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Response to request for information on the "science" and "methodology" underpinning Holistic Management and holistic planned grazing.

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Theory:

It is desirable to know the underlying theory behind Holistic Management to understand both the science applied and the methodology. Jan Christian Smuts who wrote "Holism and Evolution" in 1926 provided the theoretical base. Smuts, more than anyone subsequently provided sound reasoning to accept "holism" as the operating principle in nature. The concept that nature functioned in wholes and patterns of great *complexity*, unlike the mechanistic world view in which nature is viewed as a *complicated* machine with interconnecting parts.

Using this theoretical base we recognized that land alone is not manageable because it is so tied to the culture, beliefs and values of the people occupying it. Ultimately the practical management of whole situations, in which land is involved, could only be done by viewing people, their land and their economy as one *indivisible whole*. Land alone is no more manageable than is either hydrogen or oxygen alone manageable in water. The people's economy is indivisible from land because the only wealth that can truly sustain any community, or nation, is ultimately derived from the photosynthetic process (plants growing on sustained healthy soils). Holistic Management involves using a simple decision-making framework that ensures all their significant management decisions are simultaneously economically, socially and environmentally sound both short and long term. No longer are decisions made toward objectives or goals alone, but always toward a new concept called the **holistic context** for any management situation. The holistic context provides the context for all objectives, goals or actions toward any vision or mission. This helps greatly in avoiding unintended consequences to our actions that are so universal that economists long ago used the term "Law of unintended consequences."

Because each and every managed situation involving land (people, land, money) is totally unique, and also unique every year just as one cannot step into the same river twice because it is flowing, Holistic Management does not permit replication. Because of this fact we can only validate the "science" used and monitor or document "results achieved". Note: This point is critical to understanding the great difficulty reductionist scientists are experiencing trying to comprehend holistic planned grazing – because no two plans are ever the same even on the same property two years running, planned grazing cannot be replicated which reductionist scientists do to try to understand the "science." What such researchers also fail to understand is it were replicable as are all grazing systems and rotations, it still would only provide the results and not the "science". Every study of holistic planned grazing that has been done has provided results that are rejected by range scientists because there was no replication!

The Science supporting the major "proof of concept" learning site in Zimbabwe that won the 2010 Buckminster Fuller Challenge.

People managing holistically obviously use basic scientific knowledge from many fields/disciplines but that which matters most in this case, where the reversal of desertification is being demonstrated using greatly increased livestock numbers, is the science vital to the management of the world's largest land areas – the deserts caused by human actions and the grasslands and savannas. Because of centuries of failure to address desertification new *tools*, that have been universally condemned, are being advocated. These new *tools* being advocated to manipulate our environment at large (over millions of hectares) when managing holistically are – *grazing* and the physical impact of large herbivores (mainly livestock) which we call *animal impact*. Because livestock are blamed for causing desertification by mainstream scientists we realize that the suggestion that managed differently they are the only tools that can reverse the process is counter-intuitive.

In conventional management, although people believe there are hundreds of different tools, when listed under category headings we recognize most are simply technological and there are really only three tools. The only tools used in all professions and cultures with which to manage vast landscapes are *technology*, *fire* or *rest* (as in resting the land from grazing or rotating crops with a grass ley). Although small living organisms are used as tools for instance in using say milkweed to protect crops from aphids, or a virus to decimate rabbits in Australia, they are not generally used to manipulate vast landscape environments. Human creativity, labour and money are tools in a sense but none of these can manipulate the environment at large without operating through the tools mentioned. Water, some claim, is a tool that can reverse desertification. However, water can only be used through some aspect of technology. Let us look at the science supporting these two new tools – grazing and animal impact.

Grazing.

The myth, or deep human belief of thousands of years, that has permeated range science, is that overgrazing is due to too many animals. In thousands of PhD dissertations range scientists assumed this to be scientific fact. So much so that no one either defined overgrazing (other than too many animals) or produced any evidence linking overgrazing to animal numbers. Fortunately considerable plant physiology research on defoliation of grasses and the subsequent effects on root sacrifice, to provide the energy for regrowth, enabled a French pasture researcher to establish that overgrazing was a function of how long a plant was exposed to grazing and how long it was before it was regrazed. *In other words overgrazing was a function of time and not of animal numbers.* Whether there is one cow or a thousand does not alter the fact of overgrazing but merely changes the number of plants overgrazed if the animal(s) remain too long in the same place or returns to it too soon following grazing. This researcher, Andre Voisin, was widely published in five major European languages sixty years ago. Voisin's work was quickly picked up by myself and by scientists in Cuba, Brazil and New Zealand but ignored in Africa, Australia and the U.S. which was so influential in range science world-wide. To keep Voisin's work alive I championed republication of his book, *Grass Productivity* (Covelo: Island Press, 1988).

So Holistic Management and it's holistic planned grazing is based on minimizing overgrazing through maintaining a high graze/trample:recovery ratio (generally no more

than 3 days grazing always followed by 3 to 9 months of recovery) on the land at all times. Thus we are using the established scientific knowledge provided by this French pasture specialist rather than the myth that predominates in international range science, governments, international agencies, media and environmental organizations to this day. How this is done is covered in methodology later. Note: All grazing systems and rotations that range scientists accept and publish papers about are accepted because they could be replicated, although the "science" behind them is lacking, being based on the belief (not science) that overgrazing is a function of animal numbers.

Animal Impact.

The second 'tool' used extensively is the application of high physical impact – trampling, dunging and urinating – on the land in short periods interspersed with much longer periods for plant and soil life recovery. Ecological thinking has advanced considerably in recent years to recognizing that seasonal rainfall grasslands require periodic disturbance for overall health. Numerous papers have been published on "disturbance" regimes and their desirability. Acceptance over the last forty years has been such that prominent land grant universities in Texas and Arizona designed machines to simulate the physical effects of once prevalent vast herbivore herds – such as the millions of bison that roamed North America. These machines such as the Dixon Imprinter were put into operation over thousands of acres of the western U.S to break soil crusts and cause indentations and irregularities while laying down plant material as soil-covering litter vital to soil health. Such machines were highly effective, warranting the expenditure of millions of dollars at the time, but unfortunately the treatment could not be repeated year after year as needed without prohibitive cost and their use was abandoned. Machines using fossil fuels, and lacking digestive systems, simply could not mimic the large herbivores of old that formerly provided repeated disturbance and annual cycling of dead plant material biologically and rapidly. Note: Because the machines to mimic nature were promoted and designed by range scientists holding a mechanical paradigm their use was not first subjected to any replicated studies – governments invested in them because "experts" advocated their use. It is simply a strange anomaly of the human mind that while machines to mimic herding animals of the past were not questioned, the suggestion to use actual animals to mimic animals has raised a storm of protest for half a century.

Fifty years ago from my observation of large wildlife herds I realized that animal hooves, mouths and digestive systems could do this same task more effectively, and with the annual repetition required, and at no cost while not consuming fossil fuels. This required no science but simply common sense as any gardener would understand because large herbivores do three things that are not arguable. They:

1. Break soil crusts. Trackers have observed this for thousands of years. The effect is more pronounced when animals are concentrated in large herds as they do when under threat of predation from pack hunters. The broken crust allows soil to absorb water and to breathe, and enables more plants to germinate and establish.
2. Compact the soil under their hooves. Anyone who has had a horse stand on their boot understands this. Compaction is required for good seed to soil contact to increase germination. This is why gardeners tamp down the soil around seedlings or seeds or some farmers put a heavy roller over certain crops after planting.

3. They return standing grass plant material (dead or alive) to the soil surface earlier than the plant material would have returned to the soil had the animals not been there. One has only to watch a cow or buffalo trample or dung to know this. The conversion of plant material to litter or dung is essential to maintain biological decay – something the machines designed to imitate animals could not do.

These three influences of grazing animals are as clear as the fact that water flows downhill – no amount of research will ever disprove such influences and the management skill becomes the use of such influences in every unique situation. With use of animals to perform these tasks there is always a time dimension that planning needs to consider. For example trampling for too long powders soil, increasing erosion by wind and water. Trampling for too long, especially when soils are wet, also causes compaction in deeper layers that is adverse to plant growth, thus requiring longer recovery times between such tramplings. And dung and urine, like most things in excess, become pollutants as feedlot animal producers soon learn.

So with holistic planned grazing, whether using fencing or herding, animals are mainly used in high concentration ***over brief time periods*** to either break soil surfaces, compact soil to ensure seed germination or cycle annually dying plant material biologically and rapidly. They do this by crowding the management herd onto any ground 'requiring gardening' to increase plant establishment. Herding is proving more effective than using fencing and herders are trained to look for any areas of bare soil and make sure the surface is broken up and litter and dung are laid down with a short period of soil compaction. In addition they are trained to keep an eye out for any areas of existing grass where the seasonally dying above ground parts are starting to shift from rapid biological decay to gradual chemical/physical breakdown (oxidation and weathering). Where such areas exist that would result in the grass community shifting to bare soil and brush encroachment the herders again concentrate the animals while out grazing as a herd, laying down litter and clearing old grass away from growth points in the coming season so sunlight can reach them. The moribund oxidizing material prematurely kills the plants – the main reason people burned.

In the Zimbabwean site because many major predators are present and we run livestock in a predator-friendly manner the livestock are held every night in portable lion-proof corrals (known as *kraals* here in southern Africa). The kraals are portable to prevent excess dung and urine becoming pollutants. We do not kill the lions, leopards, hyenas, wild dogs or cheetah that are present because they are crucial to keeping wildlife moving and thus the land healthy. We have learned that these overnight kraals provide extremely high animal impact and we use this for no more than 7 nights to heal any seriously eroding gullies or extremely compacted bare soil. The results of the dramatic reversal of desertification on such sites from this treatment are available to anyone interested and are on the site www.savoryinstitute.com Note: We have also learned that using the overnight kraals for soil preparation in crop fields before planting greatly increases yields.

These being the two tools involving new understanding (grazing and animal impact as tools to manipulate our environment over vast areas of seasonal rainfall environment

grasslands and savannas) and unique at this point to Holistic Management let me now look at the only other thing we can document which is results.

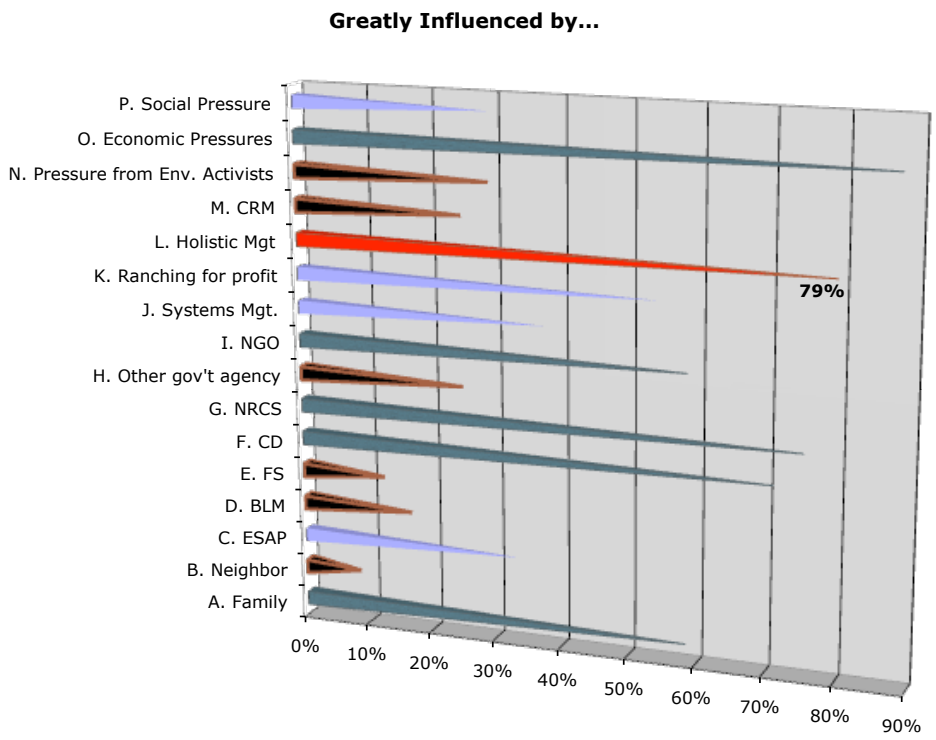
Results:

The first documented result was from an international trial established in then Rhodesia (now Zimbabwe). "Results of the Botanical Analyses in the Charter Trial," by J.N.Clatworthy for the Rhodesian Branch of the South African Society of Animal Production in 1976 and published in the *Zimbabwe Agricultural Journal* in 1984. (Not easy to track down this paper in today's Zimbabwe but essentially after 8 years of testing planned grazing against a government grazing system it showed we could run twice as many animals, and make more profit, without any deterioration of the plant community using planned grazing).

The next study comparing holistic planned grazing against total rest and against a government grazing system was not conducted till recently and it looked at soil moisture retention as well as vegetation. This, NASA funded, study by Keith Weber at Idaho State University and published by Journal of Arid Environments is to be found on the Savory Institute web site. It documents statistically significant increase in soil moisture retention under holistic planned grazing compared with both total rest of land and with a standard government grazing system.

An earlier investigation of overall results (social, environmental and economic) was published by Dr Deb Stinner and colleagues who investigated early adopters of Holistic Management across the US from California to Florida. "Biodiversity as an Organizing Principle in Agroecosystem Management: Case Studies of Holistic Resource Management Practitioners in the USA" (*Agriculture, Ecosystems and Environment,* vol. 62, 199-213, 1997), by Deborah H. Stinner, Benjamin R. Stinner, Edward Martsolf. This paper describes an attempt to move beyond purely reductionist research in order to document what happens when whole situations are managed. In essence this study documented significant increases in production, biodiversity and an average of 300% more profitability.

From an informal survey conducted independently by Tony Malmburg in 2009 he reported as follows: "I conducted a survey of 114 recipients of the U.S. National Cattlemen's Environmental Stewardship Program. These winners were selected for economic and ecological success on their land management over the past 18 years. We had a response of 22.4% overall and the three areas comprising the South, the Rocky Mountain West and the West, responded with 31.5%. I have not delved into compiling responses from the essay questions but I have attached a graph FYI of the percentage of respondents greatly influenced by each factor. Note that Holistic Management was the second greatest influence for change (79%) of these top managers over the past 18 years, with economics being the greatest influence (88%)."



Criticisms of Holistic Management

Despite years of practice it is difficult to find scholarly criticisms of Holistic Management. There are several reasons for this unfortunate situation. Perhaps the main reason is that there are substantial differences in the skills and training required for management and for research. Managers of land almost never achieve publication in peer reviewed jourals concerning range management in particular, because such journals are controlled by, and the International Range Management Society is dominated by, research people lacking both skills and training in management. Such researchers have over many years refused to accept management results as anything but annectdotal, because they cannot replicate management of any financial, social and land management situation on small plots for statistical analysis. Management needs to be holistic and can never be reductionist.

Range scientist researcher criticism.

If an internet search is conducted one will find many references to papers discrediting Holistic Management. The only independent assessment of all available critics and their citations was done by Chris Gill. Gill, involved in management and with a liberal arts education, studied every citation he could locate and who in turn those authors cited. As he reports not a single paper discrediting Holistic Management actually studied, or even attempted to study, holistic planned grazing. All papers cited referred to derivations of the work in which the holistic planned grazing process was converted to a grazing rotation system to fit research criteria and the holistic decision making framework was never used in any of those studies. Report available at www.savoryinstitute.com site.

Many are the derrivations or plagiarizations of holistic planned grazing – to name a few Short Duration Grazing System, Cell Grazing, Management Intensive Grazing and so on of which the latest is Mob Grazing.

From a paper by JAN DOUWE VAN DER PLOEG , PIET VERSCHUREN , FRANK VERHOEVEN & JOSE´ PEPELS Journal of Environmental Policy & Planning Vol. 8, No. 3, September 2006, 199–218 I quote from the summary "This article discusses a controversy that arose out of a grassland experiment in the Netherlands. Using the same data, one group of farmers and scientists concluded that a newly developed trajectory towards sustainability in dairy farming was highly effective, whilst a second group of scientists linked to the Research Institute for Animal Husbandry (PR) concluded the opposite".

In the future there will hopefully be considerably more empirical documentation of results, and people will increasingly understand that documented results without replication are not anecdotal.

Methodology:

In Holistic Management significant management objectives are achieved within a holistic context using the holistic framework. This is described in the textbook *Holistic Management: A New Framework for Decision Making,* Second Edition (Island Press, 1999), Island Press written by myself and my wife. Also now in a Spanish edition.

Incidentally there are many references in the book to the work of other scientists that was used to develop the new decision-making framework.

While the textbook mentioned covers the basics of Holistic Management there is also a publication – "Holistic Management Handbook: Healthy Land, Healthy Profits" Second Edition 2006, Island Press, by Jody Butterfield. This book describes in great detail how holistic planned grazing is done complete with illustrated charts and diagrams. In summary - to deal with the daily complexity, that managers cannot avoid or bypass through any prescribed grazing rotation or grazing system as people have tried for centuries, I simply took a military planning procedure from Sandhurst Military College in the U.K. and adapted it to the complexity of managing livestock, wildlife, erratic seasons and more. So the actual planning process has some 300 years of field-tested experience behind it. So not surprisingly it works very well and people can be trained to do it quickly and to do it even under great stress in times of fires, droughts and other catastrophes that regularly occur over large areas of land. We are now steadily simplifying the process even more for semi-literate pastoralists.