

Reading From:

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# Environmental Problems and Ecosystems

Assuming that your parents paid attention to the news, how many of these words or phrases do you think they would have found familiar when they were your age?

*Acid rain, air pollution, smog, thermal inversion, deforestation, global warming/greenhouse effect, indoor air pollution, landfill overcrowding, low level nuclear wastes, meltdown, eutrophication, urban sprawl, landfill overcrowding, ozone depletion, global warming, Kyoto treaty, radiation from power lines, species extinction, sustainable development, biodiversity, toxic waste dump, desertification, green politics, green consumerism, NIMBY syndrome*

My guess is that they would have been familiar with two or three of them at the most (probably air pollution/smog, and toxic waste dump). My guess is also that you have at least heard of many of them. That, I think, is one measure of how rapidly and pervasively environmental issues and problems have entered the popular consciousness and political discourse of our times. This book is about those problems, their human causes and implications.

In the last several decades, just behind the headlines about politics, jobs, crime, and other perennial media topics, there has been a steady barrage of news items about environmental problems and controversies. I'm sure the environmental news is not really news to you. But, just for openers—to frame but not analyze issues—here's a quick and selective laundry list of some particularly newsworthy environmental issues of our times and some controversies surrounding them.

## ENVIRONMENTAL NEWS

### The Vanishing Wilderness

The world's forests are gradually being destroyed. In 1999, half of the forests that once blanketed the earth—3 million hectares—were gone. And the loss has accelerated since the 1960s, so that each year another 16 million hectares are converted to "other uses." Deforestation is not the only problem: secondary (regrown) forests are very different from the original ones and the fragmentation is a serious problem (Abramovitz, 1998:124—125).

There are now few virgin or "old-growth" forests left anywhere in the world. The rainforests of the tropics and subtropics are being rapidly depleted as is the planet's great conifer forest on the Pacific Northwest coast in the United States and Canada, stretching from the Olympia Peninsula in Washington to the Tongas forest in Alaska. In parts of the world, trees are cut for fuel wood by villagers, but mostly they have been destroyed commercially for lumber or to clear land for agriculture. Trees and forests are particularly important because they hold soil, maintain water tables,

and recycle the gases that maintain the chemical balance of the atmosphere. Virgin rainforests, or “old-growth” forests, are particularly important in that they provide habitats for species of living things that live nowhere else (Raven, 1990; Rohr, 1992).

Along with the coastal wetlands, marshes, and mangroves swamps— also diminishing rapidly because of pollution and the encroachment of human settlements—the rainforests are the great genetic “biological storehouses” of the planet. But at the rate of destruction of the forests and wetland habitats, at least fifty to one hundred species disappear each day—for good (Rohr, 1992). Why worry? Because time after time species thought useless have proven essential to the ecological systems that support humans. Living things in little known corners of the world have also provided invaluable sources of human medicines, including those that treat cancer, malaria, leukemia and Hodgkin’s disease, high blood pressure, and multiple sclerosis (Miller, 1998: 335—344).

### **Agricultural Resources under Stress**

The resources that produce human food are also threatened. Crop and range land is threatened by soil erosion and degradation resulting from overuse. More land has been brought into agricultural production—some of it fragile and marginal land—and irrigation, fertilizers, and new seed hybrids have steadily increased *total* food production. But *per capita* food production has declined in the last decade, so that in the context of growing human population an era dominated by food surpluses may be coming to an end (Brown, 1998:13). Furthermore, a 1992 United Nations report alarmed experts about the degree to which soils are eroding and being degraded around the planet. The problem is that each year the world’s farmers must feed millions more people with billions of tons less topsoil.

The consequences of overharvesting and poor resource management is not limited to the land: The world’s fish catch peaked in the 1970s and has steadily declined. In spite of the catches by Mexican and Indonesian fishers that resulted in an exceptional world catch in 1996, the United Nations Food and Agriculture Organization (FAQ) estimates that eleven of the world’s fifteen major ocean fishing grounds are seriously depleted (Strauss, 1998: 34).

But the most critical resource for agriculture as well as industrial and household use—clean, fresh water—is coming to be in short supply on a global basis. As agriculture, populations, and human economies grew, global water use increased dramatically since the 1950s, and the consequences of such expanding demand are becoming apparent in falling water tables, shrinking lakes and wetlands, and dwindling streams and rivers. Around the world water shortages result in economic and legal conflict, and they amplify international tensions in water-short areas (Livernash and Rodenberg, 1998: 20).

### **Pollution and Other Garbage**

Environmental problems are not limited to the overuse and poor management of physical and biological resources. They also involve the *pollution and wastes* (or “effluents”) that result from human social and economic activity. In the United States, 25 percent to 75 percent of the groundwater is polluted by some combination of seepage from underground storage tanks, hazardous wastes, sewage and landfills drainage, or from accumulated nitrates, pesticides, and herbicides from farming. Hazardous wastes are stored in *thousands* of contaminated sites that may threaten human health or the environmental system (Miller, 1998: 534, 566).

Americans generate 200 million tons of solid municipal waste per year, commonly called *garbage* (Miller, 1998: 566). Many municipal landfills are overflowing or reaching capacity, even though local communities resist building more landfills and garbage dumps “in their back yards.” The problem is so visible and severe that garbage has been dumped at sea or “exported” away from cities, sometimes to less developed countries, and in wealthier nations many communities are experimenting with recycling programs to deal with its vast flow (Stark, 1999).

Various forms of air pollution also present problems. *Acid rain* produced from automobile and industrial emissions has killed or damaged forests in Appalachia and the New England states as well as in Canada, the Black Forest in Germany, Poland, and Central Europe. In Eastern Europe and Russia, these conditions have produced shortened life expectancy, soaring cancer rates, and a host of other maladies (French, 1990: 11—20).<sup>7</sup> Dangers from urban *smog*, produced by auto and industrial exhausts trapped under atmospheric thermal inversion layers, have been improved in the industrial companies by modern air pollution controls. But the hazardous health experiences of London, Los Angeles, and Pittsburgh are now being repeated in Mexico City, New Delhi, São Paulo, and many other places in the industrial world. Each year, coal burning kills prematurely an estimated 178,000 persons in China alone (Flavin and Dunn, 1999: 25).

The high-drama media events of chemical pollution are, of course, the *ocean oil spills*, which have visible and environmentally devastating effects. Oil spills from offshore production rigs and tankers have not been rare events. North Americans remember them from Santa Barbara in 1969 to the Gulf of Mexico near the Mexican and Texas coastlines in 1997, with the megaspill being the 1989 wreck of the tanker Exxon *Valdez* in the pristine northern environment of Prince William Sound in Alaska. Hitting submerged rocks, the tanker created an oil slick that coated more than 1,600 kilometers (1,000 miles) of shoreline. The full number of wildlife lost will never be fully known because most died and decomposed without being counted. The good news is that many wildlife populations are recovering, but long-term effects on such natural ecosystems are unknown. The company was required to spend billions on a cleanup that in some ways did more harm than good. *But you need to know that more oil is released during the normal operations of offshore wells—washing tankers and releasing oily water into the seas—and from pipeline and storage tank leaks.* A 1993 study found that U.S. oil companies spilled or leaked as much as 1,000 huge Exxon *Valdez* tankers—*more oil than Australia uses* (Miller, 1998: 527—529)!

A frightening potential form of toxic waste is the *radioactive material* associated with nuclear power plants. Doses of strong nuclear radiation can kill quickly, but low doses have the potential to produce, over time, much higher rates of genetic mutations, birth disorders, and fatal cancers. Several nuclear plant “mishaps” have almost occurred around the world, (notably Three Mile Island, Pennsylvania, in 1979), and the Chernobyl reactor in Kiev, USSR (now Ukraine) actually did explode in 1986. Because of their long-lasting toxicity, however, even in the absence of such a catastrophic event the radioactive waste materials from such power plants are problems in themselves: Where and how to store these materials undisturbed by leaks, geological disturbances, human sabotage or error for hundreds of years? But such accumulating nuclear wastes *have* to be stored somewhere, as long as we produce electricity in such a way. In your back yard, maybe?

### **The Spectre of Climate Change**

I’ve saved the broadest and most controversial environmental threat of the millennium till last. Climatologists have noted that for several decades carbon dioxide and other gases have been accumulating in the atmosphere. As they accumulate, those gases increase the amount of heat retained in the atmosphere, just like the glass panes in a greenhouse or your car window on a hot summer day. The earth’s temperature *is* measurably warming, and such fluctuations have happened “naturally” before in history and prehistory, but over *very long* time spans. By 1997, the Intergovernmental Panel on Climate Change (IPCC) had taken the position that the rapid increase in greenhouse gases is the gradual result of the combustion of carbon fuels and other emissions produced by modern societies, which now emit literally billions of tons of carbon dioxide and other gases into the atmosphere per year. This would likely result in a “wide array of dislocation to human and natural systems” (Dunn, 1998: 66). Most relevant scientists agree, but some do not. As you may know, there are not only scientific uncertainties here, but also intense public and political controversies about dealing with their implications. One hundred and seventy-one nations, including the United States, agreed to do so at Kyoto, Japan in 1997. But, strongly influenced by American petrochemical industries, the U.S. Senate pledged not to ratify the treaty if it were sent to them by the president. A second international meeting about the problem in Buenos Aires, Argentina, ended inconclusively. Since there is an entire chapter about this topic later on, I will say no more now.

Taken together, this is quite a gory environmental bill of particulars, and by now you have probably grown a bit jaded just by reading it. I have presented it to you as unsystematic bits of information without much depth or background—the written equivalent of news sound bites, if you will. I could go on and on. But you get the picture. In modern times, human social and economic behavior has resulted in broad, multidimensional assaults on the integrity of the biophysical earth.

## ECOCATASTROPHE OR ECOHYPE?

Is all that just alarmist stuff? How *real* are these problems? Sure, everyone knows that there are environmental problems—with pollution and the rainforests, nuclear energy, and the possibility of global warming. But is ecocatastrophe really around the corner, or are the problems greatly exaggerated?

Like me, you probably don't spend much time or energy thinking about these problems. The world seems okay: I get up and go to work and enjoy my family life, farmers continue to grow food that is plentiful and collapse of the world ecological system that would be visible by the turn of the century (Meadows et al., 1972)—have not come true. Furthermore, some scientists contest the global warming theory, based on mathematical models with many unknowns, or predict that natural processes will counter its effects (Singer, 1992, 1997). Kenneth E. F. Watt, an environmental scientist from the University of California—Davis, has gone so far as to call the global warming theory the “laugh of the century” (Sanction, 1989: 28). The point: If the Cassandras have always been wrong, why should we believe them now?

Veteran Cassandras (Brown and Flavin, 1999; Fhrlich and Ehrlich, 1992; Hardin, 1993; Lovins, 1977; Meadows et al., 1992; Ophuls and Boyan, 1992) concede many specific points made by their critics without giving away the main thrust of their arguments. It is true, for instance, that the earth is like a huge recycling system that dilutes, soaks up, transforms, and restores the damage done to it by humans or other species. So there are success stories, and environmental problems can often be cleaned up, or left to restore themselves.

However, these contemporary success stories are all local or regional cases. Data about environmental problems aggregated over time for most nations—and the world—are unremittingly depressing. The Hudson River Valley forests rebounded because farmers abandoned them in order to wipe out the native grasslands of the Great Plains. Lake Erie has come back to life but barely so; meanwhile, many other lakes, such as Lake Superior, are in a state of profound chemical and biological degradation. And the lower Mississippi River is so polluted by chemical industries that it has become famous as America's premiere “toxic waste corridor.” It is true that the lumber industry has moved away from Wisconsin and Missouri; they have moved on to the old-growth conifer forests of the Pacific Northwest, which, as I previously noted, they are cutting with a vengeance. Furthermore, the ecological “success” stories are mostly in the richer, more developed nations, which can develop more effective responses that at least buy time in a way that less developed nations cannot. But even in the more developed nations difficulties remain: soil erodes, wetlands shrink, more species disappear than are successfully protected, and toxic wastes keep accumulating (Meadows et al., 1992: 59).

Projections about human and environmental futures are highly speculative, and they have failed *insofar as they have forecast a general environmental collapse*. For centuries, humans caused no irreparable environmental damage when “population was sparse, factories small, and products few in number compared to today. The environment’s dilutive capacity was rarely exceeded and was perceived as infinite in its ability to absorb waste” (Buchholz, 1993: 8). But environmental Cassandras point to abundant evidence that contemporary ecological circumstances are without historical precedent. They have a different and more sinister character because (1) there are *many* more people making demands on the environmental resource system, (2) they have dramatically more powerful technologies to disrupt, and alter, the environment than preindustrial people did, (3) people around the world want an “improved standard of living,” which means higher levels of material consumption and environmental damage, and (4) the volume of garbage derived from human activity is much greater and much more chemically difficult for nature to absorb and recycle than were preindustrial effluents.

Increasingly, there is less wilderness to migrate to from overpopulated and environmentally degraded areas, and fewer places to throw it away and forget it. Unprecedented human numbers and technical capabilities mean that we are increasingly forced to live in a “closed system” (more about this concept later), and compelled to live with the ecological consequences of our behavior in ways that humans never have been before. Pollyannas, according to the Cassandras, fail to appreciate the ecological implications of the unprecedented increase in the scale of human activities.

I’m sure you realize by now that we have been talking about an extremely complicated set of issues and controversies. And I hope you also recognize that they are terribly important for the human future—if not for you, then certainly for your children and grandchildren. Not “merely” scientific and academic debates, they have become political issues and policy dilemmas. The American political process is infused at all levels by arguments and political conflict between those who want to protect nature from impacts and keep it “clean” for reasons of health and well-being and those who argue that further environmental protection itself represents threats to individual liberty, jobs, a healthy economy, and the material security and aspirations of citizens. This political dialogue reverberates not just in the United States but around the world.