THE 1991 GLOBAL

When viewed from the moon, the earth rises brilliant, a small planet in its universe. In its visual reality, it is no longer an abstract idea merely imagined in the minds of human beings, but a glowing, simple system of feedbacks and natural processes. It is yet miraculous and fragile, an example of a balance that alone sustains the only life we know. When viewed from the earth, the problems and challenges posed not by the earth but by how we choose to live on the earth, can seem overwhelming and even depressing. There is so much that, while seemingly out of our control, reveals just how much control and effect we humans have on our planet's life-sustaining natural processes. In understanding the environmental threats we alone have created—the air pollution and water pollution, population problems and energy impacts—there is no answer that we cannot attain. No solution is beyond the reach and ability of any human civilization now existing on our small, small, beautiful planet. But that may be our collective Achilles' heel—just because we know we can change the way we live so as not to continue to destroy the very life processes that sustain our short lives doesn't mean we will choose to do so. Perhaps this is our ultimate ecologic failure—to recognize our responsibilities even as we recognize our vulnerability and weak wills to change ourselves and thus our societies' values.

In searching for answers and solutions to these environmental challenges, and thus in seeking the hope found in understanding and the empowerment found in information, BUZZWORM asked 13 leading specialists and scientists to offer a progress report on 13 environmental challenges facing us. We asked them to designate on our global maps the location of the most critical areas affected by these problems. We asked for the bad news—and the good news—on the effects civilization is having on the earth. We asked that each contributor first define the problem and then briefly report on what actions we have taken to create the solution. We asked what must be done this year and what it might cost to meet the challenge of change. Finally we asked why each environmental issue —whether it was desertification, sustainable agriculture, population, air pollution, energy issues or water pollution—was *the* most important environmental issue we face.

The honesty in each of these very brief reports is amazing. The sum total, of course, is that each issue overlaps and interrelates with other problems we create for earth's life-sustaining processes. And all the solutions presented are, in Washington, DC language, very "do-able." It's simply up to us.

REPORT

No doubt each report will lead to more questions. What follows is a brief list of resources—books and think tanks—that you can contact to learn more, ask more questions, and hopefully, to participate more in deciding how we will respond to the challenges before us.

FURTHER RESOURCES

State of the World
World Watch Institute
Lester Brown, *et al*
WW Norton & Co., 1990

World Resources: A Guide to the Global Environment
World Resources Institute
Oxford University Press 1990

First People, A Gaia Atlas
Julian Burger
Anchor Books, Doubleday 1990

Imperiled Planet
Edward Goldsmith, Peter Bunyard, Nicholas Holdyard, Patrick McCully
MIT Press, 1990

Global Warming
Stephen Schneider
Sierra Club Books, San Francisco 1989

Ozone: Diplomacy: New Directions in Safeguarding the Planet
Richard Benedick
Harvard University Press, 1991

Planting the Future: A Resource Guide to Sustainable Agriculture in the Third World
International Alliance for Sustainable Agriculture, 1990

World Resources Institute
1709 New York Ave. NW
Washington, DC 20006
(202) 638-6300

United Nations Environmental Programme
Regional North American Office
United Nations Rm DC2-0803
New York, NY 10017
(212) 963-8138

Smithsonian Institution
1000 Jefferson Dr. SW
Washington, DC 20560
(202) 357-1300

Union of Concerned Scientists
26 Church St.
Cambridge, MA 02238
(617) 547-5552

Environmental Defense Fund
257 Park Ave South
New York, NY 10010
(212) 505-2100

National Center for Atmospheric Research
PO Box 3000
Boulder, CO 80307
(303) 497-1000

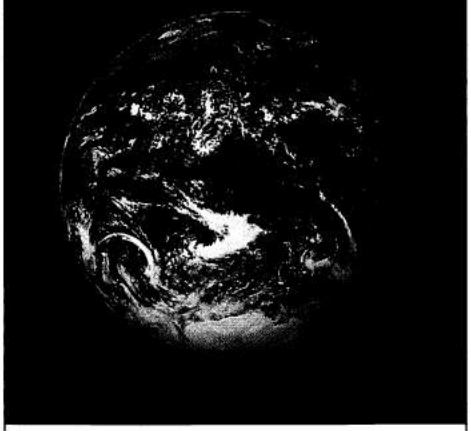
Scripps Institution of Oceanography
La Jolla, CA 92093-0216
(619) 534-8665

International Alliance for Sustainable Agriculture
1701 University Ave. SE
Minneapolis, MN 55414
(612) 331-1099

Survival International USA
2121 Decatur Place NW
Washington, DC 20008
(202) 265-1077

INTRODUCTION—James J. MacKenzie

A WORLD AT RISK



Our legacy to the new millennium is a host of unprecedented environmental threats—from regional problems such as smog, acid rain, degraded topsoils, contaminated waterways and deforestation to the global problems of climate change, ozone depletion and a species extinction rate unmatched in 65 million years.

At first glance, all these problems seem unrelated. And, unfortunately, they are being treated as such in public policy-making. Thus, according to common understanding, smog and acid rain arise from inadequate controls on motor vehicles and power plants and the solution to these problem—as prescribed by Congress in its latest revision of the Clean Air Act—lies in capping sulfur emissions from coal-fired power plants and tightening pollution standards for new cars and trucks. Climate change, on the other hand, is perceived largely as a problem of inefficient fossil fuel use. If only we drove smaller cars, used more efficient light bulbs, and perhaps built more nuclear power plants—none of which Americans seem prepared to do—we could reduce carbon dioxide emissions and thereby the threat of global warming.

But the world is more complicated than most policy-makers think. As a result, the incremental solutions they propose are unlikely to prove equal to the problems at hand.

Consider air pollution. Today's most serious problems are acid rain and tropospheric ozone (the principal ingredient of urban smog). Both arise naturally in amounts small enough to do no long-term damage to soils, vegetation and aquatic systems. But the prodigious amounts of sulfur and nitrogen compounds that fossil fuel use generates are overwhelming nature's restorative powers.

In the United States, for instance, we put out 10 to 20 times as much sulfur and nitrogen as is emitted through natural processes. Pollution persists despite past efforts to develop cleaner vehicle and power-plant designs, largely because such technological advances have been more than cancelled out by the growth in the number of vehicles, drivers and power plants. There is no reason to believe that—under current trends—the future will be any different: Unless we stabilize the number of pollution sources or fundamentally change our energy technologies, growth will eventually win out, and we will find ourselves no better off down the road than we are today.

Similar problems confront us in coping with climate change. Fossil fuels represent about 90 percent of global commercial energy use. Besides generating much of the world's air pollution, burning these fuels accounts for nearly half of the global warming threat. Despite widespread energy-efficiency improvements between 1977 and 1987, global energy consumption rose 20 percent. With no change in global per-capita energy use over this period, increased fuel burning can be attributed primarily to population growth. As a result, both global carbon dioxide emissions and regional air pollution increased.

There are other links between growth and environmental threats. For example, deforestation results at least partly from agricultural pressures, in turn related to growing populations. It is widely recognized that the disappearance of tropical forests results in a loss of biological diversity and in the emission of large amounts of carbon dioxide, the principal greenhouse gas. But deforestation results in the release of other air pollutants as well. Carbon monoxide, methane, nitrogen oxides, nitrous oxide and hydrocarbons are all emitted in the burning of the forests and contribute directly or indirectly not only to global warming but also to the formation of smog and acid rain. Moreover methane is released by termites from the remaining unburned wood.

At first glance, all these problems seem unrelated. Unfortunately, they are being treated as such in public policy-making.

These two important major threats—air pollution and climate change, linked together by deforestation and the burning of fossil fuels—illustrate the critical need to take a broader view in environmental policy-making. They also indicate how crucial policies affecting growth and technological change will be to the development of long-term solutions.

Our century's exponential growth trends —and their enormous momentum—show why there is such an urgent need for fundamental changes that affect growth and technology. Since 1900, world population has tripled while fossil fuel use has grown tenfold and the global economy twentyfold. It took all of history for the world economy to reach $600 billion in 1900, but now it grows by more than that sum every two years—and may, by the middle of the next century, be five times as large as it is today. It took some 50,000 years for the human population to reach 2.5 billion in 1950, but only 37 years to double to over 5 billion. Ten years ago, experts thought world population would level off at around 10 billion, but the latest United Nations, high-end projection sets the endpoint at a staggering 14 billion sometime in the next century. Taking today's road into that future will lead to a devastating crash, for we are already disrupting the planetary systems that support life.

Even if we managed to limit the numbers—of human beings and vehicles and power plants—we could not burn fossil fuels indefinitely. Like all finite resources, they would eventually be exhausted. Indeed, the oil and natural gas era will effectively come to an end during the first half of the next century. There will be plenty of coal left, but its climate impacts are far greater than those of oil and gas, severely limiting the amounts that can be burned.

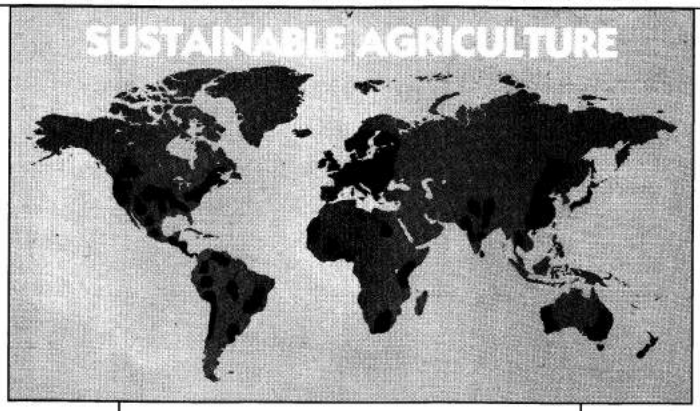
Climatologists estimate that stabilizing the atmosphere's carbon content—and thereby eventually holding the line on global warming—will require reducing carbon dioxide emissions by 60 percent to 80 percent below today's levels. Even using the most efficient technologies available, such a Draconian cut in fossil fuel burning is hard to contemplate, especially in light of expected population and economic growth. But, while we obviously cannot simply abolish the burning of fossil fuels, we also cannot guarantee our species' future unless we begin soon to take steps to replace them.

The long-term message conveyed by air pollution and global warming is clear: We must shift the world economy off fossil fuels long before we run out of them since exponential growth based on today's technologies puts us on a collision course with ecological disaster.

Since technological revolutions can take a generation or more, there's no time to waste in charting a path that will support economic development over the long term without jeopardizing the environment.

Dr. James J. MacKenzie is a senior associate in the World Resources Institute's Climate, Energy and Pollution Program.

1991 GLOBAL REPORT—By Terry Gips



When it rains, it now pours DDT in the USA, and atrazine in Germany. It has become increasingly clear that widespread environmental damage is being caused by our present agricultural practices. These methods have contaminated our land, water, air and food with hazardous pesticides and fertilizers, and have caused soil erosion and the loss of precious genetic resources.

There is an alternative. Sustainable agriculture combines the latest scientific advances with traditional wisdom and offers the possibility for creating food and agriculture systems that are productive in both the short and long term while enhancing the environment and our health.

Sustainable agriculture has four essential components. First, it must be ecologically sound. It must not destroy the environment or our health, while conserving energy and using renewable resources. Second, it must be economically viable, assuring farmers a fair return, and at the same time, accounting for all the hidden costs and subsidies in the system. Third, it must be socially just, assuring full participation for all people, from their access to land and resources to their ability to make decisions about their own destinies. Fourth, it must be humane, which means to embody our highest values. Most often we think about our treatment of animals, but it applies just as well to our treatment of human beings. Sustainable agriculture is concerned with respect for all life as well as preservation of rural communities and culture.

In the past few years there has been an increasing realization at a wide variety of levels that we must shift to a sustainable agriculture. Excellent programs are evolving at a number of land grant universities across the United States, particularly in response to the funding provided by the federal government through the Low Input Sustainable Agriculture program. This funding has been increased significantly in the 1990 farm bill which will encourage even more aid and expansion. Some states have established support systems for farmers to shift to sustainable agriculture, either through grants or loans. However, from the perspective of government assistance, the US Department of Agriculture still has a long way to go.

In other countries, such as Sweden, Germany, Switzerland and the Netherlands, there is a lot more support at the federal level for organic agriculture. They have whole programs in organic agriculture at many universities. In Sweden, the farmers have been paid several hundred dollars per acre to change over to organic farming.

In the third world there is a great deal of interest in sustainable agriculture. In Latin America, for example, there is an excellent consortium of third world groups supporting sustainable agriculture. There are newer networks and groups being formed both in Africa and Asia. More than 300 groups all over the world are working on pesticide reform through the Pesticide Action Network.

In 1991, it's my hope that we will fully implement the 1990 farm bill, which has provisions on organic agriculture encouraging crop rotation as well as alternative research. Unfortunately, the "circle of poison" legislation, which will halt the current practice of exporting banned pesticides to foreign countries, did not make it into the 1990 farm bill. While legislation is important, consumers must support the farmers by buying certified organic food.

It's time for a new accounting system. Presently, the costs of pollution caused by our agricultural systems, plus hidden costs of subsidies, are passed on to the next generation. The expense of the health and environmental impacts, not to mention the loss of certain species that are gone forever, are incalculable. If those impacts were totaled, it would be far cheaper to change over immediately to sustainable farming. Organic food would be cheaper by comparison.

The development of sustainable agricultural practices is a crucial environmental issue because it relates to our relationship with all life. Agriculture has an impact on everything from global warming, caused by animal-based agriculture and volatile fertilizers, to rainforest destruction. Our approach, assumptions and values in our agriculture need to fundamentally change to a more holistic perspective that respects nature and the rights of all life. It is essential to have this kind of value shift, to change our practices to support truly sustainable agriculture.

Terry Gips is an agricultural economist, author and founder of the International Alliance for Sustainable Agriculture.

The development of sustainable agricultural practices . . . relates to our relationship with all life.

Photo: Richard Hamilton Smith

A farmer with his organic crop at a test farm in Iowa.

1991 GLOBAL REPORT—By Joel S. Hirschhorn

The problem with toxic chemicals and wastes is that there is too much of them being produced and too much of them in all the wrong places, like our air, soil and groundwater. In the United States, well over 700 million tons of federally-defined hazardous wastes are being produced by American industry annually.

Remarkable progress has been made in getting government, industry and the general public concerned about the very high use of toxic chemicals, the releases of enormous amounts of them into the environment and the continued generation of huge amounts of toxic waste. Government has developed a maze of regulations covering toxics, laws like the Resource Conservation and Recovery Act concerning hazardous waste management, the Toxic Substances Control Act overseeing the production of toxic chemicals and, of course, Superfund regulating the cleanup of toxic waste sites. The requirement for industry to publicly reveal its releases of toxic chemicals into the environment yields the Federal Toxic Release Inventory.

But thousands of pages of government regulations and billions of dollars spent by industry on complying with those regulations have not produced enough change. What our fragile planet desperately needs is less use of toxic chemicals, less release of them into the environment and less generation of toxic waste.

Over the past 10 years there has been an increase in understanding of the benefits of pollution prevention, also called waste reduction, source reduction and toxics use reduction. The concept is both profoundly simple and elegant: Deal with the real origins of the problem in a preventive way. This means reduce and eliminate the use of toxic chemicals in manufacturing and in final products. Reduce and eliminate the production of all wastes and pollutants by making changes in industrial processes, materials and practices.

Pollution prevention is the front-end approach, whereas our current regulatory system is based on the back-end approach of using pollution control technology and waste management. Only a massive commitment to pollution prevention by every part of society can cope with rising population growth, rising consumerism and rising industrialization. The best thing that can be done next year is to support individual state Pollution Prevention Initiatives like those in Massachusetts, Indiana and about eight other states.

Public and government attention to toxic chemical and waste issues seems to be declining as interest is focused on other critical environmental problems, particularly ones that are global in nature, such as global warming and ozone layer depletion. But let us remember that we are vitally dependent on groundwater and that more and more groundwater is contaminated by toxic chemicals. For most of the chemicals we really do not know their exact health effects. The thing to remember is that it is illogical and life-threatening to pit one legitimate environmental problem against another. We must effectively address *all* environmental problems, local as well as global ones.

Many studies have concluded that it is completely feasible, technically and economically, to make fundamental changes in industry processes and in products to greatly reduce the use of toxic chemicals and the production of toxic wastes. Many companies, like Polaroid and 3M, have already shown how practical it is to do waste reduction and make money at it because it improves the efficiency of their operations. More and more bans of chemicals will probably have to be made, but history has shown that necessity is indeed the mother of invention. Banning chemicals and the pollution prevention movement stimulate technological innovation, force changes in consumer patterns and generally make society safer, more efficient and more sustainable. The key point about the pollution prevention movement is that it does *not* mean deindustrialization; rather it means restyling our industrial society to serve both long-term environmental and economic interests. In the coming decade, consumers will probably be the most effective force moving industry and government to increased practice of pollution prevention and toxics use reduction. Cleaning up all the contaminated land, water and buildings in the United States alone will probably cost between $500 million and $1 trillion over the next 50 years.

In the US, well over 700 million tons of federally-defined hazardous wastes are being produced by industry annually.

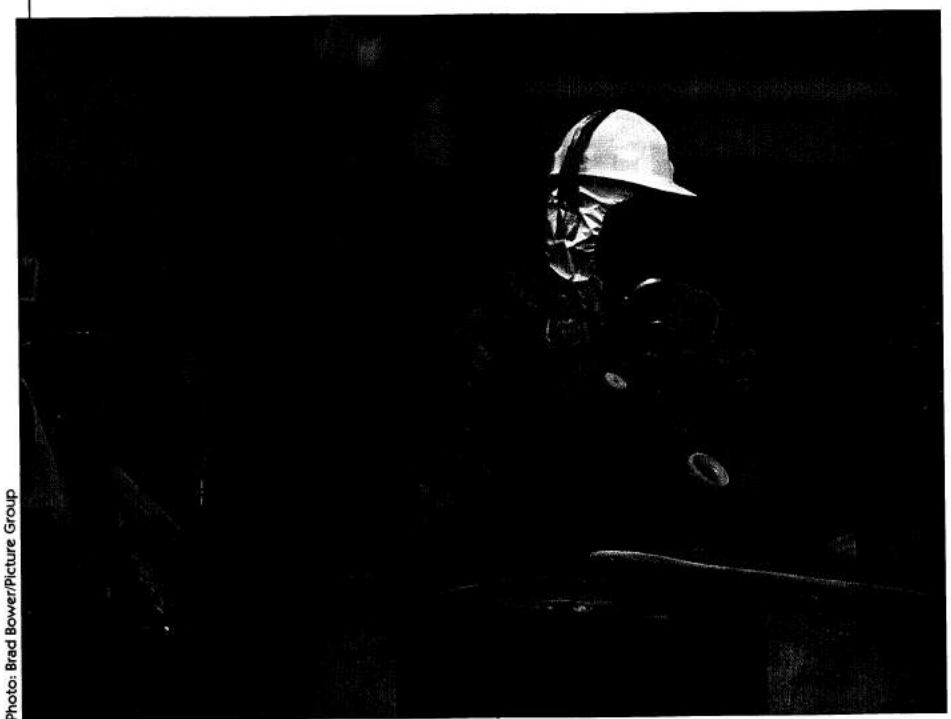
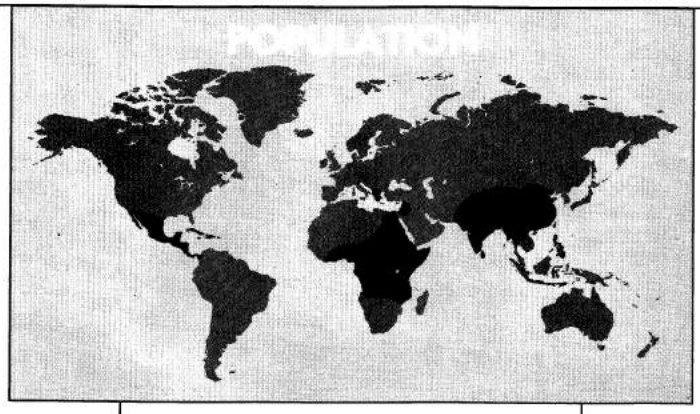


Photo: Brad Bower/Picture Group

Cleaning up toxic waste at the EZ Chemical Company in Pennsylvania.

Dr. Joel S. Hirschhorn is President of EnviroSearch-East, an environmental consulting firm that provides environmental analyses for industry's problem solvers and planners.

1991 GLOBAL REPORT—By Garrett Hardin



By definition, a population problem is solved when the population is brought down to, or below, the carrying capacity of the environment. Carrying capacity refers to the maximum number of people that can be supported on a given territory year after year without degrading the environment. At that point subsequent generations inherit an environment that is as good, or better, than the one their parents enjoyed. That happy condition is yet to be achieved.

The solution requires two approaches: "family planning" and "population control." The first is successful when each woman has no more than the number of children she wants. Contraceptive materials and education make this possible. While not perfect, present methods of contraception are adequate.

Population control is more difficult because it is a political problem, not a technological one. When will we solve it? No one can say because, as Dennis Gabor, a Nobel physicist, once remarked, "The future cannot be predicted, but futures can be invented." No one predicted the striking political events of 1989 even one year in advance. A successful program of population control is equally hard to predict. But we can describe the necessary elements of success.

Family planning alone does not produce population control. The number of children women want individually does not necessarily add up to the number that is best for a nation. Incentives (like child allowances) and disincentives (like higher taxes) can be used to persuade women to control their fertility. The mixture of methods used must fit each particular culture. There are about 180 different nations in the world, thus there are about 180 different population control problems.

Human beings need much more than food to live well. To preserve the "cultural carrying capacity" of the environment, people need houses, clothing, furniture, automobiles, television sets—the list goes on and on. Most of our wants can be expressed in energy units. The average American uses 100 times as much energy for the conveniences of life as he or she does for food alone. In addition, many of us want access to unpolluted beaches, undisturbed forests and nature preserves.

In equatorial Africa the food production, per person, has been falling for two decades. Tragically, the birth rate is not falling in most of these countries. Infrequent (but normal) droughts cause great suffering. When people in rich countries hear that tens of thousands are dying of starvation they impulsively send gifts of food. The intention is admirable, but the results are tragic. The donors seem unaware of the moral meaning of carrying capacity.

Take Ethiopia. The population has already grown beyond the mere "survival carrying capacity" of the land. Their cattle are in wretched condition, and the over-exploited soil is washing down the rivers. Metaphorically, the too-numerous Ethiopians are "eating up" their land.

From true stories like this, ecologists deduce an Eleventh Commandment: "Thou shalt not transgress the carrying capacity." When we send food to people who have already transgressed the capacity of their land, we become a party to its further destruction.

Sooner or later there will be a massive die-off from starvation and disease, unless the people lower their birth rate drastically. The size of the population needs to decrease until it matches the carrying capacity of the territory. This task each overpopulated nation must do itself: Outsiders cannot do it for them.

But what if someone asks, "Am I not my brother's keeper?" Traditionally, this question was supposed to be rhetorical; we were supposed to answer "Yes." But down through the ages most people have answered "No." The negative answer has the virtue of imposing responsibility on the people who created the problem. Who is directly responsible for a pregnancy?

The ethics of traditional religions evolved in a world that had less than 3 percent of the world's present population. Open space and unexploited resources were abundant. No more. From now on we must insist that every nation that claims sovereignty over its affairs, including the right to produce many children, must take care of those children on the home territory. Relieving nations of the responsibility for the control of their own populations will result in the universal ruin of the environment.

Dr. Garrett Hardin, trained as an ecologist and microbiologist, has made fundamental contributions to ecology, population theory, economics and political science.

Population control is difficult because it is a political problem, not a technological one.

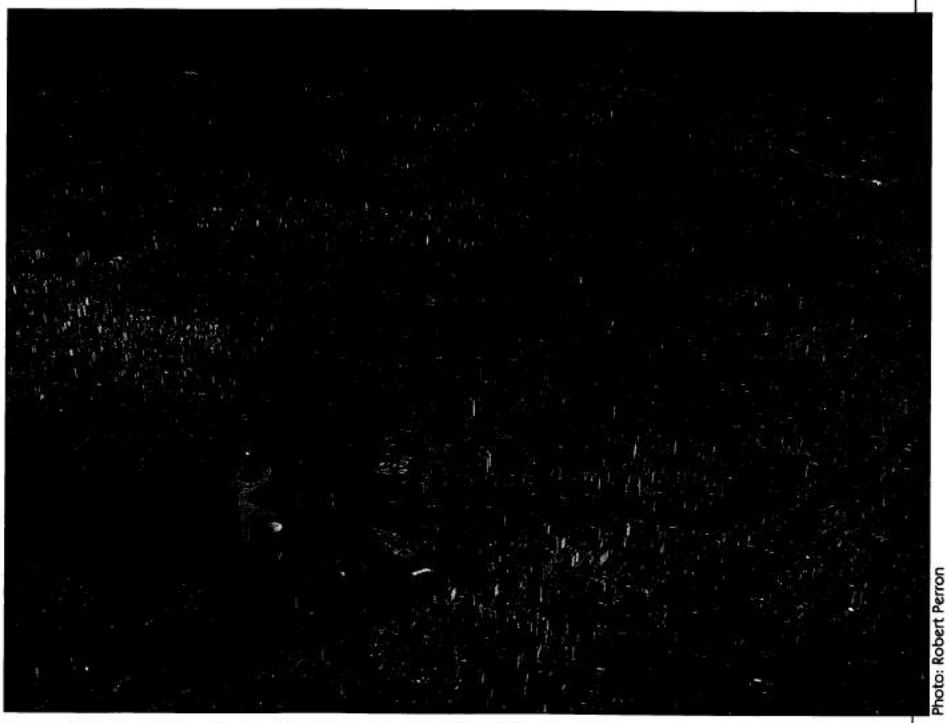
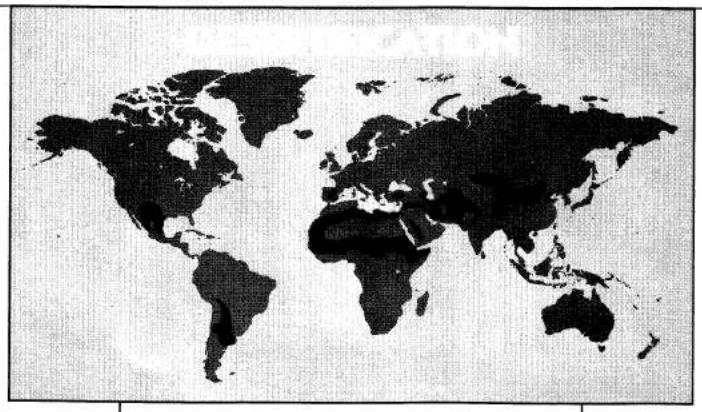


Photo: Robert Perron

An aerial view of Sao Paolo, Brazil, a city of 12.5 million people.

1991 GLOBAL REPORT—By Michael Glantz



Desertification can be defined as the creation of desert-like conditions where none had existed in the recent past. Although the concept has become most closely associated with arid areas along desert fringes, it is now applied to high rainfall areas like the Amazon rainforest. Desertification is a mega-concept. It encompasses many processes such as wind and water erosion, soil salinization, overgrazing, waterlogging and deforestation. It also has competing definitions, of which there are more than a hundred. This perspective sees desertification as a process of change, rather than just the end result of that change.

Desertification has a natural as well as a human component. In the ancient past its occurrence was dependent on land-climate interactions. In the past several thousand years the equation has been expanded to include humans. Today, desertification is dependent on land-climate-human interactions. Desertification in specific regions is occurring over decades and years instead of centuries and millennia. The difference is the human factor. We have not learned to live in harmony with our natural environment.

Many Americans believe desertification is a third world problem and not one we need be concerned about in North America. Yet aspects of desertification are under way in our country: degraded rangelands, major dust storms, decreasing soil fertility. Do we have a federal office of desertification control? No. Do we have a Bureau that deals with soil erosion? Yes. With grazing practices? Yes. While it appears that we are not doing much in North America to combat desertification (the mega-concept), we are quite active in combating those land-use problems that degrade our soil's productivity.

In North America desertification is an economic problem. It is a different situation, however, in the third world where the inability to cope with aspects of desertification that encroach on agricultural fields, rangelands and on human settlements can mean the difference between life and death. Many people in sub-Saharan Africa live from one season to the next. They are on their own when it comes to survival, as their governments are either unwilling or unable to assist them. When the fertility of their soils declines, bringing down food production with it, they become malnourished, finding it even more difficult to work their fields. Ultimately they must abandon their land in search of land not yet degraded by human activities.

Decades ago when population densities were lower, farmers could migrate to new areas, leaving their farmland fallow. Over time, the fields would recover and in a decade or two the farmers would rotate their farming back to the original site. With most of the arable land already in production, there is no possibility of letting the land lie fallow. Making a bad situation worse, animal manure is often collected in the fields to be used as fuel, eliminating a sorely needed source of fertilizer.

Poor countries do not have the funds to combat desertification. Industrialized countries apparently do not have the desire to address the sources of desertification in the third world in a major way. Lip service to combating desertification will not do the job. Training programs and technique transfer (as opposed to technology transfer) are necessary aspects of arresting desertification processes. It is far cheaper to train people to avert desertification than to reclaim land that has already been desertified.

Desertification is a long-term, low-grade, but cumulative environmental problem that, like air pollution, acid rain and global warming, keeps getting put on the back burner while governments address seemingly more pressing issues. Solutions, however, are often known but not applied for lack of appropriate funding. It will take lots of money to combat it. But those funds will have to be used more wisely in the future than they have been in the past. Education and training at the local level should be the highest priorities for agencies seeking to bring an end to desertification in those countries whose inhabitants are most threatened by the process.

Desertification deserves at least equal attention as other environmental changes that threaten "our plundered planet." Only time will tell if humans are smart enough to give it that attention.

Dr. Michael Glantz is a senior scientist with the National Center for Atmospheric Research (NCAR) and Director of the Environmental and Societal Impacts Group, a program of NCAR.

It is a long-term, low-grade, but cumulative environmental problem that keeps getting put on the back burner.

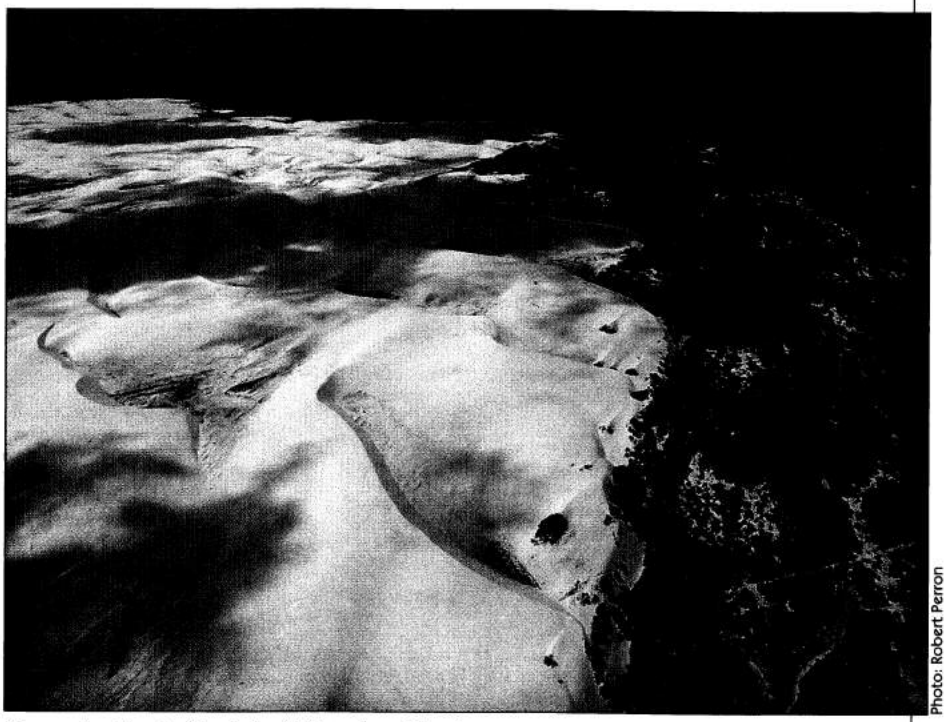


Photo: Robert Perron

Dune migration in the state of Maranhao, Brazil.

1991 GLOBAL REPORT—By Stephen H. Schneider

Global warming has become, so to speak, the hottest topic in environmental conservation as the last decade of the 20th century begins.

Human industrial energy, produced largely by fossil fuels, inevitably produces carbon dioxide (CO_2) gas, and leads to a buildup of CO_2 in the atmosphere, adding to the natural greenhouse effect about 33 degrees Celsius (60 degrees Fahrenheit) of warming. Since the industrial revolution, human activities (mostly fossil fuel burning, but perhaps 40 percent from deforestation) have led to a 25 percent increase in carbon dioxide, a 100 percent increase in methane and the introduction of human-made chemicals such as chlorofluorocarbons (CFCs). It is not controversial that these gases have trapped about two watts per square meter of extra radiative energy near the earth's surface since the industrial revolution, equivalent to the power of a small Christmas tree bulb in every square meter of earth.

What is controversial, however, is how to translate that extra two watts of heating into "x degrees" of temperature rise, since this involves yet unverifiable assumptions about how the heating will be distributed among temperature rise, evaporated water, melted ice, altered soil moisture, cloudiness, etc. These "feedback processes" make our estimates of climatic warming from the buildup of greenhouse gases uncertain to about a factor of three. Most assessments, including the recent 200-scientist, UN-sponsored Intergovernmental Panel on Climate Change, have concluded that a warming of several degrees is quite likely by the middle of the next century and that a warming of four or more degrees Celsius is possible by the end of the next century. Human civilization, which developed over the past 10,000 years, has not experienced a planet more than one to two degrees warmer than present. A four-degree warming nearly equals the temperature difference between the end of the last ice age and the present interglacial epoch, a time that literally revamped the ecological face of the earth. Transitions in nature typically take 5,000 to 10,000 years; a climate change of several degrees in a century is at least 10 times, and perhaps 100 times, more rapid on a globally sustained basis than average natural change. This raises the specter of considerable disruption to natural ecological systems, human agriculture and water supplies, threatens to raise sea levels or intensify hurricanes, and could cause unknown alterations to human and animal health.

Estimates of societal and ecological disruptions have ranged from mildly beneficial to catastrophic. Currently, there is intense international debate among individuals, corporations, government officials and nations as to what, if anything, the world should do about this issue. Particular attention has focused on the creation of a framework convention to limit emissions of greenhouse gases.

The global warming environment/development debate has led to charges and countercharges about proposed actions or inactions that will condemn millions to poverty on the one hand or a planet to catastrophe on the other.

It is my belief that solutions can be found which do not require major unacceptable concessions from either side, at least for a period of a decade or so.

The magnitude of the investments needed to achieve environmentally sustainable development will probably take on the order of tens to hundreds of billions of dollars invested annually for decades. While this seems like a staggering sum on a global basis, the world currently spends some trillion dollars annually in armaments. The kinds of investments needed to deal with environmentally sustainable development are on the order of a tenth that amount.

If the world declared war on underdevelopment, overpopulation, over-affluence and environmental damage, it could cut back substantially its investment in armaments and divert perhaps half of those savings to environmentally sustainable development, allowing the rest to remain at home satisfying demands for improved living conditions in all countries. Fundamentally, dealing with global warming is like dealing with many other global issues of environment development and security. It involves a shift of priorities away from short-term national interests toward long-term global survival.

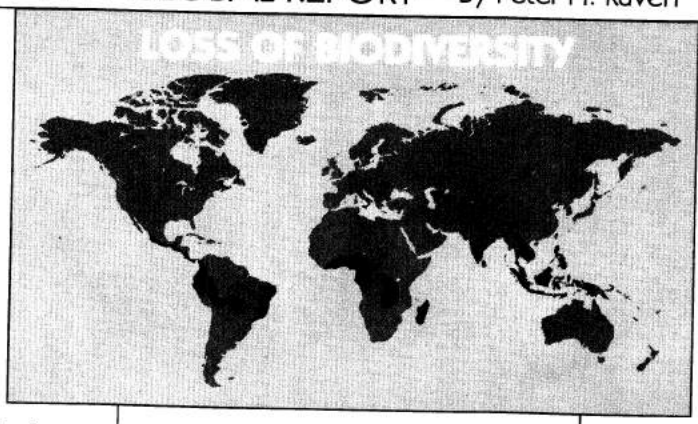
Dr. Stephen H. Schneider heads the Interdisciplinary Climate Systems Group at the National Center for Atmospheric Research.

Over 10,000 years human civilization has not experienced a planet more than one to two degrees warmer than present.

Photo: John Smierciak/Picture Group

Inspecting an Indiana lake dried up by heat and drought.

1991 GLOBAL REPORT—By Peter H. Raven



Biodiversity is suddenly a potent word, but still a somewhat forbidding and technical one. What does it mean? The sum total of all the animals, plants, fungi and microorganisms that share this planet Earth with us—they constitute biodiversity.

Are there 10 million kinds of organisms on Earth, or 100 million? No one knows for sure. But what *is* certain is that we are destroying them rapidly, and forever. The explosive growth of a runaway human population that has more than doubled in the last 40 years; the unequal distribution of wealth, which leaves three-quarters of us making do with 10 percent to 15 percent of the world's goods while contributing tens of billions of dollars each year to the rich, industrialized nations; our greedy and seemingly tireless consumption of all that the world has to offer—these are some of the factors that are working together in our time, and will likely deny our children and grandchildren the pleasure of ever seeing, studying or using a fifth of the kinds of plants and vertebrate animals that exist now.

Some 50,000 kinds of plants may vanish during the next 30 years or so, out of a world total of about 250,000. Most of them will never have been examined in detail; the vast majority will be natives of largely tropical developing countries. If they are saved, some of them would doubtless turn out to be excellent timber trees, forage plants, sources of food or biomass—a means to capture solar energy. Others might contain substances that would cure cancer, deter the AIDS virus, form the basis for whole new industries to help alleviate the poverty of the regions where they grow. With such riches within our grasp, it seems all but unbelievable that we are not taking steps to secure them while they are still there. As many as 4,000 species of legumes, 2,000 species of grasses and 600 species of palm—to name only the three plant families that contribute the most to human welfare—may disappear forever during our lifetimes.

To solve this problem, we must accept the fact that the irreversible loss of the organisms on which we depend is the most serious global problem of all—more serious than the depletion of the stratospheric ozone layer, global warming or ocean pollution—because it is moving more rapidly and because it is completely irreversible. We must work to preserve biodiversity by setting aside and protecting selected natural areas in industrialized countries like the United States.

We must also insist on effective foreign assistance programs that help other nations protect their biodiversity, to create a global network of parks and protected areas, seed banks, zoos and collections of cultures of microorganisms. Living lives that are ecologically sound, when we consume the Earth's bounty at 20 to 50 times the rate that is possible in most countries, could easily free up the 10 billion or so dollars that might be required annually to begin to address this problem seriously.

In the industrialized countries, we can all contribute to the preservation of biodiversity by working to set aside protected areas in our regions, with representative samples of natural habitats and striving to maintain the condition of those that are already protected. Groups such as The Nature Conservancy, the Audubon Society, the Sierra Club, the Center for Plant Conservation and many others deserve our support, and local chapters have up-to-date information on the kinds of efforts that are important locally.

A spirit of international cooperation is the best guarantee for the preservation of biodiversity in the future. Your elected representatives should hear from you about your interest in these matters and in effective programs of international legislation that exist for the preservation of species throughout the world.

Whether we choose to recognize it or not, we are, in effect, the proprietors of a kind of Noah's ark—we are choosing which kinds of plants and animals survive, and which die. We must choose whether we will be responsible proprietors or not and, if our decision is positive, take the appropriate steps. Only organisms, individually and in communities, make possible the sustainability on which we, and the proper functioning of the whole planet, depend. The kind of world that our descendants will inhabit a few decades from now will depend directly on the actions that we decide to take now.

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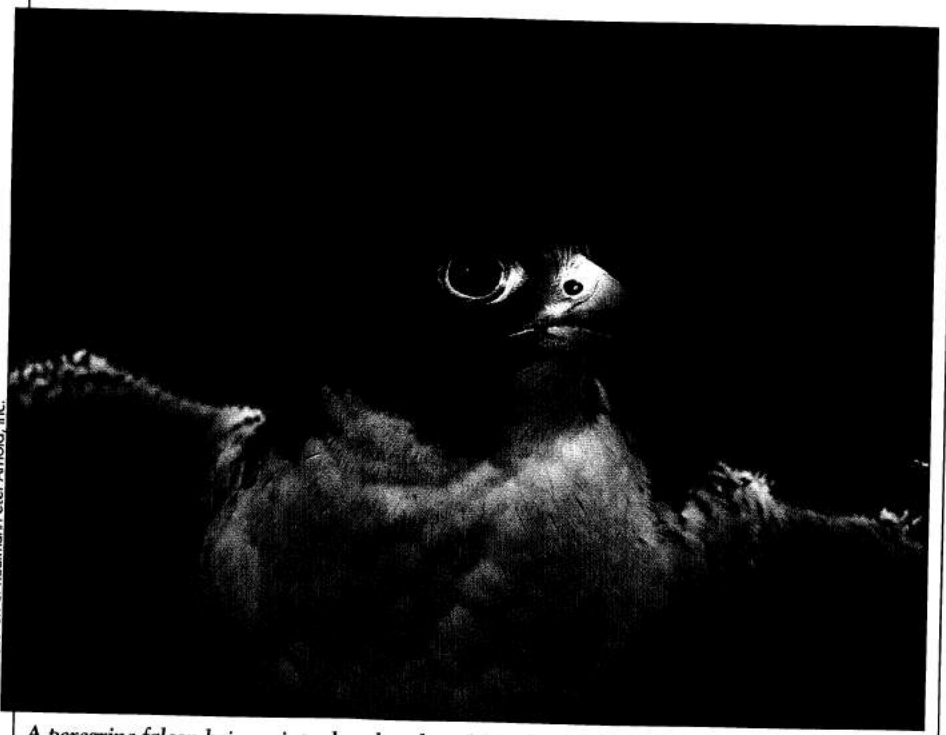
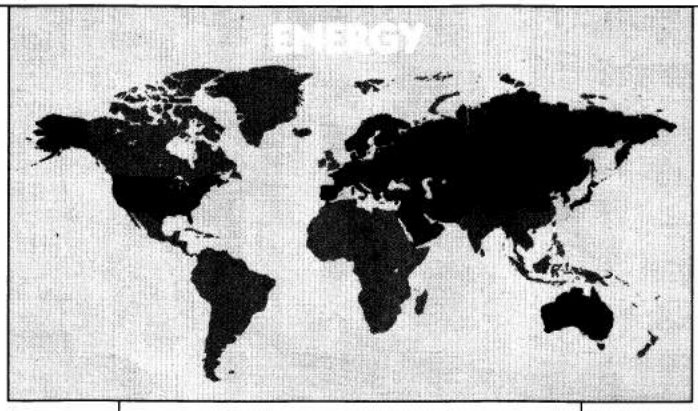


Photo: Steven C. Kaufman/Peter Arnold, Inc.

A peregrine falcon being reintroduced to the wild in the western Rocky Mountains.

Dr. Peter H. Raven is Director of the Missouri Botanical Garden and Englemann Professor of Botany of Washington University.

1991 GLOBAL REPORT—By James J. MacKenzie



The "energy problem" is actually a complex of environmental and national security problems. Burning fossil fuels gives rise to environmental damage on many fronts, the most alarming of which is global climate change. But such "local" damage as oil spills, acid rain, wilderness destruction and soil and groundwater contamination also result from producing, transporting and using such fuels—especially oil and coal.

The latest Persian Gulf crisis illustrates once again the security and economic risks inherent in our dependence on imported oil. The United States' oil production keeps declining while oil imports rise, with grave implications for the country's security and balance of trade. In 1989, the US imported about half its total oil supply at a cost of about $50 billion, almost half of the trade deficit. Since transportation consumes the bulk of US oil, the national security issue is very much a transportation issue. US dependence on foreign oil—and the attendant security and economic threats—will keep rising until measures are taken to curtail petroleum demand or substitute new energy sources for oil.

As a nation, we are a long way from adopting a rational response to energy-related problems. The US government, almost alone among the industrialized democracies, consistently downplays the need for national energy policies that address the threat of global warming. The Bush Administration is dealing with the oil-import problem by deploying military force and promoting more exploration and development of domestic oil resources, while ignoring the need for improved energy efficiency. Meanwhile, federal funding for the renewable energy technologies that could reduce these environmental and security risks is languishing. In short, the federal government is more a part of the energy problem than a part of the solution. Fortunately, some states—California is a prime example—are moving to fill the vacuum created by federal paralysis. Energy efficiency standards, electric vehicles and the development of renewable energy sources are all being promoted at the state level.

A focused national response to energy-related problems will require an integrated program of both short-term and long-range initiatives. Over the next decade, we need measures to increase energy efficiency. Specifically, we should strengthen building codes; encourage higher new-vehicle fuel efficiency through fuel taxes, gas guzzler fees and annual registration fees based on efficiency; adopt programs to remove older (thus pollution-prone and inefficient) vehicles from our roads; and provide incentives to utilities to weatherize and retrofit existing buildings and to install and lease solar domestic hot water heaters. Longer-term efforts should focus on promoting widespread adoption of nonfossil energy technologies such as wind turbines, solar thermal power plants, photovoltaic cells and electric and hydrogen powered vehicles.

Historically, it has taken several generations to switch to new energy sources. Use of new fuels—coal in the 19th century, oil and gas in the 20th—generally grew by 6 percent to 7 percent per year, doubling every decade. If the past is prologue, it takes some 50 years or more for new energy sources to displace old ones.

But there is no fundamental reason why a transformation of energy technologies should take so long. During periods of national emergency such as the world wars of this century, factories were quickly converted to make entirely different products deemed critical to the national interest. If the US government—and the electorate—recognize the urgent need for new energy technologies, the transition to solar hot-water collectors, solar thermal power plants, wind turbines and other nonfossil technologies could be greatly accelerated, as could improvements in national energy efficiency.

In sum, the energy problem presents enormous challenges over the next few decades. Political leadership and foresight will be needed to change current practices—especially the inefficient burning of fossil fuels—and thereby mitigate the growing climate, pollution and security problems that loom over our future. Since the technological means of moving to an efficient, sustainable energy system are within our reach, the resolution of our long-term problem is not a matter of fate, but of choice.

Dr. James J. MacKenzie is a senior associate in the World Resources Institute's Climate, Energy and Pollution Program.

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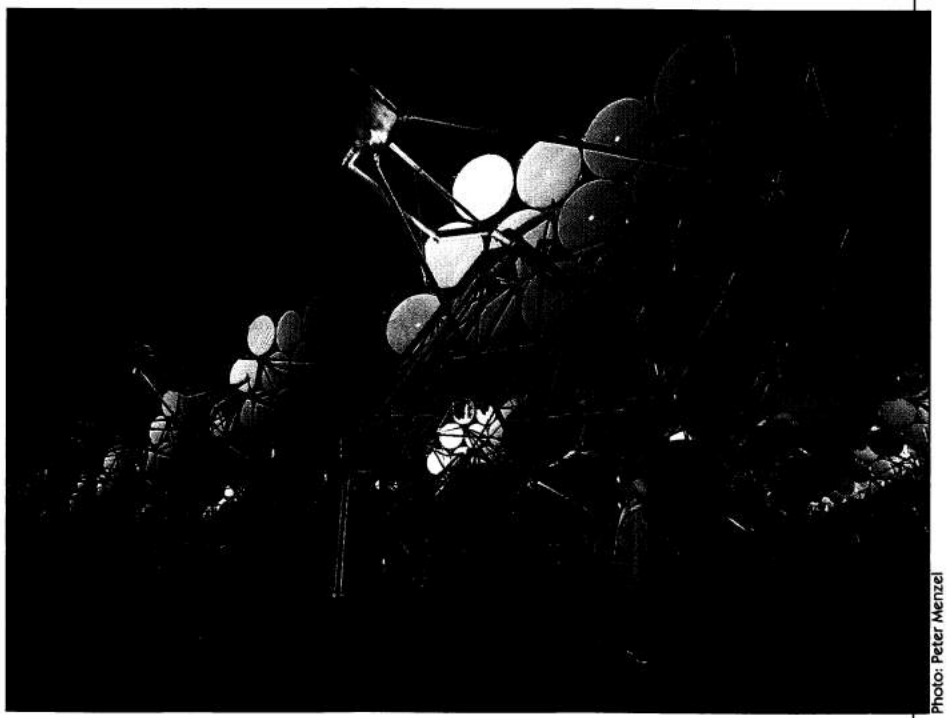

Photo: Peter Menzel

The world's largest private solar energy generator in California.