

# Threats to the Global Environment (1993)

by the Union of Concerned Scientists

More and more these days the public hears news of growing threats to the environment. Stratospheric ozone depletion is exposing the earth to dangerous levels of ultraviolet radiation. Agricultural practices are leading to soil impoverishment and cropland abandonment. Depletable ground water supplies are being exploited and contaminated. Tropical rain forests, as well as tropical and temperate dry forests, are being rapidly destroyed. The list goes on.

Add to this the fact that, across the world, one person in five lives in absolute poverty, and one in ten suffers serious malnutrition; that more money is spent on ~~development and economic growth~~ health and education; that more money is flowing out of some of the poorest countries than is flowing into them-and one can see a global disaster in the making.

Usually environmental and social problems are perceived as separate and unrelated; but, on the contrary, they are inextricably linked. The many ways in which human activities affect the environment are a reflection of many different patterns of social and economic development. Some environmental problems are the result of overconsumption of resources by affluent societies such as our own; others are caused by the desperate struggle of impoverished people to survive. And the environmental crisis itself is exacerbating poverty and malnutrition, making everyday living for many poor people more difficult.

**What are the most serious threats to the environment, and how are they affecting the way people live? The threats can be grouped into three main areas: air and atmosphere, fresh water and oceans, and soils, forests, and biodiversity.**

**Air and atmosphere. Much of humanity now lives in cities and towns where the air is dangerously polluted.**

Concentrations of carbon monoxide, nitrogen and sulfur oxides, soot and ash, ozone, and various toxic substances such as lead, cadmium, benzene, and aldehydes are rising in urban centers throughout most of the world. They are causing a variety of health problems, including respiratory ailments such as emphysema, eye and lung irritations, and even cancer.

In places such as Mexico City, where it is extremely severe, air pollution is implicated in the high rates of birth defects and learning disabilities among children.

Air pollution also affects the natural world in numerous ways. Nitrogen and sulfur oxides in the atmosphere combine with water vapor to form acids, which precipitate into lakes and rivers and kill plant and fish life. Although most industrial countries have passed laws to control such pollutants to some extent, the problem is rapidly increasing in the developing world as a result of increased car traffic, factory and power plant emissions, wood and coal burning, and other practices involving few or no pollution controls.

**Another serious and growing problem is the thinning of the stratospheric ozone layer. The antarctic ozone hole, first observed in the mid-1980s, is only the most acute manifestation of this problem, which is now being**

observed over temperate and arctic regions. In the upper atmosphere, ozone—a form of oxygen—acts to shield the earth's surface from the sun's harmful ultraviolet rays; its depletion can lead to serious human health problems, such as cataracts and skin cancer, and can harm plant and animal life. Yet the industrial world emits a number of ozone-depleting chemicals into the atmosphere—compounds such as chlorofluorocarbons (CFCs), which are used in refrigeration and air-conditioning systems, fire extinguishers, blown-foam insulation and packaging, and as aerosol propellants. Although international agreements have mandated the phasing-out of most ozone-depleting chemicals by the end of the 1990s, the damage to the ozone layer will continue to increase for decades, and may persist for a century or more, because of substances already emitted that have not yet risen to an altitude where they can do damage.

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**Overshadowing even this problem is the threat of global warming.** The burning of fossil fuels (oil, coal, and natural gas) in cars, factories, and power plants spews billions of tons of carbon dioxide (CO<sub>2</sub>)—a heat-trapping greenhouse gas—into the atmosphere. **The atmospheric concentration of CO<sub>2</sub> is already nearly 30 percent higher today than it was before the Industrial Revolution, and it continues to rise at a rate of 0.4 to 0.5 percent per year.** This trend, and the continuing atmospheric buildup of other greenhouse gases such as methane, appears likely to cause the earth's average temperature to rise to levels humanity has never experienced. Although the exact consequences of such an increase are uncertain, scientists expect that sea levels will rise and that there will be increased summer

**dryness, droughts, and heat waves, especially in continental interiors. These events could endanger fresh water supplies and seriously harm agriculture in some regions, particularly in the developing world, which will be least able to adapt to an altered climate.**

**Fresh water and oceans. Although fresh water is essential to human survival, fresh water supplies are increasingly endangered, especially in parts of Africa and Asia. Pollution is a central part of the problem. Pesticides, fertilizers, sewage, and industrial wastes are washing into rivers and lakes on a vast scale. It is estimated that diseases transmitted by polluted water kill over 12 million children each year, and the number is increasing. In addition, a growing demand for fresh water by agriculture and industry threatens to reduce the supply available for human consumption. Sheer waste of fresh water is also a major problem. For example, over two thirds of all fresh water consumed in the world goes to agriculture (mainly for irrigation), while less than 10 percent is used for domestic purposes. Yet around half of the water used in irrigation never reaches the crops, but is lost through seepage, runoff, and evaporation.**

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**Both fresh water and marine ecosystems are also under increasing stress from pollution and other causes. Soil erosion caused by logging and agricultural operations is loading rivers with sediments that harm aquatic life and can damage coastal fisheries up to hundreds of miles from river outlets. The overharvesting of fish has reached crisis proportions in several regions. In 1991, commercial marine fisheries yielded nearly 100 million tons of fish, an amount virtually equal to what the UN**

**Food and Agriculture Organization believes to be the maximum sustainable yield for the world as a whole. In numerous fisheries, the sustainable limit has already been exceeded, and populations of cod, haddock, herring, and other prime species are in decline.**

**Soil, forests, and biodiversity. The earth's soils, forests, and biodiversity are the third vital set of resources in serious danger from human activities. According to a recent UN-sponsored study, 11 percent of all vegetated soils-about 1.2 billion hectares, an area roughly the size of the United States and India combined-have suffered moderate, severe, or extreme damage since the end of World War II. Moderately and severely degraded soils show greatly reduced biological activity and cannot be restored to health without substantial expense and effort; extremely damaged soils are beyond reclamation. By far the most important types of soil degradation are water and wind erosion, which account for over 80 percent of the total degraded area. Chemical degradation, which includes nutrient loss, salinization, pollution, and acidification, is responsible for most of the rest....**

**Tropical deforestation is another major cause of soil degradation because tropical forest soils are thin and vulnerable to erosion and nutrient loss. Equally important, deforestation also destroys the habitats for many plant and animal species. It is estimated that 0.2 to 0.3 percent of forest species--roughly 4,000 to 6,000 in all-are being driven to extinction each year. This represents a loss of inestimable value to nature's storehouse of genetic codes, which have been the source of most of medicine's wonder drugs, and**

which could still yield cures for cancer and other diseases. Rain forest clearing and other land-use changes also account for roughly one-third of global CO<sub>2</sub> emissions.

A recent preliminary assessment by the UN Food and Agriculture Organization indicates that the tropical deforestation rate has accelerated sharply since the early 1980s, although some countries, such as Brazil, have managed to reduce clearing rates. Whereas 10 years ago approximately 11 million hectares of tropical rain forest were being cleared annually, in 1991 the rate had reached almost 17 million hectares. Most deforested land is used for cropland or pastureland, but logging for timber is often responsible for opening up forest areas for settlement and clearcutting by farmers and ranchers. Deforestation continues in most industrial countries but at a much slower pace, since most old-growth temperate forests were cleared in previous centuries of expansion and industrialization....

**Links between the problems: The case of agriculture.** Many of the problems described above are linked in complex ways. Too often, because scientists specialize in just one area, these connections are not obvious, and, as a consequence, neither are the full implications of these problems. Agriculture provides a good example. As long as the world's population continues to grow, so must the supply of food. Yet unless agricultural practices change, growth in the food supply will mean a potentially enormous increase in the use of fertilizers, chemical pesticides, and fresh water for irrigation, all of which may have severe impacts on people and on the

environment. The increased use of pesticides and fertilizers may further contaminate fresh water supplies and coastal fisheries; the improper irrigation of farmland may cause greater waterlogging, salinization, and mineralization of soils, leading ultimately to decreased crop yields; the use of more fossil fuel inputs in agriculture will generate Agricultural practices are linked to water, food, energy, deforestation, and soil degradation problems worldwide.

Given these interrelated problems, agricultural experts are increasingly concerned about the ability of some regions, especially central Africa and south Asia, to produce enough food to feed their growing populations in coming decade.

Regional food deficits can be made up by imports, but only if there is cash to buy them and many developing countries are already strapped for hard currency because of their weak economies and low international demand for their exports. This confluence of problems relating to agriculture and food production poses perhaps the greatest challenge for the developing world in the coming decades.

## The Causes of the Environmental Crisis

No one thumbing through this catalog of environment problems can easily ignore the need for action to change humanity's course. But the problems are so complex and vast that the situation may seem hopeless at first.

Nevertheless, concrete steps exist that will move the planet towards a sustainable future. To be effective, these steps must address the underlying causes of these environmental threats.

**Population growth. Some in the environmental movement claim that degradation of the environment and depletion of natural resources can be traced to one major cause-the expanding world population. Between 1950 and 1990, the world's population more than doubled, from 2.5 billion to 5.6 billion. Within the next three decades, it is expected to grow by another 50 percent, or almost 3 billion people. Although the population growth rate is decreasing- from just over 2 percent per year in the 1960s to around 1.7 percent per year today-it is still high enough to result in an expected doubling of the world's population within 50 years. Without question, if nothing else changes, this growth will put much additional pressure on the earth's environment and natural resources.**

**Stabilizing world population is consequently an important prerequisite for achieving ecological sustainability over the long term. But the solutions to population growth are neither simple nor obvious. Providing access to modern contraceptives and abortion services-the main focus of family planning programs in most developing countries-is necessary but not sufficient; for population growth rates to decrease, people must want to have smaller families, and women must be free to exercise their choice to have fewer children. Where there is extreme poverty and sexual inequality, experience shows, family planning programs can be only partially effective at reducing birth rates.**

**Moreover, population growth is only one of many factors contributing to environmental degradation, all of which must be addressed if humanity is to live within**

the means nature has provided. Some of the most serious threats to the environment are driven not mainly by growing numbers of people but by the unrestrained consumption of natural resources by affluent consumers. Others are the result of deliberate, unsustainable exploitation of resources by both poor and rich nations in the name of economic development. And still others can be traced to the desperate poverty of so many people who-often because of misguided national and international development policies-are forced to destroy their own habitats in order to survive. All of these issues are interconnected.

The role of affluence. Wasteful consumption and pollution by affluent societies are probably the most important factors responsible for environmental degradation today. According to the World Resources Institute, the seven largest industrial nations of the world-with barely 10 percent of the world's population-together account for over 40 percent of the world's consumption of fossil fuels, most of its consumption of metals, and a substantial share of its consumption of forest products and industrial materials. The 24 members of the Organization for Economic Cooperation and Development (comprising most of the so-called "Western" industrial countries) generate 40 percent of the global sulfur dioxide emissions, 53 percent of the nitrogen oxide emissions, 68 percent of the industrial wastes, and almost 40 percent of the emissions that contribute to global warming. Yet all of these nations represent just 16 percent of the world's population. On a per-capita basis, the Western industrial nations are far and away the world's greatest polluters and fossil-fuel

**consumers. On a per-capita basis, they are far and away the world's greatest polluters.**

**Much of this affluence-driven resource consumption and pollution is unnecessary.** For example, according to America's Energy Choices, a study released in 1992 by UCS and three other environmental groups, improvements in energy efficiency and the substitution of renewable energy sources for fossil fuels could reduce US emissions of CO<sub>2</sub> by 70 percent in 40 years while saving consumers money. It is also possible to greatly reduce sulfur and nitrogen oxide emissions from factories and power plants and to clean up industrial and human wastes before releasing them into the environment. **One of the main problems is that the impacts of pollution and resource consumption on the environment and human health are generally not accounted for in the price paid for energy, water, and other critical resources.** The United States, in particular, maintains extraordinarily low energy prices compared to western Europe and Japan, which helps explain why the per-capita energy consumption of those countries is around half as large as that of the United States.

**The immense environmental impacts of the US and European agricultural systems could also be greatly reduced. At the moment, farmers have little incentive to practice sustainable agriculture, since fertilizers and pesticides are relatively inexpensive, and little accounting is made either of their impacts on human health and the environment or of their effects on soil productivity. Research suggests, however, that alternative agricultural methods can greatly reduce.**

pesticide use, soil erosion, and other environmental impacts, without a large reduction in crop yields or a large increase in production costs. Other changes in agricultural practices and consumer habits could also yield important benefits. For example, around 70 percent of US grain production and 60 percent of that of the European countries currently goes to feeding livestock mainly to satisfy consumer demand for meat. Shifting even a portion of this grain directly to human consumption would make food production as a whole more efficient in these countries and could reduce the amount of land and agricultural inputs used.

The industrial countries of the North are not the only source of consumption-driven environmental problems, however. The expanding middle and upper classes of the developing countries of the South are widely emulating Northern consumption patterns and becoming important polluters in their own right.

Certain countries in East Asia and Latin America have made such rapid economic progress in recent decades that they are now referred to as newly industrializing countries, or NICs. Not surprisingly, their environmental problems-urban air pollution, pollution of waterways and coastal areas, degradation of soils from intensive agriculture, and rapidly growing contributions to global warming-increasingly resemble those of the United States and other major industrial countries. At the same time, the substantial populations of impoverished people in these nations affect the environment, and are affected by it, in much different ways.

The role of poverty and development. The widespread

poverty that exists in the developing world is another key factor in environmental degradation, particularly on a local scale. Tragically, the connection also goes the other way: the declining quality and quantity of natural resources makes survival for many of the world's poor more difficult every day. To a large extent, national and international development policies have ignored this link and have consequently failed either to relieve poverty or protect the environment. On the contrary, they have tended to drive the poorest countries deep into debt, forcing them to rely even more on stripping their natural resources for cash income.

The connections between debt, poverty, and environmental degradation are especially evident in the agricultural sector. In many developing countries, land that was traditionally used for subsistence farming has been consolidated and dedicated to the cultivation of cash crops (tobacco, coffee, sugarcane, and so forth) for economic development. This shift in land ownership and use, combined with population growth and urban unemployment, has forced many subsistence farmers into ecologically fragile forest and mountain areas. Soils in these areas are highly subject to erosion when their natural vegetation cover is removed. Erosion, in turn, decreases the fertility of the soil and contributes to a decline in water quality as sediments and minerals are washed into streams and rivers. The result is a pattern of declining food production for subsistence farmers and expanding destruction of forests and degradation of both soils and fresh water....

As this example suggests, many factors contribute to the relationship between poverty and environmental

degradation. Population growth is certainly one of them, but its role must be understood in the context of social and economic development as a whole. High birth rates are strongly linked to poverty, lack of education, and low health standards. Since poor couples have no money to invest for the future, they invest in children instead, who help out in planting and harvesting crops, earn income as laborers, and provide security for their parents in old age. The high infant mortality rates and low life expectancies in many poor countries also encourage high birth rates.

The persistence of extreme poverty in the South marks a central failure of national and international development policies of the past four decades. Although many developing countries have experienced strong economic growth rates in recent decades, the rising tide has not lifted all boats. Income disparities both between countries and within countries have grown; so have inequalities in the ownership of land, resulting in increasing numbers of landless peasants flocking to cities in search of work or to forests and mountains in search of land. Investments in the basic needs of the very poor, such as health care, education, and sanitation, have gone up and down with the times, but most recently the trend has been down. Half of the nations of Africa, for example, are spending less in real terms on social needs than they did a decade ago.

Military expenditures are a key part of the problem: they place a major drain on national resources, and when budgets get tight, governments are more likely to maintain military spending levels than expenditures for social needs. Political instability such as that in Somalia,

**Haiti, and elsewhere also precludes effective government action on social, economic, and environmental problems.**

## **A Sustainable America in a Sustainable World**

**If humanity is to move toward sustainability--whereby the needs of the present are met without compromising the needs of the future--then new strategies must be adopted that recognize and confront the underlying causes of environmental degradation. This means, first, that overconsumption of resources and pollution by affluent consumers in both the North and the South must be greatly reduced through improvements in technology and changes in attitudes and living habits. By and large, the changes called for--such as greater energy efficiency, sustainable agricultural practices, less consumption of meat, and more modest material lifestyles--are affordable and feasible, but the public and political will to implement them has so far been lacking. The North has a special responsibility to take the lead because its cumulative contribution to environmental problems is so disproportionately large. But the South cannot wait for action by, or aid from, the North before tackling problems that directly threaten its own prosperity and ecological survival.**

**Second, development policies in the South must be directed towards alleviating poverty and removing inequalities between men and women while protecting natural resources to the greatest possible extent. For at least the next several decades, true sustainability will be impossible to achieve, for the South's population will continue to grow the momentum of current population**

growth guarantees it-as will its economy. However, decisions made in the near future will determine whether the ultimate outcome will be sustainable and will provide an adequate standard of living for all of humanity. High priority must be given to ensuring greater equity in the distribution of income, land, and other resources; to improving the welfare of women, including access to education, health care, and family planning services; and to giving full economic and social value to preserving natural resource assets such as forests and soils. It is just as important for Northern countries to address problems of inequality and injustice within their own borders. Poor communities and communities of color have tooOne important step on the road to sustainability is the increased use of renewable energy.

The United States must play a central role in promoting equitable and sustainable policies the world over, for four main reasons. First, US consumption patterns are a major cause of environmental problems such as global warming, ozone depletion, and air and water pollution. Cutting US CO2 emissions by 70 percent over the next 40 years, for example, would have the effect of reducing global emissions by as much as 15 percent. Second, US practices and lifestyles are widely emulated by other countries, especially by the emerging middle classes in the South, who are becoming major consumers and polluters. Southern countries can hardly be persuaded to control their environmental impacts if the United States does not set a good example. Third, US policies on trade, development, and the environment have tremendous influence on the course of development and environmental protection in other countries. And

**fourth, the United States asserts considerable moral and political leadership in world affairs, and the prudent use of this leadership could substantially improve the prospects for equitable and sustainable development.**

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## **UNION OF CONCERNED SCIENTISTS, December 1993**

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