

Rachel's Environment & Health News

#472 - The Four Horsemen -- Part 2: Loss of Biodiversity

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The loss of biodiversity is the most difficult problem we face. Loss of species is permanent. Ingenuity can replace a whale-oil lamp with an electric light bulb, but it cannot replace the whales after we hunt them to extinction.[1]

Driving species to extinction is probably the only permanent change that people can make to the earth; anything else will probably be repaired, in the long run, by natural processes.

Extinction itself is a natural process. But humans have speeded up that process greatly; extinctions are now occurring at a rate 100 to 1000 times faster than the natural rate of extinctions (see REHW #441).[2]

Extinctions are dangerous for humans, but it is not immediately clear just how dangerous. In their 1984 book, *EXTINCTION*, Paul and Anne Ehrlich compare our situation to an airplane held together by rivets. As time goes on, an occasional rivet will pop out. No single rivet is essential for maintaining flight, but eventually if we pop enough rivets, a crash seems certain to occur. So it is with humans and the other species with whom we share the planet. No single species is essential to our well being, yet it is certain that we need biological diversity in order to survive. Therefore each time we diminish diversity, we take another irreversible step toward the brink of a dark abyss. In the process, we desecrate the wondrous works of the creator.

There is a growing body of scientific literature about the loss of biodiversity, which reveals a consensus that humans are the cause of the speedup of species extinction, and therefore of the loss of biodiversity.[3]

There are now about 5.7 billion humans on earth and our numbers are growing at about 1.6% each year, doubling the total population every 44 years. Each month now, we add new people equal in number to the population of New York City (about 8 million people)--a quarter of a million new mouths to feed each day. It will not be easy to keep this up. The world's farm land is already stressed, and in short supply. Furthermore, soil erosion is reducing the available supply of good land; each year about 12 million hectares (29.6 million acres) of arable land are destroyed and abandoned because of unsustainable farming practices --0.8% of the world's total arable land lost each year. To adequately feed people a diverse diet requires about 0.5 hectares (1.2 acres) of arable land per person, but only 0.27 hectares (0.7 acres) is available today. According to David Pimentel (Cornell University), in 40 years available land will be down to 0.14 hectares (0.35 acres) per person because of soil erosion and population growth. [4]

It is not easy to assess the total impact of humans on the planet. There are various ways to look at it. For instance, humans have so far changed about half of earth's ice-free land surface.[5] Furthermore, 43% of the earth's land surface has been judged "degraded," defined as "having diminished capacity to supply benefits to humanity." [6] One more doubling of our population and we'll have changed a very large fraction of the planet's vegetated surface, and will have degraded much of that. In addition, we humans are presently using, or preventing other species from using (for example, by grazing our domestic animals), about 40% of terrestrial (non-oceanic) "net primary productivity." "Net primary productivity" is the amount of new vegetable matter created each year by photosynthesis as plants use the energy of sunlight to combine water and carbon dioxide into carbohydrates, the base of all the world's terrestrial food chains.[7] One more doubling of us and there will be precious little "net primary productivity" left for other species --surely an ominous prospect. We humans depend upon other species. We seem to be gnawing holes in our own lifeboat.

Even more ominous is that we have run out of waste-disposal room on the planet. The world used to be empty, but now it is full.[8] There is no place left to isolate our residues without harming

something or someone. There is abundant evidence supporting this proposition. Global warming. Depletion of the earth's protective ozone layer. Destruction of the world's forests. (Half the world's moist forests --home to most of the world's species --have been destroyed, and the destruction is continuing.) The accelerated rates of species extinction, already noted. The decline of amphibians. The bleaching of coral reefs. The appearance of phytoplankton blooms in numerous coastal waters. The decline of sea urchins. Mass die-offs of seals and dolphins. Cancer epizootics in fish.[9] (An epizootic is a disease affecting large numbers of animals of one kind at the same time.)

Of course we humans are not exempt from these troubles. Our own rates of cancer are rising, as are rates of nervous system disease, immune system disorders, hormone imbalances, and birth defects. (See, for example, REHW #385, #376, #365, #446, #410, #411.)

Solutions[10]

In March of this year, 180 countries held a World Summit on Social Development, endorsing the statement that "social development and justice are indispensable for the achievement and maintenance of peace and security within and among nations." [11] They might as well have added "and among species," for preserving biodiversity will require us to curb human population, and curbing human population will require us to end the absolute poverty that afflicts 1.5 billion humans. When poverty diminishes, so does the pressure to have many children.

But ending poverty will require the developed world to reverse some traditional policies. As things now stand, the inequality between nations is growing larger each year. As time passes, the rich nations are gathering more of the planet's available benefits unto themselves, leaving less and less for the rest of the world. In 1960, the richest countries with 20% of world population received 70.2% of global income, while the poorest countries with 20% of world population received 2.3% of global income. Thus the ratio of income per person between the top fifth and the bottom fifth was 31:1 in 1960. In 1970, that ratio was 32:1; in 1980, 45:1; by 1991, the ratio had grown to 61:1. In constant [inflation-adjusted] 1989 U.S. dollars, the absolute gap in per-capita annual income between the top fifth and the bottom fifth rose from \$1864 in 1960 to \$15,149 in 1989.[12] An immediate, affordable positive step would be to cancel the debts accrued in recent years by the developing world.[13]

Ending poverty will require changes in parts of the developing world as well: for example, more education, better health care, and expanded political rights and social opportunity for girls and women can create more productive social conditions.[14]

But ending poverty will also require transfer of skills and technology to the developing world, to promote economic growth, meaning growth of material goods. To make room for such growth on a finite planet, the developed world needs to take the lead by curbing its own grotesque excesses: greatly reducing the use and waste of fossil fuels; of persistent, bioaccumulative toxic chemicals; of wood; of virgin metals. This implies less logging, less mining, less profligate and wasteful consumption of all kinds. We need to eat less meat; harvest (and waste) fewer fish; eat lower on the food chain--thus benefitting the planet and our own health.[15] Furthermore, the developed world needs to achieve negative population growth, reducing its absolute numbers. After all, a child born in a rich nation is vastly more destructive of the planet than a child born to a peasant family in Asia or Latin America.

These suggestions for change seem far-reaching, but in truth we need to go farther. Saving biodiversity requires leaving large tracts of land in a natural state --or returning large tracts of land to a natural state. It is not enough to merely stop cutting new roads; we need to close old roads and revegetate. (In the U.S., there are 350,000 miles of logging roads in national forests --over 7 times the

length of the interstate highway system. Many of these should be closed.) In general, we need to pave less land, and unpave more land. We need to use fewer synthetic fertilizers and pesticides, learning (re-learning, actually) to grow our crops in a more natural "organic" way. We need to re-think what we call "development," including subdivisions and one-acre lots. There was a time when these could be justified as beneficial, but that time has passed. We need to curb sprawl and we need to reverse the many public subsidies that promote it. We need to live closer together.

Many of these suggestions will require governments to set limits and boundaries because free markets --despite their many merits --tend to work poorly in allocating resources for preserving the environment and biodiversity.[16] Acting through democratic government, an organized citizenry can impose values on their local free-market economy, making sure it works for their long-term benefit and not against it.[17]

In sum, we would do well to remember that, if there is a conflict between nature and humans, nature will resolve that conflict in its own way. We should also recognize that bold new departures are needed chiefly because we are the first generation that has faced the prospect of a "full world." And we are the last generation that has the opportunity to do something about it in an orderly way.

--Peter Montague

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[1] Stuart L. Pimm and others, "The Future of Biodiversity," *SCIENCE* Vol. 269 (July 21, 1995), pgs. 347-350.

[2] Stuart Pimm, "Seeds of Our Own destruction," *NEW SCIENTIST* Vol. 146, No. 1972 (April 8, 1995), pgs. 31-35.

[3] For example, see Bryan G. Norton, editor, *THE PRESERVATION OF SPECIES* (Princeton, N.J.: Princeton University Press, 1986); Reed F. Noss and Allen Y. Cooperrider, *SAVING NATURE'S LEGACY* (Washington, D.C.: Island Press, 1994); and Edward O. Wilson, *THE DIVERSITY OF LIFE* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1992).

[4] David Pimental and others, "Environmental and Economic Costs of Soil Erosion and Conservation Benefits," *SCIENCE* Vol. 267 (February 24, 1995), pgs. 1117-1123.

[5] Peter M. Vitousek, "Beyond Global Warming: Ecology and Global Change," *ECOLOGY* Vol. 75, No. 7 (October 1994), pgs. 1861-1876.

[6] Gretchen C. Daily, "Restoring Value to the World's Degraded Lands," *SCIENCE* Vol. 269 (July 21, 1995), pgs. 350-354.

[7] Peter M. Vitousek and others, "Human Appropriation of the Products of Photosynthesis," *BIOSCIENCE* Vol. 36, No. 6 (June, 1986), pgs. 368-373.

[8] Robert Goodland, "The Case That the World Has Reached Limits," in Robert Goodland, Herman Daly and Salah El Sarafy, editors, *ENVIRONMENTALLY SUSTAINABLE ECONOMIC DEVELOPMENT BUILDING ON BRUNDTLAND* [Environment Working Paper No. 46] (Washington, D.C.: World Bank, July 1991), pgs. 5-17.

[9] Norman Myers, "Environmental Unknowns," *SCIENCE* Vol. 269 (July 21, 1995), pgs. 358-360. And see: William M. Stigliani and others, "Chemical Time Bombs," *ENVIRONMENT* Vol 33, No. 4 (May 1991), pgs. 5-9, 26-30.

[10] Thanks to Peter Bahouth for contributing ideas to this section; however, he bears no responsibility for their presentation here.

[11] "U.N. 'Social Summit' Held in Copenhagen; Delegates Reach Consensus on Poverty," *FACTS ON FILE WORLD NEWS DIGEST* March 16, 1995, pg. 182A2.

[12] See Joel E. Cohen, "Population Growth and Earth's Human Carrying Capacity," *SCIENCE* Vol. 269 (July 21, 1995), pgs. 341-346.

[13] We can easily afford to do this; see Paul Krugman, "Third World Debt," in *THE AGE OF DIMINISHED EXPECTATIONS* (Cambridge, Mass.: MIT Press, 1992), pgs. 143-151.

[14] These ideas were endorsed at the September, 1994, U.N. Population Conference in Cairo, attended by 179 nations. See *FACTS ON FILE WORLD DIGEST* September 22, 1994, pg. 675A2.

[15] Jane E. Brody, "Health Toll of Meat Diet Is Billions, Study Says," *NEW YORK TIMES* November 21, 1995, pg. C6.

[16] See David E. Bloom, "International Public Opinion on the Environment," *SCIENCE* Vol. 269 (July 21, 1995), pgs. 354-358. And see Herman E. Daly and John B. Cobb, Jr., *FOR THE COMMON GOOD* [Second Edition] (Boston: Beacon Press, 1994).

[17] This is a subject to which we will return when we continue our series on "Sustainable America" which began in *RACHEL'S* #458, #459, #460, #461, and #465.

Descriptor terms: species loss; biodiversity; land use; consumption; extinction; human population; arable land; agriculture; farming; food supply; net primary productivity; photosynthesis; global warming; ozone depletion; forests; amphibians; frogs; salamanders; phytoplankton; sea urchins; coral reefs; seals; dolphins; fish; wildlife; cancer; epizootics; poverty; inequality; income distribution; women's rights; growth; logging; mining; energy conservation; nature preserves;