very widespread soil demineralization, evidenced by the podzolized soils and "sterile heathlands" that were once rich soils supporting thick forests. He also notes the increased susceptibility to fire of forests growing on poorer soils—a point of great relevance, obviously. Another is the fact that human settlements and agricultural practices have generally ***accentuated*** the natural soil fertility decline. Dimbleby concludes by pointing out the futility of merely planting trees on poor soils; our aim must be to ***restore ecosystems*** to their states of healthy balance. In advocating reforestation ***and*** fertilization, he points to a potential future for humanity. Says Dimbleby: "We must recognize that our bank account in soil fertility is heavily overdrawn, and only some form of repayment stands between us and bankruptcy. It is a debt that has been incurred for us by many previous generations, but if we wish to preserve the land, let alone use it, we must make some effort to discharge the debt." (Dimbleby, 1962, p. 44)

In his important paper, “Post-Glacial Changes in Soil Profiles” (1964), G.W. Dimbleby says that 2000 to 4000 years are needed for primary constructive soil development to occur, and he suggests that the soils in Britain have been mature since 6000 years ago. From 8000 to 3000 years ago, the retrogressive succession of forest types was taking place, and since 3000 B.C., man’s attack on the soils and woodland has led to the virtually treeless landscape of Britain today (with disease and insect infestation taking what remains, as we’ll see later).

Finally, Prof. Dimbleby explains the many degenerative soil processes which ***accompany and follow soil demineralization***, such as: loss of humus, acidification, elimination of soil organisms, loss of structure, clay decomposition, hardpan formation, peat build-up, and erosion by wind and water. Because so few people, including farmers and soil scientists, recognize that breakdown and loss of the soil’s minerals is the primary, dominant cause of the overall manifestation of natural soil degradation, this is a most crucial point. A very enlightening article.

- **C. Turner and R.G. West, Quaternary Research Department, Cambridge University** published “Subdivision and Zonation of Glacial Periods” (1968) which further defines what they recognize to be “the strong parallelism of vegetational, climatic, and edaphic development during each of the three most recent interglacial periods . . . and likewise the Flandrian (present) postglacial period.” (p. 93) Attempting to refine Iversen’s and Andersen’s zonation stages in light of accumulating evidence, they divide the interglacials into four zones:

  I The Pre-temperate, when the pioneer forest returns to the newly mineralized soils—mostly birch, pine, other boreal trees.

  II The Early-temperate or mesocratic, when mixed oak forest thrives on rich soil achieving maximum luxuriance and denseness—oak, elm, hazel, ash, etc.

  III The Late-temperate or oligocratic, when degenerating soil conditions cause progressive decline of the mixed deciduous trees, and expansion of acid-soil trees occurs—spruce, fir, pine, hornbeam, etc.

IV The Post-temperate, when the forest steadily dies out; boreal trees, especially pine, spruce, and birch dominate; heathland and moorland spreads; and temperate zone forest trees become virtually extinct as the succeeding early-glacial period gets underway.

- **Sir Harry Godwin, Emeritus Professor of Botany, Cambridge University**, who published the second edition of his book, ***The History of the British Flora*** in 1973, points out that we are living in an "incomplete" interglacial period, and although much human disruption complicates its history, it unmistakably exhibits the broad features of previous interglacials—including maturation then podzolization of soils, and the rest. He accepts the four-zone division of Turner and West, which has now proved applicable to ***at least*** the last five interglacials in Britain. (p. 423)

- **Rhodes Fairbridge, Columbia University**, in his article, "Climatology of a Glacial Cycle," states that we are beginning to be able to predict the future from the past—and that the wise person learns from the record of history. He reminds us that we have gone the 10,000 years of an average interglacial, that a cooling trend has been ongoing for the 5000 years since the Climatic Optimum, and that northern Europe has seen the deterioration of deciduous forests and advance of the conifers pine and spruce. He says the "symptoms" of the new glacial are now evident in this temperature fall coincident with tropical dessication and growth of deserts, high-latitude retreat of treelines, and increased evaporation, turbulence, and precipitation in higher latitudes.

  This last symptom, a distinct cooling/high precipitation period, began about 2500 years ago. According to this indication, he says, this interglacial period is already over. Fairbridge concludes: "Perhaps man can learn from the past to prepare for the future."

- **Margaret Davis, Biology Department, Yale University**, in her 1976 article, "Pleistocene Biogeography of Temperate Deciduous Forests" (in West and Haag, 1976), stresses the importance of the interglacial soil demineralization and acidification process, and the fact that "ecosystems undergo progressive unidirectional changes" expressed as vegetation retrogression, etc. She also says that the climate has

been growing colder and wetter over the past few thousand years, that mountain glaciers are, as of 1967, larger than anytime since the interglacial began—yet nowhere suggests any cause-effect relationships between the soil/vegetation changes and climate. She simply tells us matter-of-factly that this interglacial is entirely analogous to past ones, and because present conditions are so like conditions at the end of past interglacials—"the present interglacial interval is nearly over."

- **W.A. Watts, University of Minnesota Limnological Research Center**, published "***Late Quaternary Vegetation of Central Appalachia and the New Jersey Coastal Plain***" in 1979. Watts, too, shows that the constructive then retrogressive soil and vegetational processes have been fully operative in North America; since the Climatic Optimum cooler and wetter conditions have created swamps and bogs as in Britain, boreal trees have been proceeding southward while deciduous trees have given way to pines, etc. as soils are progressively leached, and storm frequency, plus forest fires, have continued to increase.

The State of the Tropics

What of John Hamaker's prediction that our late-interglacial tropical jungles, growing on badly depleted soils, therefore highly susceptible to extremes of weather, fire, and acid rains, will largely die off early in the new glacial?

Many students of the tropical forests, such as Paul Richards (1973, e.g.), have reported on the great poverty of reserve minerals in their soils—most of the nutrients being directly cycled from soil organisms (primarily acid-tolerant fungi) to vegetation and back. Alan Grainger's recent article, "The State of the Tropical Forests" (1980, in ***The Ecologist***), gives a clear picture of the fragility of these marvelous ecosystems, which are called "the lungs of the Earth" by global ecologists.

Key points of the article relevant to this book include these:

- By 1976 about 40 percent of the moist forests had disappeared due to human encroachment and the “progressive dessication” since the Climatic Optimum spoken of by Fairbridge (1972).

- FAO estimates the annual loss of closed forest to be up to 15 million hectares (1 ha equals 2.47 acres)—more than the land area of England and Wales combined. This means 30 hectares destroyed per minute and the rate is accelerating.

- “Fertile soils only cover about 4 percent of the Amazon Basin area and these are restricted to ***varzea*** land which is seasonally flooded by the river, and has its fertility enriched with fresh supply of silt, just as in the case of Egypt’s fertile Nile Valley [prior to completion of Aswan Dam - D.W.]. In South East Asia, Java’s soils are fertile because they are topped up every so often when one of the island’s 112 volcanoes erupts. But these are exceptions. . . .” (Alan Grainger, p. 44)

- At least half of the wood contained in the tropical rain forests is burned when the forests are destroyed by man.

- The more these forests are destroyed, the more arid and susceptible to destruction by drought and fire they become. At the end of the dry season the newly deforested areas, virgin forest turned to wood-strewn rubble, are extremely quick to burn. Grainger quotes a BBC broadcaster who witnessed such an event:

  > “***One match was struck and almost instantly flames were leaping well above our heads . . . with a roar, the flames set about their work. We watched whole trees seared of every leaf. The smoke rose a thousand feet into the sky, and within an hour the fire had done its work.***
  > “***About twenty square miles of cut down forest had been dealt with in the most summary fashion. An English bonfire once lit will last for hours, even days, but this forest furnace, so all consuming, so incredibly hot, had done its work between 8 and 9 a.m.***”

- As Colinvaux (see Webster, 1980) and Flenly (1979) and others have established, the tropical regions become much more arid in the

glacial periods, and temperate vegetation types proliferate (migrating from higher altitudes and latitudes).

- About 200,000,000 people live within or on the margins of forests.

This overview of research on the interglacial-to-glacial soil and vegetation changes finally brings us back to Dr. G. Woillard's pollen analysis breakthrough; then we will gain further life- and Earth-saving knowledge of and insight into the reality of human ability to remineralize the world's expiring forests, and of their readiness to spring back to health. We must at least comprehend our option of not just ***watching*** this interglacial come to its violent close.

Dr. Genevieve Woillard, Institut de Botanique, Universite Catholique de Louvain published a lengthy article in 1978 entitled "Grand Pile Peat Bog: A Continuous Pollen Record far the Last 140,000 Years." In it she describes the history of her work since 1972 in northeast France, where a unique undisturbed pollen sample core has revealed a complete interglacial-glacial cycle in botanical detail.

Dr. Woillard of course recognizes the recurring vegetational succession, which she simplifies as a sequence of: tundra – boreal forest – mixed forest – acid forest – boreal forest – tundra. She states that this sequence has expressed itself in every known interglacial of the past 2 to 3 million years of the Quaternary, during which it is believed the 100,000-year (average) cycle produced 20 to 30 complete sequences. (Recall Kukla and Fink, 1977, documenting the last ***17***.) She expresses the hope that these pollen cores will soon prove useful in global climate forecasting.

Dr. Woillard's 1979 ***Nature*** article referred to by Hamaker, "Abrupt end of the last interglacial s.s. in north-east France" (s.s. abbreviates ***sensu stricto***—"in the strictest sense"), provides the first unmistakable picture of the rapid destruction of the temperate vegetation at interglacial's end. Chapter Six examines the evidence more closely; here it is enough to note her emphasis that the changeover from temperate to boreal vegetation took roughly only 150 years, and that this changeover would be difficult to detect in Europe where remaining forests are artificially managed for the most part. She concludes with a warning that we cannot exclude the possibility that our world has already entered the "terminal interglacial pollen zone" (p.562) indicating that the "irreversible" decline of temperate vegetation—

which took ***less than 20 years*** at the previous interglacial's end—is just ahead.

(Again in ***Nature***, only 4 months later, 2/14/80, p. 630, **John T. Hollin, Institute of Arctic and Alpine Research, University of Colorado**, has corroborated Woillard by his studies of Greenland ice cores. Hollin's cores reveal the same "catastrophic" cooling occurring in something under 100 years.)

ON REMINERALIZING FORESTS

In reviewing the relatively scant literature on forest fertilization, one finds some recognition of the principle of remineralization and, occasionally, conscious effort to employ it. This concise overview will focus on these efforts; also noted are a few results of adding concentrated incomplete fertilizers to forest trees, as this approach is still being considered viable despite its overall failure.

Baule and **Fricker** (1970) have apparently written the longest book on this subject of forest "fertilization," entitled ***The Fertilizer Treatment of Forest Trees***. The authors make some very important points:

- That the very widespread acidified soils ("podsols and podsolic brown earths") have only slight soil organism activity, having lost much of all the important nutrients, thus becoming shallow and hardened—poor tree supporters in every way.

- That earthworms, which can excrete 120 tons per acre of rich castings ***in good soil***, are of great importance to the nutrient, air, and water economy of the soil, as are the microorganisms.

- That the acidic moor soils can be transformed in some cases by limestone, yet in their degraded state the trees they support are heavily attacked by forest pests. Soil drought, another product of the degraded condition, also promotes insect attacks.

The authors also list documented examples of fertilization treatments causing increased tree vitality and reduced insect domination, for example: after their tree hosts were given some calcium, trace elements,

phosphorous, and nitrogen (via the soil), only ***one-third*** of the gypsy moth caterpillars attacking them even survived to produce another generation. (Gypsy moth epidemics are now ravaging many millions of acres—see ***Appendix III***)

These authors from Germany, as Dimbleby from England and Hamaker from the U.S., stress the responsibility of humanity to relate correctly to the soil and plant life. They say in their Forward that Nature can provide plant species which can tolerate today's unfavorable soil conditions, but it can not remedy the weakness—"It is only Man who can do this, by supplying the soil with what Nature has withheld or has removed in the course of thousands of years."

It is most surprising that Baule and Fricker apparently did not learn of the important silicate rock fertilization work, done largely in Europe, which preceded their book. A look at this work, as discovered through the nearly exhaustive resources of ***Influences of Fertilization on Forest Production and the Forest Environment*** (Bell et al, 1974) and ***Forestry Abstracts***, follows here:

- **Albert** spent many years experimenting with ground basalt, diabase, gabbro, and other stone quarry rocks. He reported great increases in fertility regardless of the poorness of the soil because of the many elements supplied. The immediate and lasting effects he attributed to "the chemical nutrients made available, the addition of active mineral colloids, the neutralizing effect on acid humus and the action of traces of such elements as iodine, fluorine, boron, manganese, and copper." In 1905, Albert fertilized degraded soil with crushed basalt rock at a 100 m3/hectare (117 tons/acre) rate. In 1907, one-year pine seedlings were planted out. By 1929, ***the basalt fertilized trees had a timber volume 4–5 times that of the unmineralized plots***, and "much greater than on plots treated with lime, peat, or kainit." He later found diabase debris from stone quarries "to have a similar fertilizing effect."

- **Nemec** (professor of plant physiology, University of Prague) also did extensive work in Europe during the 40's and 50's using many kinds of fertilization approaches. He began by trying commercial nitrogen and phosphorous compounds; limestone and cultivation; perennial lupine cover crops; and various combinations of these. Later he tried copper slag, which resulted in a 25 percent height increase over

controls after 12 years. Finally he discovered crushed silicate rocks, and began obtaining good results. (Even better results would no doubt resulted had he been able to use ***mixed rocks*** instead of single types.)

Nemec spread a 1–2 centimeter layer of ground diabase rock over a poor acid soil under tree plantations of oak and lime, and reported "a very favorable effect on plantation growth . . . during the first two years after application." On a podsol soil with hardpan he found that by adding small quantities of basalt and limestone, alder, oak, and beech all showed much improved growth while maple and elm showed smaller improvements. ***Increased leaf contents*** of nitrogen, calcium, etc. were noted.

On heather-infested, demineralized podsols, Nemec spread crushed basalt, cut and left the heather, and saw "excellent results" in the soil and the stunted forest plantation. Diabase meal alone again gave comparable results. In another article, he showed that "afforestation can succeed even without mechanical soil preparation, provided that the planting hole is treated with ground limestone or with a basic rock meal of local origin." Eventually Prof. Nemec wrote a booklet entitled "***Guide to the improvement of degraded forest soils: hints on the use of basic igneous rock dusts for the improvement of stunted plantations and natural stands on degraded and impoverished forest soils***." Unfortunately, it seems that translations from the Czechoslovakian were never made, and Nemec's work was never built upon by the world's foresters and tree lovers.

- **Hilf** gave "waste basalt from road-metal quarries" to soils he termed "poor sands." He reported: "The beneficial effect of basalt in improving water retention and supplying deficient mineral nutrients brought about a striking increase of growth in most of the hardwoods."

- **Suchting**, in 1940, found by testing various soils in Germany which supported larch, pine, and spruce, that nearly all soils tested had a marked "general nutrient deficiency." He recommended adding, logically, a "complete" fertilizer.

Experiments with *incomplete* chemical "fertilizers" have been interesting yet apparently futile in terms of improving ***forest health*** over the short or long term. A few examples illustrate:

- **Leroy** and **LeTacon** treated beech seedlings with "various combinations of N, P, and K fertilizers." These "did not result in any significant improvement in growth."

- **Jakoy** tried several soluble chemical elements and discovered "no influence" in one trial, and that "highly soluble N fertilizers resulted in high mortality" in another.

- **Deetlefo** tried various "dosages" of N, P, K, Ca, and Mn. The "best combination" produced an 11% height growth response; however, "results were complicated by mortality and root scorch caused by fertilizers."

- **Gilmore** added N-P-K fertilizer to an old field plantation of pine trees for three successive years. After 19 years a "not significant" wood volume increase of about 10% was found. Unfortunately, says Deetlefo, "there was a significant increase in number of trees with stem cankers of southern fusiform rust on cultivated and fertilized areas."

Has there been any work done on remineralizing the highly demineralized tropical soils and forests? Apparently very little, even though, as Alan Grainger's article notes, Nature has provided frequent examples of the principle by silt enrichment of the ***varzea*** soils and by volcanic dust toppings. One published work on human remineralization efforts was found, however, and it suffices to illustrate tropical restoration potentials.

O. D'Hotman De Villiers, after 25 years of experimentation with crushed basalt on the "extremely impoverished free soils" of tropical Mauritius, published a 2-part summary paper in the ***International Sugar Journal*** entitled "Soil Rejuvenation With Crushed Basalt in Mauritius" (1961). In Part I, 'Consistent results of worldwide interest,' De Villiers further describes the soils there as "a totally leached-out, acid residuum" and "among the poorest known"—and though they were giving "mediocre responses to liberal applications of N.P.K., could be rejuvenated by application of

adequate quantities of crushed basalt, the ***mother rock*** from which almost all the soils of the colony are derived."

With his co-workers at the Sugar Cane Research Institute, he made these important findings:

- Breaking and crushing rocks to a fine powder could be done cheaply, assuming very large quantities are crushed.

- Yields of cane steadily increased with increasing quantities of basalt, reaching a 100% increase at 180 tons/acre—the plants being at least double the weight of the controls. Chemical fertilizers, added with the basalt, tended to leach out in the heavy tropical rains. The chemicals were thought to increase immediate plant response to the basalt, but create deficiency effects of calcium and magnesium. In contrast, the basalt nutrients were steadily available throughout the plant's growth cycle.

- Lab experiments using highly dilute solutions of citric acid and nitric acid (which is formed from nitrogen fertilizers put in the soil) to extract minerals from the basalt leached out significant quantities of elements in first extracts, yet declining amounts in subsequent extracts. This provided a clear demonstration of the acidic fertilizer action, which selectively leaches the soil elements from the soil rock, as discussed by Hamaker in Chapter Two of ***The Survival of Civilization***. (This principle is further documented in many scientific studies such as Schoen et al, 1974, and studies of acid rain's leaching effects as reported by Williams, 1978; Stotzky et al, 1980; and West, 1980.)

- Soybeans, millet, oats, and tomato plants could all be successfully grown in pure crushed basalt with nitrogen fertilizer added.

- Soybeans grown with 150 tons/acre of crushed basalt gave increases up to 427% for a first crop.

De Villiers, summing up his long years of experimentation, offers this:

> "In conclusion, in addition to sugar cane it is seen that ***forest trees and foodstuffs*** can also strikingly benefit from large doses of crushed basalt

> on poor soils. It seems, therefore, that it is now up to public and/or private enterprise to examine the economic possibilities of a question which should arouse renewed interest in the agricultural world." (emphasis added)

A final notation may conclude this section.

Poole wrote an article for ***World Wood*** in 1962, with a title and message of great significance. "Fertilizer Bombed Forests React Rapidly" reveals how degenerating pine forests in New Zealand were "bombed" by plane—with "super-phosphate" (acid-treated phosphate rock) alone—yet Poole reports this to have "proved adequate for arresting deterioration and restoring vigour."

As is growing ever more painfully obvious, the forests throughout the Earth await an intelligent, constructive, ***peace-generating*** bombing—with the full spectrum of biologically-essential mineral elements!

Appendix III

Supplementary Perspectives to Chapter 5 of *The Survival of Civilization*

Insects/Disease – And Soil

A broad study of the literature of forestry and ecology over the past 50 years or so provides a more than adequate view of the increasing susceptibility of the forests to a state of dominance by insects and diseases, which largely function as ***predators of the dead and dying***.

Before we look at some alarming examples of this predation process, let's consider perspectives of foresters, entomologists, pathologists, and ecologists regarding the ***causes*** of susceptibility—to the extent they are not obvious. Then we'll look at present views of forest productivity and at estimates of the growing impact of insect/disease damage.

In ***Forest Pest Control***, a 1975 National Academy of Sciences publication, it is stated:

"Tree vigour is critically affected by soil characteristics. Variations in physical and chemical soil properties frequently cause abnormal physiology and result in tree disease. . . . Soil characteristics often interact with biotic stresses to influence severity of disease." (p. 26)

The soil influence on tree vigour is noted, usually in brief, in most forestry, forest entomology, and pathology (etc.) textbooks—yet the present degrading state of most soils is nearly always looked upon as a "given." Examples include Boyce's ***Forest Pathology*** (1948) which notes that parasites invariably attack trees suffering from unfavorable soil and climatic conditions; Graham's ***Forest Entomology*** (1952) which stresses that the normal vigorously growing tree has real abilities to resist attack (in part due to copious sap and resin flows); and Anderson's ***Forest and Shade Tree Entomology*** (1960) which points out the (then just emerging) viewpoint that insects proliferate because "the host material is suitable" (p. 249) and are ***not the cause*** of the tree's decadence. Anderson also notes the extremely great damage being done to hardwoods (according to studies in

the 1950's), which as we've seen require more fertile soils than do softwoods (conifers, primarily).

U.C. Berkeley entomologists Wood and Bedard (in White, 1977) reveal the discoveries of Person and others which have become what they call a "theoretical foundation" of applied entomology; namely, that ***abnormal enzyme activity*** in subnormal trees was the key to the initial proliferation of the devastating boring insects.

W.R. Day of Oxford University, who wrote on forest ecology and health for three decades, placed special emphasis on the overriding need to discern ***fundamental causes***. Over 50 years ago he criticized the narrow and lazy views which were ***preoccupied with the effects*** of critical problems. Regarding the increasing predation of the forests he observed back in 1929, Day wrote:

> "It is customary to speak loosely regarding diseases with which parasites are associated, assuming that the parasite is the sole factor with which one need be concerned, whereas other factors may be more necessary to the production of the diseased condition. ***One evil result of this is that fundamental causes tend to be overlooked and attention concentrated on the obvious factors in the problem, even though these may be of secondary importance***." (Day, 1929, "Environment and Disease")

In reference to the causes of spreading Armillaria mellea fungus, killer of broadleaf and conifer trees, Day asked:

> "First, is the fungus really a parasite infecting healthy trees? While there is no proof that it never does act in this way, all the evidence goes to show that it is always secondary to some other factor acting as the primary cause of disease. ***If the fungus is a parasite of a secondary nature, what are the factors predisposing the trees to its infection and bringing about the initial state of disease?*** It has been shown that in many cases these are adverse soil conditions acting alone or with others. . . . These initial causes of disease are not always obvious, but it is to be presumed, in lack of evidence to the contrary, that ***they are always there when the trees become infected***." (1929)

Twenty-one years later, Professor Day, alarmed at the multiplication of insect and disease problems, continued to stress the relations of rooting environment to size and health of trees. In “Forest Hygiene: The Imperfection of the Environment and its Importance in the Management of Forests” (1950), Day named three factors essential to healthy root and tree development:

1.) a rooting zone adequate to promote the growth in size ***normal to the species***

2.) variations in soil water and oxygen which are ***not overly stressful***

3.) adequacy and availability of ***all soil nutrients***

Again, in studying the expanding oak dieback situation in Europe, Day noted that defective soil conditions are proving themselves ***primary***. While not fully aware of the soil’s long interglacial development and its significance, he reveals the central fact in the “imperfect” environment: “It is, at least in Britain, always possible to find evidence of restriction in supply of the fundamental needs of the tree for root development and maintenance, i.e., space, food, water, or oxygen, this deficiency depending on the physico-chemical make-up of the soil.” (1950)

Day’s co-workers at Oxford, Morrison and Clarke, in their paper “Some Problems of Forest Soils” (1928), further described the degenerative podzolization process (as did Iversen, Andersen, etc., in Chapter Two) and stressed the fact that acid, demineralized ***hardpans***—largely ***impervious to roots***—developed from this process. Mueller and Cline 1959 showed that not only in the extremely rigid ***duripans***, but also in the less cemented ***fragipans***, that even when roots could penetrate them it was rarely more than 6 inches. The fragipan barrier is commonly only 12–30 inches from the surface, which they contrast with the (rare) cases of elms and basswood—growing in better soil—rooting down to 82 inches and more.

It is obvious that these barriers to rooting, so often referred to (as claypans, hardpans, ironpans, duripans, etc.) in published soil studies, are an important factor in producing “abnormal trees with sub-normal enzyme systems” en masse during the late interglacial periods.

Present-day Productivity (?)

What are present-day views on present productivity from the Earth's (unfertilized) soils. Here are a few:

- When the FAO took a worldwide forest inventory in 1963, they classified 40% as unproductive. (Bakshi, 1976)

- Robert Curry, environmental geology professor, University of Montana, states that Western forests in the U.S. may have less than 200 years before timber productivity is permanently eradicated. (***Journal of Forestry***, May 1971, p. 300)

- The Congressional Clearinghouse on the Future reports that "despite genetic improvements of planting stock and increased efforts at reforestation, many forests that have been cut will not be able to grow trees again in the near future, if ever." Meanwhile, they report, "The per-capita consumption of pulp and paper products is expected to be 3 to 4 times greater in 2030 than in 1976." (***What's Next***, April 1980)

- "The Hubbard Brook Ecosystem Study: Forest Biomass and Production" (Whittaker et al, 1974) is the study referred to by John Hamaker in Chapter 5 of ***The Survival of Civilization*** which revealed the rapid drop in forest growth rate of 18% from 1956 to 1965. The authors suggest acid rains and drought as the likely causes. Hubbard Brook (which is in New Hampshire) is probably the most carefully studied forest ecosystem in the world, and is considered representative of northern temperate forests. A later book on the studies there entitled ***Pattern and Process in a Forested Ecosystem*** (Bormann and Likens, 1979) ***fails to report an update*** on this growth rate decline, but it does show that the soils there are strongly acidified ***to less than pH 4.5***, and that acid rains continue to damage them with every storm.

- An update does come from Maine, via an article on the findings of the University of Maine's Cooperative Forestry Research Unit entitled "Maine's Trees Grow Too Slowly" (***S.F. Examiner***, 6/1/80). The Research Unit's Chief, Prof. Charles Webb, "grimly" reports finding spruce trees of 5-inch diameter proportions to be 55 years old—about 1/8th the volume the trees should be if growing under beneficial

> conditions. Prof. Webb says they are not sure what to do to improve the forest's growth, perhaps "harvest everything and start over." The article goes on to say that most of the research keeping them occupied is aimed at finding hardier tree species, because the spruces and firs—"what Maine has always grown best"—are being destroyed by a spruce budworm epidemic. The forests are being doused with pesticides every year, but this is said to barely keep the insect at bay.

Are these poisons uplifting the health of the soil and trees, and slowing the insects in their predations? The June 1980 ***American Forests*** article, "The Spruce-Budworm Disaster: An Integrated Approach," reports that since World War II, 27 million acres in the U.S. and Canada have been sprayed. Maine has been spraying since the early 1950's and has spent $35 million from 1972 to 1979 to "protect" 12 million acres. Now, says author Jones, the budworm is infesting 150 million acres in eastern North America and is ravaging them with "renewed vengeance."

An editorial note says that while Maine is planning to spray again in 1980, ***the U.S. Forest Service is recommending no more money be given for spraying***.

Have any of the Maine or New Hampshire researchers read the June 1976 ***Journal of Forestry*** article on Alaska describing the poor and fragile soils, of limited regenerative ability, which cover most of the state—except for the ***loess*** soils that receive ***glacier-ground rock dust*** north of the Alaska range? The ***high forest productivity*** here, it is said, is equaled or exceeded only on the floodplains receiving recently deposited ***alluvium.***

How much growth and timber is being lost to insects and disease each year? FAO/IUFRO (1965) and Hepting (1970) give the figure of 35% of gross annual growth as lost according to USDA data of 1952. Anderson (1960) says the growth loss impact is about 25% of net annual growth, and Petersen (1980) states that insects alone are destroying more of the forest than is fire in the U.S—and the "bugs" are at or above ***all-time record levels of infestation***.

The following section presents summary examples from readily available forest research literature of this century. One thing this literature makes obvious is that there has never been any shortage of "attackers" present to

feed on sickly tree (or other) organisms. Marlin (1965), for example, says that 124 different insects have been found to attack oaks, 140 different species are classified as destructive to pines, and many other (perhaps all) trees have 50 or more insects ***potentially*** harmful to them. Nor is there any shortage of fungal or other "disease organisms."

What is also clear from this literature, along with all the other work we have considered to this point, is the fundamental soundness of the perspective of John Hamaker. Equally evident is the complete contrast between Hamaker's voice calling for ***removal of causes*** and that of most foresters (and others) calling for ***removal or suppression of effects***, or simply concluding "nothing can be done." Right now the forests, in the throes of this rapid die-out period, evidence their support for Hamaker's view that "only an immediate aerial remineralization can save what is left of them."

In reference to wide-scale aerial remineralization, a U.C. Berkeley forest soils professor privately told this writer: "I think it's a good approach." Yet this professor has apparently accepted the nothing-can-be-done attitude, suggesting it is "great" that we may have another 10 years before civilization is thoroughly wrecked by climate change.

It appears now that this strange human attitude, if sustained by ignorance and irresponsibility, can quite effectively insure the ongoing collapse of our interglacial forests—***and the beneficial climate they sustain***.

Forest literature reports of the past few decades

- "Root Rot as a Factor in Survival" (Haasis, 1923) – The root rot ***Fomes annosus*** has been found weakening trees in the Appalachians to the point where exceptionally high winds" measured at ***30 to 44 miles per hour*** (in March, April, and May) have been blowing them down.

- "New Disease Threatens White Pine Stands" (***Journal of Forestry***, 1948) – Western white pine, already staggering under the burden of pine beetle and blister rust epidemics, now has a ***new*** "pole blight" disease of unknown cause to contend with.

- "The Role of Nectria in the Beech Bark Disease" (Spaulding, 1948) – For over 10 years, the beech trees of Maine and the Canadian Maritime provinces have been dying off at an alarming rate. The disease is spreading north and west from Nova Scotia, where it ***first appeared in 1932.***

- "The Beech Bark Disease Today in the Northeastern U.S." (Shigo, 1972) – The disease is now well established in the eastern U.S.—Maine, New Hampshire, New York, Vermont, Massachusetts, Connecticut, Pennsylvania—and is spreading rapidly along its "killing front" where large areas of forest are dying. Vast areas of beech forest remain to be saved, but the best the "forest manager" is able to do now is to harvest as much beech as possible before they die and decay. While a "better understanding" of beech bark disease is needed, some prior stress factors must have weakened the trees. All the beech forests of Europe have now been "invaded."

- "Dwarfmistletoes: A Silvicultural Challenge" (Leaphart, 1963) – Parasitic dwarfmistletoe has spread and intensified to the point of ranking second only to heart rots as a source of disease damage. One billion board feet of softwood timber is lost annually in the West, compared to 10.9 billion feet net growth. In Montana 23% of annual growth is lost.

- "Decline of the Saguaro" (Robinson, 1966) – America's most unusual forest is dying out at a rate that will cause virtual extinction ***this century.*** The giant saguaro cactus 'trees' are being destroyed chiefly by "bacterial necrosis" or "cactus cancer." Outlook on stopping this blight looks bleak.

- "The Stalactiform Rust on Jack Pine" (Anderson et al, 1967) – This fungus was until recently only considered a problem in the western U.S., but in ***1960*** it was found in Michigan and Minnesota, and is now damaging pine species of all ages from California to Colorado to Michigan.

- "Trees With Temperatures" (Neubert, 1969) – A "space age 'doctor,' " John Wear, is using NASA-funded remote scanning technologies and a helicopter to improve U.S. Forest Service ability to find the most

diseased areas in Oregon and Washington's Douglas-fir forests, where 170 million board feet of timber is killed annually by ***Poria weirii*** root rot. Trees yielding to this fungus, the region's worst disease, must be cut down to slow the spreading—no "cure" has been found.

- "Detection of Forest Diseases By Remote Sensing" (Heller and Bega, 1973) – Color and infrared color films are becoming valuable tools for distinguishing disease stressed trees, such as those being killed increasingly by Dutch Elm disease, oak wilt, dwarf mistletoe, root rots, ash dieback, and others. In the northeastern U.S., dieback of hardwood stands has "plagued forest pathologists ***for the last 2 1/2 decades.***

- "Incidence and Financial Impact of Fusiform Rust in the South" (Powers et al, 1974) – Over 800 million slash and loblolly pines have fusiform rust stem infections. Dollar loss is about $28 million yearly.

- "Plight of the Palms" (Stevenson, 1976) – A "lethal yellowing" disease, first noticed in Key West in ***1955***, has now killed thousands of coconut palms throughout southern Florida; threatens over half a million others of five palm varieties. 3/4ths of the coconut palms in Dade County died in the last four years. Similar palm disease recently found in West Africa causing concern of a spread throughout tropics. Florida officials putting their hopes on replacement of dying trees with a new 'Malayan Dwarf' hybrid palm from Jamaica.

- "The canker stain disease of plane tree in Marseilles and in the south of France" (Ferrari and Pichenot, 1976) – A strain of ***Ceratocystis***, until now thought strictly localized in North America, has killed 180 plane trees in Marseilles. Due to the rapidity and extent of damage done in ***the past 40 years*** in U.S., great concern is expressed over new disease centers found in several areas in France, Spain, Belgium—all of Europe is said to be threatened.

- "Pitch Canker of Slash Pine in Florida" (Dwinell and Phelps, 1977) –Pitch canker, first seen in ***1945*** in North Carolina on Virginia pines, has since appeared on eight other pines species from Florida to Mississippi, and in Haiti. It is intensifying, with a new symptom of

shoot dieback appearing in ***1969***. A new, devastating outbreak began in ***1974***—by ***1976*** it had spread to all 67 Florida counties.

- "Marking Ponderosa Pine To Combine Commercial Thinning and Control of ***Armillaria*** Root Rot" (Ruth et al, 1977) – While ***Armillaria*** has been present for at least 700 years, ***recent*** observations reveal not only that much of the old-growth mortality is being caused by the disease, but that a widespread increase in the ***dying of young growth*** is occurring. For "control," more harvesting of diseased trees in the path of the disease is suggested.

- "Serious pine disease (Scleroderris canker) found in Canada" (***Commonwealth Forestry Review***, 1979) – The ***Gremmeniella*** fungus, a serious disease of young pines in Canada for 40 years, is now spreading as a new more "virulent" strain from Europe, first identified in ***1977***. It can kill pines of all ages, is doing so in New York and Vermont, and immediately threatens over 300,000 acres of pines in eastern Canada.

- "The 'Stinking Cedar' is in Big Trouble" (Toops, 1981) – Florida's torreya trees, seemingly healthy ***until the mid-1950's***, have since been attacked by a "mysterious blight" which has killed all large torreyas in the wild, and now threatens all remaining torreyas with extinction. U.S. Forest Service researchers are hoping to isolate a particular pathogen responsible, and are also searching for a pesticide they think might help.

- "Forest Biology" (Lovejoy, 1917) – In the late 1800's there were "billions of feet of good tamarack standing on some millions of acres through the Lake States and the Northeast. The tamarack saw-fly has practically eliminated the species as a forest tree. The insect is a native and there is no reason to suppose but that it was present for untold years. But it increased tremendously ***within a decade or so*** and the tamarack seems to have been eliminated . . . throughout its eastern range. . . . Its loss is a very serious matter."

- "Sawflies Injurious to Conifers in the Northeastern States" (Schaffner, 1943) – 14 species of conifer-attacking sawflies have become abundant ***in the last decade***, and have become increasingly damaging

in recent years. Lead arsenate pesticides are recommended by the author.

- "How Forest Pests Upset Management Plans in the Douglas-Fir Region" (Cornelius, 1955) – These large areas of Oregon and Washington, ***until recently*** considered free of serious insect problems, had epidemic infestations in about 17% of the forested area of the two states—over 8 million acres.

- "The Balsam Woolly Aphid in the Southeast" (Speers, 1958) – First observed damaging balsam fir in Maine in ***1908***, it is now destroying five kinds of fir throughout eastern Canada, as well as the Northeast, Southeast, and Pacific Northwest United States.

- "Effects of Soil and Other Environmental Conditions on White Pine Weevil Attack in New York" (Connola and Wixson, 1963) – A study of 266 one-tenth acre plots of white pine revealed a very close correlation between insect damage and demineralized soil conditions including hardpan barriers to rooting.

- "Beetle Explosion in Honduras" (Beal et al, 1964) – A southern pine beetle epidemic, which began on old pines growing on depleted, eroded, burned-over soils, has now spread to over 4.2 million acres, destroying nearly 50 million trees—the worst epidemic ever known. No end to this epidemic is in sight. Surviving pines are being studied to determine the cause of their resistance.

- "Elm Spanworm, A Pest of Hardwood Forests in the Southern Appalachians" (Fedde, 1964) – This native North American insect, relatively obscure in the Appalachians previously, ***became epidemic in 1954*** and has remained so for nine consecutive summers. About 1.5 million acres have been defoliated in the oak hickory forests in the past 3 summers; each year the pest is expanding north and east, showing little sign of subsiding. DDT is the recommended "solution."

- "The Bark Beetle" (Wells, 1965) – The "pine beetle logging company" is destroying about 12% of the total timber crop each year.

- "Tioga's Ghosts" (U.S. Forest Service, 1967) – High along Tioga Pass in Yosemite National Park is a bleached forest of dead trees—the remnant of what was once a green and healthy lodgepole pine forest. Periodic attacks ***since 1900*** have finally killed it off. This year, as part of the continuing outbreak, which started in ***1947***, 90,000 additional acres have been infested and damaged.

- "Resistance of Western White Pine to White-Pine Weevil" (Soles et al, 1970) – Though having yet to do major damage in the western U.S., white pine weevils have been a major cause of white pine mortality throughout a huge area of eastern Canada and the U.S.

- "If Only In Clichés, For Pete's Sake, Tell It Like It Is" (Lamb, 1973) – Thousands of square miles of Rocky Mountain forests are dead and dying, and huge quantities of dead timber are accumulating on the ground, setting the stage for tremendous fires. Bark beetle epidemics continue to worsen: 670,000 acres of high-mountain Colorado wilderness was destroyed from ***1942 to 1952***; 2 million acres are now infested. Dwarf mistletoe has joined the beetles to effectively cancel any net growth in infested Grand Teton National forests, and the situation in Yellowstone National Park will soon be worse as bark beetle epidemics have now begun in the decadent forests there.

  In a recent year, a massive beetle flight crossed 18 miles of non-forested land to kill 400,000 trees in a mass attack in Colorado. The only healthy trees in Montana's Bitterroot National Forest are said to be the young trees on burned or cut-over lands. Lamb's conclusion is that only understanding, not confusion, will produce adequate solutions to these crucial environmental problems.
- "Spruce Beetle Effects On A White Spruce Stand in Alaska" (Baker and Kemperman, 1974) – This insect's first major outbreak was in the ***1920's***. By ***1960*** spruce beetle populations had built up to high levels on the Kenai Peninsula, and in ***1971***, about 260,000 acres were infested. Another infestation west of Cook Inlet has killed 70,000 acres of spruce since the late ***1960s***.

- "Douglas-Fir Tussock Moth Infestation: A Challenge to Forestry Professionals" (Ellefson, 1974) – Washington, Oregon, and Idaho are being ravaged by one of the worst tussock moth epidemics ever known. It has grown from 2,400 acres in 1971 to 200,000 in 1972 to

800,000 acres ***by 1973***. Heavy mortality is occurring. The Forest Service has proposed DDT spraying.

- "Tree Ring Evidence for Chronic Insect Suppression of Productivity in Subalpine Eucalyptus" (Morrow and LeMarche, 1978) – These studies reveal that the subalpine forests of southern Australia have had their growth severely depressed for at least ***25 years*** due to heavy, almost continual insect attacks.

- "The Mountain Pine Beetle: Friend or Foe" (Robertson, 1979) –Ponderosa and lodgepole pines throughout the West are being stricken by pine beetles. A ***recent*** epidemic killed 20 million trees in northern Oregon, and the 650,000 acres of epidemic infestation in Montana and Idaho is expected to increase in 1979. A USDA report states that any tree over 12-inch diameter ***has little chance of survival***. Thinning, pesticides, and "biological controls" are being used in response.

In 1965, ***Unasylva*** published a summary of a symposium on internationally dangerous diseases and insects sponsored by the FAO and the IUFRO (International Union of Forestry Research Organizations). The symposium participants left no doubt they were working with what were called "universal problems." Problems cited as causing "major impact on the timber economy" included these:

- Honduras - Bark beetles continue ravaging pine forests.

- South Africa - Bagworms completely defoliating wattles.

- New Zealand - ***Sirex noctilio*** destroying large areas of pine.

- Greece, Turkey, Cyprus, Israel - Defoliators and borers destroying pines, oaks, poplars, and others.

- Bermuda - A scale insect has nearly exterminated the cedars.

- West and East Africa - Shoot borers and others are causing major hardwood losses in nearly every country.

- Pakistan - Major defoliation by various insects.
- Eastern Europe - Major losses occurring from destruction by gypsy moth, ambrosia beetle, etc.
- India - Spike-disease virus causing major losses of sandalwood.
- Kenya - Large pine plantations being wiped out by ***Dothistroma*** leaf disease.
- Russia and Iran - Tens of millions of Albizia trees killed by vascular ***Fusarium*** wilt.
- Yugoslavia – Dwarf mistletoe is reducing total production volume by 19%.
- Belgium - Root rot is killing or endangering 17% of forested area.
- Norway - Root rots are taking a high toll in forests.
- Canada - Many diseases and insects causing losses comparable to the U.S.—about 35% of gross annual growth.

It should be valuable now to examine some brief histories of the most destructive diseases to have emerged to hasten the killing off of the temperate zone tree species; also, to review another recent summary of worldwide tree diseases.

American Chestnut

This tree was one of the largest hardwood dominants of the late interglacial forests of North America, reaching heights of 115 feet and diameters at breast height of 8.5 feet; it composed up to 60% of the forest canopy (Delcourt, 1981). It extended in range from Florida to California. Genetically inclined to become such a massive specimen and requiring fertile, well-drained soil, it was apparently the first to be virtually exterminated—by

chestnut blight (***Endothia parasitica***), a fungal parasite which in North America ***first expressed virulence in 1904***. Within 40 years it reduced the great chestnut to an understory shrub (Anderson and Kayo, 1976, p. 61). It is relevant to note that this entomology book also shows that, in New York, apple trees once reached a maximum number of over 18 million trees until insects and diseases began causing heavy losses in ***the late 1800s***; by 1966 New York had under 3 million apple trees left. The early American colonists, however, suffered little from insect damages (p. 331).

In regard to the chestnut, and to all trees, another article deserves mention. “Disease as a Factor in the Evolution of Forest Composition” (Woods, 1953) reveals the fact that the chestnut was nearly eliminated in the southern U.S.—well known to have poorer soils than the directly glaciated north (Marbut, 1935, e.g.)—during the period 1825 to 1875. At that time it was ***Phytophthora cinnamoni,*** the ***potentially*** very deadly root rot fungus. Woods reminds the reader that oak, plane, walnut, larch, robinia and many other species can also be subject to ***Phytophthora***.

He had the rare insight to point out that, by the 1800s, the soils had reached an impoverished stage where they provided “an excellent substrate for the growth of Phytophthora and other diseases.”

Woods goes on to state the principle that disease is a response to certain altered environmental conditions which can cause vast forest changes according to the relative abundance and ecologic importance of the species. He decried the “immeasurable biological weakening” of present forests due to ***soil changes, cutting, and burning***—changes for which “we are all responsible.” (p. 873)

Future forests, says Woods, will likely bear little resemblance to those our forefathers knew. By some undisclosed reasoning, he concludes that new hybrid species and radiation treatments may be the best answers to the problem of the weakening forests.

Dutch Elm Disease

1919 – the first definite report from Holland of this beetle-spread fungus disease. Traveling at a mean speed of 150 miles per year, it spread all

across Europe to Russia, and eventually from Ireland and Finland to Portugal and Turkey. It is still spreading rapidly (Heybroek,1966). In ***1930***, forests containing a billion American elms were stricken, and in 40 years relatively few survivors remained. Another 500 million city and farmland elms were also killed. Dollar loss estimates of $50 billion have been tallied (Goldsmith, 1979).

The American elm once flourished in at least 41 states; by the late ***1950s*** Russell Whitten of the U.S. Forest Service could state: “I have no doubts that the disease will spread to every area of the country where elms are growing.” (Farb, 1957) ***Between 1978 and 1981***, it began killing the elms in the Los Angeles and San Francisco Bay areas (***San Mateo Times***, 2/13/81).

Oak Wilt and Decline

Five articles from 1952 to 1980 indicate the oak is following the same path as the chestnut, elm, beech, ash, and the other hardwoods.

1952 – Fowler states that for several years oak wilt was seen only in Wisconsin, Minnesota, Iowa, northern Illinois, and northern Missouri, yet recently foresters and pathologists have been alarmed to discover it in new areas. At least 27 oak species, plus Chinese chestnuts, were known to be potentially susceptible. By 1949 it had spread throughout Missouri; by 1950 it had spread—or become virulent—to oaks in Kansas, Nebraska, Ohio, and Pennsylvania. By 1952 it was damaging trees in Michigan, West Virginia, Maryland, Kentucky, North Carolina, and Tennessee. Fowler concludes that what is needed is more research and more complete knowledge before wide-scale control can be considered.

1957 – Boyce’s studies show a steady spread through the southern Appalachian states.

1963 – Anderson and Anderson’s studies show continuing spread in the Lake States, where oak wilt was originally discovered in ***1944***. The authors note that the disease is now appearing throughout much of the eastern U.S.

1968 – Nichols reports oak "decline" and oak "dieback" over extensive areas of Pennsylvania, without the presence of oak wilt fungus. Prime causes are thought to be drought, ice and hail damage, and/or 23 species of defoliating and leaf-rolling insects.

1979 – Goldsmith states that oak wilt is now decimating stands over a wide area in the U.S. and spreading at a 50 miles per year rate. It endangers at least 35 species and what is left of a once estimated 12,000 million (12 billion) oaks.

Goldsmith is editor of Britain's ***The Ecologist***, which published a special double issue on the worldwide crisis of tree diseases in July/August 1979. A summary of key points from this outstanding issue should follow here:

- ***Phytophthora cinnamoni*** (a close relative of Ireland's infamous 'potato blight') is now attacking four hundred species of trees and plants in 48 orders including avocados in California and Australia (starting in ***1949***), pines in New Zealand, sweet chestnuts in England (since ***1930***), and the giant Jarrah eucalyptus forests of Australia. There it first kills the shorter (up to 40 feet) Banksia, then soon after the massive (up to 185 feet) Jarrahs die back—400,000 hectares destroyed so far with 20,000 more each year at present rates. Author L.D. Hills makes it clear that the fungus is in fact present most everywhere, but only becomes destructive ***when soil conditions become imbalanced in its favor.***

  Hills also states that in the weakening tropical forests Phytophthora may soon spread like "wildfire," and, not incidentally, he cites the success of Australia's organic avocado growers in eliminating it via fertilizing their soils with ground dolomite rock and organic matter. Hills concludes that ***the answer must lie in a healthy balance of soil organisms.***

- Dutch elm disease continues to expand into Northern England, Scotland, Wales, and has recently arrived in Ireland and the Channel Islands. It appears that by ***1980*** over 90% of Southern England's elms will be dead as a "new strain" of the disease is increasing the destruction. All efforts at control not designed to replenish soils have

failed abysmally. (Worldwide, about ***1 of every 8 remaining elms dies each year*** - Lamb, ***World Without Trees***)

- In ***1977***, large beech trees in many areas of Britain began showing beech bark disease symptoms: abnormal sap flow, yellowing, and crown die-back. The drought year of 1975 to 1976 is suggested as the causative stress.

- Chestnut blight is wiping out Italy's chestnut groves; by 1967 over a billion dollars in economic losses had been calculated.

- The history of pesticide spray programs attempting to thwart insect epidemics has been a tragic, drawn-out exercise in futility and ecological destruction extending from soil microorganisms to the children in Canada who suffered liver and brain damage symptoms—termed "Reye's Syndrome"—unknown before the heavy spraying of the 1950s. In the 1970s, Nova Scotia's Deputy Prime Minister of Lands and Forests finally refused to grant a permit to the forest industries for more spraying. He is quoted as saying:

  > "We feel that it is far better from a forestry point of view to suffer our losses now, rather than spray and prolong the inevitable, as New Brunswick has done. The forests of New Brunswick after 25 years of spraying certainly are not the envy of anyone involved in proper forest management." (p. 142)

  Likewise, attempts at spraying pesticides onto elm trees, injecting chemicals into chestnut and palm trees, etc. have all failed to do anything more than "slow the inevitable." Goldsmith says it is unfortunate that the "experts" never learn that the toxic chemical approach to problems of biological health can only make things worse. He believes this is because they do not want to learn, and in this connection he, too, quotes Oxford's Prof. W.R. Day ("One evil result of this is that fundamental causes tend to be overlooked. . . .")

- Finally, the soil section (again) brings out the fundamental point that hardwoods such as the elm and chestnut have higher soil mineral requirements than do the conifers and birches, while oak is intermediate. Also noted by editor/author Goldsmith is the significant

> fact that planting trees on former agricultural land often leads to disease; also, that soil demineralization ("podzolization" again here) results in acidification, loss of soil organisms, etc., thus creating a poor growing medium for most trees. Therefore, Goldsmith concludes: "This being so everything possible should be done to prevent podzolization." (p. 146) (Mr. Goldsmith has since been informed of the key principles of soil remineralization.)

To further research the decline of forest health, and die-out at the "hands" of expanding "pest complexes" (U.S. Forest Service), bio-regional studies were made of these areas: the Southwest, California, Northwest, Rocky Mountain states, New York state; also, the U.S. as a whole and all of Canada by each province. The readily accessible literature from the respective Forest Services, and Societies (New York), when viewed over the monitoring period 1950 to 1980, ***unmistakably confirms the accelerating trend of temperate forest die-out***. (Those readers still in doubt may wish to consult this literature.)

These reports consistently show the increasing appearances of either named or "mysterious" blights which become suddenly prominent, then remain established to spread to wherever "suitable host material" is available. Likewise, more and more formerly innocuous insects are becoming major tree destroyers, teaming up with "America's Biggest Forest Killers" (Hay, 1976)—gypsy moth, eastern spruce budworm, elm bark beetle, southern pine beetle, mountain pine beetle, western pine beetle, Douglas-fir tussock moth, western spruce budworm—and the rest.

Instead of citing another score of examples from the available forestry literature, a final few considerations should suffice here in clarifying the actual situation.

First, ***Forest Insect and Disease Conditions in the United States 1978*** (USDA, May, 1980), the latest issue of this annual government summary, gives an idea of how far along things are:

Insect epidemics are increasing throughout the country. In the Northeast, spruce budworm defoliated 6.4 million acres in 1977; 7.7 million acres in

1978. It is stated that “nearly the whole northern half of Maine was defoliated.” Higher levels are expected for 1979. Very significant in this publication is the (continuing) obvious pre-occupation with toxic chemicals as insect killers. The glossy color photos of infested and dead forests, including one of a lone man with respirator and long hose shooting “Sevimol-4” onto scraggly pines (for mountain pine beetle “protection”), provide appropriately haunting pictures to accompany the text. Also of obvious significance, an attempt to grow a wood energy plantation in Kansas led to die-back destruction of the 2 and 3 yr.-old cottonwood seedlings—”caused” by ***cytospora*** canker. ***Cytospora*** is also killing off the Rocky Mountain aspens.

“Battling Bugs From Above” (Petersen, 1980) states that the 1979 forest insect infestations are again ***at or near all-time record levels***, and studies show insects destroy more timber annually than fires—enough timber to build about 900,000 two-bedroom homes, or 9 billion board feet. Of course fire susceptibility and insect disease damage are not unrelated phenomena, as explained by USDA’s ***Western Forest Insects*** (Furniss and Carolin, 1977): “Insect-killed trees increase forest-fire hazard. The foliage and fine branches of recently killed trees provide flash fuel that often gets a fire on its way. Conflagrations that defy control often run through dead timber and beyond. Long after trees are killed by insects, they stand as snags inviting lightning to strike. . . . Insects set the stage for fire. Fires kill trees that then breed insects.”

An AP article in the ***Lansing State Journal***, June 18, 1981, is entitled “Worm that turns Easterners off is gypsy moth.” The increasing dominance of the gypsy moth is made clear, yet the causes for this are shrouded in the mystery of specialized expertise. Note that in 1975, 1976, 1977 and 1978 the gypsy moth had defoliated 464,000, 855,000, 1.6 million, and 1.3 million acres (USDA annual summary); in 1981 a huge outbreak has USDA officials estimating a 5 million acre total from Maryland to Maine. Oaks, poplars, maples, fruit trees, golf courses, scout camps, etc. are all being ravenously consumed—even freight trains are being halted by too many crushed moths beneath their wheels.

Vic Mastro, USDA entomologist at Otis Methods Development Center in Bourne, Massachusetts, says no one knows ***why***. The article concludes that the government’s strategy is to “contain” the moths until means to

“exterminate” them are found—probably within a decade or two, officials say.

Bess, Spurr, and Littlefield apparently knew why when they published ***Harvard Forest Bulletin*** No. 22, “Forest Site Conditions and the Gypsy Moth,” back in 1947. They classified areas of susceptibility to defoliation according to soils and physiography. ***They found the poorest soils to support the most susceptible forests, while the healthiest forests—on calcareous (calcium/mineral-rich) soils—***were ***highly resistant to insect damage***. They also noted that these richer forest ecosystems carried higher gypsy moth ***predator*** populations; also, that severe defoliation ***predisposes the forest*** to further epidemics, especially when the trees are favored food plants growing on poorer soils.

Why was this work not built upon?

Note: An update of the 1981 defoliation figure comes from ***Science,*** August 28, 1981. “The Summer of the Gypsy Moth” states – “It looks as though the total will be 9 to 10 million acres, maybe more. Next year is expected to be worse.”

Finally, consider J. Heinrichs’ article in the April 1981 issue of ***American Forests***, “Tragedy of the City Forest.” Heinrichs asks the reader to imagine a forest of 70 million acres, supporting between 228 and 500 million trees and “worth” $15 billion, and which also surrounds 80% of the U.S. population. Next he says to imagine this forest dying at a rate never before seen—huge numbers of maples, oaks, sycamores, elms, etc. being struck down by fungi, bacteria, viruses, borers, webworms, aphis, scale insects, leaf miners, sawflies, gypsy moths, cankerworms, etc.; also by air pollution and wind damage, causing much of this forest to have only an 18-year lifespan.

This is precisely what is happening to the trees of American cities, and, Heinrichs concludes, ***without a great deal of work***, this city forest decline can only get worse.

Robert Lamb, author of ***World Without Trees*** (1979), puts it this way:

“There is one thing of which you can be absolutely certain: if things go on as they are, some day the sun will rise on a world without trees. That day is closer than you think.”

The Acid Rain Factor

To explore this subject in any great detail, as more and more articles and books already are, is unnecessary here. John Hamaker has pointed out the logical results of additional ecosystem stress due to life-destroying acidic rain (and fog and snow) in terms of the glacial process, and its role in that process. Consideration of the facts presented by the literature at hand strongly confirms the seriousness of this ongoing injury to our already well-demineralized and acidified late-interglacial ecosystem.

Given here are short summaries of some recent articles and books which leave no doubt that this aspect of the whole crisis of survival is quickly worsening. Another "sleeping giant" is awake, and has joined in the challenge to humanity's right to survive.

- ***Environmental Quality - 1979,*** 10th annual report of the Council on Environmental Quality – "Acid rain is recognized as one of the two most serious global environmental problems associated with fossil fuel combustion, the other being the accumulation of carbon dioxide in the atmosphere. . . . In the eastern half of the United States the acidity of rainfall appears to have increased about 50-fold during the past 25 years. . . . Other effects have not been quantified. Loss of crop productivity and forest yields due to acid rain may be prevalent."

- ***Pattern and Process in a Forested Ecosystem*** (Bormann and Likens, 1979) – Acid rain and snow are significantly stressing forested landscapes, and forest growth is declining. Field and lab studies have established that acid rain can erode and leach nutrients from foliage, alter susceptibility to insects and pathogens, reduce tree seed germination and seedling establishment, leach essential soil minerals, and kill soil organisms.

- ***Effects of Air Pollutants on Mediterranean and Temperate Forest Ecosystems***, Symposium Proceedings (USDA Forest Service, 1980) – Soil minerals Ca, K, Mg, Mn and others are being leached from soils; microorganisms are dying out, and both seedlings and mature trees are suffering. "Acidic precipitation accelerates podsolization and depletes nutrient pools in forest litter and shallow inorganic soils . . . and soils data from New England indicate that acidification of drainage

basins (including soils) has occurred and nutrient depletion is underway." (p. 156)

- ***Proceedings of the First International Symposium on Acid Precipitation and the Forest Ecosystem*** (USDA Forest Service, 1976) – Acid rains accelerate the podsolization (demineralization) process, and are estimated to be acidifying soils in Alberta, Canada at a rate of 1.0 pH unit every 10–20 years from sulphuric acid alone. (p. 767. Nitric acid and others not estimated.) A 1.0 pH unit decline equals 10 times greater acidity. Soil acidification via chemical fertilizers are thought to be even more serious.

- **"Acid Rain"** (Likens et al, 1979) – Has increased to between 5 and 30 times more acid than the lowest now expected in a not directly polluted atmosphere, pH 5.6, while some storms are found to be from hundreds to several thousand times more acid than this "normal" figure. Swiss scientists studying Greenland ice cores ***found the precipitation of 180 years ago to range from 6.0 to 7.6***. Destructive soil effects will vary according to present day mineralogy of the soils, formed on the glacial till and outwash deposits of over 10,000 years ago.

- **"Acid Precipitation: Causes and Consequences"** (Stotzky et al, 1980) – Prof. G. Stotzky of New York University's laboratory of Microbial Ecology, and co-workers, state that presently acidic soils are being further demineralized of nutrients essential for the soil organisms, such as in Scandinavia where ***some soils now have a pH below 3.4***. The soil microorganisms and all organisms are suffering the following effects from lowered soil and water pH levels:

    - ***on a molecular level***, pH-dependent enzyme activity is being reduced or destroyed.

    - ***on a cellular level***, the normal biological activity of the protoplasm is being destroyed.

    - ***on an organism level***, acid-sensitive populations are being killed off, thus imbalancing and reducing fertility and productivity of entire ecosystems.

Also noted is the laboratory technique of using acids to leach out minerals from soils, as takes place when acidic fertilizers are used, but in this case for doing subsequent analysis to determine acid rain effects. As the acid rain (and fertilizers) can dissolve soil minerals, so is it dissolving stones and statuary the world over—from the Parthenon to the Taj Mahal to Rodin's 'The Thinker,' etc. Donald Fraser, Canada's former Minister of Environment, calls acid rain: "The most serious environmental problem that Canada faces."

- **"Acid From Heaven"** (West, 1980) – Acid rain, first noted in the 1950's in Europe, has steadily spread over the world until it is now found virtually everywhere, as indicated by Lewis and Grant's declining measurements in an isolated Colorado wilderness in 1979. (Chapter 3 of ***The Survival of Civilization)*** EPA's Norman Glass notes the danger to forests, plants, and soil organisms, stating: "The foliage is assaulted from above while the roots are starved and poisoned in the soil." 48,000 lakes surveyed by EPA were on the brink of fish-killing pH. Pennsylvania researchers found the average pH of summer storms to be 3.4—over 100 times the acidity of 5.6 pH rain. Limestone rock dust is being spread by helicopter over New York lakes in an attempt to prevent their deaths.

- **"Canada Grows Increasingly Impatient With Pollution From U.S."** (Gross, 1981) – A joint report from American and Canadian scientists says that in just the past year as many as 4000 lakes in Ontario alone have been killed by consistently acidic rain and snow. ***At least 20,000 lakes in Scandinavia are essentially dead***, and hundreds of thousands of lakes worldwide also face extinction as supporters of life unless remedial action is taken very soon. Soil and forests are being punished—and the "experts" say the acid rain will prohibit the soil fertilization (i.e., ***acidifying*** chemical fertilizers) "required" to promote tree growth.

- **"Acid Rain: The California Context"** (Williams, 1978) – The most serious consequence of acid precipitation may result from further soil degradation: changing the balance of elements and disrupting normal enzyme reactions in the "aquatic system" of cellular protoplasm, thus tearing asunder the natural symbiosis of soil organisms with crops and trees. Agriculture as now practiced will then be impossible.

- **"Acid Rain killer of forests, too, official warns"** (Smith, 1980) – Peter Rennie of the Canadian Forestry Service, speaking at Toronto's 'First Global Conference on the Future,' says both hardwoods and conifers are having their tissues eroded, their soils deteriorated, and they are being opened up to destruction by insect and fungal devastation. Trees are unable to pick up soil nutrients in acidifying soils, and with food crops, "only two shocks of acid rain a season is enough to cause great losses in productivity."

  Paul Choquette of the Environmental Protection Service told the Conference: "The prospects for the future look bleak. Sulphur dioxide emissions will increase modestly by the turn of the century, but nitrogen oxides will increase significantly."

- **"Acid Rain's Worldwide Threat"** (Perlman, 1981) – According to Dr. Lars Overrein, Norway's air pollution research director, pollution-laced winds are crossing all continents, causing environmental acidification, and only concerted international action can solve the problems.

- **"Scientists fear acid rain may pose threat to Sierra Nevada"** (***UPI***, 2/16/81) – John McColl, plant and soil biology professor at U.C. Berkeley, states that acid rain is now widespread in California, and dying fish in 14 Sierra lakes are causing concern. He says: "The warning is here. . . . We have all sorts of evidence to show we're on the downward pH trend. We must realize we do have a problem and start reacting. . . ."

- **"Biomass burning as a source of atmospheric gases CO, H_2, N_2O, NO, CH_3, Cl_2 and COS"** (Crutzen et al, 1979) – Very large amounts of acidic gases are being released ***from forest fires*** and other biomass burning worldwide; these gases include dangerous amounts of NO_x (nitrous oxides) as proven by Lewis and Weibezahn. Their instruments recorded a ***ten-thousand times (10^4) greater acidity of rainfall*** from the beginning to the end of the dry season in the tropical forest of Venezuela—caused by burning forests releasing NO_x (and other gases) which then fell as acidic HNO_3-charged rain.

- **"Death in the Sky"** (***Newsweek***, 10/22/79) - High levels of acidity are falling not only in urbanized areas but also in remote Colorado

wilderness and tropical rainforests. George Hendrey of the Brookhaven National Laboratory says this:

"What we see is frightening a lot of scientists. . . . Thousands of square miles are undergoing loss of nutrients, washed away by acid rain. . . . Its a lot worse than we thought." There is concern that acid rain effects may be irreversible, but researchers are trying aerial remineralization—***with limestone rock alone***—to see if it can save the dying lakes. And they hope to breed more acid-tolerant fish.

- **Coal and Ecology"** (Blum, 1980) – Deputy Administrator Barbara Blum, in this talk to the Mining and Reclamation Council, says that it looks as though burning ***three times as much coal*** by 1995 is the only way to solve the "energy crisis," yet she says there is a problem. She quotes President Carter: "One major problem has not been resolved—the problem of increasing air pollution loadings and increases in acid rain that will result from these coal conversions. We have recently come to understand that sulfur dioxide and nitrogen dioxide . . . are a principal cause of acid rain. I am becoming increasingly concerned about the problem."

  Blum says: "The President has asked EPA to accelerate our work on acid rain and to begin immediately to work with Congress on ***a comprehensive way to improve the situation as a whole***—not simply to prevent it from worsening.

  No mention is made to the mining people of CO_2 release from coal—nor of the need for land remineralization and reforestation programs. Instead Ms. Blum speaks of how many workers there are ready to dig up all that coal, and she suggests that EPA and the coal industry work together, because: "At our fingertips, we have the tools to convince a skeptical American public that vast quantities of American coal can be burned cleanly and at less cost, thereby meeting a full range of national needs now." She also notes that highly acidic rain has recently been reported in the Hawaiian Islands.

- **"The Poisoned Harvest of Acid Rain"** (D'Antonio, 1980) – A picture of Rodin's 'The Thinker,' intently corroding under acidic rains in Baltimore, highlights yet another review of all the problems of acidic

rain in a degenerating global environment. Over 50 million tons of acidic gases will be released in America alone this year. “Environmentalists” agree that the best way to “attack” acid rain is by a combination of legislation and science. Maine Senator George Mitchell, after failing in his efforts to convince the U.S. Congress to at least add an emissions clean-up provision to their $3 billion oil-to-coal power plant conversion program, told the media this:

“The problem is so critical, that ultimately we’re going to have to come to grips with it.”

“A vision without a task is but a dream,
a task without a vision is drudgery,
a vision and a task is the hope of the world.”

-- From a church in Sussex,
England, ca. 1730