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## **Environmental Heresies**

The founder of The Whole Earth Catalog believes the environmental movement will soon reverse its position on four core issues.

By Stewart Brand

Over the next ten years, I predict, the mainstream of the environmental movement will reverse its opinion and activism in four major areas: population growth, urbanization, genetically engineered organisms, and nuclear power.

Reversals of this sort have occurred before. Wildfire went from universal menace in mid-20th century to honored natural force and forestry tool now, from "Only you can prevent forest fires!" to let-burn policies and prescribed fires for understory management. The structure of such reversals reveals a hidden strength in the environmental movement and explains why it is likely to keep on growing in influence from decade to decade and perhaps century to century.

The success of the environmental movement is driven by two powerful forces -- romanticism and science -- that are often in opposition. The romantics identify with natural systems; the scientists study natural systems. The romantics are moralistic, rebellious against the perceived dominant power, and combative against any who appear to stray from the true path. They hate to admit mistakes or change direction. The scientists are ethicalistic, rebellious against any perceived dominant paradigm, and combative against each other. For them, admitting mistakes is what science is.

There are a great many more environmental romantics than there are scientists. That's fortunate, since their inspiration means that most people in developed societies see themselves as environmentalists. But it also means that scientific perceptions are always a minority view, easily ignored, suppressed, or demonized if they don't fit the consensus story line.

Take population growth. For 50 years, the demographers in charge of human population projections for the United Nations released hard numbers that substantiated environmentalists' greatest fears about indefinite exponential population increase. For a while, those projections proved fairly accurate. However, in the 1990s, the U.N. started taking a closer look at fertility patterns, and in 2002, it adopted a new theory that shocked many demographers: human population is leveling off rapidly, even precipitously, in developed countries, with the rest of the world soon to follow. Most

environmentalists still haven't got the word. Worldwide, birthrates are in free fall. Around one-third of countries now have birthrates below replacement level (2.1 children per woman) and sinking. Nowhere does the downward trend show signs of leveling off. Nations already in a birth dearth crisis include Japan, Italy, Spain, Germany, and Russia -- whose population is now in absolute decline and is expected to be 30 percent lower by 2050. On every part of every continent and in every culture (even Mormon), birthrates are headed down. They reach replacement level and keep on dropping. It turns out that population decrease accelerates downward just as fiercely as population increase accelerated upward, for the same reason. Any variation from the 2.1 rate compounds over time.

That's great news for environmentalists (or it will be when finally noticed), but they need to recognize what caused the turnaround. The world population growth rate actually peaked at 2 percent way back in 1968, the very year my old teacher Paul Ehrlich published *The Population Bomb*. The world's women didn't suddenly have fewer kids because of his book, though. They had fewer kids because they moved to town.

Cities are population sinks-always have been. Although more children are an asset in the countryside, they're a liability in the city. A global tipping point in urbanization is what stopped the population explosion. As of this year, 50 percent of the world's population lives in cities, with 61 percent expected by 2030. In 1800 it was 3 percent; in 1900 it was 14 percent.

The environmentalist aesthetic is to love villages and despise cities. My mind got changed on the subject a few years ago by an Indian acquaintance who told me that in Indian villages the women obeyed their husbands and family elders, pounded grain, and sang. But, the acquaintance explained, when Indian women immigrated to cities, they got jobs, started businesses, and demanded their children be educated. They became more independent, as they became less fundamentalist in their religious beliefs. Urbanization is the most massive and sudden shift of humanity in its history. Environmentalists will be rewarded if they welcome it and get out in front of it. In every single region in the world, including the U.S., small towns and rural areas are emptying out. The trees and wildlife are returning. Now is the time to put in place permanent protection for those rural environments. Meanwhile, the global population of illegal urban squatters -- which Robert Neuwirth's book *Shadow Cities* already estimates at a billion -- is growing fast. Environmentalists could help ensure that the new dominant human habitat is humane and has a reduced footprint of overall environmental impact.

Along with rethinking cities, environmentalists will need to rethink biotechnology.

One area of biotech with huge promise and some drawbacks is genetic engineering, so far violently rejected by the environmental movement. That rejection is, I think, a mistake. Why was water fluoridization rejected by the political right and "frankenfood" by the political left? The answer, I suspect, is that fluoridization came from government and genetically modified (GM) crops from corporations. If the origins had been reversed -- as they could have been -- the positions would be reversed, too.

## **Embracing GMOs**

Ignore the origin and look at the technology on its own terms. (This will be easier with the emergence of "open source" genetic engineering, which could work around restrictive corporate patents.) What is its net effect on the environment? GM crops are more efficient, giving higher yield on less land with less use of pesticides and herbicides. That's why the Amish, the most technology-suspicious group in America (and the best farmers), have enthusiastically adopted GM crops.

There has yet to be a public debate among environmentalists about genetic engineering. Most of the scare stories that go around (Monarch caterpillars harmed by GM pollen!) have as much substance as urban legends about toxic rat urine on Coke can lids. Solid research is seldom reported widely, partly because no news is not news. A number of leading biologists in the U.S. are also leading environmentalists. I've asked them how worried they are about genetically engineered organisms. Their answer is "Not much," because they know from their own work how robust wild ecologies are in defending against new genes, no matter how exotic. They don't say so in public because they feel that entering the GM debate would strain relations with allies and would distract from their main focus, which is to research and defend biodiversity.

The best way for doubters to control a questionable new technology is to embrace it, lest it remain wholly in the hands of enthusiasts who think there is nothing questionable about it. I would love to see what a cadre of hard-over environmental scientists could do with genetic engineering. Besides assuring the kind of transparency needed for intelligent regulation, they could direct a powerful new tool at some of the most vexed problems in the field.

For instance, invasive species. Most of the current mass extinctions of native species is caused by habitat loss, a problem whose cure is well known-identify the crucial habitats and preserve, protect, and restore them. The second greatest cause of extinctions is coming from invasive species, where no solution is in sight. Kudzu takes over the American South, brown tree snakes take over Guam (up to 5,000 a square kilometer), zebra mussels and mitten crabs take over the U.S. waterways, fire ants and

fiendishly collaborative Argentine ants take over the ground, and not a thing can be done. Volunteers like me get off on yanking up invasive French broom and Cape ivy, but it's just sand castles against a rising tide. I can't wait for some engineered organism, probably microbial, that will target bad actors like zebra mussels and eat them, or interrupt their reproductive pathway, and then die out.

Now we come to the most profound environmental problem of all, the one that trumps everything: global climate change. Its effect on natural systems and on civilization will be a universal permanent disaster. It may be slow and relentless -- higher temperature, rising oceans, more extreme weather getting progressively worse over a century. Or it may be "abrupt climate change": an increase of fresh water in the north Atlantic shuts down the Gulf Stream within a decade, and Europe freezes while the rest of the world gets drier and windier. (I was involved in the 2003 Pentagon study on this matter, which spelled out how a climate change like the one 8,200 years ago could occur suddenly.)

## **Let's Go Nuclear**

Can climate change be slowed and catastrophe avoided? They can to the degree that humanity influences climate dynamics. The primary cause of global climate change is our burning of fossil fuels for energy.

So everything must be done to increase energy efficiency and decarbonize energy production. Kyoto accords, radical conservation in energy transmission and use, wind energy, solar energy, passive solar, hydroelectric energy, biomass, the whole gamut. But add them all up and it's still only a fraction of enough. Massive carbon "sequestration" (extraction) from the atmosphere, perhaps via biotech, is a widely held hope, but it's just a hope. The only technology ready to fill the gap and stop the carbon dioxide loading of the atmosphere is nuclear power.

Nuclear certainly has problems -- accidents, waste storage, high construction costs, and the possible use of its fuel in weapons. It also has advantages besides the overwhelming one of being atmospherically clean. The industry is mature, with a half-century of experience and ever improved engineering behind it. Problematic early reactors like the ones at Three Mile Island and Chernobyl can be supplanted by new, smaller-scale, meltdown-proof reactors like the ones that use the pebble-bed design. Nuclear power plants are very high yield, with low-cost fuel. Finally, they offer the best avenue to a "hydrogen economy," combining high energy and high heat in one place for optimal hydrogen generation.

The storage of radioactive waste is a surmountable problem (see "[A New Vision for](#)

[Nuclear Waste](#)," December 2004). Many reactors now have fields of dry-storage casks nearby. Those casks are transportable. It would be prudent to move them into well-guarded centralized locations. Many nations address the waste storage problem by reprocessing their spent fuel, but that has the side effect of producing material that can be used in weapons. One solution would be a global supplier of reactor fuel, which takes back spent fuel from customers around the world for reprocessing. That's the kind of idea that can go from "Impractical!" to "Necessary!" in a season, depending on world events.

The environmental movement has a quasi-religious aversion to nuclear energy. The few prominent environmentalists who have spoken out in its favor -- Gaia theorist James Lovelock, Greenpeace cofounder Patrick Moore, Friend of the Earth Hugh Montefiore -- have been privately anathematized by other environmentalists. Public excoriation, however, would invite public debate, which so far has not been welcome.

Nuclear could go either way. It would take only one more Chernobyl-type event in Russia's older reactors (all too possible, given the poor state of oversight there) to make the nuclear taboo permanent, to the great detriment of the world's atmospheric health. Everything depends on getting new and better nuclear technology designed and built.

Years ago, environmentalists hated cars and wanted to ban them. Then physicist Amory Lovins came along, saw that the automobile was the perfect leverage point for large-scale energy conservation, and set about designing and promoting drastically more efficient cars. Gas-electric hybrid vehicles are now on the road, performing public good. The United States, Lovins says, can be the Saudi Arabia of nega-watts: Americans are so wasteful of energy that their conservation efforts can have an enormous effect. Single-handedly, Lovins converted the environmental movement from loathing of the auto industry to fruitful engagement with it.

Someone could do the same with nuclear power plants. Lovins refuses to. The field is open, and the need is great.

Within the environmental movement, scientists are the radical minority leading the way. They are already transforming the perspective on urbanization and population growth. But their radicalism and leadership will have to increase if humanity is to harness green biotech and step up to its responsibilities for the global climate. The romantics are right, after all: we are indivisible from the earth's natural systems.

