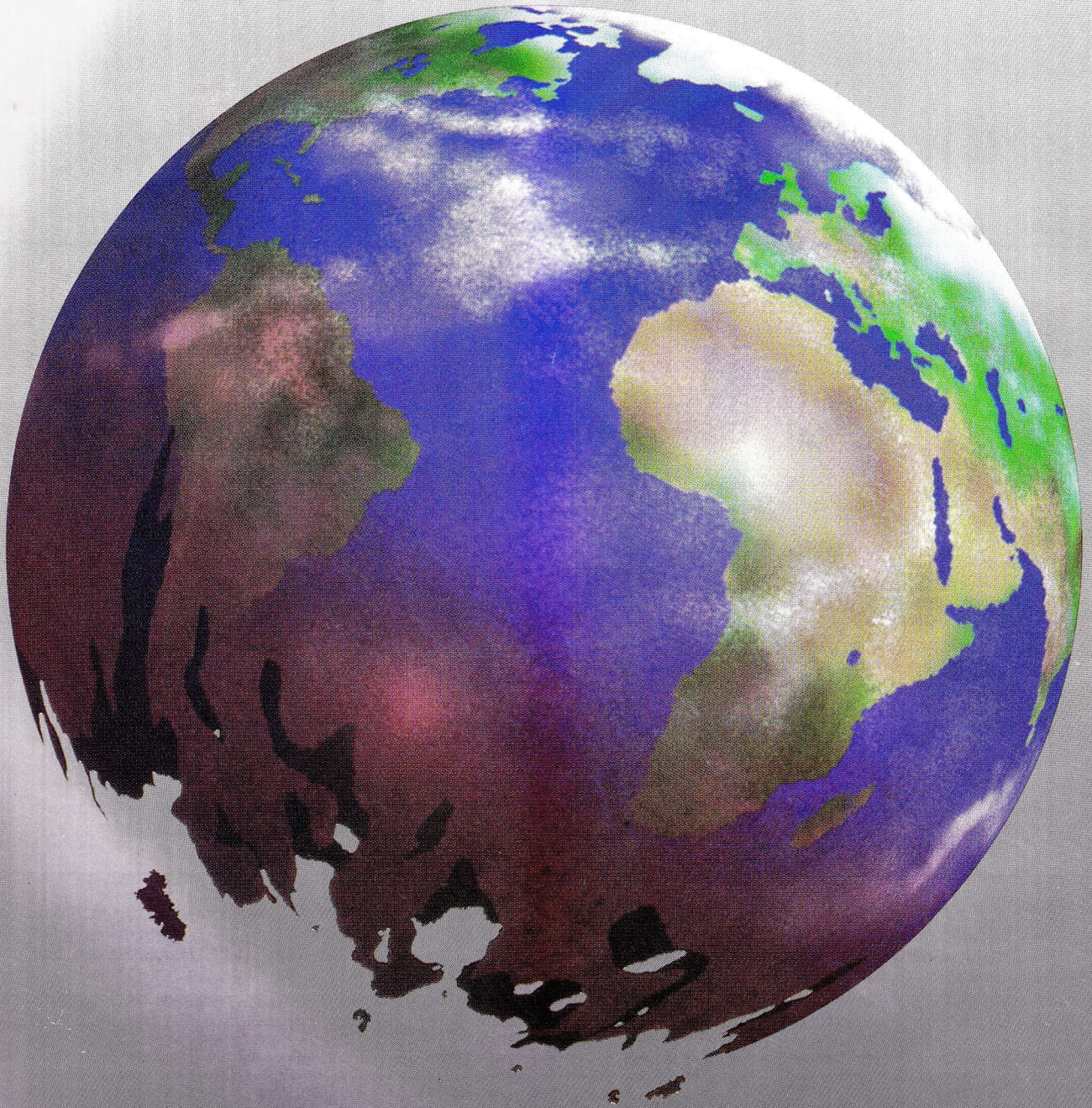


Planet

EARTH



Beyond Repair?

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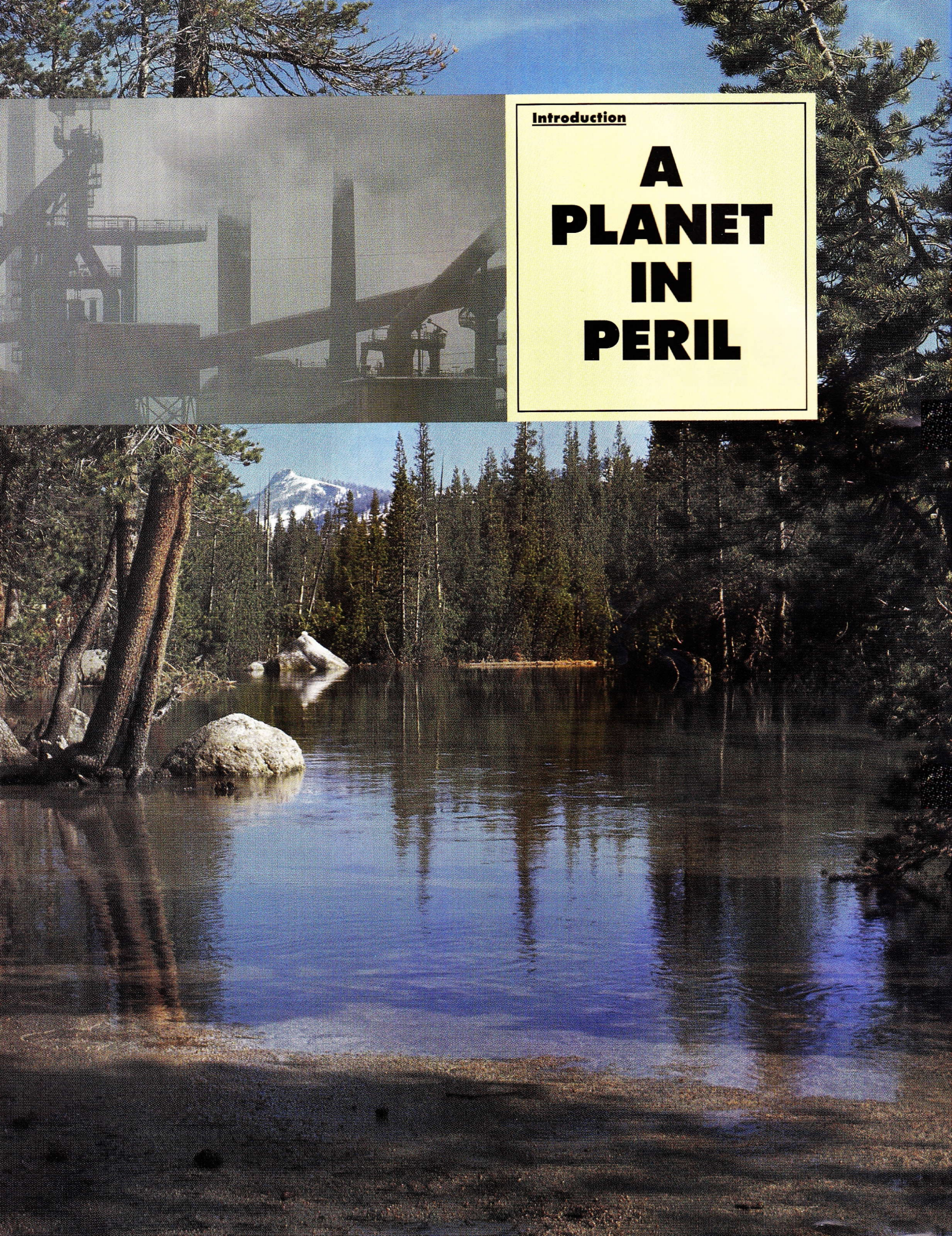
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PLANET EARTH

Beyond Repair?



Introduction

A PLANET IN PERIL

PLANET EARTH is in trouble. And most of us know it! Scientists, government leaders and citizens around the world are worried about what is happening to our planet.

For the past few decades, scattered voices were telling us that if humanity continued as it was, civilization would be endangered by a global environmental crisis. Evidence supporting this conclusion is coming from every area of the world. We now face polluted oceans and seas, rapidly disappearing forests, widespread land degradation, acid rain, leaking toxic wastes, and—if some scientists are correct in their conclusions—a climate-changing greenhouse effect and the destruction of the earth's protective ozone layer.

Alarming Reports

In 1987, Thomas McMillan, formerly Canada's environment minister, said: "We are a global village. Everything one country does has an effect on another. Unless that message seeps in, we are going to have more than chaos; we are going to have annihilation."

Others are saying that humanity as a whole is waking up far too late to the fact that human societies all over the earth have been too ignorant, too careless and too cavalier about the environment that supports them.

"The human species is part of nature. Its existence depends on its ability to draw sustenance from a finite natural world; its continuance depends on its ability to abstain from destroying the natural systems that regenerate this world," said William D. Ruckelshaus, former administrator of the U.S. Environmental Protection Agency.

How much more punishment and abuse the critical structures that sustain our environment can take from humanity's environmentally destructive ways is not yet known. But the conclusion of virtually everyone who knows and studies the facts is that all of us are going to have to start living and doing things differently if humanity is to have a long-term future.

"Our most important task is to make peoples realize that simply to carry on as we are is not an option," warned British Prime Minister Margaret Thatcher in the closing address of the Saving the Ozone Layer Conference, in London, Mar. 7, 1989.

"The earth is slowly dying, and the inconceivable—the end of life itself—is actually becoming conceivable," said alarmed Queen Beatrix of the

Netherlands. For the first time, many leaders are talking about global security more in terms of the ecological threat caused by humanity's ways of daily living and doing business than in terms of nuclear warfare.

Hardly a week goes by that we do not hear or read some shocking news of the sad state of planet earth: Every second, the land-hungry—often the hapless rural poor—clear nearly another acre (0.4 hectares) of tropical forest for agriculture and logging. Every day, the United States produces more than 400,000 tons of residential and commercial solid waste. Every year, overcultivation, deforestation, overgrazing and unskilled irrigation reduce some 80,000 square miles (200,000 square kilometers) of arid and semiarid land to the point of zero economic yield.

Many scientists warn that industrial gases are depleting levels of ozone in the upper atmosphere. Ozone is a gas that screens out the sun's harmful ultraviolet rays. Some researchers predict that we may see a 5 to 6 percent increase in skin cancers for every 1 percent decrease in ozone.

The World Health Organization (WHO) reports that most of the 1.8 billion living in the world's urban centers breathe air of unacceptable quality.

But are all the reports of environmental dilemmas accurate and true? Some would say that they are not.

Exaggeration or Fact?

Speaking at a conference in New Zealand, British environmentalist Edward Goldsmith claimed, "In the past 40 years we have done more destruction than during the whole of man's tenancy of this planet." He went on to warn, "If our policies remain unchanged there is no question about it, there is no way man can survive another 40 years."

Not everyone would agree with Mr. Goldsmith's conclusions. Although not often reported in the press, authorities frequently disagree about the nature and extent of environmental problems. Many of the reports that appear to be stating concrete, proven facts are subject to debate in scientific circles. One commentator in a major U.S. news magazine called the reports of many environmentalists "exaggeration" and "runaway rhetoric."

If so, are concerns about the environment well-founded? What is the truth? What about inaccuracy, exaggeration and bias?

Chapter One

HOW MUCH PROOF DO WE NEED?



GLOBAL WARMING from the greenhouse effect is a good example of an issue that has had one point of view widely publicized as if it were a certainty. In reality, this topic is highly controversial among scientists.

Most of what we read about the greenhouse effect says that carbon dioxide levels are rising mainly because of our using fossil fuels and cutting and burning tropical forests. Carbon dioxide acts like the glass in a greenhouse. It traps heat. The claim is that we are now experiencing or will soon see a small but important rise in worldwide temperatures. This will, among other things, melt polar ice caps, raise worldwide sea levels anywhere between one and 26 feet and cause dramatic changes in global weather patterns.

Except for the rise in carbon dioxide levels, however, none of the above greenhouse scenario is proved. It is all subject to debate on various levels. Howard Ris, executive director of the Union of Concerned Scientists (UCS), seeking support for the UCS Greenhouse Action Program, was careful to point out, "All predictions for specific changes in our climate are extremely uncertain."

Also uncertain is the thought that a hole formed in the upper atmosphere ozone over Antarctica is due to industrial gases. Some scientists insist the hole could be a natural phenomenon caused by normal changes

in upper atmosphere wind fields or temperatures, or by cyclical changes in solar activity.

Many reports say that acid pollutants in the air, commonly called acid rain, have been causing a decline in European and North American forests over the years. It is likely that acid rain has damaged some forests. But the extent of this damage is not as easily proved as is popularly believed. Some damage publicized as due to acid rain might have other causes.

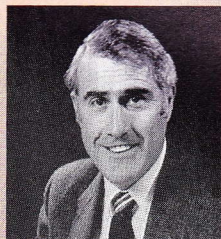
An article in the November, 1987, issue of *Environment* summarized: "It is impossible to make any confident statements about the development of [European forest] decline over time." It went on to say, "It is even less possible to make any observations related to the causes of forest decline and the contribution made by air pollutants" (page 30).

Readers must be cautious about accepting reports of environmental degradation at face value. While many reports about possible environmental problems are not yet proved, many are also not yet disproved. Scientific research is a slow, painstaking process.

How Long Can We Wait?

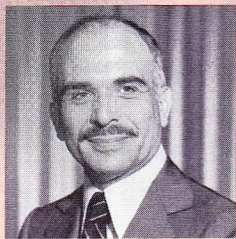
Must we humans have absolute proof, a sometimes elusive thing in the earth sciences, before we take action?

Lloyd Timberlake, senior editor for external



"The scourge of pollution . . . will destroy us unless we are willing to put principle above expediency. . . . And if we take no action, we will have no future."

—Geoffrey Palmer,
Prime Minister of New Zealand



"Our beautiful planet, with which the almighty God has blessed mankind, is being subjected to brutal attacks. . . . No individual state or nation can handle the problem on its own."

—King Hussein of the
Hashemite Kingdom of Jordan



"We have borrowed from our children part of their natural heritage and the time has come to repay the debt. . . . It's time to say enough is enough."

—Bob Hawke,
Prime Minister of Australia

ENVIRONMENT A MAJOR PRIORITY

Pollsters asked a sampling of the general public and leaders in 14 countries this question: "Do you think that preserving the environment and protecting the land, oceans, rivers and the air for future generations should be a major priority for government, a minor priority, or not a priority?" Below are the percentages for those answering "MAJOR PRIORITY."

COUNTRY	THE PUBLIC	THE LEADERS
ARGENTINA	96%	100%
CHINA	81%	72%
HUNGARY	78%	75%
INDIA	89%	92%
JAMAICA	91%	94%
JAPAN	63%	67%
KENYA	96%	100%
MEXICO	93%	100%
NIGERIA	91%	92%
NORWAY	94%	100%
SAUDI ARABIA	89%	94%
SENEGAL	76%	80%
WEST GERMANY	85%	94%
ZIMBABWE	94%	98%

Source: Louis Harris and Associates

affairs of the International Institute for Environment and Development, says this concerning the greenhouse effect: "We should certainly take immediate action, while we continue to look for more proof."

Others insist that if governments act before there is proof, they may divert resources—land, labor and capital—from more certain needs. They also believe government action before it is proved necessary might lower the sense of responsibility of individual citizens to care for the environment (see the debate, for example, in "Getting Warmer?", *National Review*, July 14, 1989).

So the questions remain, how much evidence do we need and how much of a risk are we willing to take before we do something? If we wait for unshakable proof, will it be too late to act?

The Earth Is in Trouble

Even with the conclusions of some reports still in doubt, most experts agree that humanity is seriously harming the earth's environment. For many, all the "proof" they need is a look and a sniff out the window. It is obvious humanity is changing the environment faster than we can prove what effects those changes will have. The only sane response under such circumstances is to stop such reckless behavior.

That is why government leaders and scientists are now discussing global environmental security. Louis Harris and Associates conducted an opinion

THE GREENHOUSE EFFECT

Many scientists are convinced that the earth is in a warming trend. "It is time to stop waffling so much," Dr. James Hansen of the National Aeronautics and Space Administration's Goddard Institute for Space Studies warned a U.S. Senate Energy Committee, "and say that the evidence is pretty strong that the greenhouse effect is here."

Dr. Hansen and others believe that unless humanity stops polluting the air with the gases (principally carbon dioxide, chlorofluorocarbons and methane) that can trap solar heat in the atmosphere, we can expect our climate to get hotter, causing crop failures and, as polar ice caps melt, major coastal flooding.

But a number of scientists disagree with Dr. Hansen. They admit that carbon dioxide levels have risen considerably since the beginning of the industrial revolution, but note that there has been no corresponding *provable* rise in worldwide temperatures. These scientists also point out that computer predictions of global warming due to greenhouse gases cannot be trusted because computer simulations of the earth's climate are only crude approximations.

survey of 14 countries¹ for the United Nations Environment Programme. They found that 90 percent of the leaders in those countries felt that preserving the environment and protecting the land, oceans, rivers and air for future generations should be a major priority for government.

British Prime Minister Thatcher said: "For centuries mankind has worked on the assumption that we could pursue the goal of steady progress, without disturbing the fundamental equilibrium of the world's atmosphere and its living systems. In a very short space of time that comfortable assumption has been shattered." Mrs. Thatcher went on to call the environmental situation, "one of the greatest challenges which life on earth has yet faced."

Soviet President Mikhail S. Gorbachev told the United Nations General Assembly in December 1988, "International economic security is inconceivable unless related not only to disarmament but also to the elimination of the threat to the world's environment. In a number of regions, the state of the environment is simply frightening."

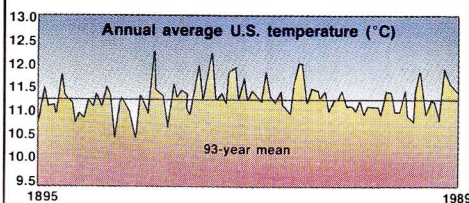
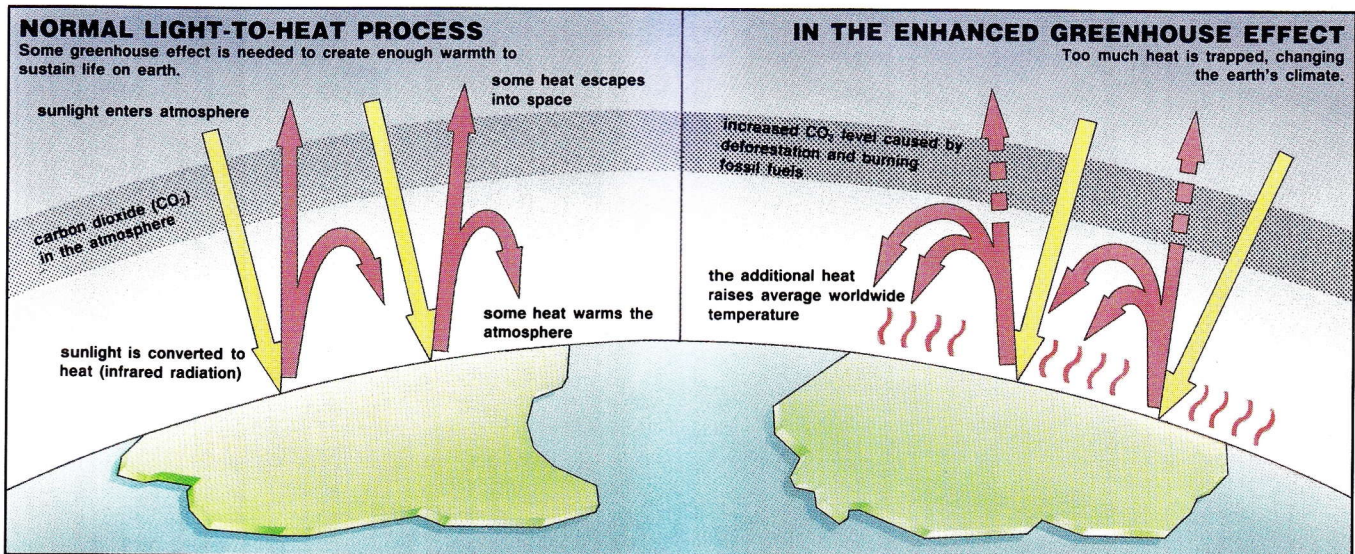
¹ Argentina, China, Federal Republic of Germany, Hungary, India, Jamaica, Japan, Kenya, Mexico, Nigeria, Norway, Saudi Arabia, Senegal, Zimbabwe.

A couple of months later, Zhou Guangzhao, head of the Chinese Academy of Sciences, warned, "There could be a deadly threat to the survival of the Chinese nation if immediate action is not taken to halt environmental pollution."

Worldwide, leaders say they are concerned about the state of the environment. But are they doing enough to save our planet from catastrophe?

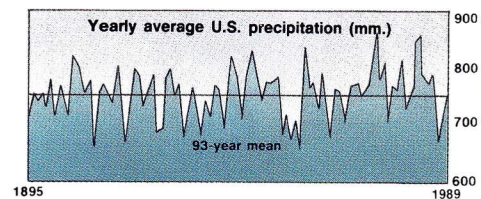
Caring for the environment is everyone's duty. But action by scattered individuals is not enough to solve the massive environmental problems we face worldwide. It is chiefly the responsibility of government to coordinate efforts and enforce compliance. Yet what government official or legislative representative in an industrialized nation will ask constituents to give up the relatively affluent life to which they have become accustomed? Most politicians would consider this to be political suicide. And among the developing nations, what government will tell its citizens to change their lifestyles to prevent long-term environmental problems when this may mean cutting off their people's means of survival? Many farmers, for example, either eke out a living on marginal land or they have no living at all.

Unfortunately, the world community has locked itself into a system of which environmental degradation is an intrinsic part.



Human activities of past 100 years have raised carbon dioxide levels from 270 parts per million to 350. According to some climate models, this should have raised temperatures, but chart above shows no such rise for the United States and there has been no provable rise worldwide.

The above illustration shows how, according to some authorities, increases in atmospheric carbon dioxide lead to global warming. Other scientists point out that this picture is too simplified. It does not take into account the effects of cloud cover, sulfur dioxide, phytoplankton and other variables that can have a counterbalancing effect to rising carbon dioxide.



Simple models of the greenhouse effect call for decreases in U.S. precipitation. The above chart shows normal variations, but no overall decrease during the period greenhouse gases have been rising.

Source: Kirby Hanson et al., Geophysical Research Letters

OZONE DEPLETION

Many scientists warn that the ozone "blanket" that surrounds the earth and which makes life on this planet possible by screening out the sun's harmful ultraviolet rays is being depleted by certain chemicals.

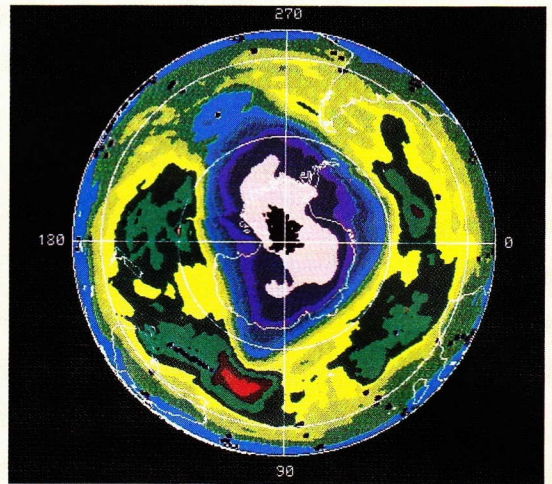
They say the biggest culprits are chlorofluorocarbons (CFCs). These are used in air conditioners, refrigerators, cleaning solvents and plastic foams. They are also still used in some countries in aerosol cans, but a number of nations have banned that use. Scientists have shown that CFCs can destroy molecules of ozone, an oxygen-like gas naturally found in the upper atmosphere. When researchers discovered that over Halley Bay, Antarctica, a 40 percent loss in ozone occurred at certain times of the year, many sci-

entists believed CFCs were responsible.

Also suspect is airborne methane gas, most of which comes from decomposition in rice paddies, swamps, the guts of cows and wood digestion in termites. Scientists say methane can help destroy ozone by aiding the formation of ice clouds. These act as catalysts to help CFCs do their dirty work.

But not all scientists agree that CFCs are responsible for upper-atmosphere ozone loss. Robert W. Pease, professor emeritus of physical climatology at the University of California, Riverside, says that

ozone molecules are created at a much higher rate than the small concentration of CFCs in the upper atmosphere can destroy them. He suggests that the same phenomenon that creates the northern and southern auroras could be a natural cause of ozone loss.



Antarctic ozone hole: In this satellite image, the black and pink colors toward the center show the area of greatest ozone depletion.



Severely damaged forest in Bohemia, Czechoslovakia. This country has the highest density of sulfur dioxide deposits in Europe. Sulfur dioxides contribute to acid rain.

WHEN ACID RAIN FALLS

When one sees thousands of dead trees stand with barren branches starkly outlined against the sky, it is easy to assume that acid rain is to blame. Acid rain comes from the atmospheric sulfur oxides created when coal and oil are burned. Through complex processes, sunlight converts the sulfur oxides into acids. Then the acids fall downwind in raindrops, snowflakes, fog, mist or clouds of dust and gas, killing lakes and trees.

Acid rain is certainly responsible for much damage to the environment. But some scientists say it is not always a simple matter to determine why trees and lakes are dying. Other possible culprits that can mimic acid rain damage include blight, drought followed by extremely cold winters, or other stress-related phenomena.

EASTERN EUROPE'S DYING LANDSCAPE

An ecological crisis confronts governments across Eastern Europe. Only until recently, the East Bloc denied any problem existed. Socialist countries, they claimed, were in harmony with nature. Unfortunately, the air, trees and rivers didn't agree.

Ironically, an awareness of these problems is coming at a time when countries throughout Eastern Europe are going through dramatic, sweeping changes in the way their governments and economies are run. Among the problems Eastern Europe's new breed of leaders will have to face are the environmental woes they have inherited.

In the Soviet Union, for example, the nation's leadership is feeling mounting pressure to get the economy moving after years of shortages in consumer goods. But finding the money for environmental needs will not be easy. As the British magazine *The Spectator* points out, environmental issues are not something the Soviets are used to dealing with:

"The record of centralized economies in the matter of the environment is not encouraging. The worst pollution in Europe occurs not in the most efficient economies, but in the least. The Soviet Union has managed to combine low production and a low standard of living with vast open spaces utterly devastated by the rank indifference to environmental pollution that inevitably occurs where there is no private or countervailing interest to consult."

In Krakow, Poland, the thick smog with its high concentrations of sulfur dioxide is causing old buildings to crumble. Infant mortality within the region is three times higher than the national norms

with malignant cancer exceeding worldwide averages.

Some pollutants blow in from other countries such as East Germany and Czechoslovakia, but most are produced locally—the result of four decades of investment in heavy industries.

Many seaside resorts are closed because oil and chemical industries dump emissions directly into the Baltic or into rivers. Only about one percent of the country's water is clean enough to drink, and almost half the water is so polluted that it's unfit for any use.

Landlocked Czechoslovakia is seen as Europe's foremost exporter of pollution. More than 2 million acres of forests there are damaged by pollution from coal-fired factories. Sections of northern Bohemia, Czechoslovakia's industrial heartland, endure times of near-zero visibility.

Hungary does not escape from a

host of environmental problems. Smog hangs over Budapest and sewage has fouled Lake Balaton, once one of the purest sources of water in Europe.

Even Romania and Bulgaria, the least industrialized Eastern European countries, have mounting pollution problems. Romania, for example, routinely dumps phosphate into the Sebes-Leoroies River, poisoning it.

The most heavily polluted Eastern European countries, Poland, Hungary, Czechoslovakia and East Germany, all rely on high-sulfur coal as a primary energy source. These coal-fired plants use almost no filtration, often blanketing the countryside with sooty air and smoke.

These countries lack water-filtration facilities, produce cars without pollution control equipment and their farmers use chemical fertilizers that eventually leach



Haze hangs over Prague, Czechoslovakia (above). Prague is in Bohemia where visibility can approach zero. Steel mill in Romania (left).



into the water supply.

Eastern European governments must face the prospect of a public health catastrophe or must invest in expensive pollution control systems they cannot afford. But these nations are already strapped with large foreign debts, and do not have the money to overhaul factories, use cleaner and more expensive high grade fuel, or clean up rivers.

—Ronald S. Toth

AIR POLLUTION— A NOXIOUS COCKTAIL

Our atmosphere is about as substantial, relatively, as the coat of veneer on a classroom globe. But that thin layer which protects and sustains us is being muddied and poisoned.

The World Health Organization reported that most of the world's 1.8 billion urban dwellers are breathing unacceptable-quality air.

Not five miles from the offices of this publication in Pasadena, California, the San Gabriel Mountains rise nearly 10,000 feet above the valley. On many days of the year, they are completely hidden behind a dirty blanket of smog—a noxious photochemical cocktail of ozone, particulates (bits of soil, nitrogen and sulfur), carbon monoxide and nitrogen compounds.

The Los Angeles area, with some of the filthiest air in the world, is getting tough on air pollution. It's requiring that all cars be powered by electricity or "clean" fuels by the year 2007. It has also eliminated free parking for city employees, a step that will hopefully encourage ride-sharing.

As a result of earlier programs, smog in Los Angeles has already decreased. But experts warn that the increasing population will negate the improvements.

The situation in Los Angeles often presages the rest of the United States. President George Bush has set up a plan to clean up America's air, saying the 1990s would be known as the "era of clean air." The cost will run up to \$19 billion annually—added to over \$30 billion already spent by industry each year on pollution reduction.

The president's proposals are modifications of The Clean Air Act of 1970. The act has already made some gains in the reduction of lead (from auto emissions), particu-

lates, sulfur oxides and carbon monoxide.

Europe, realizing its own air pollution problem, is making a concerted effort to solve it.

"The romantic sighs of Paris might actually be gasps," *The Wall Street Journal* reported. "After decades of uncoordinated and ineffectual environmental regulation in Europe, a continent-wide reform effort is taking place."

But so far it has been difficult to agree on standards. "Environmental regulations are among the world's toughest in Scandinavia, West Germany and the Netherlands," the *Journal* reports, "but that does little good when winds waft Britain's loosely regulated power-plant fumes and their product, acid rain, eastward."

The growing environmental awareness in Europe and the United States is leading to progress. But cleaning up the air is a complicated business, and at the bottom line it costs money.

It may be money that finally drives us to action. "It was the price rise in petroleum that led to more fuel-efficient cars, not the arguments," the *Spectator* writes. (In Los Angeles, smog runs up a bill of over \$9 billion a year in health costs.)

Westerners may foot the bill for their pollution, however grudgingly. But less-industrialized countries can't afford to clean up their act.

Developing nations are the least able to afford a clean environment. Neither can they afford the consequences of their policies now.

Mexico City has the dubious distinction of having the world's worst air. Schools there are sometimes closed during the coldest days of the year, when air pollution approaches a lethal level because thermal inversions are created, trapping the cool air and smog in the valley under a layer of warm air.

Eighty-five percent of childhood illnesses there are caused partly by air pollution, according to the Mexican Pediatric Association. Yet each year 5.5 million tons of pollutants are released into Mexico City's air, the Mexican government says.

"If firm steps are not taken we could have one of the worst ecological catastrophes in history," said Luis Manuel Guerra, director of Mexico's Autonomous Institute for Ecological Research.

Somewhere, something's got to give. "I'd say man rules himself as well as he does the planet," Wilhelm Knabe, a founder of the Green Party in Germany told *The Wall Street Journal*.

If humanity is to survive, we're going to have to do a better job at both.

—Michael Warren



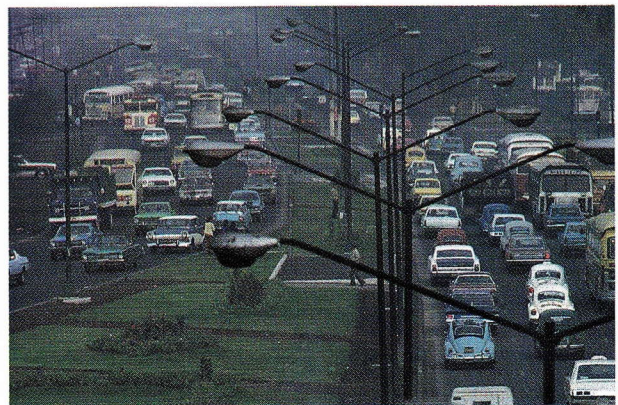
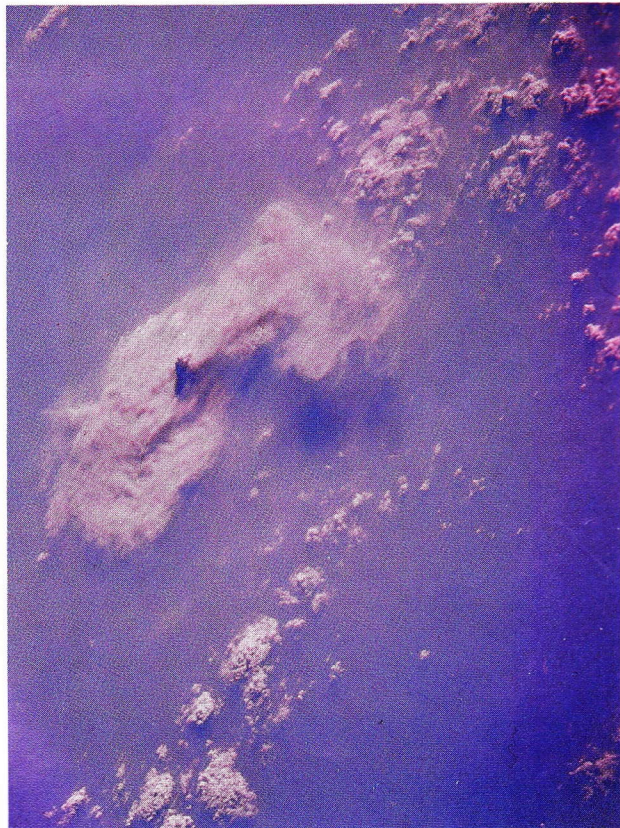
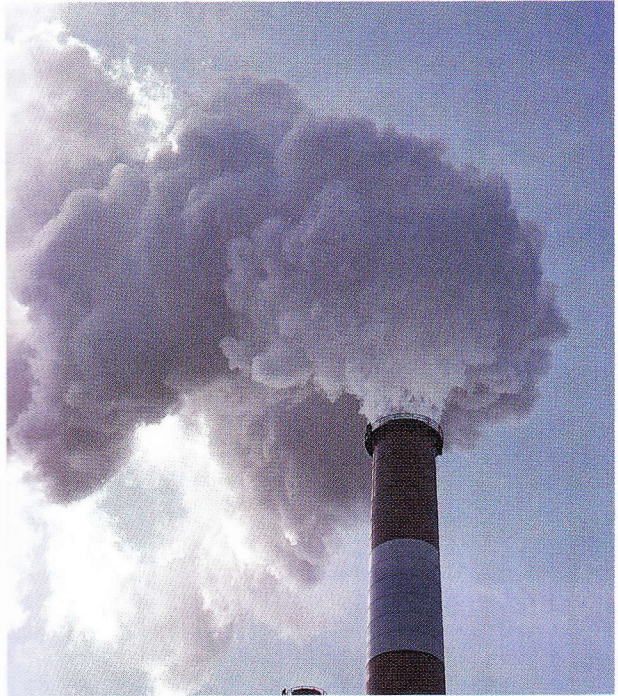
The Los Angeles, California, skyline, visible on an unusually clear day, disappears as the city's notorious smog returns.

“We are . . . burning our forests [and] fuels and darkening our skies. . . . It is as though we had set fire to our own house after we had locked ourselves inside.”

—President Corazon Aquino of the Philippines



Clockwise from above: The clean air these cyclists are enjoying is threatened; smokestack in New York; birds against the Manhattan skyline—wildlife must also breathe pollution; a smog-generating traffic jam in Mexico City; this smoke cloud from the burning of tropical forest was photographed by astronauts in 1988 and covers 1.044 million square miles of the Amazon Basin—it would reach from London to Moscow.



TROUBLED WATERS

Do you know if your own water is up to standard? While much water in industrialized nations meets government standards, studies in various regions have nevertheless identified hundreds of synthetic chemicals in drinking water.

The solution to this situation *appears* simple: Stop dumping chemical-laden matter into streams, lakes and rivers. In reality, the problem would not be resolved in some regions, even if all municipal and industrial interests were to immediately halt pollution of surface waters.

Increasingly, large segments of humanity get their household water, not from rivers, lakes and streams, but from aquifers. These are water deposits under the surface of the earth that have built up over millennia. It is this water that comes out of wells and springs.

This vast underground water supply was long assumed to be safe from contamination, purified through layers of earth. Now planners know different. It turns out that groundwater has not been immune from pollution. Chemicals from agriculture have reached it. So has infiltration from toxic and industrial waste repositories. Leaking sewer pipes, septic tanks and petroleum storage tanks have added thereto. So has runoff, including deicing salts, from streets and highways.

Surface water can generally be cleaned up or, given a chance, in time cleanses itself. Just being exposed to light and air helps. But how do you go about trying to clean up an aquifer? Even if you could replace all the water, there are still pollutants in the soil that haven't reached the water yet and so will continue to taint

the groundwater for years to come.

Not immune from the effects of human society are the oceans which many have believed offer a nearly inexhaustible potential as dumping grounds for wastes. The theory has been that if the wastes are dumped deep and far enough out to sea, risks of negative effects are minimized or eliminated. Indeed some have suggested that treated wastewater is actually beneficial for certain marine animals.

Increasingly clear, however, is that contaminants spilled into the oceans and seas come back to haunt us. Garbage, such as used medical paraphernalia, washes onto the shore. Petroleum spills coat coastlines. Toxic chemicals have been identified in ocean sediment as well as in fish. Substances like DDT, for example, are found in the livers of penguins in the Antarctic—far removed from any dumping sites. The ocean floor environment has already been altered in places.

Now, American research indicates that vast quantities of sewage bacteria and viruses are not killed by seawater, as traditionally thought. In fact, some viruses are known to survive for about 1½ years in the sea and evidence indicates that it is possible, in certain regions, for sea spray entering a person's nose to cause illness.

Despite the fact that only 3 percent of the water on earth is fresh, there would be more than enough for human needs. One problem, however, is that it is not conveniently distributed. Extensive regions are arid or semiarid, while others receive more than enough moisture. Vast amounts of fresh water are concentrated in areas away from the centers of human settlement, such as in polar ice or

in lakes and rivers in remote areas that do not lend themselves to urbanization or agriculture.

What water is readily accessible to civilization has been generally subjected to pollution and overuse.

As populations grow, the demand for fresh water of any kind—clean or not—increases. For example, Egypt's foreign minister has warned, "The next war in our region will be over the waters of the Nile."

Available quantities of water are in numerous cases being depleted faster than nature can replenish them. Rivers are repeatedly dammed and tapped along their ways so that what began as mighty torrents are reduced at the end of their courses to little more than befouled streams.

Subsurface water is being pumped out at alarming rates in areas where this water was always taken for granted. Some of the world's major irrigated crop-producing regions are menaced. This includes areas of California, the American plains, the Soviet Union and China.

One thing is certain: Water wastage will have to stop. Fresh water, now often bottled, is going to become more and more expensive. It is going to be a case of the highest bidder taking the spoils. In many instances agriculture is going to be out-bid by urban sprawls. But even then, urban life-styles are bound to change in regard to conveniences such as prolonged daily showers and baths, automatic dishwashers, laundromats and car washes. Lush, green lawns are going to be a luxury fewer can afford. And all this leaves a disturbing question: After major agricultural areas return to their normal dry state, who will produce the food for all the masses huddled around the water spigots in the cities?

The whole picture regarding humanity's relationship with water requires serious and urgent consideration. Warning signs are plentiful. But time is not.

—Clayton Steep

“At this rate, we cannot hope to pass on to our posterity the environmental heritage entrusted to us by preceding generations of humanity.”

—Sithi Savetsila, foreign minister of Thailand

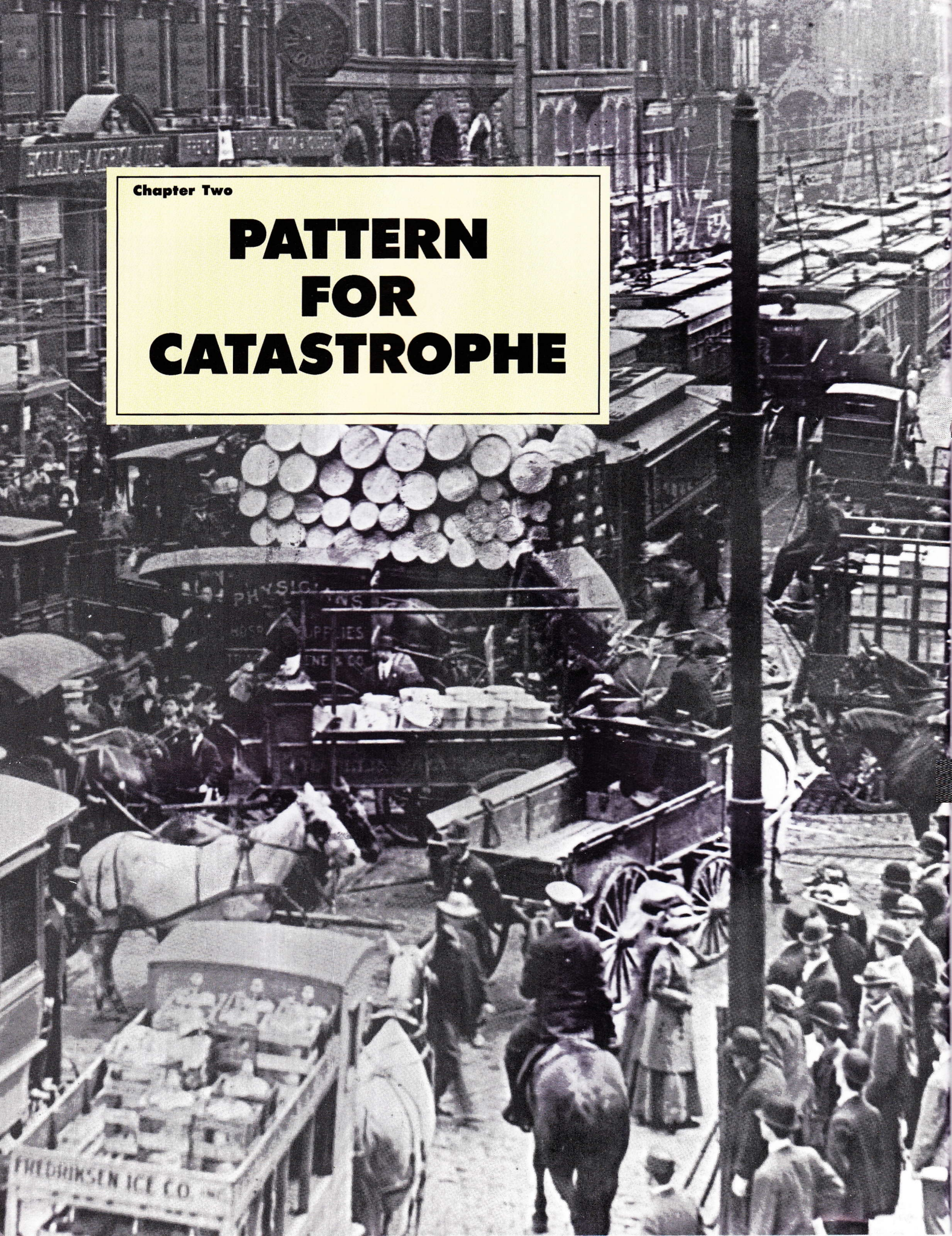


Clockwise from upper left: Public water sources often spread disease in the 19th century; the North Atlantic receives a dose of pollution near Azemmour, Morocco; oil spills are deadly to waterfowl and other forms of wildlife; an aerial view of water pollution from a mining operation; effluent from a copper plant in Tennessee.



Chapter Two

PATTERN FOR CATASTROPHE



OUR impact on our environment has been the focus of much recent attention. Yet humanity has always been altering the natural environment. This of itself is not necessarily wrong or harmful. After all, according to the account preserved by the Hebrews, Adam's job was to "tend and keep" the Garden of Eden (Genesis 2:15). This involved interfering with what would take place were the Garden left to itself. God's charge to humanity to have dominion over the living creatures likewise implied intervention in the natural processes. With dominion, however, came the need for proper responsibility, care and stewardship. In this, we have fallen short.

Instead of caring for the earth's fauna, we have, over the centuries, hunted species to extinction. Instead of replenishing the earth, we have indiscriminately cut down its forests, at times eradicating plant species that live only in limited areas.

We have amassed in cities with inadequate provision for the disposal of biological and industrial wastes. We see stark evidence of this in our befouled air and water.

We have ruined vast areas of the earth through improper agricultural techniques and then moved on to plunder yet more sections of our life-sustaining home. Lack of awareness or concern for our environment has characterized human history.

Deforestation, today associated with tropical forests, occurred millennia ago in other regions. In Greece, the clearing of hill forests prompted Plato to write in the fourth century B.C., "Our land, compared with what it was, is like the skeleton of a body wasted by disease."

Tall cedars covered Mount Lebanon before loggers began to cut them down around 3000 B.C. Yet those forests survived until the 20th century when the local railway burned cedars for fuel.

Europeans deforested vast areas of their continent centuries ago, using the timber to construct buildings, to heat homes, cook, and kindle the first flames of the industrial revolution in the 18th century.

Industrial Woes

Our modern environmental troubles began with the industrial revolution of Europe and North America. At first, wood and water power were the chief sources of energy. Therefore, industries located in the countryside where these resources were found. The demand for fuel led to overcutting of forests and a scarcity of wood.

At the same time, the wages workers received in these countryside industries raised the standard of living. This led to earlier marriages, more children being born and a higher survival rate among those children. For the first time in centuries, the population grew steadily. This led to increased demands for manufactured products.

Manufacturers were faced with a dilemma. How could they produce more goods to meet this demand at a time when wood, the primary fuel, was becoming ever scarcer? They also had a transportation problem. The roads to transport manufactured goods to the towns were in bad condition. If, while solving their fuel crisis, they also could solve their transportation problem by producing goods closer to population centers and harbors, so much the better.

Coal and a processed form of coal called coke were the answers. Manufacturers no longer needed to spread factories throughout the countryside. They built them close together near coal mines. This created new urban centers. Not long after, engineers devised a network of canals that people used to transport coal overland allowing manufacturers to build factories in other towns.

The population distribution within the industrialized nations changed. The countryside workers moved to the towns. When the factories needed even more workers, farmers moved from the countryside to take industrial jobs. Some were fleeing famine. Others moved because their landlords, who found it more profitable to raise sheep on the land than have tenant farmers on it, evicted them. Many farmers thought they would find a better life working in the factories.

"Filth and Stink"

In a short space of time, towns and cities had more people than they were equipped to handle. Manchester, England, for example, grew from 9,000 at the beginning of the 18th century to 70,000 in the second half of that century. Glasgow, Scotland, swelled from 12,000 to 84,000. This rapid urbanization quickly led to trouble.

The way these former country folk were used to disposing of their waste didn't work under these crowded conditions. They now commonly got rid of rubbish and sewage by dumping it in or near drinking water sources.

Smith Hart in *The New Yorkers* describes post-colonial conditions in that city: "The wells from which drinking water was drawn were situated for the most part in the middle of the extremely filthy

streets. Much of the supply came from the famed Tea Water pump in Chatham Street . . . fed by seepage from the Collect Pond, once a beautiful, limpid pool surrounded by hills, which had long since become a receptacle for dead dogs and cats and the contents of slop buckets."

In 1839, doctors reported to the British Home Secretary the conditions they found in some areas of London: "The masses of the population were crowded in courts and alleys and narrow streets almost insusceptible of ventilation; in dwellings which themselves were often not fit to be inhabited by human beings; while all around the dwellings, the utter absence of drainage, the utter omission of scavenging and nuisance prevention; the utter insufficiency of water supply, conduced to such accumulations of animal and vegetable

refuse, and to such pondings of odourous liquids, as made one universal atmosphere of filth and stink."

Disease Stirs Awareness of Environment

Doctors and common folk alike then believed that most disease stemmed from foul odors (miasma). Since living conditions in most industrial centers generated such odors, some physicians recommended a cleanup. The unhealthy urban environment became a popular social topic.

In his *Discourse on the Origin of Inequality* published in the mid-18th century, the philosopher Jean-Jacques Rousseau attributed illness partly to the effects of an unhealthy environment. Regardless, leaders were usually slow to act. They thought of industrialization as a benefit to all.

HEAVY METALS: MERCURY

Hheavy metals have been insidious pollutants for centuries. Scientists examining human remains from ancient civilizations have found that those people often suffered from lead poisoning.

Mercury is a typical heavy metal pollutant in today's society. It is a toxic, liquid metal widely used in several industries.

Mercury, in various forms, is in our air, water and food. It gets there through industrial burning, dumping and spraying. Burning coal and oil releases more than 3,000 metric tons of mercury into the air each year. Companies pollute lakes, rivers and bays by dumping mercury and mercury compounds that have been used to produce chlorine, plastics and paper. Some farmers use mercury-containing fungicides to control fungus on produce, grains and seeds.

With mercury thus introduced into the environment, we breathe it and eat it. The human body is fearfully and wonderfully made, but, many concerned experts say, it can only handle so much accumulated mercury in its cells. But there

are controversies over how much mercury is acceptable.

For example, there is the dental-amalgam disagreement. "Silver" dental fillings contain 50 percent mercury. Some researchers believe the mercury vapor emitted from these fillings is toxic and can cause disease. Others believe there is no significant danger.

From 1953 to 1968, about 650 people died from eating fish from Minamata Bay, Japan, contaminated with high levels of mercury. But the effects of eating seafood with lower levels of mercury remains controversial.

The *cumulative* effect of a toxin must be considered. And a person's health, including the strength of the immune system and the amount of other toxins in the body, all contribute to the effect mercury may have.

Symptoms of chronic mercury poisoning, occurring from prolonged exposure to small amounts, include depres-

sion, irritability, insomnia, fatigue, confusion, uncoordinated muscular movement and oral disorders.

Symptoms of acute mercury poisoning, from ingesting large amounts of mercury, include oral pain, vomiting, diarrhea, hemorrhage and mental disorders.

The likelihood that you are being exposed to some amount of mercury is high. So what can you do about it? Your best defense is awareness and avoidance. You can avoid mercury-containing foods. You can discontinue use of products that contain mercury compounds. Do a little detective work to protect your health.

—Lana Walker

Potential Sources of Mercury

Foods sometimes containing mercury	Cosmetics, medications & personal items
Shellfish	Powders, talcs with calomel
Tuna, salmon, swordfish	Calamine lotion
Carrots, lettuce	Contact lens solutions
Grains, seeds	Waterproof mascara
Kelp, seaweeds	Psoriasis ointments
Miscellaneous items	Hazardous occupations
Adhesives	Chlorine makers
Batteries	Dentists
Cinnabar (used in jewelry)	Disinfectant makers
Fungicides	Explosives makers
Latex/solvent-thinned paints	Mirror makers
Tattooing	Seed handlers
	Vinyl chloride makers

Even when statistical reports convinced them to make changes, those changes were usually only small ones. As recently as the decade 1901 to 1910, unhealthy and unsafe living and working conditions caused the death rate in England's urban centers to be 33 percent higher than in its countryside.

In 1818, one medical expert pointed out that keeping the population healthy would increase national productivity. To achieve this, he recommended that the state intervene to maintain a healthy environment. This line of reasoning, popularized by philosopher Jeremy Bentham, got some action.

Some regions built sewers. Unfortunately, most did not have a correct understanding of what the sewers should achieve. Sewers were usually ineffective in removing waste far enough from drinking water supplies. As one doctor later stated, man "removed pollution a little further from his habitation by sending it into sewers, but by a retribution of Providence, it turned back upon him in the water which he required for washing and drinking."

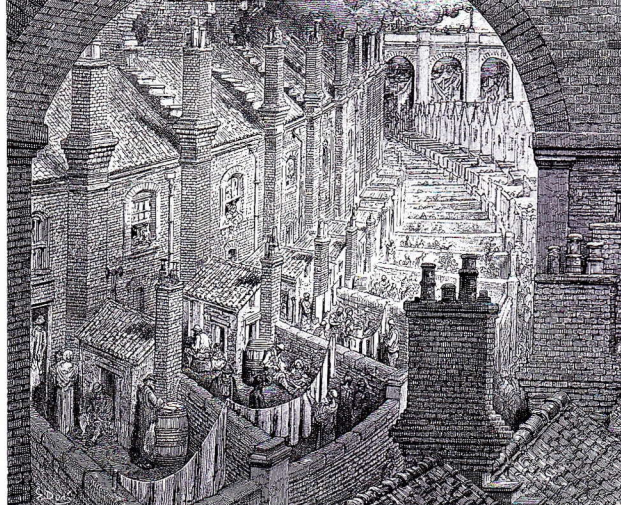
It was not until a cholera epidemic in the 19th century killed thousands that those who studied the problem found the environmental link between sewage in drinking water and disease. Edwin Chadwick, Southwood Smith and Neil Arnott, all disciples of Jeremy Bentham, taught that ridding industrial towns and cities of filth would eliminate contagious diseases. In 1842, Chadwick put his conclusions along with evidence from Smith and Arnott into the landmark environmental document *The Sanitary Conditions of the Labouring Population of Great Britain*.

The report had an international impact and led to improvements in human waste disposal. It had to. Politicians could not ignore the shocking statistics the report presented. For example: Eight people were dying from disease for each one dying from old age or violence. Of children under age five, those in industrial centers were dying at three times the rate of those in other areas. Yet even as sanitary conditions improved, other aspects of the environment were getting worse.

Coal Smoke Blackens the Sky

While coal has been burned on a limited basis for many centuries, most considered it too dirty and smelly for general use. In 1306, the British Parliament took action to outlaw it in London. In 1661, English diarist and author John Evelyn wrote to the king complaining about coal smoke. He said the smoke came from "some few particular tunnels and issues, belonging only to brewers, dyers, lime-burners, salt- and soap-boilers and some other private trades." Most people were not yet burning coal.

This all changed in the 18th century with the Industrial Revolution. The world's air has not been the same since.



Doctors reported of 19th century London, "The masses of the population were crowded in courts and alleys . . . almost insusceptible of ventilation."

Smoke hung over houses and factories. Levels of carbon dioxide began to rise. Sulfur dioxide, which some scientists now say is largely responsible for acid rain, poured out of chimneys.

J.B. Stoner, a physician of the time, stated concerning the smoke nuisance: "There are more people subject to nasal, throat and bronchial troubles in a smoky city than in a clean city. There are also more fatalities from pneumonia, diphtheria and typhoid fever owing . . . to the lowering of the vital forces as a result of the scarcity of sunshine, caused by heavy fogs of smoke. . . . Women living in sunless, gloomy houses and attired in somber clothes [were] also prone to be irritable, to scold and whip their children and to greet their husbands with caustic speech."

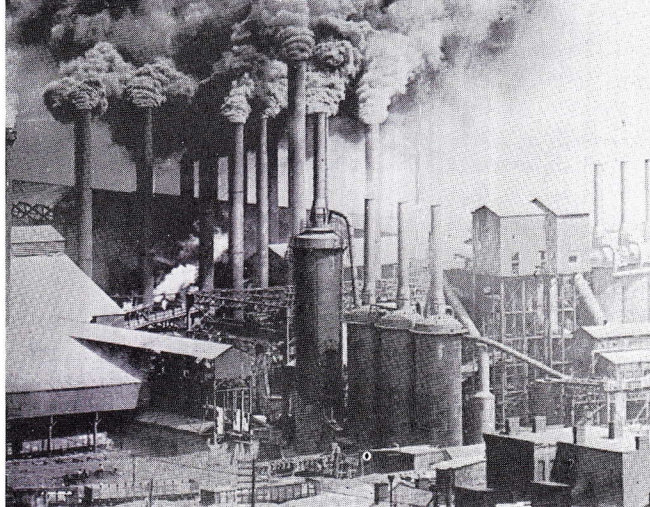
Under certain weather conditions, the smoke and sulfur dioxide became so concentrated that it would kill people in "killer fogs." These occurred well into the 20th century. One killed at least 4,000 Londoners in 1952.

Concerned citizens formed smoke abatement leagues and engineers devised ways to lower some of the air pollutants. The International Association for the Prevention of Smoke was formed in the early years of the 20th century. There have been some improvements in air quality. Nevertheless, air pollution is still a major problem, with a far greater variety of chemicals in our air now than in the 19th century.

Coal Gives Birth to Chemicals

With the discovery that a by-product of burning coal (coal tar) could be made into various products, the ensuing chemicals industry created its own environmental problems, especially after World War II. Nonbiodegradable plastics, synthetic fertilizers and pesticides flooded the marketplace. Toxic chemical wastes spewed into the air and waterways, and were dumped into landfills.

Increasingly widespread mining of the earth's resources provided more and more coal and raw materials for industry. The human-created mountains



Pittsburgh, Pennsylvania in the 1890s. Coal smoke in early industrial centers blackened skies and lungs. The air now contains a greater variety of pollutants.

of tailings or spoils from the mines led to more problems. Not only did these ugly, barren heaps cover the land, but sediment, acids and toxic metals leaching from them polluted rivers, streams and ground water. Strip mining produced gaping wounds on the earth's surface and disturbed wildlife. Belatedly, action was taken in the mid-20th century to curb this destruction, but serious problems still exist in many areas, including the western United States.

But in the 19th century, even though concern about *urban* conditions grew, few gave a thought to the destruction of nature. People saw the wild environment not as an ally they should work with, but as an enemy they should conquer. It was the rare person who in the early 19th century saw a problem with humanity's attitude toward the natural environment.

Early Calls for Conservation

Ralph Waldo Emerson, Henry David Thoreau and other writers proposed a view that was contrary to the idea that progress requires human victory over nature. "Life consists with wildness . . .," wrote Thoreau, "not yet subdued to man, its presence refreshes him." His words, "In wildness is the preservation of the world," became the motto of the Wilderness Society. True progress, those writers urged, stems from a harmonious relationship with nature.

Some of the first calls for sound management and conservation of natural resources were in the United States. In the 1860s, U.S. Congressman George Perkins Marsh promoted the idea that natural resources, commonly thought by most Americans at the time as limitless, were not inexhaustible. He wanted the federal government to manage publicly owned forests and watersheds.

Later, leading educators, artists, writers and scientists warned that Americans were squandering the nation's resources through overgrazing, overcutting of timber and other abuses. Those concerned included artist George Catlin, landscape architect Frederick Law Olmstead, Harvard Uni-

versity President Charles William Eliot and Stephen Mather, who later became the first director of the U.S. National Park Service. They wanted a portion of government-owned land to be preserved in national parks.

In 1872, the United States, under President Ulysses S. Grant, set aside 2 million acres of forest in northwestern Wyoming as its first national park—Yellowstone. Nineteen years later, the U.S. Congress created the first federal forest reserve and gave the president the authority to designate additional reserves. This land was to be set aside to ensure future supplies of timber and to protect the watersheds of U.S. rivers. It took only six years for presidents Benjamin Harrison and Grover Cleveland to set aside land for 28 more forest reserves.

In 1901, Theodore Roosevelt, a longtime conservationist, became president. When Congress created the U.S. Forest Service to manage and protect the reserves, President Roosevelt appointed Gifford Pinchot as its chief. Mr. Pinchot managed the reserves, renamed National Forests, with two main goals in mind:

(1) To make sure the timber harvested, plus that which died through diseases, pests and fires, would not exceed new growth. Forest managers call this the principle of sustained yield.

(2) To put the forests to many uses ranging from timbering and grazing to recreation and water conservation. This is the principle of multiple use.

But there were some who wanted the government to preserve large tracts of land in their natural state. They were often at odds with Pinchot's forest management principles. These people became known as preservationists. Among their leaders were Scottish-born naturalist John Muir, who, in 1892 founded the Sierra Club, Robert Marshall, founder of the Wilderness Society, and wildlife biologist Aldo Leopold, an early ecologist.

Of the forests in his beloved California, John Muir wrote, "Through all the wonderful, eventful centuries . . . God has cared for these trees, saved them from drought, disease, avalanche, and a thousand straining, levelling tempests and floods; but he cannot save them from fools—only Uncle Sam can do that."

Largely because of the efforts of preservationists, Congress in 1916 passed legislation that said the national parks—there were 16 at the time—were to remain unimpaired for future generations.

Nearly one-half century later, in 1964, an act of Congress created the National Wilderness System. Under this act, the federal government protects areas set aside as wilderness from road building, timber harvesting, mining, drilling, commercial activities, toilet facilities and human-made structures. Motor vehicles, power saws and other motors are forbidden.

Today, more than 100 other countries follow

the U.S. model for land conservation and preservation. However, governments protect from abuse (in theory if not in actual practice because of lax enforcement in some areas) only about 3 percent of the world's land.

Warnings of an Endangered Earth

In 1962, biologist Rachel Carson in *Silent Spring* sounded one of the first significant alarms about the hazards of pesticides. She called pesticides, "As crude a weapon as the cave man's club, the chemical barrage hurled against the fabric of life." This book perhaps more than any other was responsible for awakening the public to environmental problems. Bill McKibben writes in his book *The End of Nature*, "Had [Rachel Carson] not written when she did about the dangers of DDT, it might well have been too late before anyone cared about what was happening."

One year after *Silent Spring* was published, Barry Commoner, also a biologist, warned not just of pesticides but also of synthetic fertilizers, detergents, automobile exhaust and even nuclear fallout. Pollution and the use of toxic chemicals became newsworthy items.

In the 1970s, the U.S. government extended its responsibility toward the environment. Protection was expanded from publicly owned land to protecting the air, land, water and wildlife in general. Barry Commoner and other biologists—including Paul Ehrlich and Garrett Hardin—brought global environmental issues to the attention of the public. The pictures they painted of the problems and the solutions they offered were controversial. Nevertheless, the information they presented at that time helped the public see that there was a relationship between populations, resource use and pollution. Govern-

ments passed laws intended to guard the environment against degradation.

Environmentalists of the 1970s thought they could bring about significant changes that would save a world heading toward self-destruction. This brought on a false sense of euphoria within the environmental movement. Alden Cushing in *The Call of Earth* wrote of the movement: "It promised millennium." It didn't deliver. Why?

The awareness raised about individual issues and the resulting environmental protection laws were like patches here and there upon an environment being worn out by a society that had changed little in its overall economic, industrial pattern.

The Insidious Pattern is Set

During their industrial revolution, the nations of Europe and North America set the pattern for today's industrialized world. Canals, railroads and later automobiles and aircraft brought raw materials from outlying areas to urban centers. There, large populations of laborers worked and took up residence, as described by sociologist Michael Young in his book *The Metronomic Society*: "Non-renewable fossil fuels—oil, gas, coal—which store the sun's energy are piped from the primeval past into the pulsing present to maintain people . . . in the temperature-conditioned urban fortresses to which God did not call them."

This succinct description helps us see where we are now. The industrialized nations have made improvements in living conditions at the expense of their own and imported natural resources. They pour many of their industrial wastes into the air and water. They are also running out of landfills to bury their rubbish.

Impact of the Developing World

Now let's shift our view to the Developing World. Many of these nations borrowed heavily during the 1970s when oil prices were high and world trade burgeoned. Then recession set in and oil prices collapsed. The Developing World now faces a \$1.3 trillion debt. What does debt have to do with the environment? Everything.

By the year 2000, 82 percent of the world's population will live in developing nations. The decisions that majority makes to solve its problems are not local and minor. They have a major effect upon the global environment.

One decision is to industrialize rapidly, leading to hasty urbanization. Looking to the example set by Europe and North America, they see more industry as a way to pay off their debts.

In 1920, the urban population of the Developing World was about 100 million. Now it is near 1 billion and still growing quickly. This is due to natural population increases, as well as to peasants migrating from rural areas. Low-labor, modern agricultural techniques commonly displace these peasants from their land forcing them to



Theodore Roosevelt (left) with John Muir on Glacier Point above Yosemite Valley, California. Standing on such a mountaintop, Muir once said, "Up here all the world's prizes seem as nothing."

THE LAND: SHRINKING FORESTS, GROWING DESERTS

People the world over grow food and graze livestock on a mantle of topsoil just a few inches thick. Carefully managed soil will last for generations, being continually replenished with the formation of new soil.

But when the land is overcultivated, overgrazed or left exposed to wind and rain, soil erosion can exceed soil formation—the result is desertification.

Desertification is not the spread of natural deserts, but the result of poor land management pulling the deserts in over land that was once arable. In effect, people spread deserts by careless activity.

Soil erosion and desertification affect more than 100 nations. Areas at high risk of becoming desertified are the world's arid and semiarid land. More than 13 million square miles (33 million square kilometers) of land—an area almost equal to the combined land mass of North and South America—are affected.

Most of the arid and semiarid land is in developing countries and, despite its name, is considerably productive, providing a living for 600 million people. This land is under continued pressure to produce more food for a growing population, so traditional farming methods are breaking down.

Herdsmen graze their livestock on arid and semiarid rangeland. The burgeoning population's need for food, however, is forcing the herdsmen onto more fragile land and hillsides. Some governments are also encouraging nomadic herdsmen to settle down. The concentration of animals in the areas where the herdsmen settle soon strips the land of vegetation and compacts the soil, making it impenetrable to water.

The exposed soil bakes hard in

the sun, causing temperatures to rise, dry spells to become longer and drought more common. The heat kills the soil microorganisms necessary for plant growth. The result is a desert.

Rangeland is too often put into farm production despite its being unsuitable for this use. Demand for food means shorter periods for the soil to lie fallow and regain its fertility. Frequent planting of crops results in a loss of soil fertility and crop yield. When the exhausted land is no longer economical to farm it is abandoned to the weather's erosive process.

Farming techniques that cause soil erosion are a growing threat to developing and developed countries alike. Both the U.S. and U.S.S.R. are losing valuable topsoil.

To accommodate larger farming equipment, soil erosion checks, such as alternating field crops, field terraces on sloping land and tree belts have been abandoned. In 1982, one fifth of U.S. cropland was losing soil at a rate likely to reduce productivity. To hold topsoil in place, 11 percent of U.S. cropland is now being turned over to grassland or forest.

Paradoxically, one of the leading causes of desertification is irrigation. When improperly drained, irrigated land becomes waterlogged and as the water evaporates it draws salt up from the subsoil into the topsoil. This crust of salt makes the land inhospitable for most plants.

For every plot of land newly irrigated about the same amount of irrigated land is untillable due to salinization. More than 1 million acres of irrigated land become unproductive each year.

The creation of deserts is difficult to reverse and a massive ef-

fort is required if erosion and famine are to be avoided. Attempts to control it have been small in scale but successful when those directly affected practice sustainable farming techniques, land conservation and reforestation.

Desertification marches in step with deforestation. Trees protect the soil, help to conserve water in the ground and regulate its release. When the trees are gone, wind and rain carry precious topsoil away. Water running off the denuded land leads to flooding and siltation of rivers.

Disastrous flooding of the Sudan in 1988 was caused by high rainfall and rapid deforestation—more than 3 million acres of forest a year leading up to the disaster—in the countries of the Nile Basin. Without the trees, rainwater ran off the hills, swelled rivers to overflowing and flooded the cities of Khartoum and Omdurman.

Deforestation in China (fires have destroyed 21 million acres of China's forests over the past 25 years) has contributed to the loss of more than 5 billion tons of soil a year. And of this an estimated 1.6 billion tons of topsoil is flushed down the Yellow River into the sea. Siltation of China's rivers increases the risk of floods.

A similar loss is being experienced in India. The Ganges River carries 1.5 billion tons of soil to the Bay of Bengal each year. Wind erosion is also a serious problem. India alone has lost 32 million acres of soil due to wind erosion.

If the world's arable land is to be saved without consigning more than half the world's population to poverty, it will require the effort of the whole human family.

All nations are responsible for the earth's well-being and all nations must cease activities that degrade the environment.

Developing and developed nations must practice cooperation and a just way of life in the global village. The world is small, its resources finite, its environment vulnerable.

—Paul Monteith

“When people conspire against nature . . . to the point that climatic changes occur, then the consequences, measured in terms of human suffering, are likely to be acute.”

—Prince Sadruddin Aga Khan, former UN high commissioner for refugees



Settlers in the Amazon clear forest (above) for cropland or as forage area for livestock. Unlike soils in temperate areas (below) tropical rain forest soils will not support agriculture year after year. Unfortunately, much good land is covered with civilization's rubbish (left).



seek industrial jobs in cities.

The life they find very often turns out to be a life in the slums. Half the population of greater Delhi, India, lives in slums. Authorities estimate that the figure will near 85 percent by the end of the century. In a repeat of the 18th and 19th century history of the industrialized nations, the Developing World's overcrowded cities cannot supply enough fresh water and handle waste.

The developing nations are also deciding to exploit their natural resources. Their cutting of tropical rain forests is a good example.

Because of the regional climate and the structure and lack of fertility of tropical rain forest land (the trees have most of the nutrients, not the soil), cleared rain forest will not support agriculture year after year. It can be worked for only two or three years on average before it is no longer profitable to cultivate. Despite this, growing rural populations feel they must clear-cut the forests to provide even temporary agricultural land.

Others deforest land to sell timber to industrial nations for quick cash. Or cattle ranchers convert forest land to pasture. Foreign fast-food companies buy the cattle, which is a cheaper source of beef than their own grain-fed beef. The savings to the consumer are about five U.S. cents per hamburger patty.

Using tropical rain forest land for pasture, like using it to grow crops, often quickly depletes it. Ranchers abandon the land after a few years. They then clear more forest for pasture.

Trees are also a source of heating and cooking fuel for more than one billion inhabitants of the developing nations. But an increasing population has made it an unsustainable practice. Trees are cut down faster than they can grow back and when wood is scarce people begin burning dung and crop residue which should be used to fertilize the soil.

In Brazil alone, 13,000 square miles (33,670 square kilometers) of forest were burned down between 1987 and 1988. Photographs taken aboard the U.S. space shuttle *Discovery* in 1988 revealed a huge smoke cloud over the Amazon Basin. Scientists estimated that the smoke cloud covered one million square miles—an area larger than the 12 nations of the European Community.

Africa's Ivory Coast had 29 million acres of continuous rain forest in the early 1960s. Today only two to five million acres remain. And India's forest cover declined by more than three million acres a year during the 1970s.

By continuing such practices, developing nations will lose all their forest resources.

They may even lose the forests before they completely cut them. Much of the moisture of the rain forest comes from the forest itself in a delicate balance. It is possible that cutting too many trees will upset this balance, leading to a drier climate over the remaining forest. This will cause moisture-dependent trees to die off and death of

the entire forest may eventually result.

Despite the drawbacks of rapid urbanization and exhaustion of natural resources without regard to future generations, the developing nations look to these resources as answers to their economic woes. Who can blame them? Ninety percent of the five billion people the earth will add to its population in the next 100 years will be born in developing countries. These nations see the burning of coal, the cutting of forests and the use of toxic chemicals in virtually the same light that the industrialized nations have seen these practices for 200 years—as a quick way to reduce national debt and help their citizens rise out of poverty. Who thinks about long-range plans while struggling to find the next meal?

"It makes perfect private sense to someone in Brazil who owns a forest to chop it all down and . . . put the money in the bank for his or her children and grandchildren," explains Mr. Timberlake. "That's a terrible decision for the planet and public good as a whole."

Countries no longer struggling for economic growth can afford to turn their attention to the environment and the quality of life. But most developing nations believe that for them, caring for the environment is a luxury. It has little priority compared to their immediate need to stabilize their economies and feed their citizens. Nonetheless, such shortsighted reasoning, however understandable, will not make the inevitable consequences go away.

Constructive Criticism or Hypocrisy?

The industrial nations have expressed their concern that developing nations are beginning to inflict great harm on the environment. They censure them for contributing to rising carbon dioxide and sulfur dioxide levels by cutting tropical rain forests and burning coal. They also want the Developing World to limit its use of chlorofluorocarbons (CFCs), a family of gases that some scientists conclude are major culprits in destroying upper-atmosphere ozone.

Many developing nations bristle at these attacks. How, these countries ask the industrial nations, can you who have already attained economic stability with sacrifices to the environment now tell us we cannot do the same?

They see what they describe as hypocrisy in the industrialized nations. "I don't think there is any prospect of preaching with moral authority to Third World countries, unless more developed countries put their own house in order," says Timothy Hornsby, director-general of the Nature Conservancy Council. "I just don't see that we [the industrial nations] would have the right to talk about the reduction of CFCs . . . to Third World countries if we [are using CFCs] ourselves."

Kilaparti Ramakrishna of India, a senior associate in international environmental law at the Woods Hole Research Center, in Massachusetts,

asked the industrialized world: "Are you prepared to lower your standard of living? You won't drive less miles in your car, but you tell the Third World not to cut trees."

Whether we are in the industrialized world or those nations still developing, we are, whatever our political persuasion or economic system, locked into a deeply entrenched pattern of living. "Capitalism and Marxism have one thing very much in common," scientist Bruce Murray once observed, "they both presume that man's fundamental needs are material." Capitalist and socialist nations alike set continuous economic and industrial growth as a goal.

Until recently, leaders saw environmental con-

cerns as contrary to this goal and largely ignored them. Only now do increasing numbers of politicians see that depleting the land that feeds us, endangering the health of populations and changing our climate, will have grave economic and political consequences. Sad to say, some are using this awareness to accuse others rather than to take action at home and set a right example.

What, then, is the answer? International cooperation is crucial, but, given humanity's history of competition and war, is it realistic to expect? How can nations with their diverse national interests work together in unprecedented cooperation to find remedies acceptable to all? Is there anyone with the vision and authority to lead them?

WILDLIFE—IT'S OUR RESPONSIBILITY

Unless something drastic is done, many of the animals, plants and birds we enjoy may soon be extinct.

The U.S. Fish and Wildlife Service has listed more than 1,000 species of animals and plants as endangered or threatened worldwide. In addition, more than 3,000 species are candidates for listing.

"Endangered" means a population is declining quickly and the species is in immediate danger of becoming extinct. "Threatened" means the species is likely to become endangered.

Why are so many species in trouble? Today, the major reasons for decline of certain animals and plants are destruction and degradation of habitat.

It is estimated that two thirds of all species live in the tropics, and in turn two thirds of these are unique to tropical forests. Once the forests are cleared, the species are gone for good.

Some scientists believe that destruction of tropical rain forests is responsible for loss of one species of animal or plant every day. Unless current patterns change, one

quarter of all species will become extinct by the year 2050.

Destruction of the wetlands (coastal marshes, mangrove swamps, ponds and springs) has endangered many species, including the whooping crane and several species of rare orchids and other flowers in the United States.

Other vital habitats in danger include the coral reefs (which some scientists think are as species-abundant as the tropical forests) and the African savannah.

Human greed is also a reason species are threatened. According to the African Wildlife Foundation, ivory poachers have reduced the number of elephants in Africa from 1.3 million in 1979 to less than 750,000 today.

All five rhino species are endangered because poachers kill them for their horns. The black rhino's population has dwindled from 65,000 in 1970, to between 3,000 and 4,000 in all Africa today.

Human exploitation has also brought the Hawksbill turtle close to extinction. People want its shell for jewelry. Jaguars, leopards and

otters are hunted for their furs. The gray whale is hunted for the fatty oil in its body.

Certain chemicals and foreign materials brought into the species' environment are also dangers to wildlife. Lead poisoning helped decimate the California condor—the condors ate deer shot by hunters, lead bullets and all.

The bald eagle, brown pelican, osprey and peregrine falcon all were nearly destroyed when DDT was used in North America from 1947-72. While government action has since banned DDT there, several other nations still use it.

Animals and plants seem to be caught in a catch-22: when humans are *unaware* of any use or value a particular species may hold, the habitat of the species is often destroyed, and the species living there die in the process. When humans are *aware* of a species' value, the species is likely to be overexploited.

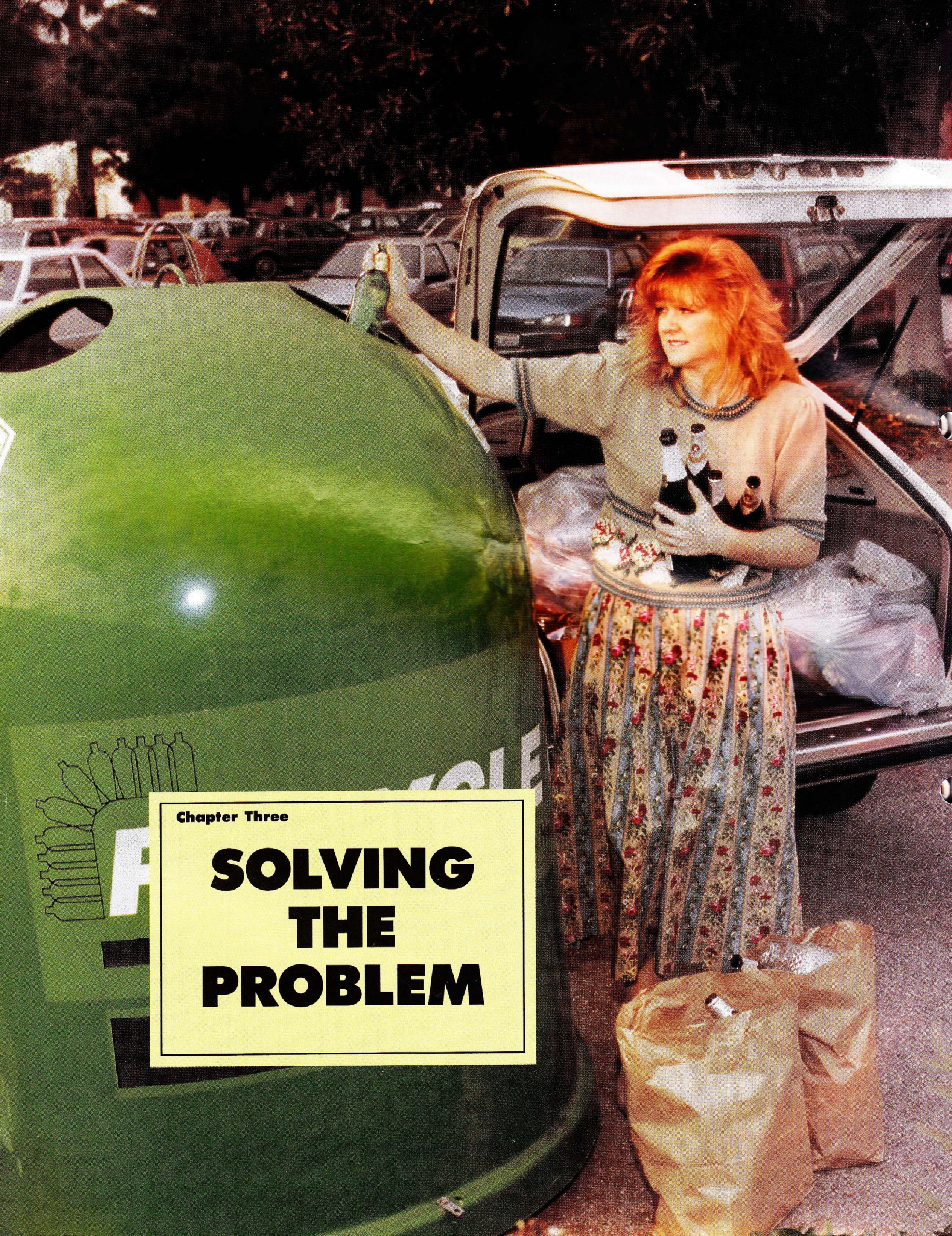
People don't seem to know how to use the earth's resources (including animals and plants) in balance.

God put humanity in charge of the earth to take care of what he created. We are to use what we need, but not to plunder.

Even with no foreseeable use for certain forms of wildlife, we have no justification for wantonly exterminating them.

—Becky Sweat





Chapter Three

SOLVING THE PROBLEM

“WE abuse land,” wrote Aldo Leopold in *A Sand County Almanac* in 1948, “because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.” More than 40 years later, environmentalists are calling for a cooperating global community with sustainable development as its primary ethic.

Is Continuous Growth Sustainable?

What is sustainable development? “The problem with sustainable development,” says Lloyd Timberlake, “is that no one has really defined it. It’s a concept like justice, equality, which continually needs redefining and it will mean different things in different places.”

Mr. Timberlake did point out a basic description of sustainable development found in *Our Common Future*, a report published by the World Commission on Environment and Development: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Few would disagree that this sounds good. Why, then, don’t nations immediately adopt sustainable development as an immediate goal? Because it is at odds with present society.

Our society is based upon all-out growth. We expect populations to grow, production to grow, economies to grow. *Our Common Future* points out: “Over the past century, the use of fossil fuels has grown nearly thirtyfold, and industrial production has increased more than fiftyfold. The bulk of this increase . . . has taken place since 1950.”

Some proponents of sustainability call for an end to economic, industrial and population growth, or even tell us “negative growth” is needed. Canadian geneticist David Suzuki told a group of school children in Australia that civilization is no longer at the beginning of its expansion. If it continues to grow, we will soon be using all of the planet’s available resources. This would leave nothing for other life forms and would eventually bring about our demise.

In *Building a Sustainable Society*, the Worldwatch Institute’s Lester Brown writes: “Creating a sustainable society will require fundamental economic and social changes, a wholesale alteration of economic priorities and population policies.” In his book, Mr. Brown calls for massive changes in the world’s economy, agriculture, use of energy and

raw materials, and population growth and distribution. These changes would affect nearly every aspect of public and private life. Even societal values such as family size and the desire for material possessions would not “survive the transition” to a sustainable society.

Will people change their deeply entrenched ways of life? Is it likely they will voluntarily give up values for which their ancestors fought and died?

Not all environmentalists agree that such a radical change is needed. *Our Common Future* calls for “a new era of growth in which developing countries play a large role and reap large benefits.” But how are we to *sustain* such growth?

British Prime Minister Margaret Thatcher stated to a conference of the Inter-Parliamentary Union (IPU) in September, 1989, “Economic growth and environmental protection are compatible.” She went on to say, “Indeed proper protection is not possible without adequate growth.”

The Earth Report, edited by Edward Goldsmith and Nicholas Hildyard, by contrast proposes that sustainability and development are “contradictions in terms.”

Can we make the necessary changes in the way we treat the environment while making little change in our basic way of life? Some sort of change is needed, but what kind?

Environmentalists do not wholly agree on the solution to our predicament.

Heart of the Problem

Are the problems we see in the environment no more than external physical difficulties? If so, the answers are purely physical. Perhaps they are found in cleaner technologies. We need then only look to science and technology for the solutions.

Or are pollution, deforestation, ozone depletion, wildlife extinction and all our other environmental problems only external symptoms of an inner malady affecting human nature?

Social scientist and educator Lynton K. Caldwell answers: “The environmental crisis is an outward manifestation of a crisis of mind and spirit. There could be no greater misconception of its meaning than to believe it to be concerned only with endangered wildlife, human-made ugliness, and pollution. These are part of it, but more importantly, the crisis is concerned with the kind of creatures we are and what we must become in order to survive.”

If this is true, then science and technology by themselves can no more rid us of environmental

problems than they can the scourge of war that has plagued civilization through millennia of technological and scientific advance.

“Just as the world has been living with the possibility of man-made disaster in the form of nuclear war,” stated U.S. Senator Albert Gore, “so it now lives with the growing threat of man-made disaster in the form of catastrophic environmental failure.” Senator Gore explained that we respond to these twin threats with increasing efficiency and technological sophistication. Always, however, our efforts to insure our security instead threaten our survival. “It is hard to escape the conclusion,” said the senator, “that we must also transform ourselves—or at least the way we think about ourselves, our children, and our future. . . . We cannot rely on science to give us a new point of view for it is partly responsible for the problem.”

One Problem Replaces Another

Let's look at some illustrations. In the days before the automobile, city streets—even in affluent neighborhoods—were littered with horse manure. Cities faced perplexing waste disposal problems and the natural by-product of horse-drawn transportation added to these problems. Health officials of Rochester, New York, calculated that if the annual waste from the 15,000 horses in that city was spread over an acre it would pile 175 feet high and could potentially breed 16 billion flies. “A strong demand for the ‘horseless carriage’ existed very early in the large cities of America,” writes Joseph M. Petulla in *Environmental Protection in the United States*.

Eventually, the automobile, a triumph of industrial technology, replaced the horse as the primary means of transportation. We no longer have to worry about how to deal with horse manure. Instead, we have to worry about how to deal with the tons of carbon monoxide and hydrocarbons belched into our air every day and with the health problems that can result from breathing these pollutants.

Take another example. Nuclear power once looked like the answer to many environmental and energy dilemmas. It could generate electricity without using coal, eliminating the need for strip mining and the pollutants associated with burning fossil fuels. What proponents of this scientific advance didn't greatly publicize is that nuclear reactors generate more than electricity. They also generate radioactive waste—tons of it. Today, in the United States alone, about 20,000 metric tons of radioactive nuclear waste await permanent disposal. Yet no totally adequate method for permanently disposing of highly toxic nuclear waste is agreed on. Also, as most of us know, nuclear reactors have had accidents, notably Three Mile Island in the United States and, with its far reaching environmental effects, Chernobyl in the Soviet Ukraine.

What of future developments? Scientists have devised methods we can use to reduce sulfur dioxide emissions when we burn coal. This should be good

news. Ironically, new research says it is possible that atmospheric sulfur dioxide counteracts global warming. Therefore, because lowering sulfur dioxide emissions could intensify the effect of so-called greenhouse gases, doing so might do more harm to the environment than good!

American author Lewis Mumford wrote: “Modern man is the victim of the very instruments he values most. Every gain in power, every mastery of natural forces, every scientific addition to knowledge, has proved potentially dangerous; because it has not been accompanied by equal gains in self-understanding and self-discipline.”

This does not mean that science and technology cannot help solve the problems. Nevertheless, until someone can centrally coordinate their efforts in a worldwide program that justly takes everyone's welfare into account, their solutions will be only temporary at best.

British economist Barbara Ward once observed, “No problem is insoluble in the creation of a balanced and conserving planet, save humanity itself.” History shows that we humans have had little to be proud of in our attempts to achieve global cooperation and just government. True success in saving our threatened global environment will require major changes in attitudes and actions.

Where Are the Answers?

Will we be able to meet and overcome the awesome challenge presented by the earth's environmental crisis? Will we worldwide be able to surmount our differences and become committed to eliminating the causes of pollution and destructive ways of living? One nation or group of nations stopping their own pollution while others continue environmentally destructive ways won't rid the world of life-threatening ecological dangers.

Will economically pinched or deeply indebted nations be able to come up with the astronomic sums needed to develop and introduce less-polluting industrial technology? Will countries be able to educate their citizens in less-damaging alternative ways of living? Will nations act in time to prevent the human annihilation we fear? Leaders of nations no longer have the luxury of decades to ignore the problem.

There is only one way global pollution and environmental destruction can be stopped. We must pass from narrow, selfish concerns to equal concerns for others, including keeping in a healthy condition the environment all of us share. Such a transition will happen only after a profound change occurs in most of humanity's way of thinking. It will occur only after a transformation in human values, attitudes and ways of living. Yet nothing in history gives reason to believe humanity *by itself* can make such a change.

Why is humanity facing this dilemma? What are the causes and cures of the crisis of mind and spirit Mr. Caldwell mentioned as underlying our environmental crisis? The answers are found in a

ENERGY AND THE ENVIRONMENT

One of the major sources of environmental damage is the worldwide obsession for ever-increasing amounts of energy. The combustion of fuels to provide energy creates much pollution.

Certain improvements have been made in clean-coal technologies. Removing most of the sulfur from low-sulfur coal has reduced sulfur dioxide emissions. Scrubbers—equipment to remove toxic gases from chimney emissions—have also helped. Unfortunately, these technologies are commonly too expensive for developing nations.

One of the biggest users of energy is transportation, particularly the personal automobile. Gasoline substitutes such as ethanol, methanol, hydrogen and electrical solar cells are either still experimental or have not made great inroads into the marketplace. No cleaner-burning alternative to gasoline is yet commonly available to the consumer.

Most other alternate sources of energy also are relatively uncommon. These rely upon the sun, the seas and rivers, the earth's internal heat and the wind. They avoid most of the environmental hazards of our conventional energy sources, but are usually either expensive or inefficient.

By far the most common of these alternate sources is hydroelectricity. The typical hydro-power technology is a dam where the water is stored and regulated. The falling water powers a turbine linked to a generator, to convert the mechanical energy into electrical energy.

Hydroelectric plants can have serious environmental drawbacks. The dams needed by the bigger projects flood large tracts of land,

upsetting the ecological balance and threatening wildlife. In the tropics, these flooded areas become insect breeding grounds and can spread waterborne diseases threatening multiple millions of lives.

An energy source that humanity has harnessed for centuries, wind power has been effectively used to run mills, pumps and other machinery. Earlier this century, generators were connected with windmills to produce electricity. Technological refinements are producing more efficient windmill generators. Nevertheless, an average wind speed of at least 12 miles an hour is needed for these machines to be economical.

They are often used to provide electricity for remote houses, farms or ranches, or sometimes small villages. Larger windmills have been built to supply electricity to the grid system.

It is also possible to have offshore wind turbine generators providing electricity on land. Another development is the grouping of 50 or more large wind turbines to form "wind farms." California has been the focus of these projects.

Another increasingly popular system consists of solar collectors on houses. These heat water for space heating or washing and bathing. They do not usually totally substitute for gas or electricity, but depending upon the climate, can heat a large percent of the water in homes that use them.

An area of recent research is photovoltaic energy, in which solar cells convert sunlight directly into electricity. So far, most uses of these solar cells have not involved any considerable quantity of electricity being fed into power grids; rather, they are more used in re-

remote areas, especially for communications equipment.

There are other sources being developed such as tidal, wave and geothermal power, but none of these provide significant amounts of the world's energy.

Geothermal energy, for example, provides only some 5,000 megawatts of electricity compared to more than 500,000 megawatts from hydroelectric power plants.

Nuclear power is a common alternative to the traditional fuels. Many environmentalists, however, do not see this as an acceptable energy source because of the difficulties in properly disposing of the toxic wastes nuclear fission-fueled power plants produce. They are also concerned about accidents such as occurred in Chernobyl in the Soviet Ukraine. Nuclear fusion has not yet proved to be a practical source of controlled energy.

There are at least two interwoven elements that will continue to prevent environmentally safe energy sources from replacing the fossil fuels: rising demand for energy, and economics. In the years between 1970 and 1986, energy production rose by 40 percent while consumption rose by 45 percent. Many developing countries are projected to continue increasing their electricity consumption at a rate of between 5 and 15 percent a year.

Yet little of that demand will be met by alternate sources which are not competitively priced against more common sources of energy. The impetus to research alternate energy sources was provided by the oil embargo in 1973. When the embargo ended, alternate energy sources were no longer economically viable.

Of course, fossil fuels have a hidden cost not added to their price—environmental damage.

Unless the economy changes or until we recognize the need to develop alternate energy sources for environmental reasons, we will see a further depletion of non-renewable fossil fuels.

—Tim Finlay

TWELVE WAYS YOU CAN MAKE A DIFFERENCE

You can lessen your personal impact on the ecosystem. Here are 12 ways to start:

1. Recycle trash. Check your community for areas to recycle glass, cans, plastic and paper products such as newspapers, magazines and cardboard.
2. Compost grass clippings, leaves, vegetable waste to use as mulch and fertilizer for gardens.
3. Avoid using disposable paper cups, plates, napkins, towels, etc.
4. Use no- or low-phosphate detergents. Phosphates, an active ingredient in many detergents, are a major polluter of waterways.
5. Limit your use of hazardous substances. Use natural cleansers such as borax, vinegar, baking soda and unscented soap.
6. Properly dispose of hazardous substances. Don't pour motor oil, automobile antifreeze/coolant, paint and paint thinners, pesticides, wood preservatives or

other chemicals down the drain, into waterways or on the ground. Instead, find out where they can be properly discarded. Local health or waste management officials or your fire department can usually give you this information.

7. Limit your use of pesticides and synthetic fertilizers. There are many books and magazines containing detailed information on



A recycling plant. Many nations and cities are taking the pressure off landfills by instituting recycling programs.

how this can be done.

8. Use cloth diapers. Cloth diapers can be used time after time and make good rags later. Disposable diapers take hundreds of years to decompose. It is questionable that even biodegradable ones, when buried in a landfill, will properly decompose. All disposable diapers put human waste into landfills.

9. Walk, cycle, use mass transit or carpool when possible. Have your car's emissions tested.

10. Plant trees. Trees absorb carbon dioxide and give off oxygen. They also help prevent soil erosion and, when properly positioned near a home, can save you some heating and cooling costs.

11. Avoid purchasing endangered plants or animals or products made from these species. The extinction of any species can be detrimental to the ecosystem.

12. Don't waste energy. Turn down thermostats in winter and wear warmer clothing, turn the pilot light to your furnace off in the summer, install insulation, avoid air conditioning when possible, close off unused rooms, switch off lights in rooms not in use, install water-saving shower heads.

—Rick L. Shallenberger

book that has been around for many years. This book explains how environmental destruction can and will finally be stopped.

This same book tells how a global community working together for the good of everyone will be established. It gives examples of the successes and failures of ancient civilizations. In the pages of this book is even the outline of an economic system that safeguards the land and guarantees forgiveness of crushing, destructive debts.

Why, you ask, isn't this book in the hands of world leaders? Why isn't everyone reading it? Why isn't it being used to pull us out of our nosedive toward ecological disaster?

In truth, many world leaders do own this book. It is, in fact, an all-time best seller. Yet it is often considered outdated, the writings of an ancient and superstitious people. Even those who read it often miss the practical solutions and certainty of the bright future it contains. Therefore, we find ourselves in the mess we are in.

Wouldn't you like to read this book that contains the answers people have been seeking for cen-

turies? You can. It is readily available. It is the Bible.

Who Will Save the Earth?

The Bible tells us that when God finished creating the natural world as we know it, he said it was "very good" (Genesis 1:31). God commanded humanity both to "subdue" the earth (Genesis 1:28) and to "tend and keep it" (Genesis 2:15). He reveals in the pages of the Bible the laws by which we could live in harmony with nature and each other. But he also created us with the power of choice—we can decide for ourselves whether to follow those laws. If we choose to obey, we reap the benefits. If not, we suffer the consequences.

In the book of Deuteronomy, God tells us that he would "call heaven and earth as witnesses today against you, that I have set before you life and death, blessing and cursing; therefore choose life, that both you and your descendants may live" (Deuteronomy 30:19).

When we see our polluted skies, ravaged earth and poisoned waters, can we deny that heaven and earth bear witness of the choices we have made?

“We live in an inherently anti-ecological society. This situation will not be healed by acts of statesmanship or the passage of piecemeal legislation. Ours is a society in need of far-reaching structural change.”

—Murray Bookchin, author and lecturer on environmental topics

Prominent people in many fields are warning us that we must all change our thinking and learn to live differently if we are to save the earth for ourselves and our children. If we do not, the gloomier projections of environmental catastrophe are probably right. There is indeed not much time left for debate. The outlook for future generations may be grim as the sins of the fathers are visited on the children (Exodus 34:7).

In the book of Revelation, the apostle John recorded a vision he saw of a future time when “a third of the trees were burned up, and all green grass was burned up” (Revelation 8:7). John also heard a command given to locusts (in the Bible, symbolic of armies) “not to harm the grass of the earth, or any green thing, or any tree” (Revelation 9:3-4). The implication is that vegetation at that time is so scarce and precious that this army will have to be given special instructions not to harm what is left.

Jesus Christ spoke of the many crises of that time in Matthew 24:22: “And unless those days were shortened, no flesh would be saved [alive].” This describes a time when humankind, through mismanagement and war, has brought itself and every other life form on this planet to the brink of extinction.

But Jesus continued, “Those days will be shortened.” The Bible paints an encouraging picture of the future. The ancient Hebrew prophets saw visions of a future earth that is healthy and environmentally balanced.

Deforested, abused and parched lands will once again become productive: “The wilderness and the wasteland shall be glad for them, and the desert shall rejoice and blossom as the rose. . . . For waters shall burst forth in the wilderness, and streams in the desert. The parched ground shall become a pool, and the thirsty land springs of water” (Isaiah 35:1, 6-7).

Any upset in global climate will be corrected. God promises: “I will cause showers to come down in their season” (Ezekiel 34:26).

No more will people be landless and overcrowded in towns and cities, “but *everyone* shall sit under his vine and under his fig tree” (Micah 4:4). This is a statement describing residential conditions as they will be at that time. It also suggests family ownership of fertile land.

Yet there will be carefully planned urban centers. Jerusalem and the areas surrounding it, for example, will contain a green belt, farming areas for the use of city residents, clean rivers and wetlands (Ezekiel 47:9-12; 48:15-19; Zechariah 14:8).

All this implies a very different economic system from the one we now have. The inequitable system of our world—the system that leads to immense wealth and greed on the one hand and poverty and unending debt on the other—will be replaced. An examination of the books of Leviticus and Deuteronomy reveals the economic system that God gave to the ancient Israelites. They largely ignored these instructions. But if this system were enacted worldwide, it would end the need and the desire to exploit the environment irresponsibly. This would require global cooperation. That cooperation will be accomplished through an equitable, worldwide government.

An often-quoted scripture concerning the birth of Jesus Christ is also about government: “For unto us a Child is born, unto us a Son is given; and the *government* will be upon His shoulder. And His name will be called Wonderful, Counselor, Mighty God, Everlasting Father, Prince of Peace. Of the increase of His *government* and peace there will be no end” (Isaiah 9:6-7). Jesus Christ is going to return to rule all nations of the earth (Revelation 19:15-16).

God will even eliminate the spiritual cause of environmental degradation—self-centered human nature: “I will put My Spirit within you and cause you to walk in My statutes, and you will keep My judgments and do them” (Ezekiel 36:27).

But if God is going to establish a government that will take care of our environmental problems, what responsibility do today’s governments have? Are they free to plunder the earth? No! They have the responsibility to fulfill the charge given to the first humans to “tend and keep” the earth.

We have a chance to accomplish this now, but humanity’s time to fulfill its responsibility will soon be past. If we do not act, environmental calamities with much suffering are a certainty!

A loving God will then intervene and spare his creation from total extinction. But not without consequence. The Bible says that the time is coming when God will “destroy those who destroy the earth” (Revelation 11:18).

All peoples of the earth have, as the title of the World Commission on Environment and Development’s report suggests, a “common future.” That future includes a common, equitable, worldwide government established by the Creator God. In his love for his creation, he will right the many wrongs humanity has inflicted upon its planet and upon itself.

The earth will be saved.