

WORLD·WATCH

Volume 22, Number 4


Vision for a Sustainable World

July/August 2009

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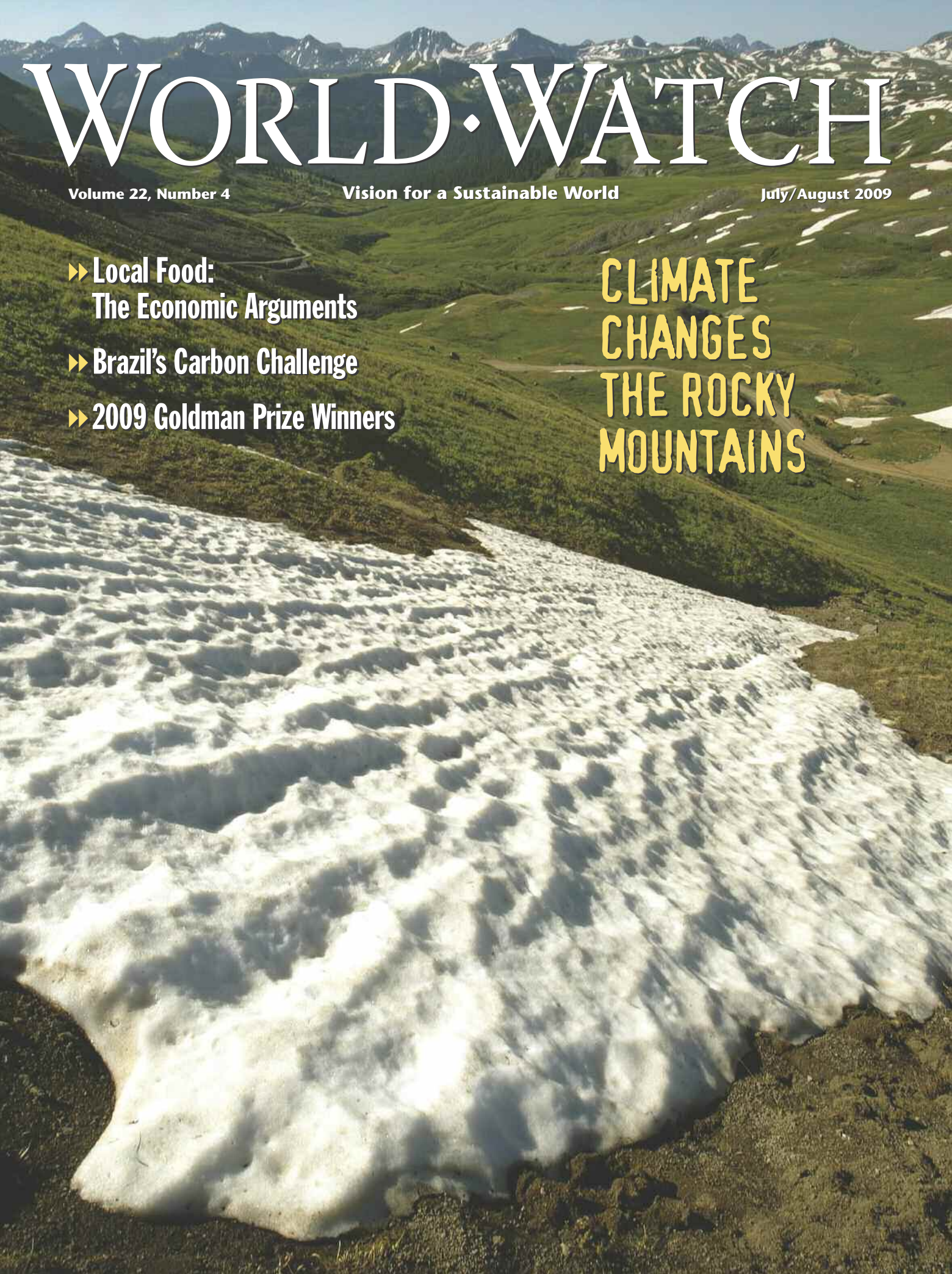
Volume 22, Number 4

Vision for a Sustainable World

July/August 2009

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CLIMATE
CHANGES
THE ROCKY
MOUNTAINS



LIFE-CYCLE STUDIES

Palm Oil

Overview

People have shimmied up the oil palm to reach its prickly red fruit for thousands of years. Native to West Africa, *Elaeis guineensis* contains two distinct oils used in a variety of dishes. The Industrial Revolution provided a boon for African farmers, who supplied London's cravings for candle making and machine lubricants. Then colonial plantations took over production, and by the 1920s the crop had spread across the Congo Basin and into Central and South America. After European agronomists discovered that the oil palm thrived in Southeast Asia's heavy rains, the crop quickly transformed the island landscapes. By the mid-twentieth century, Malaysia and Indonesia were supplying the world.

Once planted, oil palms can produce fruit for more than 30 years, yielding more oil per hectare than any major oilseed crop. Markets—for margarine, frying oil, soap, lipstick, biofuel, and more—continue their dramatic growth (an additional 2.2 million tons are demanded each year).

Yet plantations often replace tropical forests, killing endangered species, uprooting indigenous communities, and contributing to the release of climate-warming gases. Due mostly to oil palm production, Indonesia emits more greenhouse gases than any country besides China and the United States.

Production

With government support, millions of farmers spread across Indonesia and Malaysia's islands in recent decades to establish small oil palm farms, resulting in many violent clashes with local inhabitants. Government-arranged committees often appoint prominent village leaders to work with the industry in dividing community land, and corruption regularly fouls the deals. "They install a divide-and-rule tactic within the communities," said Norman Jiwan, an Indonesian human rights campaigner. He estimates that violent conflicts between oil palm estates and villagers rose from nearly 200 in 2004 to 514 in 2007.

Production methods differ depending on scale and oil palm variety. But the nearly 40 million tons of palm oil produced in 2007 resulted from four identical steps: separate the fruit, soften the flesh, press out the liquid, and purify the oil.

Oil palm plantations have replaced more than 10 million hectares of land in Southeast Asia, mostly lowland tropical forests. Native orangutans may become extinct in central Borneo if plantation growth continues for another two or three years, environmentalists warned in 2008.

Palm-oil biodiesel, once supported as a low-carbon alternative to gasoline, often contributes far more greenhouse gases to the atmosphere than it helps to avoid. When each hectare of carbon-rich tropical peatland is drained for oil palm production, an estimated 3,750–5,400 tons of carbon dioxide are released over 25 years, according to peatland ecologist Jack Rieley. By comparison, clearing a hectare of tropical forest releases 500–900 tons of carbon dioxide.

Reducing the Impact

In response to environmental concerns and new restrictions on biofuel enacted by the European Union, the palm oil industry launched the Roundtable on Sustainable Palm Oil (RSPO) in 2004 to improve transparency and environmental responsibility. Yet new plantations can still clear forest not deemed "high-value" for conservation—a term that remains largely undefined. The RSPO plans to create a standard for greenhouse gas emissions, however, based on the original biomass within a forest that a new plantation would replace. Areas with dense, old-growth trees or carbon-rich peat would rank higher on the biomass standard than new growth forests. However, oil palms planted before 2005 are exempted. With seven years needed for the trees to bear fruit, there is little guarantee that palm oil currently certified by the RSPO has been sustainably produced.

—Ben Block

Achmad Rabin Taim



Oil palm plantation in West Java, Indonesia.

fitri agung



Freshly harvested palm oil fruit.

Nick Hobgood



Palm oil press in the Dem. Rep. of the Congo.

Nonie



Captive orangutan in Royal Melbourne Zoo.

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Photograph © 2005 Erich Schiegel/Dallas Morning News/Corbis

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Joan A. Wolbier

► Cultural Survival

There is one perspective I continue to find remarkably unrepresented in virtually all forums that address sustainability issues: the selective forces acting on human behaviors. This is the field of sociobiology.

The basic principal of evolutionary theory is that whatever genetic characteristics leave more surviving offspring will spread in those offspring. For intelligent, social species, genetic expression also includes behavioral tendencies. In higher mammals, reproductive success is not simply quantity of offspring but quality in physical condition and social status. Wild dog, primate, dolphin, and even bird societies offer abundant examples of the selective benefits of high social as well as physical status. For social, communal species such as ourselves, with the ability to store social status and wealth, there is a selected-for drive to have ever more of these things.

We function largely with all the behavioral tendencies to have lots of resources and high social standing that have been genetically selected-for over hundreds of thousands of years in a world which was relatively unlimited with respect to resources. And we still reproduce. This explains why we continue to over-exploit, pollute unnecessarily, and degrade natural ecosystems even when aware of the long-term degradation of the planet. This is not just selfishness, it is genetically selected-for selfishness. How does one turn the tide on that? One doesn't.

What we *can* do is use our big brains in a different cultural context. All this brainpower we have accumulated over the eons fulfills its original purpose in the context of the culture we are in. Cultures

and subcultures are incredibly diverse, even within one nation. A recent and growing subculture promotes the "small is beautiful" ethic, supports in action the "reduce, reuse, and recycle" approach to consumed materials, and adheres to the "think globally, act locally" principal. We are not going to change biologically driven behavioral tendencies which have become destructive to our planet, but we can promote and reward (via social standing) the culture of taking care of our planet. The climate is changing, both cultural and physical. How fast? There is a race going on.

CRAIG STRONG

Crescent City, California, U.S.A.

► Water Pricing

"Water Wars: Is Water a Human Right or a Commodity?" [March/April] gives a good overview of some water issues, but dwells too much on the privatization debate.

Today, the privatization debate is not the same color as it was some years back, at least not in Asia. With 90 percent of the world's water in the hands of the public sector, it is a no-brainer that outright privatization is not going to happen in most parts of the world. Today the debate is more about the different forms of public-private partnerships (PPPs) that could give the maximum benefit, such as build-operate-transfer, engineering procurement construction, or fixed-term management contracts. Every city that wishes to involve the private sector has to weigh the pros and cons of different PPP models and tailor win-win contracts to suit its needs. China and the Middle East, including Saudi Arabia, are at the forefront of the PPP movement.

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About WORLD WATCH

WORLD WATCH is a bimonthly, nonprofit magazine, written by Worldwatch Institute analysts and guest authors, that tracks key indicators of the Earth's well-being. We monitor and evaluate changes in climate, forest cover, population, food production, water resources, biological diversity, and other key trends, and identify and analyze the most effective strategies for achieving a sustainable society—including those that come from the advances of science and technology, the rethinking of traditional economics, and the neglected wisdom of now-vanishing indigenous peoples. We are beholden only to our readers, from whom we welcome comments.

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What the article did not explore in much depth was the issue of tariffs for water. It costs money to get water from a source, treat it, and then supply it to thousands of households. With inordinately low tariffs set for water in most parts of the world, utilities are unable to meet their expenses and therefore run into huge debts. Ironically, the urban poor for whom the tariffs are kept low often pay up to seven times the actual cost of water to vendors since they have no other means of accessing water.

Water as a human right extends to only the roughly 25 liters of water that we need for drinking and other essential activities every day. Water for swimming pools, golf courses, gardens, etc., cannot be taken as a human right. Not pricing water correctly is at the root of many problems in the water sector. Subsidies encourage corruption, and more so when water needs to be rationed. If a utility loses money on every cubic meter of water it sells legally, its employees will find ways to make money by selling it illegally.

Ultimately what is needed is good water management. Striking examples of good management can be found in both the public sector (Singapore, Phnom Penh, Colombo) and PPP models such as Manila, Johor, Penang, and others.

SAHANA SINGH

Editor, Asian Water, Singapore

► Beyond the Tailpipe

Neil Kolwey ("Planes, Trains, and Automobiles," March/April 2009) provided a good analysis of tailpipe emissions from transportation from an individual family perspective. However, looking only at tailpipe emissions means missing about one-third of transport emissions and results in an inadequate analysis for decision making.

For example, the 2006 Hydro Quebec study *Greenhouse Gas Emissions from Transportation Options* found that transport tailpipe emissions account for 31 percent of total Canadian GHG emissions but more than 50 percent of lifecycle emissions. Similarly, researchers from the UC Berkeley Center for Future Urban Transport estimated last year that total emissions for a typical U.S. passenger car are

57 percent higher than tailpipe emissions.

The lifecycle emissions from transportation include not only the obvious upstream emissions from extracting and refining petroleum, but also the emissions from manufacturing and maintaining vehicles, and building and maintaining roads and parking facilities. When you look at lifecycle emissions, automobile ownership becomes almost as big an issue as how much each car is driven. A two-car family can do a lot more by selling one of their cars and reducing the distances they drive than by just reducing the amount they drive.

The individual or family is also not a particularly useful level of analysis for transportation emissions in urban areas. Automobile traffic volumes expand and contract to fill the available road and parking space, as do the resulting emissions. If an individual stops driving to work, in many cases someone else will make use of the road and parking space vacated (and this person might buy a new car to take advantage of the opportunity). Decisions about expanding freeways and parking supply, or instead re-allocating resources and road space to transit, cycling, and walking, are primarily societal decisions.

Looking at the full lifecycle emissions of transportation leads me to conclude that we need to slam the brakes on all urban roadway expansion and shift the resources to high-quality transit to get people out of their cars, fast. Then we need to start re-allocating road space to low-emissions transportation modes. Individual actions count, but in the case of urban transportation societal actions count for a lot more.

ERIC DOHERTY

Vancouver, British Columbia, Canada

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Please include your home town, country, and phone number (not for publication). Letters may be edited for clarity or brevity. Send them to: tprugh@worldwatch.org

— or —

Editor, *World Watch*

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by Ben Block

California Department of Health Services

WARNING!

Nearly all fish and seafood contain some amount of mercury and related compounds, chemicals known to the State of California to cause cancer, and birth defects or other reproductive harm. Certain fish contain higher levels than others.

Pregnant and nursing women, women who may become pregnant, and young children should not eat the following fish:

SWORDFISH · SHARK · KING MACKEREL · TILEFISH

They should also limit their consumption of other fish, including **fresh or frozen tuna.**

Fish and seafood can be an important source of nutrients and an important part of a balanced diet. However, the Federal Food and Drug Administration advises pregnant and nursing women and women who may become pregnant to limit their consumption of fish to no more than 12 ounces per week.

Fish that tend to have little or no mercury include salmon (fresh, frozen, or smoked), shrimp, and anchovy. Mercury levels in certain fish vary, but on average are lower than levels in many other fish. Check or check light tuna has less mercury than solid white or chunk, white tuna.

The California Department of Health Services (CDHS) recommends certain steps you can take to reduce mercury exposure:

- Eat a variety of different types of fish.
- Eat smaller fish rather than larger, larger fish.
- Begin following these guidelines one year before becoming pregnant.

For more information consult the following websites:

U.S. Food and Drug Administration (FDA)	www.fda.gov
U.S. Environmental Protection Agency	www.epa.gov/mercury
California Department of Health Services	www.cdhs.gov
www.cdhs.gov/pdfs/foods/fish/011005m/mercury_in_fish.html	

or call the FDA toll-free at 1-888-SAFEFOOD (1-888-726-3366).

Global Mercury Negotiations Commence

At a United Nations Environment Programme (UNEP) meeting in February, more than 140 countries agreed to reduce global mercury pollution through a multilateral treaty. “Today we are united on the need for a legally binding instrument and immediate action towards a transition to a low-mercury world,” said UNEP Executive Director Achim Steiner. “The time for action on this pollution is now.”

Mercury, a neurotoxin, is released into the environment from chemical production facilities as well as from coal-fired

power plants, gold mines, and household products such as thermometers and light bulbs. Mercury pollution circulates around the globe and accumulates in human bodies and the tissues of commercially important fish species, such as swordfish and tuna.

The previous U.S. administration opposed a legally binding mercury treaty, but President Barack Obama’s team has embraced a quick reversal of that policy.

“It is clear that mercury is the most important global chemical issue facing us today,” said Daniel Reifsnnyder, U.S. deputy assistant secretary for environment and sustainable develop-

ment. Other countries that previously opposed the treaty, including Australia, Canada, and New Zealand—as well as China and India, the two largest commercial consumers of mercury—all joined the United States in support.

The UNEP decision leaves room for the final treaty to include both binding and voluntary approaches to curb mercury pollution. Negotiations are set to begin next year and to conclude by 2013.

Carbon Markets Slow Down

Negotiators are set to decide on the next international climate agreement this December in Copenhagen, Denmark. Until then, uncertainty surrounding how

the United Nations will regulate carbon offsets in developing countries has slowed investment in related projects, carbon traders said at an April conference in Washington, D.C.

Although investments in greenhouse gas offset projects such as methane capture, soil sequestration, and reforestation are difficult to measure, market analyst Point Carbon predicted that the volume of high-value Certified Emission Reductions (CERs)—carbon credits from UN-approved projects—would fall 45 percent in 2009.

U.S. carbon investments are likely to increase if the country develops a domestic cap-and-trade carbon market, which would allow

polluters to exchange carbon credits. Congress has begun drafting legislation to this end, but carbon investors are not likely to increase their spending without knowing key details, such as how pollution auctions would allocate the permits or spend the auction profits, market participants said.

Despite the slowdown, many investors are preparing themselves for a more robust market. The carbon credit registry TZI has expanded to more than 180 customers, including investment banks, carbon traders, and project managers, since its launch in April 2008. And investment group EcoSecurities is developing carbon offsets throughout the Americas and Asia, including investing in local government projects to capture landfill methane.

In order for emission levels to peak by 2015, clean energy investments would need to reach US\$500 billion per year by 2020, according to the group New Energy Finance.



James Brown

These four power plants at the Cathkin landfill outside Glasgow generate about 30,000 MWh annually from captured methane.

Tar Sands Could Threaten Millions of Migratory Birds

In April 2008, an anonymous tip alerted Canadian officials to the fact that 500 ducks had mistaken a tar sands company's polluted reservoir in Alberta as a safe place to land. Hundreds of decomposed ducks have since risen to the surface, leading Syncrude Canada to clarify that its toxic tailings pond in fact killed an estimated 1,606 birds.

The losses have become symbolic of the problems associated with the development of tar sands—strips of sand or clay mixed with bitumen, a dense form of petroleum. In a 2008 report, the Natural Resources Defense Council (NRDC), the Pembina Institute, and the Boreal Songbird Initiative estimated that if all of Alberta's proposed tar sands projects came to pass, the death toll could reach 166 million birds over the next 50–60 years.

"We say we have laws that are supposedly protecting migratory birds in both Canada and the United States, but clearly that is not happening," said Susan

Casey-Lefkowitz, a senior attorney with NRDC who is currently suing the governments of both countries to halt tar sands developments.

With the price of oil reaching record highs in recent years, costly tar sands became an affordable option for many energy companies. The province of Alberta, which receives nearly CAN\$1 billion in royalties each year from the fuel, anticipates output of 3–5 million barrels a day by 2030.

Although tar sands account for less than one-tenth of 1 percent of global carbon dioxide emissions, NRDC says the fuel source has become Canada's fastest growing contributor to greenhouse gas emissions. Producing a barrel of crude from tar sands emits as much as three times more carbon dioxide than is released from conventional oil wells, according to estimates.

But it remains to be seen whether new climate change legislation being debated nationally and internationally will support expansion of oil sands in the future. "Oil [tar] sands extraction is very carbon intensive, yet most oil sands projects do not anticipate regulatory constraints on CO₂ emissions," said a March report from Innovest Strategic Value Advisors.



David Dodge, Pembina Institute

View of tailings ponds at the Syncrude processing facilities north of Fort McMurray, Alberta.

Financial Leaders Call for Adaptation Resources

Leaders from the world's top development banks have acknowledged that significant research and funding gaps are preventing developing countries from adapting adequately to climate change.

Sustainable development initiatives often do not factor in climate change, and without greater resources as part of an international climate agreement, developing countries will not be able to finance climate change adaptation plans, said representatives of the World Bank, Asian Development Bank (ADB), and Inter-American Development Bank.

"We really have to get our acts together," said Ursula Schäfer-Preuss, the ADB's vice president of knowledge management and sustainable development. "Migration in low island states and Bangladesh is a huge problem, but we do not know what to do about it."

Depending on the region, climate change is expected to cause various effects that include widespread drought as glaciers melt, coastal flooding as sea levels rise, and

changes in crop production as weather patterns shift, according to the Intergovernmental Panel on Climate Change.

Adaptation plans strive to protect regions from climate change-related fatalities or economic losses. Examples include water conservation measures and the use of flood-resistant crops. According to the United Nations Development Programme, developing countries will need US\$86 billion per year by 2015 for adaptation efforts. So far, the Global Environment Facility, an independent partnership headquartered at the World Bank, manages three adaptation funds that total about \$200 million.

The successor climate agreement to the Kyoto Protocol, being negotiated this year, will include a revised version of the Adaptation Fund. The fund is financed by a 2-percent levy on the Clean Development Mecha-

nism (CDM) investments that polluting countries finance in developing countries to compensate for the polluters' greenhouse gas emissions.

Climate negotiators will meet in Copenhagen in December to determine the details of future carbon markets, including how the Adaptation Fund and CDM system will function.



Andrew Biraj/Reuters © 2008

Villagers move part of their dismantled house to a site on higher ground in a flooded area of northern Bangladesh.

Coffee Sales Helping Chimpanzees, Goodall Says

Decades after Jane Goodall began her efforts to protect Tanzania's endangered chimpanzees, she found a solution growing right beneath her nose: The forests surrounding the famed chimps grow some of the best coffee in Tanzania. At 1,400 meters above sea level, the region provides a cool enough climate for beans of "giddy, honey-toned, floral sweetness as fresh but voluptuous as a tropical morning," according to *Coffee Review*.

Since the savory discovery about three years ago, U.S.-based coffee companies such as Green Mountain Coffee Roasters and Starbucks have helped improve and expand the region's bean production. As a result, growers are receiving double compensation for their crop, and the additional income is encouraging greater community support for Goodall's conser-



vation efforts.

Within Gombe Stream National Park, about 100 chimpanzees continue to face the threats of habitat loss, poaching, and inbreeding. An estimated one-third of the population has been lost since Goodall's work there began four decades ago, and more than half of the chimps' original habitat has been converted into farmland.

"All problems are related—poverty, increasing populations, lack of good sanitation.... Did the [communities] care

about conservation? Of course they did, but it was not a priority. They cared about health; they cared about their children," Goodall said. Her group is now working with The Nature Conservancy and regional farmers to preserve a 670-square-kilometer matrix of ecosystem corridors and habitat patches. Conventional farms would tend to block the corridors, but coffee can be grown in forest shade, and the chimps do not eat coffee beans.

The Jane Goodall Institute says the coffee income has helped the communities build schools and expand agricultural activities without deforesting the landscape. During a visit to Gombe several months ago, Goodall said she saw true signs of hope: "I was able to look over the valley to see reforestation, such is the resiliency of nature. I can see this forest, the corridor I've been talking about. I had tears in my eyes. It was really beautiful."

Recession May Hinder Sustainable Tourism

Developers of ecotourism and other "sustainable tourism" operations are searching for ways to ensure that the global economic slowdown does not undermine years of progress. The World Tourism Organization expects cross-border visits this year to remain steady or decline slightly, according to a January assessment.

Businesses are already cutting travel budgets, which often means bypassing more expensive eco-conscious destinations. Less than 20 percent of companies rated environmentally sustainable travel—trips that do not adversely affect habitats, local communities, or cultural heritage—as a high priority, according to a survey conducted between December and January by the Association of Corporate Travel Executives and KDS, a European business consultancy.

Ronald Sanabria, who directs the Rainforest Alliance's sustainable tourism training program, observed that more hotels are seeking ways to reduce their energy costs in case fewer visitors arrive in the coming months. Travel businesses in Central America are also marketing closer to home to prepare for declining interest from North America and Europe,

Sanabria said.

Matt Landau, founder of the online newsletter *The Panama Report*, sees the economic downturn as spawning new possibilities, which he calls "recession tourism." Students, the recently unemployed, and "midlife crisis individuals who can't afford a convertible" may help the ecotourism market stay afloat, he predicts. Tourism ministers have called on countries to include sustainable tourism in their economic stimulus packages, many of which offer support for green jobs.

Even if recession tourism fails to materialize, experts say, most destinations should be able to withstand the loss of revenue—provided the region is developed in a more sustainable manner. In other words, communities should not rely entirely on tourists, said William Powers, a senior fellow at the New York-based



The Black Orchid Resort, a sustainable tourist destination in Belize.

Courtesy of Black Orchid

World Policy Institute. "Tourism is one of several things you put in place, including sustainable agriculture, education, healthcare, land rights," Powers said. "You try to diversify."

An estimated 1 percent of all tourism operations fall under the category "sustainable," according to the recently developed Global Sustainable Tourism Criteria.



Stories are posted continually at www.worldwatch.org/eyeonearth.

See "Can Organic Farming Feed Us All?" May/June 2006, p. 18

Onward, Organics U.S. sales of organic products reached \$24.6 billion in 2008, up 17 percent over 2007, according to the Organic Trade Association. Organic food now accounts for 3.5 percent of the nation's food sales, the group said.

See "Meltdown or Green Deal?" January/February 2009, p. 13

Growing Hunger The United Nations warns that the global financial crisis could add as many as 104 million people to the ranks of the hungry as a result of diminished trade and declining development aid, raising the total to 1 billion.

See "Capturing the Sun: The Future of China's Solar Power," July/August 2006, p. 10

Solar Revolution? China is on track to exceed its 2020 target for installed solar power capacity by five- to ten-fold, the government reported in May. Even so, the amount of solar capacity tied to China's grid remains minimal, at only 0.01 percent of installed capacity in 2008.

See "Malaria," May/June 2008, p. 26

DDT Death The United Nations plans to rid the world of DDT, a banned pesticide used to fight malaria-spreading mosquitoes, by 2020. Forty developing countries would instead tackle malaria using non-chemical tactics that have proven successful in Latin America.

See "The Living Earth Ethical Principles," September/October 2008, p. 46

Shifting Shopping More than half of U.S. consumers consider "green" options when evaluating similar products, according to a survey from the Grocery Manufacturers Association and Deloitte. But less than half of shoppers looking for green products actually find them, and only 22 percent ultimately buy them.

See "Home-Grown Juice," May/June 2008, p. 20

Power Shift In 2008, more renewable energy than conventional power capacity was added in both the European Union and United States, according to the renewable energy policy network REN21.



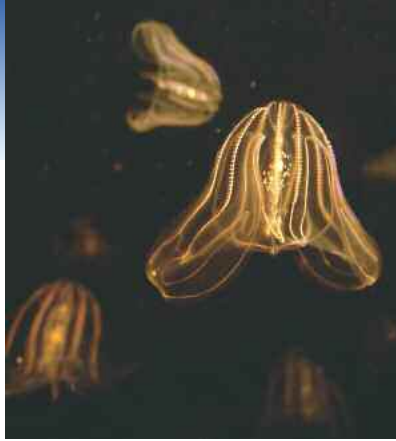
Visit www.worldwatch.org/www/ to access these and other archived editions of *World Watch*.

Alliance Formed to Limit Invasive Species

A new partnership between the United Nations and global shipping companies will attempt to control the overseas travel of unwelcome species. The collaboration, known as the Global Industry Alliance, will encourage the shipping industry to share approaches on limiting the transfer of invasive species in ballast water, the leading cause of "alien" marine species introduction.

The International Maritime Organization (IMO), United Nations Development Programme, Global Environment Facility, and four private shipping corporations form the alliance. The groups hope to develop cost-effective ballast water treatment technologies and new ways to create "ballast-free" ships.

Unloaded cargo vessels fill up with ballast water to provide stability on the high seas. The process enables plants and animals to enter the ship, where they are stored until the vessel pumps out the ballast water at its destination. The IMO



Wikimedia/New England Aquarium/Steven G. Johnson

The warty comb jelly (*Mnemiopsis leidyi*) was carried to the Black Sea in the 1980s where it caused a plunge in commercial fish populations.

estimates that cargo vessels carry 10 billion tons of ballast water across the globe each year and transfer more than 3,000 plant species daily.

Harmful non-native species, such as the comb jelly in the Black Sea and the zebra mussel in the U.S. Great Lakes, have overtaken habitats and fundamentally altered the areas' ecological balances. Once established, alien species are often impossible to remove. Technologies being developed to remove the species from ship ballast water include the use of heat treatment, biodegradable chemicals, and electrochemical control.

Drought May Threaten Darfur Peace

Africa's Sahel region has had above-average rainfall in recent years, but trends suggest that drought is in the near future, possibly unhinging peace efforts in the disputed region of Darfur. "This is three years they've been above the statistical average [for rainfall]," said Andrew Morton, manager of the United Nations Environment Programme's conflicts and disasters program. "If you believe in statistics, there is no evidence it will continue."

Competition for water and fertile land is considered a root cause behind the violence that has killed more than 300,000 people in Darfur since 2003. Improved resource management is necessary to avoid further conflict between the Sudanese government and Darfur's rebel factions, Morton said.

U.S. forecasters predict that this year's rainy season (July through September) could bring up to 20 millimeters less rainfall than the 47-year average from 1955 to 2002. The UN already struggles to provide water, food, and health care for an estimated 1 million people in need.

Climate change is recognized as a contributor to the Darfur conflict. In the region's north, 16 of the 20 driest years on record have occurred since 1972, according to UNEP. The organization reports that during the past 60 years, intrastate conflict resolutions have been twice as likely to deteriorate if the fighting was associated with a natural resources dispute.



© UNICEF/NYHQ2006-2208/Georgina Cranston

Women and children pump water at a camp for displaced people near El Geneina in Darfur.

PORTRAITS OF CLIMATE CHANGE: THE ROCKY MOUNTAINS

BY LINA BARRERA



Coal-fired power plant on the Front Range in Boulder, Colorado.

louisianaphoto.com

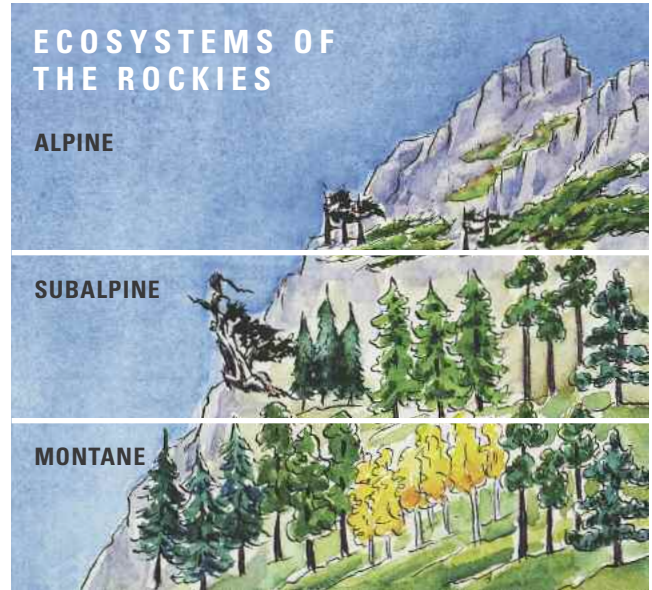
People have been moving westward in North America since the earliest European settlement of the continent. For many early migrants, the Rocky Mountains simply impeded progress toward California and the Pacific coast, but more recent arrivals have come to the Rockies to stay, drawn by their spectacular beauty, agreeable weather, livable communities, and seemingly endless options for outdoor recreation. Between 1990 and 2000 these amenities attracted well over 2 million new residents to the area, and the in-migration has continued into this decade (50,000 came to Colorado last year alone). The area has become a rapid-growth zone; six of the top ten fastest-growing U.S. states lie along the Rockies.

Growth of this magnitude would have brought problems at any time, but the recent spurt has come during an era of increasing stress on natural systems. Drought, resource development, land-use changes, and above all climate change have put the population growth and the region's ecosystems on a collision course.

— ECOLOGY AND ECONOMY —

The Rockies rise from the central plains in the United States and Canada through three distinct ecosystems (montane, subalpine, and alpine; see diagram) on their way to a maximum peak of 4,399 meters (14,433 feet) at Colorado's Mount Elbert. The range extends from Alberta and British Columbia in the north through Montana, Wyoming, Utah, Idaho, Colorado, and New Mexico in the south (see map). The northernmost ranges contain the lowest elevation thresholds for each ecosystem. For example, the front ranges of the Rockies, which ascend from the east, contain most of the lower altitude montane ecosystem; however, in the south the montane can extend all the way to 2,900 meters, whereas in the north the montane transitions to the subalpine at 1,675 meters. Characterized by Ponderosa and lodgepole pine, Douglas fir, and the distinctive, golden-leaved quaking aspen, the montane is the winter home of many of the region's charismatic species, including mule deer, elk, moose, mountain lions (cougars), great horned owls, and black bears.

At 2,750 meters, about the altitude of major ski resorts like Jackson Hole (Wyoming), Aspen (Colorado), and Banff's Lake Louise (Alberta), the landscape transitions to subalpine forest, where typically a mix of Engleman spruce and subalpine fir provides habitat for species such as the yellow-bellied marmot and the snowshoe hare. Harsh conditions increase with altitude and trees begin to shrink in size, so that at the transition between the subalpine and the alpine the ground is carpeted by a dense growth of trees no taller than the rocks and snow that protect them from the wind. Above the last of these stunted trees is the open expanse of the alpine tundra (starting between 2,200 and 3,350 meters), home primarily to hardy flowering plants, such as the lovely dwarf clover and low-lying mosses. Most plants here have adapted by growing long



Joan A. Wolbiel





Above: The San Juan natural gas field in southern Colorado: a web of access roads and production wells.

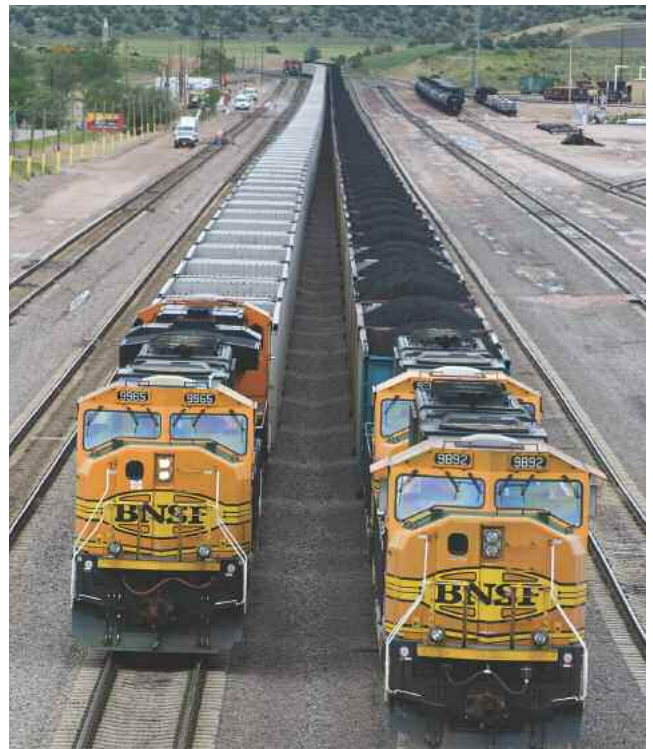
Right: Coal trains half full or half empty? Near Gillette, Wyoming.

Far right: Wind turbine blades en route to a wind farm, southern Wyoming.

taproots for water and dense hair for wind protection.

The Rockies are already a refuge for numerous populations of animals whose natural habitat ranges have been restricted by construction and human population growth. Wolves and grizzly bears are among the animals that have found unfragmented habitat in the parks and wilderness areas of the Rockies, and they will be most at risk if those habitats disappear. Unfortunately, mountain ecosystems are very sensitive to the impacts of climate change. The higher elevations of the Rockies in Montana, Wyoming, and Northern Idaho have experienced three times the global average temperature increase of 0.74 degrees Celsius (1.3 degrees Fahrenheit) in the last century. These areas not only host many species, but also provide most of the water for western cities and towns, as well as natural space for snow-based winter recreation and many summer activities that underpin key portions of Rocky Mountain state economies.

Those economies often began with hard-rock mining, which was a key attraction for early settlers. Gold was first found in the Southern Rockies in the late 1850s, and by the summer of 1860 5,000 miners were arriving every week. Many towns in the Rockies were built on gold, silver, and copper, and the names of many of the region's towns (both inhabited and not) carry this legacy: Golden, New Mexico; Silverton, Colorado; Goldfield, Arizona; Garnet, Montana. Today, more than half of U.S. coal output is produced in the western states and natural gas extraction has been increasing since the 1980s. The region will also feature prominently as we move toward new forms of energy production, including renewable sources



Lauren Stealy

© Lyle Rostbom

(wind and solar) and more controversial processes like oil shale extraction.

Although extractive industries persist in the Rockies, the economies of many western communities have transitioned away from mining over the past 40 years toward much greater diversity facilitated by the region's wild spaces. People flock to the Rockies for many outdoor activities, including hiking and backpacking, hunting, fishing, whitewater rafting, mountain biking, and skiing. Tourism, a leading contributor of jobs and income, is now vital to the economies of the Rocky Mountain states. For example, in 2008 visitors to Utah spent US\$7.1 billion and tourists to Montana contributed \$4.31 billion in direct spending and travel-related income, roughly a tenth of the state GDP. Idaho reports that skiers, hunters, and fishers spend more than double what the average visitor to the state spends, and tourism in the region is expected to hold steady throughout 2009 despite the economic downturn. Moreover, tourism is often a catalyst for economic growth and diversification, as inspired visitors seeking a new way of life become settlers and increase demand for a full range of goods and services, from new homes to doctors and entertainment options. As the local economy expands to include new activities and possibilities, such as the growing high-tech sector, the area becomes increasingly "knowledge and amenities driven" and thus attractive to further waves of immigrants.

As a result of these changes, the services sector, defined broadly to include everything from dining, lodging, and entertainment to financial advising, health care, and public services, has added about 20 million new jobs to the western U.S. economy since the 1970s. Meanwhile, employment in agriculture and mining has stayed relatively flat. From 1990 through 2000 the fastest growing sector of the services industry included high-wage, knowledge-based jobs, which accounted for 96



percent of the region's personal income growth. The second fastest growing source of income came from retirement accounts and government payments (such as Social Security), courtesy of the influx of retirees moving to the region.

The vast system of protected lands in the west directly provides many of the amenities that are boosting local economies. A Sonoran Institute study found that western counties abutting or containing public lands display the fastest economic growth in the region. In contrast, those areas more dependent on mining, logging, agriculture, and manufacturing exhibit the slowest economic growth. The combined threats of climate change and development-driven degradation threaten to destroy the amenities delivered by natural areas that are sustaining the region's economic prosperity.

— CLIMATE CHANGE IN THE ROCKIES —

Climate and weather patterns vary significantly from low to high altitudes and from north to south along the Rocky Mountain range, and current research is fragmented across the different states and altitudes. However, there has been a clear upward trend in temperatures across all the continents and major ocean basins in the last three to four decades—increases that exceed anything expected from natural variability—and the Rocky Mountain zone is no exception. As elsewhere, most of its ecosystems cannot adapt to the temperature increases as rapidly as they occur.

Climate sets the parameters for which ecosystems can occur in any given location, determining the vegetation, water availability, and temperature ranges that make an area viable for one species or another. Changes in temperature and water flows alter the vegetation patterns in a region and thus the habitat and food sources available for the animals living there.

In the Rockies, for instance, the normally low-elevation Douglas fir has already crept into higher elevations. The upward movement of alpine treelines has also been documented in the northern Rockies. Eventually it may become warm enough that the uppermost ecosystem in the Rockies, the alpine tundra, could disappear, which would trigger the extinction of the well-known resident bighorn sheep.

The Rockies harbor many species with specific habitat and temperature needs that are at risk from a changing climate. The American pika (pronounced pie-ka), for example, is a small, furry relative of the rabbit that is at risk of extinction because of changes to the alpine tundra it calls home. Pika are unable to withstand even a few hours outside their dens in temperatures higher than about 27 degrees Celsius, and they usually nest above 2,400 meters in areas where the temperature rarely exceeds 25 degrees. At least one-third of pika colonies in Nevada and Utah have disappeared in the last century, with warming temperatures being considered a main reason, according to the U.S. Geological Survey. If this trend continues, pika will probably be extinct in 100 years.

A trend of particular concern is warmer winters. The average winter temperature in the U.S. West has risen about 1.4 degrees Celsius over the last century, and with it the amount of snow that accumulates on the mountains (the snowpack) has decreased. The northern Rockies are seeing 15–30 percent less moisture in the spring snowpack (measured according to the amount of water that the snow would produce if melted) since the 1950s, and along the entire range the spring snowmelt is arriving 10–30 days earlier. In Montana's Glacier National Park, the snowpack and summer temperatures have remained relatively constant since 1922, but the average yearly temperature has increased by 1.6 degrees Celsius, rainfall has increased over snowfall, and winter lows have risen. These factors are



Above: The Olde Stage Fire burned more than 1,200 hectares on the Front Range north of Boulder in January 2009.

Right: Diminishing returns as meltwater flows out of Glacier National Park.

driving the disappearance of the iconic glaciers: They are expected to be gone by the end of the next decade. (Global satellite data since 1978 show that mountain glaciers and average snow cover have declined worldwide.)

As temperatures warm, winter snow is much more likely to become winter rain, particularly at the middle and lower altitudes where temperatures fall below freezing less often. A “widespread increase” in rain over snow has been identified throughout the western United States from 1949 to 2004, according to a report by the Western Water Assessment for the Colorado Water Conservation Board. These changes will have critical economic effects. For example, less snow means reduced stream and river flows in the spring and summer, and therefore less drinking water for western towns and cities, which derive 75 percent of their water supply from the snowpack. Related declines in species prized by hunters and fishers are also likely to harm mountain-state economies. According to the nonprofit group Trout Unlimited, most populations of trout that inhabit the cold waters of Rocky Mountain streams, mainly bull trout and Bonneville and Colorado cutthroat trout, are already under pressure because of habitat loss. These popular species could lose a further 50–90 percent of their habitat with an increase of 3 degrees Celsius in summer temperatures, well within the predictions of the Intergovernmental Panel on Climate Change of between 1.5 and 5.7 degrees Celsius by the end of the century.

And while businesses catering to hunters and fishers will be hurt, less snow also means that the ski season in the Rockies will be shorter and snow bases shallower. The National Ski Areas Association reports that, despite the economic downturn during the 2008/09 season, resorts with good snow conditions had strong visitation and some even had record numbers in the first half of the season. Those areas with poor snow coverage, however, did less well. The prime ski conditions of the Rockies attract about 35 percent of all U.S. skiers every season, an impressive 21.3 million (out of 60.5 million) in the 2007/2008 season. If conditions decline due to warmer temperatures, the region would lose a major source of revenue.

The earlier spring onset and warmer temperatures also mean longer summers. While this translates to more fun for summer adventurers, it also creates generally drier conditions for a longer period. These conditions can be aggravated by drought, one of several kinds of extreme weather event expected to increase globally due to climate change. Indeed, from 1998 through 2003 the Rockies suffered a major drought, the worst in western North America in 500 years. Wildlife in the region suffered considerably, with some areas reporting big game species foraging for food near roadways where runoff sustained favored vegetation that had died elsewhere. For some species the increasingly dry conditions are a death sentence: 30 populations of bighorn sheep in the southwest United States became extinct between 1900 and the early 1980s due to increased temperature and decreased precipitation leading to a loss of food sources.

The pine bark beetle epidemic, which has destroyed about



Mike Goren

800,000 hectares of forest in Colorado alone since the early 2000s, is partially rooted in the warmer and drier temperatures. The beetles are traditionally kept in check by annual die-offs caused by cold weather, but due to the warmer winters the beetles have been breeding twice as often as normal. Subsequently they've caused unprecedented damage to the region's mature stands of pine, especially lodgepole. As the forests are decimated, the species that depend on them will also decline. Scientists predict that the boreal owl, which likes to hunt largely in mature forests, will be scarce for 40–60 years following the end of the beetle epidemic. Populations of snowshoe hare, and therefore lynx and other predators, will also decline for at least 10 to 15 years until the lodgepole pine forests become dense once more.

Climate change is also increasing the risks associated with wildfires in the West. Although federal, state, and local fire control efforts have long shaped the incidence and location of forest wildfires, climate is increasingly a primary driver as well. A recent study from the Scripps Institution of Oceanography found that the number of fires in the Rockies increased by 400 percent in the 16 years from 1987 through 2003 compared with the previous 16 years (1970–1986). Moreover, the length of time the fires burned also increased, from an average of one week to five weeks. The greatest increase in forest fires occurred in the northern Rockies, where fire suppression has been minimal but where the early onset of spring is significantly reducing the soil moisture by mid-summer. The study found that there were many more fires in warmer years than in cool years, with early snowmelt being a major indicator

of a more active fire season. In fact, temperatures were found to account for 66 percent of the variation in fire frequency from year to year (primarily in areas between 1,680 and 2,590 meters). Average spring and summer temperatures in this region have increased by 0.87 degrees Celsius since the 1980s, and because of the added warmth and dry conditions, the fire season is now starting earlier and ending later than in the past. (Parenthetically, drier soils, when disturbed—possibly by increased off-road vehicle activity, livestock grazing, and oil and gas development—may be behind a rising incidence of regional dust storms, which leave dark soil layers on the snowpack that tend to accelerate melting.)

Fighting wildfires already costs \$1 billion per season in the United States (and is a grave problem elsewhere as well, as demonstrated by Australia's recent experience with a string of savage fires that claimed more than 200 lives and 2,000 homes). Unfortunately, experts predict that the area burned by wildfires in the western United States will double by 2100, hitting Montana, Wyoming, Utah, and New Mexico particularly hard. Worse, the forests of the western states account for 20–40 percent of the carbon sequestration in the country; if they are destroyed by fires then they will cease to function as carbon sinks and very possibly could become net emitters of CO₂. The Australian fires are estimated to have increased the country's total annual carbon footprint by up to 20 percent in just a few days.

As fires continue to grow in size and duration, the composition of forests will change as open, sunny spaces are created that are unsuitable for native species but inviting for invasive species. At least 37 problematic invasive species of

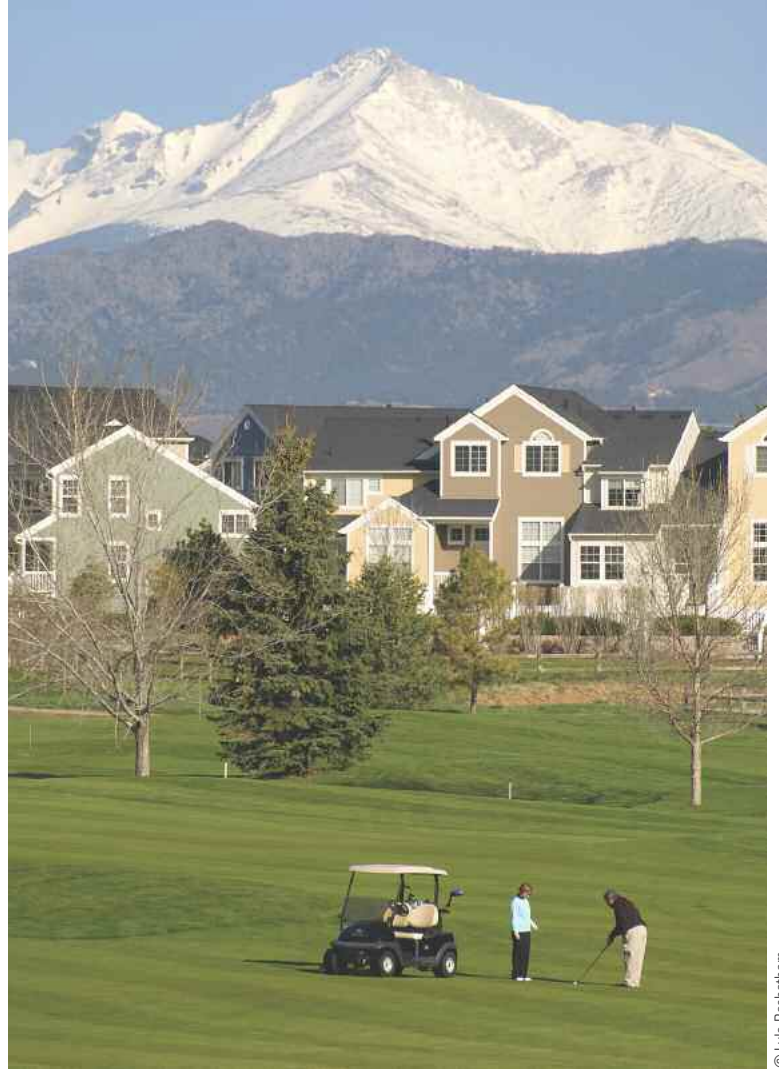
fish, amphibians, plants, insects, and diseases are expected to increase their ranges in the United States as a result of climate change.

—DEVELOPMENT—

An estimated 25 million new residents will move to the western United States in the next quarter century. The Rocky Mountain region will receive a substantial portion of this influx, guaranteeing continuing encroachment of open spaces, even if some portion of the region remains protected. Residential development has been rising in the region since the population boom in the 1970s, when western states grew their populations by 40 percent.

Colorado's chapter of The Nature Conservancy estimates that approximately 80 percent of the state is still relatively undeveloped, but is quick to point out that the impacts of development are felt well beyond the edge of any given housing complex or new pipeline because connecting roads bring additional development, access to formerly isolated natural areas, and increased demands for resources. Major impact in the Rockies spreads out along the Interstate highway corridors, with I-25 forming a north-south access pathway along the Front Range on the eastern edge of the chain, and along I-70 and I-90 reaching west over the mountains. The resulting habitat fragmentation makes it difficult for species to move as they try to adapt to changing climatic conditions. Formerly, the combination of public lands and large private ranches maintained significant open space and important buffers between wild and urban areas, but now such farms and ranches are being divided into small-lot residential developments that increase habitat fragmentation, one of the largest threats to species survival in the region. Large species, especially, need intact migratory corridors. Pronghorn, a beautiful antelope-like native species, already struggles as it attempts to travel its yearly migration path, which is now cut by fences and roads. The size of the Wyoming herd of pronghorn has declined 40 percent since 1984, according to Brian Maffly, writing in *National Wildlife* magazine. *Season's End*, a report sponsored by a consortium of hunting and fishing groups, expects that mule deer and elk will eventually disappear from the intermountain West.

Valuable habitat is also under threat from energy development, which is on the rise. The federal Bureau of Land Management in 1999 issued 1,803 permits for drilling on public lands, but by 2007 that number had more than tripled to 6,399, most in Colorado, Montana, New Mexico, Utah, and Wyoming. As the cost of traditional fuel fluctuates and concerns about carbon dioxide concentrations grow, the pressure to find both domestic conventional and alternative energy sources increases. The western United States holds great wind



© Lyle Rosbotham

and solar energy potential, but the Rockies are also being eyed for natural gas development and the even more controversial process of oil shale removal, which extracts oil from rocks by heating the ground and then pumping the liquefied oil to the surface. The targeted area for this process, the Green River Formation, is one of the most valuable areas of wildlife habitat in the Rockies. Situated on the shared border between Colorado, Utah, and Wyoming, the Formation is home to mule deer, elk, mountain lions, black bears, and bald eagles. Oil shale extraction would not only degrade this unique area, but would also demand vast amounts of water and energy, producing more greenhouse gas emissions than traditional oil extraction. Also at risk are millions of hectares of important fish and game habitat that harbor recoverable oil and gas in Montana, Wyoming, Utah, Colorado, and New Mexico.

—WATER, WATER...NOT EVERYWHERE—

Finally, looming over all the other challenges facing the region, is water. Stories of gunfights sparked by conflicts over water rights are standard fare in recounting life in the old West. Today there are complex agreements and adjudication processes to resolve these conflicts in a more civilized, if still contentious, manner. Increased scarcity from climate change, coupled with skyrocketing population growth, will add to the already complicated dynamic in the region.



Most of the water supply in the western United States (except for a few rivers rising in the Sierra Nevada mountains and watering parts of California) typically comes from rivers originating in the Rocky Mountains. Additionally, winter snow that falls in the Rockies and melts slowly throughout the spring and summer replenishes groundwater supplies in the plains and feeds the streams that eventually fill reservoir systems. All told, the Rockies provide more than 75 percent of the water supply for cities, towns, and primarily farms throughout the western states. Most of the water (80–90 percent) in the region goes to agricultural production, which in the Colorado River basin produces about 15 percent of the nation's crops and 13 percent of its livestock.

Water rights in the western United States are determined on what is essentially a “first come, first served” basis, where the first person to divert water for “beneficial use,” such as irrigation or municipal use, receives the rights to that water. In times of scarcity, priority goes to the person with the earliest claim, so that subsequent, or “junior,” claimants may end up with nothing at all. When water crosses state lines, it is managed by legally binding “compacts,” such as the 1922 Colorado River Compact. This agreement provided the basis for a series of intricate, comprehensive water allocation arrangements dividing Colorado River water among 30 million people in seven states: Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming.

Climate change affects the amount of water available in the region through various chain reactions. As snowfall and snowpack decline with rising temperatures, river flow reductions

Left: From snowmelt to fairway: at 14,259 feet (4,346 meters), Long's Peak looms over a golf course and subdivision in Lafayette, Colorado.

Above: Fly fishing against a backdrop of pine beetle-killed lodgepole pines, in Rocky Mountain National Park.

are expected. The annual flow of the Colorado River, for example, is 90-percent dependent on runoff from high-elevation snowpack in Wyoming, Colorado, and Utah. Researchers at the University of Washington predict that as the ambient temperatures continue to rise, moisture levels in snowpack will drop by 30 percent by the end of the century and runoff will decrease 17 percent. The study finds that under these conditions the water stored throughout the Colorado River basin will drop by almost half, and the release of water from the upper to the lower basin that is mandated by the Compact will only be met between 60 and 75 percent of the time by 2025. These forecasts are corroborated by a new study from the U.S. National Center for Atmospheric Research concluding that water flows in the world's largest rivers, including the Colorado, have declined in the last half-century, mostly as a result of climate change. Other rivers fed by Rocky Mountain snow, such as the Snake River in Idaho and the North Platte in Wyoming, are likely to see similar impacts.

Currently there is no discernable trend, up or down, in precipitation levels throughout the range, largely because of the considerable natural variability from site to site in the Rockies. So while climate change is expected to increase rainfall globally, which could provide a glimmer of hope for mountain-fed water sources, climate models disagree if, and how, this might affect the Rockies. What models can predict is that even

if precipitation increases along with temperature there will still be a net loss in runoff in the Rockies because of increased evaporation due to heat.

In 2006 the International Water Management Institute estimated that 1.6 billion people are living in areas of “physical water scarcity,” where water is not available either because of an arid climate or because the resources have been overcommitted to multiple users. These areas include the region south and west from the central Rockies to central California and Mexico. In response to anticipated changes in both supply and demand for water, water managers in the region are implementing new conservation measures and water recycling programs, but the savings from these won’t be nearly enough to mitigate the expected changes. If the cities and towns in the Rockies are to keep growing, then agriculture, the biggest water user in the region, will have to reduce its consumption. Efficient irrigation systems will be one option. Ultimately, however, the most likely scenario, according to Brad Udall of the Western Water Assessment, will involve the directing of water toward the most productive sectors of society. At this time, those are the “amenities and knowledge” portions of the economy. It may be a slow and painful process, particularly for those communities that are deeply rooted in agriculture, but eventually this water-intensive portion of the economy will be drastically reduced. This is not an uncommon coping mechanism for areas with water shortages; Middle Eastern countries have long minimized their water stress by importing food so that they can use all of their water for other purposes.

— CHOICES —

Climate change poses severe challenges to the Rocky Mountain region as well as to the rest of the globe. So far, the response has been mixed. The key message of the landmark 2006 *Stern Review on the Economics of Climate Change* is that we don’t have to choose between controlling greenhouse gas emissions and continuing to grow our economies. The *Review* estimated the cost of reducing greenhouse gas emissions at 1 percent of global GDP per year in perpetuity (in a later revision this was raised to 2 percent), while unmitigated climate change impacts will cost *at least* 5 percent of GDP per year, and possibly as much as 20 percent per year, in perpetuity.

Taking note of this are several states tired of waiting for national action, including Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington, and the Canadian provinces of British Columbia, Manitoba, and Quebec. This coalition recently launched the Western Climate Initiative, a regional cap-and-trade program to reduce greenhouse gases from all major sources. The expectation is that a cap on carbon will not only help reduce emissions but will also spur investment in new technologies and feed the regional economy. Meanwhile, President Obama has since asked Congress



Calvin E. Whitehall

Running out of cool? A pika gathers forage to dry for winter storage.

to enact a national cap-and-trade program, and expectations are that it will become law in 2010. This act would set the entire country on a path to mitigating climate change, and would enhance efforts to minimize its damaging effects on the wild places of the Rocky Mountain region. However, this hardly means that there are no threats from booming populations, ongoing sprawl, further oil shale and natural gas development, and the impacts of the changes in climate that we have already put into motion.

If the Rocky Mountain states want to continue to see growing, robust economies and levels of personal income as well as the quality of life that is so appealing, then the smart money is on investing to protect natural, amenity-producing areas throughout the region from the impacts of spreading development. This, of course, will not protect the Rocky Mountain ecosystems from the impacts of climate change, which is ultimately a global phenomenon, driven by choices made by people and governments all over the world. The Rocky Mountains are already changing in response to climate shifts, but to protect them from further severe climate change will require global action to reduce greenhouse gas emissions in what will amount to a fundamental transformation of our energy systems and many other aspects of our lives, from transportation to jobs. The world’s attention is focused on Copenhagen, where a new post-Kyoto agreement on climate change will be debated this December and will either move the global community toward a collective transformation or leave us in a continued state of denial and piecemeal attempts at mitigation.

Lina Barerra has a graduate degree in geography from the University of Cambridge and has worked in international conservation, specializing in the impacts of development on ecosystems, for eight years. She lives in Colorado.



For more information about issues raised in this story, visit www.worldwatch.org/ww/Rockies.

Erik Assadourian: Tea Parties for the Climate?



On March 2nd, I and about 2,500 other people showed up at the Spirit of Justice Park, just south of the U.S. Capitol in Washington, D.C., in order to march around the coal- and gas-fired Capitol Power Plant and blockade the entrances. The police were out in force, and we were risking arrest for trespassing, unlawful assembly, and disorderly conduct.

It was a bitterly cold and snowy day, so raising a crowd of 2,500 felt like a success. As a group, we drew attention to this polluting power plant just blocks away from the Capitol. A few brave journalists defied the elements to report the events, and organizers worked to expand the ranks of the climate movement. And just days before the protest (after months of protest organizing), Congressional leaders agreed to phase out coal at the plant.

Now it's late April and I'm less confident with the results—particularly when I compare them with the “Tea Party” protests that occurred across the United States around April 15th (taxes-due day). Over 300,000 people in 346 cities gathered, garbed in tea bags, to hold Boston Tea Party reenactments in order to protest tax proposals.

These demonstrations opposed a future of increased government services and more tax responsibilities for the rich. Our power plant rally fought a future of increased temperatures and more extreme weather events. Unlike the climate change protest, the “tea parties” received vast media attention across the political spectrum.

I'd also wager that they helped mobilize the conservative base against the Democratic agenda in both the White House and the Congress. Many have criticized the movement as an “Astroturf” (fake grassroots) operation, but regardless of its roots over 300,000 people seem to believe that freedom means lower taxes, fewer services, less social safety net. When that type of momentum can be generated, what is the right strategy for smaller groups of less well-funded climate change activists to take?

My answer: the level of commitment must be dramatically escalated. At the power plant, I was saddened to observe that not once did any of the organizers or celebrities present say that political action is not enough, that our lives must be our message—that we must use as little energy or resources in our own lives as possible and model how satisfying this simpler life can be.

We also must select our political resistance activities carefully. The Capitol Climate Action started at 1 p.m. and officially ended at 6 p.m. Knowing this, the police decided not to arrest a single person, allowing us to disperse on our own (and not creating any martyrs). But suppose protesters had blockaded the power plant for several days or blocked off the major roads into Washington? The police, media, and politicians would certainly not be able to ignore *that*.

Unaddressed, climate change is going to disrupt the lives of billions. Yet few of us are really changing in the ways necessary to curb emissions. While blocking traffic might not be the right means, neither is a series of ineffectual symbolic protests—not when other groups can mobilize the media and supporters so much more effectively. We'll have to reassess our strategy if we seriously want to prevent global warming and not just feel good that we didn't stay silent as humanity cooked the climate.



Some of those chilled 2,500 marchers with the U.S. Capitol in the background.

© Greenpeace

T A L K I N G



© Lyle Rosbotham

Ranch fence in the Badlands, South Dakota.



Mark Kobayashi-Hillary

Matilda tries to get through a hole in a Gunnersbury fence, England.



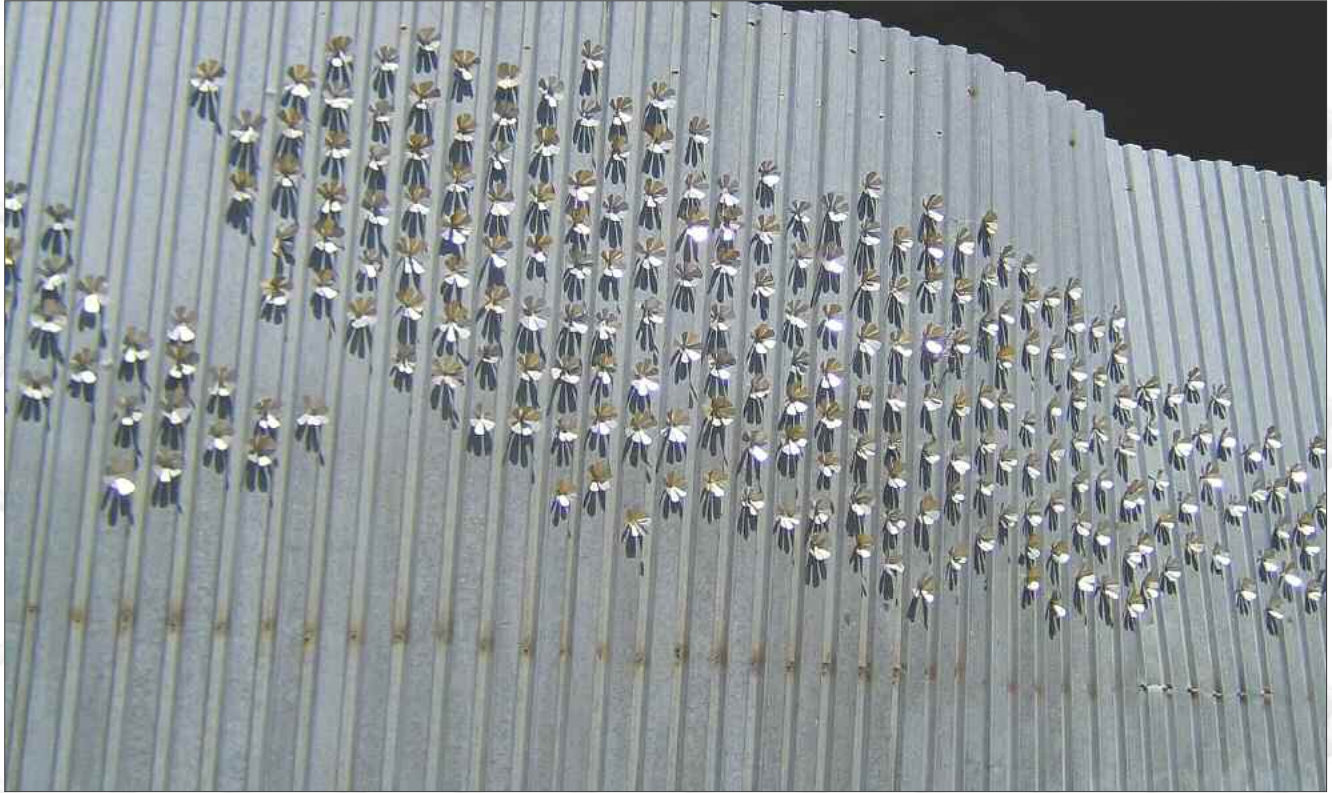
Scott Robinson

Crying out for maintenance at the Maryland School for the Deaf.

P I C T U R E S

“GOOD FENCES MAKE GOOD NEIGHBORS.”

What exactly did poet Robert Frost have in mind?



eva101

Artificial flowers decorate corrugated sheetmetal in the DUMBO neighborhood of Brooklyn, New York.



Ralph Urdien

Disintegrating security on the banks of the Hudson, New York.



switch_1010

Tagged security fence in Ramallah, Israel.



Local Food: The Economics

by Sarah DeWeerd

One drizzly Sunday last March, I went to the weekly farmers market in my favorite Seattle neighborhood and bought a bag of potatoes. I stopped at a stall where a farmer, his hands caked with dirt, was filling mesh bags with small, just-dug potatoes and singing a silly made-up ditty as he twirled each bag shut. “That one looks good,” I said, pointing to the bag in his hands. “Can I have that one?” “Yeah,” he agreed with me, “it has a nice mix of spuds.” I held out a few crumpled dollar bills and he passed me the bag.

Eating local has economic benefits for communities, say proponents of local food, and after such a quintessential farmers market moment that conclusion seems obvious, the logic inescapable. After all, I’d handed my money directly to the farmer who grew my food—rather than passing it along a chain of faceless and distant middlemen—and what’s more, he honestly seemed to be having a good time.

That’s different from the economic logic of the mainstream food system, which de-emphasizes place and sees trade as a disembodied, win-win endeavor. Different communities can specialize in growing different foods—or in activities other than growing food altogether—thereby developing production efficiencies that enable them to offer their products at a lower price. Money flows freely among communities, and everyone gets a more varied diet for less money.

Well-drained Farms

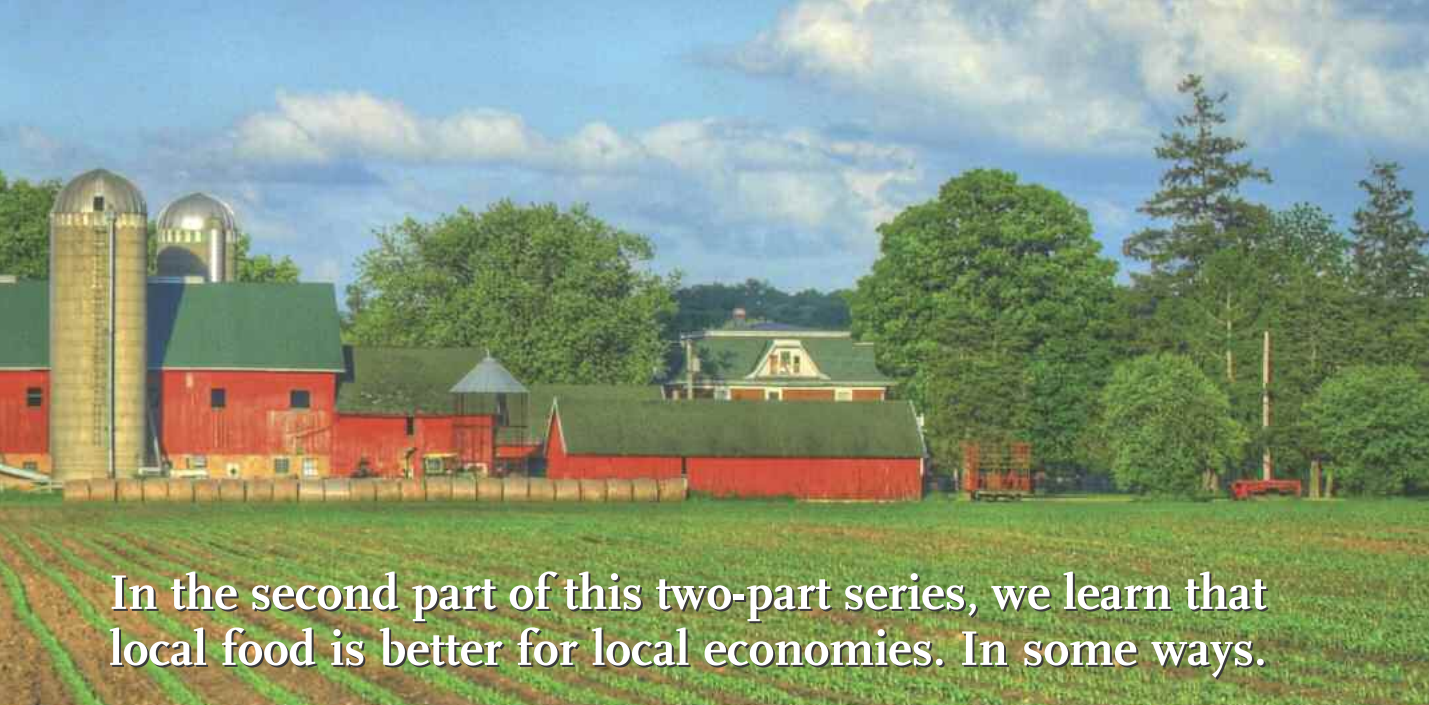
The trouble is, that’s not all that’s going on. Over the past decade, Ken Meter, president of the Minneapolis-based Crossroads Research Center, has documented the way the current food system drains money and vitality from farming communities throughout the United States. His first investigation, focusing on the seven-county Hiawatha region of southeast Minnesota, is representative. In that 2001 study, Meter and Jon Rosales, of the Institute for Social, Economic, and Ecological Sustainability at the University of Minnesota,

found that farmers in the region sold an average of US\$912 million worth of farm commodities every year. But they spent \$500 million on farming inputs—things like seed, animal feed, fertilizer, and (crucially) credit—sourced from outside the region. Moreover, the region’s consumers spent an additional \$500 million on food purchased from elsewhere. All of the money—and then some—that the region earned from farming was drained right back out of the community by the food system itself.

Meter has found a similar pattern in landscapes as diverse as Iowa, Arizona, and Washington State: farmers often operate at a loss, spending more to grow their crops than they earn from selling them. (In the southeast Minnesota study, farmers spent \$996 million to grow \$912 million worth of crops. Some of this difference, but in many regions not all, is made up for by farm subsidies.) Most of the inputs necessary to produce those crops come from outside the community. And most of the food that farm families eat is purchased from far away.

Even where farmers aren’t producing at a loss, the food system as a whole drains money from the local economy. In Meter’s study of the eastern shore of the Chesapeake Bay, farmers collectively earned \$70 million more each year than they spent to produce their crops. Yet they sourced about \$375 million in farm inputs from outside the region annually, and consumers in the region purchased about \$400 million in food from afar. That amounts to a net loss of \$700 million from the region each year—about the same as the value of all agricultural products produced there. “Basically every region that I’ve studied is losing hundreds of millions of dollars a year” as dollars flow out of the community, Meter says. He adds, “It’s building wealth for some people, but not for the farmers.” Instead, most of the profits in this system flow “to the supply industries, the service industries, to agriculture, and the financial sector—not to the farm and certainly not to the rural community.”

Local food has been promoted as one solution to this economic imbalance. “More local or regional food commerce is



Brian Lamy

In the second part of this two-part series, we learn that local food is better for local economies. In some ways.

Spring corn crop sprouts on this family farm in Wisconsin.

going to benefit local and state economies,” says Rich Pirog, associate director of the Leopold Center for Sustainable Agriculture at Iowa State University. A variety of studies, from the Leopold Center and elsewhere, have calculated the economic rewards communities could reap by buying more food produced nearby.

In their southeastern Minnesota study, for example, Meter and Rosales found that if people in the region bought just 15 percent of their food from local sources it would generate two-thirds as much income as the region’s farmers receive from federal farm subsidies. In a study by economist Dave Swensen of Iowa State University, if Iowans purchased a quarter of their produce from Iowa farmers, it would create \$139.9 million in new economic output and more than 2,000 jobs for the state. If people in the Central Puget Sound region (Seattle and nearby cities, including Tacoma, Bellevue, and Everett) spent 20 percent of their food dollars at local food businesses such as farmers markets and locally owned restaurants, it would inject an extra billion dollars every year into the region’s economy.

Even a small shift in spending can have a big impact because of what economists term the local multiplier effect. Every time money changes hands within a community, it boosts the community’s overall income and level of economic activity, and fuels the creation of jobs. The more times money changes hands within the community before heading elsewhere, the better off the community is. And spending money at a locally based business has a greater multiplier effect, the theory goes, because locally owned businesses are more likely to re-spend their dollars locally.

This thinking isn’t unique to the food system. In the United Kingdom, the New Economics Foundation has documented how directing a small portion of public sector spending to locally owned businesses in disadvantaged areas would multiply through, and help revitalize, these struggling economies. In the United States, many local multiplier studies have focused on the economic impacts of spending at mom-and-pop stores versus big-box chain retailers.

In the case of food, some impressive numbers are found in *Why Local Linkages Matter*, the study of the Central Puget Sound region referenced above. In that study, independent economist Viki Sonntag calculates that spending \$100 at a local restaurant results in \$79 in additional income to local businesses, while spending the same \$100 at a chain restaurant results in just \$31 being re-spent locally. When farmers in the region grow food for export, each dollar of sales generates \$1.70 of community income, but every dollar spent at a farmers market generates a whopping \$2.80 for the region’s economy. Similarly, a 2005 study from the Iowa Farmers Market Association found that every two jobs at an Iowa farmers market gives rise to three jobs elsewhere in the economy.

On the Other Hand...

The local multiplier effect is the foundation of the claim that local food benefits local economies. But studies of the potential benefits of shifting food dollars to the local food system are just that: potential. They rely on economic models to predict how a hypothetical change in consumer behavior would ripple through the economy at large. To date, according to Pirog, there’s been no instance of a community actually undertaking such a shift and seeing the predicted economic benefits materialize. The local food movement is still too new, and too small, for that to have happened. (Even in the Seattle region, a hotbed of enthusiasm for local food, the stuff accounts for only about 1–2 percent of food purchases, according to Sonntag’s study.)

But Pirog points to some encouraging developments in northeastern Iowa, where a recent focus on strengthening the local food system as a means of economic revitalization is starting to have a marked effect. “When you get enough people doing it, then the input suppliers start to move back,” Pirog says. An area equipment dealer has begun to carry and repair farm implements needed by small farmers that sell to local and regional markets, he reports. A new food edu-

Farm workers sort spring onions grown on Mike Fox's farm near Mexicali, in Mexico. Fox is one of a group of American farmers farming over 20,000 hectares in the area, where workers' wages are about a tenth of those north of the border in California.



Stringer/Reuters © 2008

cation non-profit has formed to help with school and community gardens.

That's good news for northeastern Iowa, but Pirog's comment points to another important caveat regarding food system localization studies. Crucially, these studies depend on an approach that mainstream economists call import substitution. They look at products that local residents are already buying from far away, and ask what would happen if people bought these same products from closer to home. They carefully account for the economic pluses and minuses of such a switch for the community in question. For example, if Iowa farmers grew more produce, they would have to grow less corn and soybeans. So Swensen's study considers the loss of income from corn and soybeans that would occur as some acreage was switched from commodity crops to melons, tomatoes, and the like.

However, import substitution studies don't take into account the impacts of such a switch on *other* communities—if Iowa grows more of its own vegetables, for example, the California farmers currently supplying those vegetables will lose out. So if some communities localize and not others, there will be winners and losers. And if all communities localize, it's a bit of a wash.

"It's not like you're creating additional new jobs in the economy, you're shifting those jobs around," Pirog acknowledges. But, he argues, "that's why it's important to broaden this debate beyond economics"—when local economies are healthier, "crime problems go down, health problems decrease, people have more of a sense of connectedness." Indeed, it's almost

impossible to talk about local food without ending up talking about values rather than just money. But that, Viki Sonntag argues, could be considered a failing of economics itself. "We don't really have very good formal economics models to represent social capital and the importance of social capital to the development of financial or economic stability," she says.

Means, Not Ends

Still, the meaning of localization studies depends on the scale at which you're considering them. Looking at a single community or region in isolation—particularly an agricultural area that's been economically hollowed out by the current food system—these studies have a powerful, up-by-the-bootstraps appeal. Viewed from a broader perspective, they can seem parochial, or even, at the national level, protectionist.

That is, localizing food systems in the United States would produce a net increase in agricultural jobs for the country. That's because the United States, like other wealthy countries, imports a significant and growing proportion of its food from developing nations (in the case of the United States, primarily Mexico). So some of the jobs gained in the United States would simply be shifted—or more precisely, shifted back—from Mexico. It's not clear that food system localization at a grand scale would increase the number of jobs globally.

In the United Kingdom, which imports significant quantities of fresh produce from Africa, this line of reasoning has led some to suggest that in fact people *shouldn't* buy local food, precisely because the livelihoods of impoverished farmers in the developing world depend on food exports to wealth-



Açaí berries being loaded on a truck in Abaeteuba, Brazil. Touted as one of the newest “super foods,” full of anti-oxidants and vitamins, they will be exported for use in energy drinks, cosmetics, and health bars.

ier nations. Benito Müller, director of energy and environment at the Oxford Institute for Energy Studies, points out that Kenya earns UK£100 million per year from produce sold to the United Kingdom alone, and argues that Europeans have “a moral duty to eat African strawberries at Christmas.”

On the other hand, purchasing food imported from developing nations doesn’t necessarily improve economic wellbeing for the farmers who grow it. In fact, switching to export-oriented agriculture often *increases* food insecurity in the developing world, pushes small farmers off the land, and traps those that remain in a cycle of debt. There’s some intriguing, if limited, evidence that local food systems could have economic benefits in developing countries as well. Jules Pretty, a sustainable agriculture researcher based at the University of Essex in the United Kingdom, has worked with farmers in the Santa Catarina state in southern Brazil, where diversified small farmers (on one farm, more than 50 crops, plus pigs and chickens, on just 10 hectares) are building small-scale, on-farm processing facilities, forming associations with like-minded neighbors, and marketing directly to consumers in nearby cities—and seeing better economic returns than they’d get from contract farming for agricultural conglomerates.

Or, alternatively, there are fair-trade arrangements, which attempt to ensure that developing-country farmers get a fair price and a living wage when they grow foods for export. Taking these complexities into account, Pretty suggests “what you might call a ‘near and far policy,’ that you should localize food as much as you possibly can wherever you are...and grow whatever you can locally, but then source the stuff that

needs to come from the tropics or from elsewhere in the most fair-trade, just, appropriate way that you can.”

Other analysts question whether buying local ought to be the default policy in the first place. Depending on the structure of the business, buying local might not, in fact, do much for the local economy. (After all, every global mega-corporation is “local” somewhere.) In an influential 2006 paper, Branden Born and Mark Purcell, two urban planning professors at the University of Washington, call the assumption that local food is automatically better—not only better economically, but better for the environment, fresher, more nutritious, and so on—the “local trap.” Instead, they argue that there’s nothing inherently better or worse about any particular scale—local food might be just or unjust, and non-local food might be better for the environment in some instances or much worse in others. Instead, they argue that localization should be a means to an end, and not an end in itself.

“Local”...or “Sustainable”?

In the first article in this series [May/June 2009 *World Watch*], we concluded that the environmental benefits of local food aren’t always intrinsic to its local-ness, and the same is true in the economic realm. That’s clear from a closer look at several of the studies concerning the economics of local food. For example, Swensen’s study of the potential benefits of increased local fruit and vegetable consumption for Iowa assumes that half of the increased local production would be sold through farmers markets and other direct-marketing schemes—in effect, shortening the food supply chain. Shorter food supply



Liquid manure from a hog farm being spread on cropland in Iowa.

chains are a common strategy for increasing the portion of the purchase price that goes to the farmer. But while shorter supply chains are often associated with local food, the two aren't intrinsically linked (the same approach underlies many fair-trade schemes that connect producers with very distant consumers, after all).

Then there's the question of what we eat, not just how far it travels. Many farmers don't grow food, they grow raw materials for industry. And a number of recent efforts to rebuild rural economies have focused on reintroducing fruit and vegetable production into areas currently dominated by commodity farming. That strategy leads to economic gains in part because the value per hectare is so much higher for produce compared to commodity crops. In Swensen's study of increased local produce consumption in Iowa, the greatest economic benefits were seen in scenarios that assumed Iowans would also increase their total fruit and vegetable consumption to the recommended five servings a day (a goal that only about 20 percent of the state's population currently reaches). Of course, Pirog points out, more fruit and vegetable consumption would lead to a healthier population, which would have economic benefits of its own—fewer sick days, lower health care costs. But there are several issues at play here, and not all are strictly about local-ness.

"What we need to do is shift from talking about local food to talking about sustainable food," says Jim Sumberg, an expert on agriculture and food systems who is currently the director of research and programs at the New Economics Foundation. For Sumberg, sustainable food means "food that's associated with high levels of wellbeing, of social justice, of stewardship,

and of system resilience." While it would take some discussion to agree on a definition of each of those aspects of sustainability, this approach at least moves us beyond a narrow focus on food miles/kilometers or local economic self-interest.

To be sure, some of the solutions to increase wellbeing and social justice in the food system would be local ones. For example, Ken Meter suggests that farmers could reduce their spending on inputs sourced from far away by re-adopting old systems that combine crops and livestock, grazing livestock on renewable pasture and using the manure to fertilize their

fields. That kind of arrangement really only makes sense on a local scale. (It's worth noting that it would have environmental benefits as well.) Restoring local and regional processing networks might shorten supply chains and put growers on a more equal footing with processors. Other possible solutions, like shifting transportation funds away from major highways and toward secondary roads to help rebuild regional distribution networks, would require action at an even higher level. Decentralization of the food system is a common theme of these solutions, but the details matter. Who will own the regional processing plants? Who will work there? How can farmers be assured of a fair price for their commodities? That's different from a reflexive insistence that local is a goal in itself.

When I got my farmers market potatoes home, I cut them in half, roasted them in a hot oven, and then tossed them in a dressing made with smoked paprika (about the furthest thing possible from a local ingredient). The potatoes were astonishingly sweet, in a rounded way that tasted of healthy earth, and as I ate them I thought again of the farmer I'd bought them from. I could hardly imagine a more perfect dish of potatoes. Was that dish also better for the place I call home than the one I could have made with potatoes bought at the supermarket? Probably so—but there's a lot more to the story.

Sarah DeWeerd is a Seattle-based science writer specializing in biology and the environment.



For more information about issues raised in this story, visit www.worldwatch.org/ww/localfood.

VITAL SIGNS

Bicycle Production Reaches 130 Million Units

Gary Gardner

Bicycle production was up 3.2 percent in 2007 to 130 million units, continuing a trend of several years. China produced two of every three bikes made worldwide. India, the European Union, Taiwan, Indonesia, and Brazil were the next five largest producers, accounting together for about a quarter of the total.

The share of all trips made by bike varies greatly among countries. Chinese cities still register some of the highest cycling rates in the world, despite growing interest in cars. In the most-cycled cities, such as Tianjin, Xi'an, and Shijiazhuang, the bicycle accounts for more than half of all trips. In the west, the Netherlands, Denmark, and Germany have the highest rates of cycling, ranging from 10 to 27 percent of all trips. This compares with about 1 percent of trips in the United Kingdom, the United States, and Australia.

In Africa, where bicycles are often unaffordable and walking is generally the dominant transportation mode, cycling's share of trips registers in the single digits except in a few medium-size cities such as Morogoro, Tanzania; Eldoret, Kenya; and Ougadougou, Burkina Faso, where 10–23 percent of trips are made by bike.

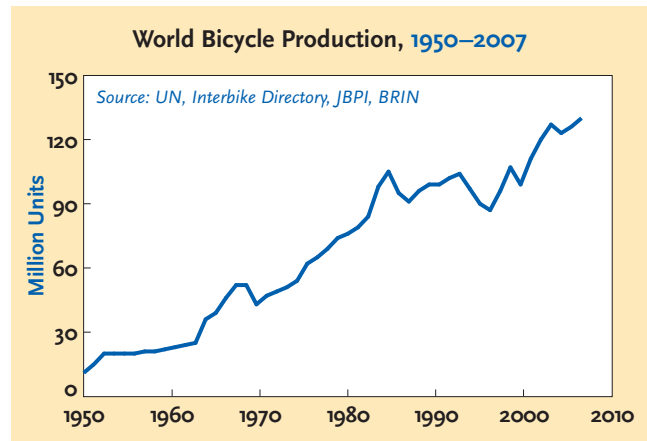
Electric bikes, which use an electric motor to assist pedaling, are a burgeoning market segment, with most production again taking place in China. Sales of electric bikes in Germany nearly tripled in 2007. For aging populations and for riders tackling hilly terrain or living in hot climates, electric bikes make cycling a viable transport option. Yet battery disposal poses a potentially significant environmental downside to e-bikes.

Increases in global commodity prices in 2007 and 2008 could soon affect bicycle production. Price hikes for steel, butyl, rubber, titanium, and other materials are driving up production costs, and materials shortages have left tens of thousands of partially completed bikes in warehouses.

At the same time, the spike in gas prices in the first half of 2008 began to stimulate cycling, especially among commuters. Dealers began to stock bikes and accessories in anticipation of increased demand. In some U.S. cities, rising gas prices led officials to resurrect or start police bicycle patrols. The Netherlands, Denmark, Germany, and other European nations reached high cycling rates through policies that give priority to cycling, walking, and public transportation over private automobiles. Bikeways that are separated from traffic, stoplights timed to the speed of bikes, shortcuts allowing cyclists to make right-hand turns before intersections, traffic calming in residential neighborhoods, ample bicycle parking, and coordination with public transport have all

made cycling safe, fast, and convenient in strong biking cities.

Placing importance on cycling in transportation and land-use policy leads to an increase in cycling safety. Bicycle injuries per kilometer traveled are about 30 times higher in the United States than in the Netherlands, and cycling deaths are eight times higher. The sense of safety in the Netherlands has helped increase ridership even among the elderly: 24 percent of all trips made by elderly Dutch people are bike trips.



Some cities are also increasing accessibility to cycling by establishing public bicycle rental programs. Similar to car-sharing programs, these schemes make bikes available to subscribers at strategic locations citywide. Patrons pay about US\$50 per year to subscribe, as well as a per-hour charge. Users get access to a bike with an electronic card, use the bike as needed, and return it to the same or another parking rack when finished. In many cities, the program is paid for through on-bike advertising or through concessions to communications companies, who fund the programs in exchange for the right to erect new billboards and sell advertising on them.

Copenhagen, Berlin, and other European cities have featured public bike programs like this for many years, and Paris took the concept to a new level in 2007–08 by making 20,600 bikes available at more than 1,450 rental stations—four times as many stations as subway stops. Bikes are now essentially an extension of the public transportation system in Paris. Barcelona and Lyon have also started major programs in the last two years, and new initiatives are planned for Rome, London, Moscow, Geneva, Beijing, Tel Aviv, and Sydney, as well as in a few U.S. cities, including Washington, D.C., and San Francisco.



Vital Signs are adapted from Vital Signs Online, which contain additional data and more in-depth analyses. Visit www.worldwatch.org/vsonline to view and read the complete list of available trends.

Goldman Environmental Prize Winners

In 1988 U.S. philanthropist Richard N. Goldman was inspired to create an honor recognizing six grassroots environmentalists each year—"among the most important people you have not heard of before," as Goldman has put it. "All of them have fought, often alone and at great personal risk, to protect the environment in their home countries." Goldman and his late wife Rhoda envisioned the prize as a way to demonstrate the international nature of environmental problems, draw attention to critical global issues, and inspire others to emulate the examples set by Prize recipients. Since 1990, 119 individuals from 70 countries have been rewarded with US\$125,000 and a 10-day media and publicity tour. An international jury bases their selections on confidential nominations submitted by a worldwide network of environmental organizations and individuals.

This year's prize winners shared their stories with *World Watch* staff writer Ben Block during their visit to Washington, D.C. Additional information about current and past winners can be found at www.goldmanprize.org.

N O R T H A M E R I C A

Maria Gunnoe, United States

Maria Gunnoe raises her children in a small town in the Appalachian Mountains of West Virginia. Her grandfather toiled in the coal mines for 32 years to buy the property where she lives. She helped build the house that her son and daughter call home.

Five years ago, a spring rain turned the docile creek that transects Gunnoe's yard into a barrage of black water. "There is nothing more intimidating than a 60-foot-wide, 20-foot-tall wall of water coming at you," said Gunnoe, whose property has flooded seven times in the past nine years. She blames the 486-hectare mountaintop removal mine that has been leveling the ridge above her home.

Now one of the most fearless opponents of mountaintop removal in her state, Gunnoe has helped attract international attention to the damaging practice. During mountaintop

removal, miners blast away ridges to expose coal seams deemed too costly to reach via traditional subsurface mine-shafts. Bulldozers push the rubble into adjacent valleys, which can fill with rain and trigger flooding. Holding ponds at the sites often contain high levels of heavy metals, such as lead, arsenic, and selenium.

Gunnoe is a medical technician who now works as a grassroots organizer with the Ohio Valley Environmental Coalition. In 2007, the coalition sued the Army Corps of Engineers to stop new mining at a mountaintop site near Gunnoe's town. Days before the hearing, Gunnoe gathered 20 local residents to join her in testifying against the site. But more than 60 miners showed up at the community hall to harass the protestors, leaving Gunnoe as the only resident willing to speak up.

The federal court ruled in the coalition's favor. Soon after, the mining company announced potential job losses at the site, and Gunnoe found her face on local "Wanted" posters, labeled "Job Hater." Her daughter's dog was shot. Friends heard rumors that Gunnoe too would be shot and her home burned with her children inside. "There were times when I literally stayed up all night long so my children would sleep," she said.

But Gunnoe has remained steadfast. She continues to lobby for an end to mountaintop removal mining, and she refuses to move from her home. "That's my birthright and I'm not going to walk away from it," she said.



Maria Gunnoe outside her home.

Tom Dusenbery



Tom Dusenbery

Mountaintop removal in progress, as seen from an adjoining mountain.

Yuyun Ismawati, Indonesia

Indonesia's islands are overrun with trash. In the capital city of Jakarta, authorities have been known to dump untreated refuse near fish farms. In Bandung, West Java, a 70-meter-high garbage mound collapsed in 2005, killing 147 residents in a settlement nearby.

Government services collect less than half of Indonesia's solid waste, and poor communities are most often ignored. "If we wait for the government to provide everything—all the sanitation services—the government will wait for decades," said Yuyun Ismawati, director of the nongovernmental organization Bali-Fokus. Since 2003, Ismawati and her five-person team have coordinated 200 community organizations across six provinces to develop collective waste management services.

In 2005, BaliFokus began teaching residents of Denpasar, Bali, how to make compost from organic waste and to develop biogas digesters. The city has been transformed from hosting one of Indonesia's foulest-smelling slums into one of the most visited neighborhoods on the island, leading several small-scale entrepreneurs to settle there, Ismawati said.

More than 600 communities have applied for Ismawati's help

in gaining local government support. She estimates that Bali-Fokus projects have reduced household waste in the participating villages by 50 percent. Ismawati has also helped tourist resorts reduce waste. Her "green tourism" model has been incorporated in the Bali towns of Ubud and Candi Dasa, as well as in Hua Hin, Thailand.

As a student, Ismawati was reticent to work in the sanitation industry and wanted to be a doctor. "After I graduated, I realized that my profession is also a doctor," she said. "I cure people. Not directly for their diseases, but through improving their environment."



Will Paimello

Yuyun Ismawati, second from right, during a Bali community sanitation workshop.

E U R O P E

Olga Speranskaya, Russia

Since the collapse of the Soviet Union in the early 1990s, stockpiles of banned pesticides and fertilizers have been unearthed across Eastern Europe and Central Asia.

Many poor communities lack the capacity to dispose of the dangerous chemicals, and farmers continue to use them despite international bans.

"As a result of overconsumption, 80 percent of land is contaminated. Water is contaminated. Food is contaminated. Human bodies are contaminated," said Olga Speranskaya, director of the



John Antonelli

Olga Speranskaya with an old toxic chemical storage site in the background.

chemical safety program at the Eco-Accord Center, a Russian environmental group. "We cannot simply run away from toxins."

Speranskaya leads a regionwide network of community, government, industry, and scientific leaders tasked with rooting out the harmful toxins. Since joining Eco-Accord in 1997, she has advanced community awareness of the dangers associated with 12 particularly pernicious chemicals linked to dysfunctions of human endocrine, reproductive, and immune systems, known as persistent organic pollutants (POPs). Her work has supported more than 80 projects since 2004 that monitor, research, or remove the chemicals in 11 former Soviet states.

Speranskaya said that nongovernmental organizations have been key in influencing farmers to abandon the obsolete chemicals. "Because of economic constraints, people do not afford new or less dangerous pesticides.... They go to the warehouses...take the pesticides and apply them to their back yards," she said. "The government authorities simply close their eyes."

Moldova has sent its POPs stockpiles to France for proper elimination. Ukraine is discussing similar plans with Germany and Poland. In Russia, many stockpiles are stored properly in warehouses, but thousands of tons of PCBs have been burned in an effort to reduce elimination costs, threatening the global environment, Speranskaya said. "Our problem is a global problem. As soon as the world recognizes that, the easier it will be to tackle it together."

Marc Ona Essangui, Gabon

Rainforest Foundation



Marc Ona Essangui

A treasure trove of iron ore lies beneath virgin tropical forest in the West African country of Gabon. For more than a century, the costs required to tap the so-called Belinga deposit deterred investors. Then, in 2006, a Chinese-owned consortium, CMEC, agreed to provide US\$3.5 billion to develop the mine and associated infrastructure.

The support seemed like a blessing for impoverished Gabon, until media reports revealed that the country would receive only a tenth of the mine's profits

and that CMEC would receive a 25-year tax break. CMEC was also granted 7,700 square kilometers for the mining operations, even though only some 600 square kilometers was deemed necessary for development. "We didn't understand why the government gave this area to the Chinese company," said Marc Ona Essangui, president of the Gabonese environmental group Brainforest, which obtained the leaked contract. "The reality is that President [Omar] Bongo didn't have the right information."

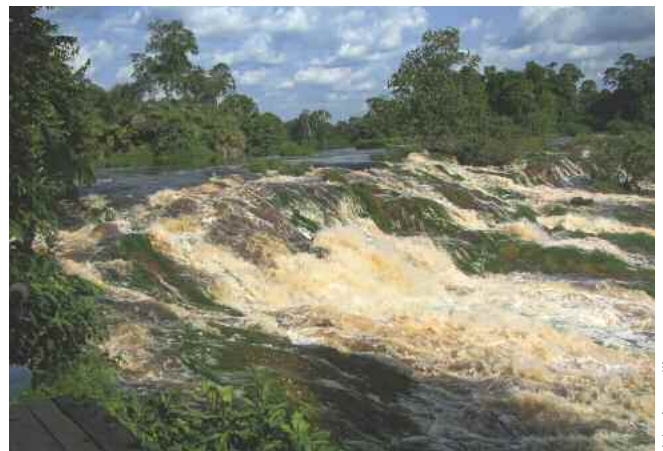
The project would have inundated more than 5,000 square kilometers of Gabon, displacing upstream villages and threatening nearby protected areas. In 2007, a road was built directly through the country's Ivindo National Park. Ona said that poachers have since used the path to access formerly sheltered forest elephants.

Gabon's interior minister has suspended the activities of a nongovernmental coalition that Ona coordinates, and the Brainforest office was ransacked in March 2008. In December, Ona and other civil society leaders were arrested without charge; Ona was

later accused of intent to incite rebellion. "We were arrested because of this small reason, but the real reason is that we're fighting against corruption," said Ona, who denies the government's allegations.

The Belinga mine may not proceed, due to Ona's efforts. The renegotiated contract reduced the forest area affected by the infrastructure construction. Ona said the project is now on hold due to financial uncertainty and Gabon's 2012 presidential election.

Ona appears an unlikely character to confront powerful Gabonese and Chinese authorities. Wheelchair-bound, he contracted polio as a child and his father carried him to school on his back, promising not to abandon him when he could not walk. Likewise, Ona said that he would not abandon Ivindo park and its Kongou Falls if the mine project resumes. "As long as Kongou Falls is still breathing, I will not leave it behind."



John Antonelli

Kongou Falls in Ivindo National Park, Gabon.

Hugo Jabini and Wanze Eduards, Suriname

The Saramaka people, descendents of escaped African slaves, live in 9,000 square kilometers of central Suriname. In the late 1990s, their territory came under threat when the government allowed Chinese logging companies to set up speculation sites without the tribe's permission. "They tried to cut our forests, but we said 'No,'" said Hugo Jabini. "Our territory in Suriname is the only place that the Saramaka have to call home. It is the only place that we exist."

Jabini and Head Captain Wanze Eduards united the Saramaka people to oppose the logging. With help from the international human rights group Forest Peoples Programme, they documented their traditional territory and the loggers' activities. In 2000, they filed a petition with the Inter-American Commission on Human

Rights, which requested that Suriname suspend all development activities on Saramaka lands until the claims were investigated. Nevertheless, the government has allowed at least US\$11 million worth of tropical hardwoods to be exported in recent years, according to former World Bank advisor Robert Goodland.

The human rights commission sent the Saramaka case to the legally binding Inter-American Court of Human Rights, in what amounted to an existential fight for the Saramaka. "If they lose more territory, it would be no exaggeration to say that they will face a substantial risk of irreparable harm to their physical and cultural integrity and survival," Goodland said during court testimony. In 2007, the court ruled that Suriname had violated the Saramaka's right to property and ordered the government to



Captain Wanze Eduards and Hugo Jabini traveling on the Suriname River.

A S I A

Rizwana Hasan, Bangladesh

Many of the world's largest oceangoing vessels reach their final destination on the beaches of Bangladesh. The coast near Chittagong, the country's main seaport, is overwhelmed with scrap metal, toxic oil, and the fumes of the ship-breaking industry.

Some of Bangladesh's poorest citizens disassemble the ships, piece by piece, with little more than blowtorches and sledgehammers. Human rights groups estimate that one worker is killed a week, on average. A few years ago, one worker died and another was knocked unconscious after dropping a heavy metal plate they were carrying. The survivor was taken to a nearby hospital and given saline, but otherwise left to die. "A colleague based in our Chittagong office called and asked what to do," said Rizwana Hasan, executive director of the Bangladesh Environmental Lawyers Association (BELA). "I said, 'Whatever money you have, start his primary treatment.'" Hasan convinced the ship-breaking yard to pay for the four surgeries required to save the worker's life. "Enough was enough. Someone needed to take responsibility for these deaths," she said.

Hasan began battling the ship-breaking industry in 2003, and her firm has since argued that Western nations cannot legally deposit toxin-laden ships in Bangladesh, in accordance with international treaties. In March, the country's Supreme Court ruled that domestic ship-breaking yards must close if they do not possess an environmental clearance. The decision also banned from Bangladeshi waters any vessels that the environmental group Greenpeace lists as carrying untreated toxins.

The case, which BELA brought to court, threatens to close the 36 ship-breaking companies that operate in Bangladesh. In response, the Bangladesh Ship Breakers' Association has stated that it supplies the country with 80 percent of its iron ore, recovered from ship scrap. Directly or indirectly, the association estimates that it provides livelihoods for some 250,000 people.

Thousands of workers from ship-breaking yards protested the Supreme Court's decision—and BELA's involvement. But Hasan argues that the industry is exaggerating its employment

ensure that the logging concessions preserve the group's territory. The court also demanded that Suriname grant the Saramaka "free, informed, and prior consent" for any future development or investment projects that may affect them. The decision was the first international ruling to state that a non-indigenous minority has legal rights to the natural resources within its lands—setting a possible precedent for similar disputes.

For Jabini and Eduards, the decision represented new hope for the Saramaka. They are now exploring plans to expand protected areas around their lands and to develop an ecotourism industry. "The forest means everything to the Saramaka. From it we get our food, our medicines, our homes, everything for life," Eduards said. "We live in the forest and with the forest."

statistics, and that ship-breaking provides less than half of the country's iron. "Even if it is 20,000 [employees], what is happening to these people? They are inhaling asbestos," she said. "Do you want people to choose between employment and unemployment, or do you say that this is a choice between unemployment and exploitation?"

Some 700 ships are sold to ship-breaking yards each year, mostly in China, Bangladesh, and India, according to Greenpeace. As the global fleet ages, the number of ships sold to scrap-paring yards is expected to rise. "There was a point in time when there was ship-breaking in Bangkok, in Vietnam, in other parts of world," Hasan said. "For Bangladesh to decide that they will not continue is not impossible. One just has to show that courage and provide alternatives for its people."



Tom Dusenbery

Rizwana Hasan with ship-breaking workers in Chittagong.



For more information about issues raised in this story, visit www.worldwatch.org/ww/goldman.



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Brazil's Carbon Challenge

Brazil's carbon footprint comes mainly from land uses, not energy.

by *Tim Hirsch*

At the opening ceremony of last year's international climate conference in Poznań, Poland, United Nations Secretary-General Ban Ki-moon praised Brazil for having built "one of the greenest economies in the world." South America's largest country uses renewable energy on a scale (nearly half of total energy consumption) that other major economies can only dream about.

And yet, according to the World Resources Institute, Brazil was the world's fourth largest emitter of greenhouse gases in 2005 (the most recent data year). Its own government's energy plan, published earlier this year, envisages a tripling of emissions from the country's electricity-generating sector over the next 10 years.

These apparently contradictory facts can be explained by three essential elements that give Brazil a unique profile in tackling the global climate challenge: hydropower, sugar-based ethanol, and, most of all, deforestation in the Amazon.

The big picture of Brazil's climate change contribution is this: historic decisions, based not on climate concerns but on

factors such as resource availability and the wish for energy independence, led the country to a relatively low dependency on fossil fuels. Hydroelectric dams dominate the supply of electricity (accounting for some 90 percent of domestically generated power), and Brazilian sugarcane estates have been powering vehicles for 30 years. Unlike every other top emitter, energy plays a relatively small role in Brazil's official greenhouse gas account.

What puts Brazil into the big league of emitters is the use made of its vast land area: land-use change, principally but not exclusively Amazon deforestation, accounts for some 75 percent of annual carbon dioxide emissions. Agriculture makes up an exceptionally high proportion of total greenhouse gases: some 25 percent, mainly methane from cattle and nitrous oxide from farm wastes and fertilizers. The power sector, by contrast, accounts for just 3 percent of greenhouse gas emissions, compared with a global average of 27 percent.

In fact, the green credentials of Brazilian energy production come with complexities and questions attached, which are explored below. From this big picture, however, it becomes clear why controlling deforestation in the Amazon is at the



A sugarcane plantation bisected by powerlines, near Ribeirão Preto, São Paulo state.

heart of the country's climate change policies. There are huge challenges involved, not least overcoming contradictions in the government's policies that often seem to undermine its own ambitions to protect the Amazon. The prize, however, for the world as well as for Brazil, is enormous: at relatively low cost, a significant source of carbon emissions can be reduced dramatically, and an ecosystem of incalculable worth to humanity for reasons other than climate can at last be valued and preserved.

Cutting the Cutting

For years, Brazil resisted setting any firm numerical targets for reducing deforestation in the Amazon, in large part out of reluctance to be held to specific policies in the region by international organizations. Sovereignty over the Amazon is a highly sensitive issue in Brazil and conspiracy theories abound about plots to take it out of the country's control. (Alleged conspirators range from Greenpeace to Prince Charles.)

This made Brazil's National Climate Change Plan, published on December 1, 2008 and presented at the UN climate conference in Poland, all the more of a

landmark in the country's approach to the rainforest. For, at its heart, the plan set specific and detailed targets to reduce the annual deforestation rate in the Amazon by a total of 70 percent between 2006 and 2017. This overall target was divided into three periods of four years each, with a goal of reducing average annual deforestation by 40 percent in the first period and by 30 percent in each of the subsequent periods. The end point of the plan is to bring Amazon deforestation down to around 5,000 square kilometers per year by 2017, compared with an annual average of 19,500 square kilometers in the decade from 1996 to 2006.

In presenting this target, the Brazilian government estimated that achieving it would involve the saving of some 4.8 billion metric tons of carbon dioxide emissions over the 10-year period: to put this in context, the overall greenhouse gas emissions from the whole European Union currently amount to the equivalent of around 5.6 billion tons annually.

Some criticism was made at the time about the starting point or baseline for these deforestation targets: by selecting a period of exceptionally high rates of destruction, even a 70-percent reduction would mean losing an area of forest more

than half the size of the U.S. Yellowstone National Park each year. Even so, given the current annual loss rate of 12,000 square kilometers, the plan is ambitious, and Brazil has received widespread praise for doing what developing countries have so far resisted strongly: putting numbers on greenhouse gas reduction targets.

However, a closer inspection of the climate change target reveals some important nuances that mean net carbon emissions would not necessarily be reduced on the order claimed by the government, even if deforestation slowed along the lines projected. Roberto Smeraldi, director of Friends of the Earth's Amazon program, points out that the only activity referred to in the target, and from which the 4.8 billion tons of CO₂ is calculated, is the clear-cutting of rainforest in the Amazon. It does not make commitments on other significant changes in land use, such as the degradation of Amazon forest, nor on destruction of other Brazilian ecosystems including the woodland-savanna region known as the Cerrado (see map below).

The importance of taking account of forest degradation was revealed recently by the Brazilian National Space Research Institute (INPE), the body responsible for compiling the official deforestation figures from satellite images. In a new initiative, it has developed a technique of analyzing satellite pictures that looks for telltale signs of a forest that has not been fully clear cut but which has been significantly altered, i.e., different coloring of the canopy or the presence of clearings.

The first, preliminary analysis using this technique revealed a shocking trend that was not widely reported outside Brazil. INPE estimated that between 2007 and 2008 the area of degraded Amazon forest rose from approximately 15,000 square kilometers to 25,000, a 66-percent increase. This was in the same period during which the official deforestation figures, recording only clear-cut areas, showed only a slight rise over the previous year, despite fears of a much larger jump.

Smeraldi points out that, should this trend continue, it will



have a significant impact on carbon emissions. “The difference between the amount of carbon emissions from a hectare of degraded Amazon forest, and one hectare of clear-cut Amazon forest, is negligible over time,” he says. “The degraded hectare is only slower in terms of the release than the clear cut, but the overall result is similar.”

Giving Away the Carbon Store

The other gap in the targets of the National Climate Change Plan relates to the widespread changes being made to the Cerrado, the region of central Brazil composed of savanna-type vegetation ranging from scrubby bush to extensive dry forests. Apart from being exceptionally rich in endemic plant species and a wide variety of fauna, the Cerrado stores very significant quantities of carbon. While the amount of vegetation above ground is much less than in a rainforest, many of the fire-tolerant plants in this ecosystem, adapted to long drought periods, have extensive below-ground root systems that contain substantial carbon stocks. The ecosystem has been compared to a forest standing on its head.

The Cerrado is at the front line of agricultural expansion in Brazil; well over half of it has gone under the plow to grow crops such as soy (see back cover), corn, and cotton, or set aside for grazing cattle. It is also the region where much of the new investment is being made to expand sugarcane production for ethanol, although there is a debate over how much of the new plantations will be on degraded land and how much on areas of native vegetation.

Roberto Smeraldi argues that these changes must be taken into account when judging Brazil’s climate performance, since it is estimated that a hectare of Cerrado contains approximately two-thirds the amount of carbon as a hectare of Amazon rainforest. “If you deforest three hectares of Cerrado or two hectares of Amazon forest, you have the same net emission of carbon,” says Smeraldi. “If while reducing further clearcutting of the Amazon you actually increase the occupation of the Cerrado, we might or might not have a net reduction in land-use change emissions in Brazil.”

This exposes one of the potential policy contradictions in Brazil’s “green economy.” If the relatively clean fuel mix used in the country’s vehicle fleet is achieved at the cost of releasing carbon from native ecosystems, the benefits to the climate could be undermined. In presentations made by the Brazilian sugar industry and the government, the point is often made that the focus of sugarcane expansion is thousands of kilometers away from the Amazon—the suggestion being that there is nothing to worry about. The potential impacts on the Cerrado and their implications for both biodiversity and climate are rarely mentioned.

Setting aside the gaps in Brazil’s commitment under the National Climate Change Plan, the big question that remains is whether the targets for reducing Amazon clear-cut deforestation will in fact be achieved. Here, the evidence is mixed. Looking at the satellite evidence of recent months, there does

Typical Cerrado: open savannah with termite mounds, Emas National Park, Goiás state.

appear to have been a significant slowing in the rate of forest loss—although that is perhaps not surprising in the context of the global economic downturn, as the pressures behind deforestation are closely connected with world demand for products such as timber, beef, and soy.

Analysis of the pattern of Amazon deforestation in recent years has shown a close correlation with the price of key agricultural commodities, most notably soy and beef. So the peak of destruction in 2003 coincided with high prices, and declines in subsequent years can be tracked against a fall in those prices. The big challenge for Brazil is whether it can decouple the two so that deforestation will not shoot back up once global demand and prices start to move upward.

There are some signs that this is already beginning to happen, that specific anti-deforestation measures imposed by the Brazilian government are keeping forest clearance below the level that would be expected if commodity prices were the only factor. The non-governmental organization Amazon Institute for People and the Environment (Imazon) carried out a study of precisely this issue, and estimated that in 2007–08 the actual level of deforestation was approximately 13 percent lower than it would have been if it had followed soy and beef prices. The study concluded that about 1,700 square kilometers of rainforest had been saved by government actions imposed in 2008, notably an aggressive operation by state forces against illegal logging, the seizing of cattle grazing illegally in forest areas, and the threat of cutting off credit to landowners who violated environmental legislation.

On the other hand, many groups (including Imazon) see worrying trends in other government policies that could overturn these gains. One of the most controversial is a proposal for “regularization” of land in the Amazon. This is an attempt to address the chaotic occupation of the region since the 1970s, which has left literally hundreds of thousands of farmers and ranchers in a kind of legal limbo, with no title over land that in some cases they have been farming for a generation. The proposal is to introduce a fast-track system of processing these claims, so that occupiers of properties of up to 1,500 hectares (the vast majority) would be granted title to what officially is still public land, with the smaller holdings being





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handed over for free. While there is widespread agreement that the current chaos makes effective enforcement and sustainable development impossible, there are fears that the current proposals will be seen as a reward for the land-grabbers, and could stimulate further deforestation. Brenda Brito of Imazon described the land proposal as a “generous privatization” of the Amazon: “It is a clear incentive for continuing the disorganized occupation of the region, stimulating deforestation to demonstrate use of the land, and to guarantee the regularization of new areas.”

Another government policy that could potentially undermine the gains from anti-deforestation enforcement is the program to integrate the region through infrastructure projects, most notably the building of new highways and the paving of existing ones. In most cases, this involves the completion of the highway network begun by Brazil’s military government in the 1970s. Many of these roads were never paved and have become partially or totally impassable.

Roadbuilding has always had a close connection with deforestation. Take a look at any part of the Amazon on Google Earth, and you can clearly see what is known as the “fishbone

effect”: the appearance of secondary roads at right angles to the main spine of the highway, driving land occupation deep into the forest on either side so that the influence of a road extends far beyond the line of the carriageway. The Brazilian federal environment ministry itself estimates that some 75 percent of deforestation in the past decade has occurred adjacent to paved roads.

Analysis of one of the most controversial current road schemes suggests that the potential climate impacts could be enormous. Among the priority projects for the government is paving the BR-319 federal highway between the Amazon cities of Manaus and Pôrto Velho, a distance of 875 kilometers (see map, page 31). This is one of the highways that has become totally impassable since it was carved out in the 1970s. The idea of the project is to connect Manaus with the markets of the rest of Brazil, and even to the Pacific through a new link via Peru.

The problem is that this highway runs through the heart of one of the least-disturbed areas of rainforest in the western Amazon, far distant from the so-called “arc of deforestation” that is concentrated to the south and east of the region. A study by the Institute for Conservation and Sustainable



Development of Amazonas estimated that the deforestation associated with this single road-paving scheme could release between 950 million and 4.9 billion tons of CO₂ into the atmosphere by 2050, thus undermining a great portion of the gains from controlling deforestation in other areas.

Such a glaring contradiction seems bizarre when such a high profile is being given to Brazil's anti-deforestation measures on the international stage. According to Roberto Smeraldi of Friends of the Earth, the explanation is that the climate goals have not yet filtered down to the specific policies of different government ministries. "The fact is that, so far, sectoral plans in the energy, transport, mining, and agricultural sectors, including cattle ranching, have not taken into account the climate goals," he says. "So you have two parallel types of planning, a cross-cutting climate plan to which no specific ministry is accountable, and ministry-specific sectoral economic plans to which related ministers are accountable, establishing activities and investments without any consideration for climate goals. You guess which one tends to prevail."

A striking example of this dichotomy was widely picked up in the Brazilian press earlier this year, when the Ministry

for Mines and Energy published its 10-year energy plan. Barely a month after receiving its glowing praise from Ban Ki-moon, Brazil was projecting a tripling of greenhouse gas emissions from its electricity sector by 2017, through the construction of 68 new power stations fired by coal, natural gas, and—most controversially—fuel oil and diesel. The priority being reflected in this plan was to build up sufficient generating capacity to avoid the specter of power rationing, imposed in 2001–02 to prevent rolling blackouts in Brazil. Even with this big expansion, the contribution of fossil fuel combustion to Brazil's emissions would remain relatively low, due to the continued domination of hydropower and the dwarfing of power emissions by the impacts of deforestation. Nevertheless, the plan was pilloried by a wide range of critics in Brazil, citing the lack of ambition it expressed for expanding the windpower sector (0.3 percent of generating capacity), or cutting down on the high level of energy wastage due to an inefficient transmission system.

"We are going against the trend of history, and increasing greenhouse gas emissions unnecessarily," commented Luiz Pinguelli Rosa, chairman of Brazil's National Climate Change



Left: The reservoir created by the Balbina dam, in Amazonas state, flooded thousands of hectares of rainforest and left the trees to rot.

Right: The Fishbone Effect, clearly visible in this Landsat image. Land west of the Manora River is in Bolivia, showing different land-use policies.

Forum and coordinator of the year-long consultation that led to the national climate plan. “It is a serious error.”

Hydro Carbon

A final challenge to Brazil’s green credentials on climate change is the issue of hydropower itself. The overwhelming dependence on this renewable source of electricity is what gives the country such a favorable official report card on emissions from energy production. Yet it is well established that large hydroelectric dams can have a significant carbon footprint—first, through the production of large quantities of cement used to construct the dam; next, through deforestation involved in the building of the dam and the flooding of the reservoir behind it; and finally, through the emissions of methane, a powerful greenhouse gas, produced by decomposing vegetation at the bottom of the reservoir and suddenly released through the turbines in what has been called the “soda bottle effect.”

The problem is that because no agreed methodology yet exists for calculating these emissions from large dams, they are simply left out of the greenhouse-gas accounts. The emissions will vary greatly according to the local geology and vegetation, but studies of three major dams in the Amazon have estimated that their emissions are considerably higher per unit of electricity generated than equivalent fossil fuel-burning plants elsewhere in Brazil. So the inclusion in the government’s current infrastructure priorities of major new hydroelectric projects in the Amazon—most notably two big dams on the Madeira River in the state of Rondônia—is seen as another potential conflict with the climate and deforestation policy, especially as the prospect of these major investments has created something of a boom in the region and heated up property speculation in a forest area.

Yet even with all these contradictions, Brazil can be seen as a key world player in the efforts to reduce emissions and combat climate change. A recent report by the McKinsey consulting group estimated that, at relatively low cost, the country could cut its emissions by 70 percent by 2030. Such an action by the world’s fourth-largest emitter would represent an important gain for the climate.



Courtesy NASA, <http://visibleearth.nasa.gov/>

The great bulk of this reduction, according to the McKinsey scenario, would come from reducing deforestation and from changes in agriculture, such as feed supplements to reduce methane emissions from cattle. The report calculated the cost of reducing emissions from Amazon deforestation at €8 per ton—a fraction of the price of cutting emissions in other sectors. Around two-thirds of this cost is accounted for by social investments, such as education and health, with the logic that improving living standards in the region is essential if anti-deforestation measures are to be durable.

The author of the report, Marcus Frank, argues that such investment is essential, and an excellent value for the money for the global community. “We need to recognize there are 25 million people living in the Amazon. So it’s very difficult just to put a fence around the forest and say, well, no more deforestation,” says Frank. “You cannot move 25 million people out of the Amazon. You need to bring them to a living condition that will allow them to live in the forest or in urban areas within the Amazon, and not destroy the forest.”

The Brazilians argue that it is only fair that the rest of the world share the cost of achieving these savings, since the Amazon provides benefits to the entire planet. A new Amazon Fund launched last year is inviting foreign governments, businesses, and individuals to contribute to projects that help to reduce deforestation.

Big questions remain as to whether the Brazilians can really achieve the potentially huge gains to the climate that remain consistent with Brazil’s economic development. It is in the whole world’s interest that they succeed.

Tim Hirsch is a writer and broadcaster specializing in environmental issues in Brazil.



For more information about issues raised in this story, visit www.worldwatch.org/ww/Brazil.



both, Joan A. Wolbier

am I having. I do this at the store, at the office, at home, everywhere I can.

Of course, that doesn't completely eliminate the pressures to keep up with the latest exciting new products and experiences that the consumer culture offers. So I regularly remind myself that there are hundreds of millions who are just as deserving as me but barely have enough to eat (let alone access to consumer goods), so that while all the cultural forces around me encourage me to fly to exotic places, eat until I'm stuffed, buy something because I "deserve it," in reality I am *not* entitled to the consumer lifestyle—no matter how much advertisers, celebrities on TV, and friends and family members tell me otherwise. The only way I will be able to preserve a high-quality life for myself and family (and in my small way help free up resources to allow others to have a decent life while not destroying the longterm viability of the planet) will be to renounce my role as a consumer and help build a new culture reaffirming that wellbeing is not sold at the mall but can only be found through a healthy life, focused on family, friends, and service to the Earth.

Active Political Engagement. *We should be fully engaged citizens, advocating changes in the political systems over which we have influence, so that exploitation of the Earth and those without power will cease and so that fair and sustainable political systems will take root.*

Regardless of where we live, we must be politically engaged if we expect the human species to redirect its path from self-destructive to sustainable. Political systems (whether referring to the rules governing one's office place or the laws of nations) are a leading tool to orient how large groups of people live. Consciously shaping these rules with the Earth's natural limits in mind will be essential for putting humanity on a sustainable path.

Easy to say, hard to do. First, the rules of most systems are stacked against engagement—whether because of the extensive political influence of private interests that weakens the voice of the people, or (in some countries) the risk of death or imprisonment if one speaks up for change. Second, there are so many other, more satisfying ways to spend one's time: with friends, watching the latest movie, even volunteering at the local soup

kitchen, which feels like a more tangible way to help people. Third, there are so many campaigns, so many crises to choose from—climate change, health care, education, gay rights, abortion, gun control, immigration, and on and on—that it's hard to know which to focus on.

Addressing the first obstacle may be as simple as just committing to being active, regardless of the barriers. Naturally, the barriers you face will shape *how* you get involved, but by staying silent, you're handing the victory to those who currently control the system—not likely leading proponents of sustainability.

Second, you can find a way to make political engagement satisfying. Recruit friends so that advocacy becomes a social event. Choose efforts that work with your personality—an introvert might choose to do the essential behind-the-scenes work instead of lobbying or protesting.

Third, seek a campaign that keeps you energized and excited, and that addresses root causes. Look at climate change, for example—we're trying to regulate emissions while ignoring their ultimate source, our consumer culture. As essential as it is to pass a carbon tax, passing subtler laws that address climate change and improve quality of life (while building up barriers against consumerism) is also important. A law that shortens the work week could not only improve quality of life for millions, but also create jobs while reducing pay to each employee. So some—with the new jobs—will have better access to the basics, while others will have smaller salaries, which would mean less spending on superfluous consumer goods that keep us distracted and pollute our environment.

So, get engaged, make it fun, and choose how you participate wisely. And when you start to run out of steam, just remember Horace Mann's words: "Be ashamed to die until you have won some victory for humanity."

A woman in a red sari is the central focus, holding a sleeping baby in a black sleeveless top. She has a serious, determined expression. The background is a blurred crowd of people, suggesting a community setting. A piece of torn paper with the handwritten text "I am powerful." is positioned in the upper right corner.

I am powerful.

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Four Great Powers

Per-capita energy consumption (tons of oil equivalent)	
in Qatar (1st of 137 countries), 2006	22.07
In Iceland (2nd)	14.23
In Bahrain (3rd)	11.87
In Senegal (134th)	0.25
In Bangladesh (136th)	0.16
In Eritrea (137th)	0.15



Per-capita food calories (Kcal) consumed daily in the United States	
(1st of 175 countries), 2003	3,753
In Portugal (2nd)	3,746
In Austria (3rd)	3,731
In Burundi (173rd)	1,647
In Democratic Republic of the Congo (174th)	1,605
In Eritrea (175th)	1,519



Per-capita income (\$), purchasing power parity basis, in Liechtenstein	
(1st of 193 countries), 2007	118,000
In Qatar (2nd), 2008	103,500
In Luxembourg (3rd), 2008	81,100
In Liberia (191st), 2008	500
In Burundi (192nd), 2008	400
In Democratic Republic of the Congo (193rd), 2008	300

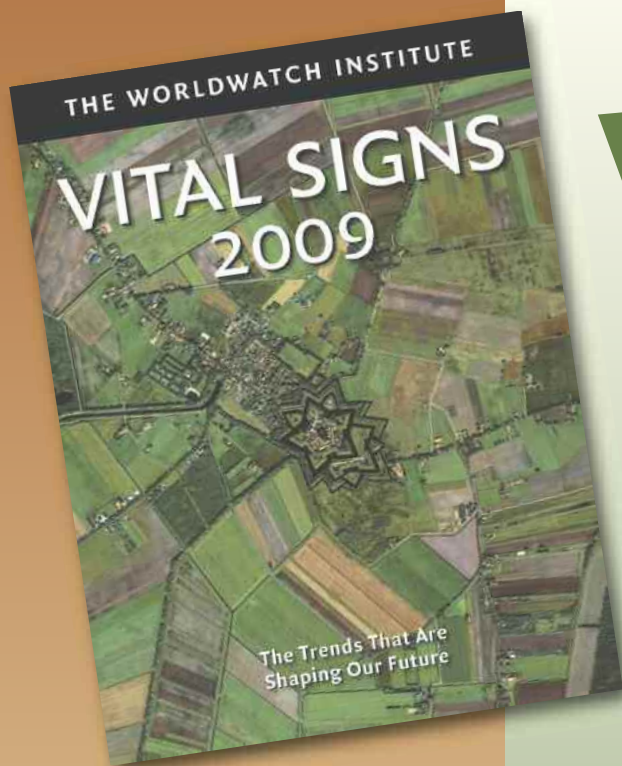


Democracy ranking (based on human and political rights, free speech, and corruption)	
of Denmark, out of 210 countries, 2008	1
Of Sweden	2
Of Finland	3
Of Uzbekistan	208
Of Turkmenistan	209
Of Myanmar	210

SOURCES: Energy: International Energy Agency. Food: UN Food and Agriculture Organization. Purchasing power: CIA World Factbook. Democracy ranking: WorldAudit.org.



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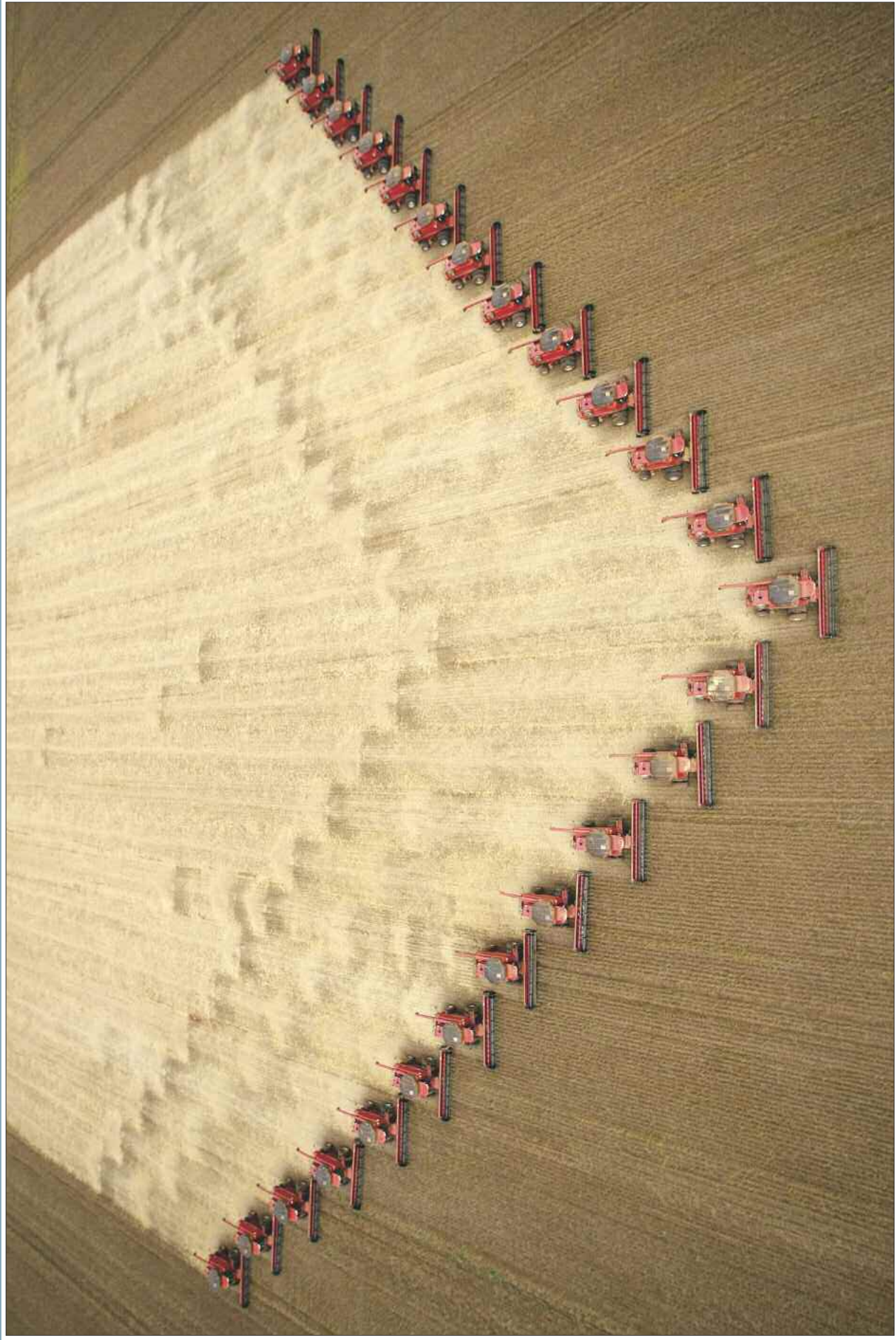
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Capturing Soybeans, Releasing Carbon. A phalanx of combines harvests soybeans last March at a farm in Tangara da Serra, Mato Grosso state, western Brazil. Vast farms like this one, when converted from Mato Grosso's Cerrado savannah, release two-thirds as much carbon per hectare as cleared Amazon rainforest. See *article on page 30*.