TIME
IN PARTNERSHIP WITH CNN
Monday, Feb. 02, 1970

Environment: Fighting to Save the Earth from Man

The great question of the '70s is:

Shall we surrender to our surroundings or shall we make our peace with nature and begin to make reparations for the damage we have done to our air, to our land and to our water?

—State of the Union Message

NIXON'S words come none too early. The U.S. environment is seriously threatened by the prodigal garbage of the world's richest economy. In the President's own boyhood town of Whittier, a part of metropolitan Los Angeles, the once sweet air is befouled with carbon monoxide, hydrocarbons, lead compounds, sulfur dioxide, nitrogen oxides, fly ash, asbestos particulates and countless other noxious substances. The Apollo 10 astronauts could see Los Angeles as a cancerous smudge from 25,000 miles in outer space. Airline pilots say that whisky-brown miasmas, visible from 70 miles, shroud almost every U.S. city, including remote towns like Missoula in Montana's "big sky" country. What most Americans now breathe is closer to ambient filth than to air.

The environment may well be the gut issue that can unify a polarized nation in the 1970s. It may also divide people who are appalled by the mess from those who have adapted to it. No one knows how many Americans have lost all feeling for nature and the quality of life. Even so, the issue now attracts young and old, farmers, city dwellers and suburban housewives, scientists, industrialists and blue-collar workers. They know pollution well. It is as close as the water tap, the car-clogged streets and junk-filled landscape—their country's visible decay, America the Ugly.

Politicians have got the message. Late last year, Congress easily passed Senator Henry M. Jackson's National Environmental Policy Act and appropriated $800

million to finance new municipal waste-treatment plants. Senator Gaylord Nelson plans to introduce an amendment to the U.S. Constitution that will guarantee every citizen's right to a "decent environment." Last month, the Governors of New York and California devoted much of their "state of the state" speeches to environmental matters; campaigns later this year will reverberate with antipollution statements. Says Senator Edmund S. Muskie: "In the past, we had to fight against all kinds of political pressure, public apathy and ignorance. Now the wind is blowing at our back."

The New Jeremiahs

The real problem is much bigger than the U.S. By curbing disease and death, modern medicine has started a surge of human overpopulation that threatens to overwhelm the earth's resources. At the same time, technological man is bewitched by the dangerous illusion that he can build bigger and bigger industrial societies with scant regard for the iron laws of nature. French Social Anthropologist Claude Levi-Strauss compares today's human condition to that of maggots in a sack of flour: "When the population of these worms increases, even before they meet, before they become conscious of one another, they secrete certain toxins that kill at a distance—that is, they poison the flour they are in, and they die."

Ultimately, both men and maggots need the help of an emerging science of survival—ecology. In the U.S., a tiny band of ecologists has achieved sudden prominence: Rene J. Dubos (Rockefeller University), LaMont C. Cole (Cornell), Eugene P. Odum (University of Georgia), Paul R. Ehrlich (Stanford), Kenneth E. F. Watt (University of California at Davis), and a few others. In terms of public recognition, perhaps the outstanding figure in the field is Barry Commoner of Washington University in St. Louis (see box, page 58), who has probably done more than any other U.S. scientist to speak out and awaken a sense of urgency about the declining quality of life. Last week he addressed 10,000 people at Northwestern University, where young activists staged the first of a series of major environmental teach-ins that will climax in a nationwide teach-in on April 22. In varying degrees, the once sheltered ecologists have become ardent advocates of seemingly radical views. They sometimes sound like new Jeremiahs. They do not hesitate to predict the end of the world, or at least the end of a life with quality. Yet they hold out hope too. "We are in a period of grace," says Commoner. "We have the time—perhaps a generation—in which to save the environment from the final effects of the violence we have done to it."

Web of Life

Ecology is often called the "subversive science." Only 70 years old, it avoids the narrow specialization of other sciences—and thus appeals to generalists, including people with a religious sense. Ecology is the systems approach to nature, the study of how living organisms and the nonliving environment function together as a whole or ecosystem. The word ecology (derived from the Greek root oikos, meaning "house") is often used in ways that suggest an attitude rather than a discipline. Anthropologists and psychiatrists have adapted it to their work. Poet Allen Ginsberg declaims it like a revolutionary slogan. But few yet grasp its subtle meanings—as Senator Ted Stevens of Alaska proved last summer. Arguing for fast development of his state's oil-rich North Slope, Stevens referred to his dictionary. "Ecology," he declared, "deals with the relationship between living organisms." Then he added triumphantly: "But there are no living organisms on the North Slope."

Stevens missed the whole point: the arctic ecosystem is full of life (including Eskimos) but is so vulnerable to pollution that the North Slope threatens to become a classic example of man's mindless destruction. The intense cold impedes nature's ability to heal itself; tire marks made in the tundra 25 years ago are still plainly visible. What most worries ecologists, in fact, is man's blindness to his own utter dependency on all ecosystems, such as oceans, coastal estuaries, forests and grasslands. Those ecosystems constitute the biosphere, a vast web of interacting organisms and processes that form the rhythmic cycles and food chains in which ecosystems support one another.

The biosphere (see chart, page 59) is an extraordinarily thin global envelope that sustains the only known life in the universe. At least 400 million years ago, some primeval accident allowed plant life to enrich the atmosphere to a life-supporting mixture of 20% oxygen, plus nitrogen, argon, carbon dioxide and water vapor. With uncanny precision, the mixture was then maintained by plants, animals and bacteria, which used and returned the gases at equal rates. The result is a closed system, a balanced cycle in which nothing is wasted and everything counts. For example, about 70% of the earth's oxygen is produced by ocean phytoplankton—passively floating plants and animals. This entire living system modified temperatures, curbed floods and nurtured man about 5,000,000 years ago. Only if the biosphere survives can man survive.

To maintain balance, all ecosystems require four basic elements: 1) inorganic substances (gases, minerals, compounds); 2) "producer" plants, which convert the

substances into food; 3) animal "consumers," which use the food; and 4) "decomposers" (bacteria and fungi), which turn dead protoplasm into usable substances for the producers. As the key producers, green plants alone have the power to harness the sun's energy and combine it with elements from air, water and rocks into living tissue—the vegetation that sustains animals, which in turn add their wastes and corpses to natural decay. It is nature's efficient reuse of the decay that builds productive topsoil. Yet such is the delicacy of the process that it takes 500 years to create one inch of good topsoil.

The process is governed by distinct laws of life and balance. One is adaptation: each species finds a precise niche in the ecosystem that supplies it with food and shelter. At the same time, all animals have the defensive power to multiply faster than their own death rates. As a result, predators are required to hold the population within the limits of its food supply. The wolf that devours the deer is a blessing to the community, if not to the individual deer. Still another law is the necessity of diversity. The more different species there are in an area, the less chance that any single type of animal or plant will proliferate and dominate the community. Even the rarest, oddest species can thus be vital to life. Variety is nature's grand tactic of survival.

The Domino Theory Applied

Man has violated these laws—and endangered nature as well as himself. When a primitive community ran out of food, it had to move on or perish. It could harm only its own immediate environment. But a modern community can destroy its land and still import food, thus possibly destroying ever more distant land without knowing or caring. Technological man is so aware of his strength that he is unaware of his weakness—the fact that his pressure upon nature may provoke revenge.

By adding just one alien component to a delicate balance, man sometimes triggers a series of dangerous changes. Nature immediately tries to restore the balance—and often overreacts. When farmers wipe out one pest with powerful chemicals, they may soon find their crops afflicted with six pests that are resistant to the chemicals. Worse, the impact of a pesticide like DDT can be vastly magnified in food chains. Thus DDT kills insect-eating birds that normally control the pests that now destroy the farmers' crops. The "domino theory" is clearly applicable to the environment.

In South Africa, for example, a campaign was waged against hippopotamuses. Deemed useless beasts that merely cluttered up rivers, they were shot on sight.

Result: the debilitating disease called schistosomiasis has become as great a public-health hazard in certain areas as malaria was 50 years ago. As usual, the missing links in the chain of events were discovered the hard way. It turns out that hippos keep river silt in motion as they bathe. When they heave themselves up riverbanks to dry land, they also go single file and act like bulldozers, making natural irrigation channels. Without the animals, the rivers quickly silted up; without the overflow channels, periodic floods swept like scythes over adjacent lands. The altered conditions favored a proliferation of schistosomiasis-carrying water snails. Such harsh intrusions on wildlife constitute only one way in which man abuses nature. Another is through his sheer numbers. From an estimated 5,000,000 people 8,000 years ago, the world population rose to 1 billion by 1850, 2 billion about 1930, and now stands at 3.5 billion. Current projections run to 7 billion by the year 2000. Neo-Malthusians like Stanford Population Biologist Paul Ehrlich grimly warn that the biosphere cannot sustain that many people. As Ehrlich puts it: "There can only be death, war, pestilence and famine to reduce the number."

Davy Crockett Goes to Jail

Ecologist LaMont Cole raises the crowding problem. Since 80% of the population is likely to live in cities occupying only 2% of the land, the sheer density of people will strain what might be called the urban ecosystem. Asks Cole: "Are we selecting for genetic types only those who can satisfy their aesthetic needs in congested cities? Are the Davy Crocketts and Kit Carsons who are born today being destined for asylums, jails or suicide?"

Barry Commoner believes that under present conditions the earth can hold between 6 billion and 8 billion people. After that, environmental and food-supply problems may become insurmountable. Commoner notes that humans tend to view the procreation of several children as a kind of guarantee of immortality. "What makes human populations turn off?" he asks. "If a father knows that his sons will survive, perhaps he will not feel the need for so many successors." But Commoner's principle that greater material security might stop population growth requires a dramatic rise in the world standard of living—hardly a bright prospect. Moreover, ecologists are not hopeful that a "green revolution" can increase farm harvests enough to feed twice as many people. "Undeveloped countries cannot afford to mechanize their farming production," argues Eugene P. Odum. "The fancier a seed we give them, the more artificial care it needs, along with tractors and gasoline."

Modern technology is already pressuring nature with tens of thousands of synthetic substances, many of which almost totally resist decay—thus poisoning man's fellow creatures, to say nothing of himself. The burden includes smog fumes, aluminum cans that do not rust, inorganic plastics that may last for decades, floating oil that can change the thermal reflectivity of oceans, and radioactive wastes whose toxicity lingers for literally hundreds of years. The earth has its own waste-disposal system, but it has limits. The winds that ventilate earth are only six miles high; toxic garbage can kill the tiny organisms that normally clean rivers.

Massive Filth

In a biospheric sense, the U.S. bears a heavy responsibility. According to Paul Ehrlich, "Each American child is 50 times more of a burden on the environment than each Indian child." Although the U.S. contains only 5.7% of the world's population, it consumes 40% of the world's production of natural resources. In 70 years of life, the average American uses 26 million gallons of water, 21,000 gallons of gasoline, 10,000 lbs. of meat, 28,000 lbs. of milk and cream, as well as $8,000 worth of school buildings, $6,000 of clothing and $7,000 of furniture. To compound the problem, a Gallup poll shows that 41% of Americans consider the ideal family size to be four or more children.

The result of massive production is massive filth. Every year, Americans junk seven million cars, 100 million tires, 20 million tons of paper, 28 billion bottles and 48 billion cans. Just to collect the garbage costs $2.8 billion a year. The U.S. also produces almost 50% of the world's industrial pollution. Every year, U.S. plants discard 165 million tons of solid waste and gush 172 million tons of smoke and fumes into the air. Moreover, chemicals have replaced manure as fertilizers, while vast cattle feedlots have moved closer to cities. Result: animal wastes now pollute drinking water and pose a sanitation problem equivalent to that of almost a billion people.

The truth is that Americans have done far too little to tame the polluting effects of technology. Even the far reaches of Puget Sound are burdened with pulp-mill discharges. Mining companies spew so many wastes over tiny East Helena, Mont. (pop. 1,490) that the lettuce there contains 120 times the maximum concentrations of lead allowed in food for interstate shipment. Tourists are beginning to leave Appalachia nowadays; poisonous acid from strip mines has seeped into the water table.

The nation's 83 million cars cause 60% of the air pollution in cities. Fully aware of the pressure to reform, Detroit will introduce 1971 models that exhale only 37% as much carbon monoxide as did 1960 models. To achieve this, however, requires increased engine heat, which in turn will increase the nitrogen oxide emissions. And nitrogen oxides are particularly dangerous: under sunlight, they react with waste hydrocarbons from gasoline to form PAN (per-oxyacl nitrate), along with ozone the most toxic element in smog.

"We now have 50% more nitrogen oxides in the air in California," says Ecologist Kenneth E.M.F. Watt. "This has a direct bearing on the quality of light hitting the surface of the earth. At the present rate of nitrogen buildup, it's only a matter of time before light will be filtered out of the atmosphere and none of our land will be usable." Tougher auto-emission standards in California will start reducing the nitrogen problem next year. But Watt argues that California's air pollution is already so bad that it may start a wave of mass deaths by 1975—perhaps beginning in Long Beach. He also blames pollutants for the rising number of deaths from emphysema in Southern California. Trouble may well loom for Los Angeles, which sits in a smoggy bowl that often contains only 300 ft. of air. Almost every other day, the city's public schools forbid children to exercise lest they breathe too deeply.

California is a blessed state—young, aggressive, progressive. And yet it is rapidly losing many of its best natural qualities through heedless exploitation of its resources. Among its problems: OPEN SPACE. Every year, Greater Los Angeles' growth consumes 70 sq. mi. of open land. Not only is prime farm land taken out of production, but it is also developed in an inefficient way; the term "slurb" was coined in California to describe sleazy, sprawling subdivisions. By planning ahead, much land can be preserved, with houses and services concentrated between green belts. But Californians, like all Americans, have a record of acting for their own benefit only after the damage is done.

SALINITY. The Imperial Valley has perhaps the richest farm land in the nation, producing five or six bumper crops a year. The valley's intense irrigation, however, is raising the level of the water table to the bottom of the irrigation trenches. Salts are pulled to the surface —and salts do not evaporate. In time, the soil becomes too saline to support normal crops.

FERTILIZERS. To boost crop production, nitrogen fertilizers are spread liberally on California's superb farm lands. Just as people get hooked on drugs, so the soil seems to become addicted to chemical additives and loses its ability to fix its own

nitrogen. As a result, more and more fertilizer has to be used. What makes the problem doubly serious is that the nitrates eventually turn up in the water supply, where they endanger human health.

WASTES. Each of California's 18.5 million residents throws away 20 lbs. of solid wastes per day—an amount that in a year would make a wall 100 ft. wide by 30 ft. high stretching from Oregon to Mexico. Most of the garbage is buried in landfills, but space is running out, and there is no state or regional authority to coordinate solutions. San Francisco now plans to pay the town of Mountain View $2 per ton to accept 2,000 tons of solid wastes a day. The arrangement stops when Mountain View's marshes are filled, in about six years. After that, nobody is quite sure what to do.

When the Snow Fell Black

The U.S. is far from alone in these battles with pollution and waste. The smog in Tokyo is so dense that some residents are asking: Is it worth owning a car when there is no blue sky to drive it under? The tidy Swiss are horrified to discover that their three crystalline lakes — Geneva, Constance and Neuchatel—are turning murky with effluent from littoral cities and industries; the trout and perch in them are nearly gone. In Italy, trash is neatly collected in plastic bags and then thrown like confetti over the landscape. Norway's legendary fjords are awash with stinking cakes of solid wastes.

Pollution respects no political bound aries. The Rhine flows 821 miles past the potash mines of Alsace, through the industrial Ruhr Valley to the North Sea. Known as "Europe's sewer," the river is so toxic that even hardy eels have difficulty surviving. The Dutch, who live at the river's mouth, have a stoic slogan: "Holland is the rubbish bin of the world." In Sweden, when black snow fell on the province of Sma-land, authorities suspected that thick soot had wafted from across the sea.

Where do most of the pollutants end up? Probably in the oceans, which cover 70% of the globe. Yet even the oceans can absorb only so much filth; many ecologists are worried about the effects on phytoplankton. If the supertanker Torrey Canyon had leaked herbicides rather than oil, the spillage would have wiped out all plankton life in the North Sea. Other ecologists fear that the oceans will become so burdened with noxious wastes that they will lose their vast power of self-purification.

The famed French marine biologist, Alain Bombard, says that the sea can handle human sewage. "But," he adds, "this process of purification is easily and seriously

disrupted by the introduction of the chemical byproducts of civilization." Near Marseille, a pair of big aluminum refineries each day discharge 6,000 tons of a red sediment into the Mediterranean. Though 80% of it funnels into a deep submarine trench, the remainder settles elsewhere on the bottom. "The problem," says Bombard, "is that this waste, though not toxic in itself, blankets and kills all living things. Moreover, this is an area where it is essential to have living water to purify the sewage of Marseille."

Some environment experts visualize future dramas of disaster that seem to border on science fiction. A few scientists feel that the outpouring of carbon dioxide, mainly from industry, is forming an invisible global filter in the atmosphere. This filter may act like a greenhouse: transparent to sunlight but opaque to heat radiation bouncing off the earth. In theory, the planet will warm up. The icecaps will melt; the oceans will rise by 60 ft., drowning the world's coastal cities.

Other scientists argue the exact opposite: they point out that the earth's average temperature has dropped by .2° C. since 1945, though the carbon dioxide content of the air keeps increasing every year. To explain this phenomenon, many ecologists think that various particles in the atmosphere are reflecting sunlight away from the earth, thus cooling the planet. Since about 31% of the world's surface is covered by low clouds, increasing this cover to 36% through pollution would drop the temperature about 4° C.—enough to start a return to the ice age.

The Earth Shudders

This is no idle speculation. Various experts feel that major volcanic eruptions in the past have thrust enough particles into the air to affect global climate. When Krakatoa exploded in 1883, the temperature at the surface of the earth was reduced for several years. The new worry, though, is that such particles will not shower to the ground in rain or snow. The supersonic transport will fly at 60,000 ft., where there is no atmospheric turbulence or weather to bring pollutants down to earth. Even assuming that the plane has a fumeless engine, the water vapor in its exhaust may accumulate in the stratosphere, reflecting sunlight away from the earth.

Man's inadvertence has even upset the interior conditions of the earth's crust. One of the most respected U.S. geophysicists, Gordon J. F. MacDonald, reports that wherever huge dams are built, the earth starts shuddering. The enormous weight of the water in the reservoirs behind the dam puts a new stress on the subsurface strata, which are already in natural stress. In consequence, giant sections of the

earth's crust sheer past one another and the earth quivers. MacDonald warns that earthquakes may result (and did near Denver) from one of the newest anti-pollution techniques: injecting liquid chemical wastes into deep wells.

If technology got man into this mess, surely technology can get him out of it again. Not necessarily, argues Anthony Wiener of the Hudson Institute. Wiener sees technological man as the personification of Faust, endlessly pursuing the unattainable. "Our bargain with the Devil," he says, "is that we will figure out the consequences of whatever we do. We may have a 100% probability of solving all those problems as they arise. But as we solve them, we may find that our only remedies will create more of the same problems."

One example is the mighty Aswan High Dam project, built on the Upper Nile River with Soviet aid. When an international team of ecologists studied the effects of the dam, they were shocked. For one thing, waterweeds are clogging the shoreline of Lake Nasser behind the dam. The weeds may well speed evaporation through transpiration to the point where the lake lacks enough water to drive the gigantic generators.

Unexpected Side Effects

The dam has also stopped the flow of silt down the Nile, which in the past offset the natural erosion of the land from the Nile delta. As a result, downstream erosion may wash away as much productive farm land as is opened up by new irrigation systems around Lake Nasser. Without the nutrient-rich silt reaching the Mediterranean, the Egyptian sardine catch declined from 18,000 tons in 1965 to 500 tons in 1968. As a final penalty, irrigation projects on the delta plain have allowed a moisture-loving snail to thrive. Since it carries schistosomiasis, most of the delta people have had that agonizing liver and intestinal disease.

An example closer to home: though President Nixon prescribes an increased dose of technology to cure pollution, his medicine may well have side effects. Consider his $10 billion plan to build new primary and secondary municipal water-treatment plants. While such plants do make water cleaner, they also have two serious faults. Unlike more expensive tertiary treatment plants, they do not exterminate man-killing viruses, like those that cause infectious hepatitis. They also convert organic waste into inorganic compounds, especially nitrates and phosphates. When these are pumped into rivers and lakes, they fertilize aquatic plants, which flourish and then die. Most of the dissolved oxygen in the water is used up when they decompose. As a result, lakes "die" in the sense that they become devoid of oxygen, bereft of

fish, choked by weeds. In short, by solving one problem (dirty water), the sewage plants create another (eutrophication).

Behind the environment crisis in the U.S. are a few deeply ingrained assumptions. One is that nature exists primarily for man to conquer. Many thinkers have traced the notion back to early Judaism and Christianity. Genesis 1: 26 is explicit on the point that God gave man "dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth." The ecological truth is quite different. The great early civilizations —Babylonian, Sumerian, Assyrian, Chinese, Indian and perhaps Mayan—over-exploited the basic resource of land. In the end, says LaMont Cole, "they just farmed themselves out of business."

Another ready assumption is that nature is endlessly bountiful. In fact, the supply of both land and resources is finite. Martin Litton, a director of the Sierra Club, says: "We are prospecting for the very last of our resources and using up the nonrenewable things many times faster than we are finding new ones." Litton reaches this alarmist conelusion: "We've already run out of earth, and nothing we can do will keep humankind in existence for as long as another two centuries."

No less troubling is the belief that economic growth is worth any effort. Until recently, neither capitalist nor Communist seriously questioned the whirling-dervish doctrine that teaches, in René Dubos' words, "Produce more than you can consume so that you can produce more." This leads to ecological mismanagement. For example, says Barry Commoner: "Every day we produce 11,000 calories of food per capita in the U.S. We need only 2,500 calories." At the same time, while most of Latin America is suffering from protein deficiency, the U.S. is taking thousands of tons of protein-rich anchovies from the Humboldt Current off Peru and Chile. The anchovies are ground up for chicken feed in Arkansas—food energy that could have gone more wisely to hungry human beings. Worse, some of the fish meal is made into cat food. "And," says Commoner, "we don't even eat the cats!"

What most appalls ecologists is that technological man is so ignorant of his impact. Writing in Foreign Affairs, Britain's Lord Ritchie-Calder recently pointed out that neither the politicians nor the physicists who developed the first atomic bomb were fully aware of the consequences of radioactive fallout. The men who designed the automobile helped to annihilate distance as a barrier between men. Yet the car's very success is turning cities into parking lots and destroying greenery in favor of highways all over the world.

Each year the U.S. alone paves over 1,000,000 acres of oxygen-producing trees.

"Once you understand the problem," says Barry Commoner in one of his gloomier moments, "you find that it's worse than you ever expected." Yet even LaMont Cole, a charter member of the doomsday school of ecologists, is not entirely discouraged: "There has been so much progress in the past five years that if I'm not careful I'm liable to become a little optimistic."

There is certainly no lack of hopeful ideas for balancing the environment, and the most encouraging change to date is the groundswell of U.S. public opinion. The nation is at least starting to combat gross pollution. Even so, real solutions will be extremely difficult and expensive. To wean farmers away from pesticides and chemical fertilizers, for example, would cause at least a temporary decline in farm productivity and a hike in food prices. Fortunately, ecologists are developing reasonable replacements; there is nothing wrong with organic fertilizers or the prechemical method of crop rotation. Much is also being learned about the biological control of pests. To kill the leaf hopper Dikrella, which destroys grapes and is now immune to DDT, California ecologists have employed a tiny wasp—and the cost of controlling leaf hoppers has declined by 87% since the wasp buzzed into action.

Ideally, the entire environment should be subjected to computer analysis and systems control. Whole cities and industries could measure their inputs and outputs via air, land and water. By making cost-benefit choices—for example, between new plants and old marshes —they could balance the system. But this is a far-off dream. Far more knowledge is needed about how ecosystems work. Even the simplest is so complex that the largest computer cannot fully unravel it. Yet a promising start is being made in Colorado, where Ecologist George Van Dyne is running a key project under the International Biological Program to discover how a grasslands ecosystem responds to various stresses. Van Dyne and 80 other scientists are trailing every imaginable creature on the Western prairie and gathering data for a computer-modeling scheme that may become a landmark in ecological forecasting.

Government's first priority is to enact environmental standards—and then enforce the law. Regulatory agencies should do far more to assess new products and policies before they harm man and nature. At all levels, governments must join in regional attacks on air and river pollution that cross political boundaries. At the federal level, the maze of agencies with conflicting environmental responsibilities must be reordered. While the Agriculture Department pays farmers to drain wetlands, for example, the Interior Department pays to preserve them. Worse, the farm-subsidy program encourages the misuse of toxic chemicals, one-crop farming

that destroys ecological diversity, and mechanization that drives jobless rural laborers into packed cities. Federal highway builders, the Army Corps of Engineers—all such official land abusers—need retraining in ecological values.

To relieve city congestion, Washington should subsidize more new towns and rural redevelopment. Especially in a technological society that so burdens nature, it should do more to limit population. It is obvious that few Americans will imitate Paul R. Ehrlich and some of his young disciples, who have tried to set a dramatic example by having vasectomies. Instead, the Government might well offer new incentives: bigger tax deductions for small families and even singles, for example, or higher old-age benefits for couples who have no more than two children. If all parents had two children, the U.S. population would remain stable.

Industry has a vital role: first to minimize pollution, and then to work toward recycling all wastes (see box, page 60). There is profit in the process. Paper, glass, and scrap copper have long been reused. Fly ash can be recaptured and pressed into building blocks; reclaimed sulfur dioxide could ease the global sulfur shortage. The oil industry could do a profound service for smoggy cities by removing the lead from gasoline (motorists would pay 20 more per gallon). The packaging industry would benefit all America by switching to materials that rot—fast. By one es timate, burning scrap paper and garbage in efficient incinerators could generate 10% of the nation's electricity. Such incinerators already provide central steam heating for Paris. To be sure, big changes might raise consumer prices and cut profits. But businessmen should also consider a greater profit: rescuing the environment.

Basic to all solutions is the need for a new way of thinking. So far, the key to so-called progress has been man's ability to focus his energies on a single problem, whether fighting a war or going to the moon. But thinking in compartments is the road to environmental disaster. Americans must view the world in terms of unities rather than units. To recognize the interdependence of all creatures is to see all kinds of follies—from the one-occupant cars that choke highways to the tax policies that discourage mass transit and land preservation.

The biggest need may be a change in values; the whole environmental problem stems from a dedication to infinite growth on a finite planet. Pessimists argue that only a catastrophe can change that attitude—too late. By contrast, Barry Commoner and others put their faith in man's ability to reform when confronted by compelling facts. It is also possible that ecologists can eventually stir enough people to an emotion as old as man—exaltation. Ecology, the subversive science,

enriches man's perceptions, his vision, his concept of reality. In nature, many may find the model they need to cherish. The question is: How many?

- 
- **Click to Print**

- **Find this article at:**
- http://www.time.com/time/magazine/article/0,9171,878179,00.html