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ABSTRACT

This monograph contains the text of a lecture given on August 4, 1987, at the Institute for Environmental Studies at the University of Wisconsin-Madison. A viewpoint is advanced advocating personal involvement in the movement to insure that environmental balance and security can be sustained for future generations. Discussed are trends in national environmental policies, industrial policies, energy alternatives, world peace, pollution, the world resource base, international finance, and nuclear war. Three suggestions for improving society's chances for avoiding environmental disaster are advanced that involve government, industry, and education. The speech was concluded by stating that the knowledge to change these trends and policies exists but that what is missing is the willingness to face up to these threatening trends. (CW)

Global Balances in the 21st Century

Russell W. Peterson

IES Monograph 2

Institute for Environmental Studies
University of Wisconsin-Madison

Global Balances in the 21st Century

Russell W. Peterson

It's great to be alive. And it's great to be here in Madison with you, my fellow travelers -- travelers on planet Earth with five billion other Homo sapiens, all linked together with millions of other species, all dependent on each other and on the air, water, land, and sun.

It took aeons and an infinite number of biochemical experiments before Earth, with the aid of solar energy, was able to put together this current stew we call the biosphere. Some now consider this earth-encircling assembly of plants and animals and the atmosphere, waters, and soils as one organism, a living planet, with each member of the populations of the many species a component of the whole, the vast assembly recycling and regenerating its vital components and creating and regulating its life-supporting atmosphere.

Whatever the explanation, we must admit our biosphere is a glorious place in which to live -- in fact, it is the only known place in which to live.

Regardless of how one views the whole he must agree we are a unique component, possessor of the most remarkable invention of all, the human brain. It will come in handy as we consider how we might help to save the creation -- not from some invader, but from ourselves -- for clearly it is the cumulative action of humans that is most threatening.

My assignment tonight is to talk about "Global Balances in the 21st Century" and what choices we have for insuring that those balances will provide a decent sustainable quality of life for future generations. And the most important choice to be made is what we will do as individuals in our own lives. Will we devote our abilities, our energy, our time exclusively to further our own material well-being or to improve our own status? Or will we dedicate part of ourselves to working to enhance future life on planet Earth?

Many of you out there have already made the latter choice. The cumulative impact of millions of individuals around the world working to enhance the lives of future generations can save the biosphere. And working in such a cause can bring a great current reward: the self-fulfillment that comes from contributing of one's self in a meaningful way.

Yes, friends, our top choice should be to become personally involved, to stand up and be counted, to speak out for what we believe, and to raise hell with what is wrong.

Leaders who make the big decisions in both public and private life, especially in democracies, cannot survive unless their constituencies give their decisions legitimacy. Unfortunately, this legitimacy is often provided by silence, by failure of constituents to stand up and speak out on what they know is wrong.

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This monograph is the text of a lecture on August 4, 1987, given by Dr. Peterson as a visiting professor in the Institute for Environmental Studies at the University of Wisconsin-Madison. His lecture was the last in an eight-part series entitled "Environment and Development: Building Sustainable Societies."

One recent example of the people speaking out to block a governmental initiative was in an area of special relevance to my speech tonight, the environment a area. When President Reagan set out to dismantle the environmental regulations and institutions in our country, the environmental citizens organizations organized a nationwide grassroots lobbying effort to get the Congress to block most of the president's antienvironment programs. This effort forced out of office the president's two principal aides on environmental matters, James Watt and Anne Gorsuch-Burford. Such action was possible because the people who overwhelmingly support strong environmental protection made their views known.

The administration bases its antienvironmental actions on the false ideology that environmental regulations are bad for the economy. On the contrary, more jobs and business opportunities have been created by such regulations than have been lost as a result of them (Leung and Klein 1975). I first became aware of this when, as head of the President's Council on Environmental Quality in the Ford Administration, I helped launch the Environmental Industry Council, an organization of businesses that develop and market equipment and processes for cleaning up the environment.

This false ideology continues to plague the country as the president applies it in arguing against legislation to reduce acid rain, in opposing energy efficiency standards, in promoting drilling for gas and oil in ecologically sensitive natural areas, and in refusing to support the Law of the Sea, to mention only a few examples.

To help insure that the world environment is kept livable, we must restore our world leadership on environmental issues.

Most leaders of government, like most leaders of industry and finance and not a few leaders in the academic community, are bogged down with matters of the moment. Getting reelected next election, maximizing this year's operating income, avoiding antagonizing legislatures and other current funders -- these are the forces that have the most impact on our decisionmaking.

And scientists, with few exceptions, plagued by the self-imposed restraints of their disciplines, refuse to enter the public debate about the consequences of their findings. It is time to change this, to look to the longer-range future, to work together toward a saner, safer world. If the problems facing us today are unprecedented, so are the opportunities.

The big issues are global issues that affect every individual, every locality, and every nation, but issues that can also be affected by action here at home. As Rene Dubos advised us, "Think globally, act locally" (1980, p. 156). The resolution of these issues calls for leaders with broad perspective, with an understanding of the interconnectedness of things, with appreciation of the interdependence of people everywhere, with foresight capability, with a social conscience, and with an independence of thought and action.

The escalating rate of change in the world today makes the need for such leadership ever more urgent. Consider the following:

When I was in high school, the world's population reached two billion, having taken a century to add the second billion. Now we have added the fifth billion in only 13 years.

The cumulative action of ever more people with ever more wants and ever more tools is having an unprecedented negative impact on the natural resource base, causing the most rapid desertification, deforestation, soil erosion, wetland destruction, groundwater depletion, and species extinction in history (Brown et al. 1986, 1987). We are spending our biological capital most recklessly.

While most people on earth, including us here in this citadel of luxury, are moving toward higher socioeconomic status, more and more children are being born into "absolute poverty," a term coined by Robert S. McNamara, president of the World Bank, to describe "a way of life so degraded by malnutrition,

illiteracy, violence, disease, and squalor as to be beneath any reasonable definition of human decency." The World Bank estimated that 780,000,000 people were in this category in 1980 (McNamara 1984).

While our news media report the daily and even hourly rise and fall of the indicators of economic health and entertain us with the rape, murder, terrorist attack, execution, or chemical leak of the day, the most tragic news of all goes unreported. Do you know that 40,000 children died today, 40,000 died yesterday, and 40,000 will die tomorrow (UNICEF 1987, p. 1)? Do you know we fellow human beings have the knowledge and the wherewithal to prevent this? What a subject for investigative reporting -- to ferret out who is responsible for this bungling.

Over and above all this, the nuclear powers continue to squander hundreds of billions of dollars on killing machines that some afternoon or evening could be triggered off by human or mechanical failure, by madness or drunkenness in the chain of command, or by implementation of a first-strike strategy, wiping out much of civilization around the globe, not only in the U.S. and the USSR, but in Asia, Africa, and Latin America as well.

Plants and animals would share a similar fate. Think of this: one species among the millions of species on earth having dealt a crippling blow to life on earth.

Within the lifetime of today's university students, the world will use 80 percent of all the oil the world ever will use, draining the tanks and wells of the source of energy that has powered much of our current way of life (Hubbert 1956; Gever et al. 1986).

And nuclear energy, which 20 years ago was thought to be the answer to our projected huge growth in energy needs, now appears to be on the same track as oil, its production likely to peak in 15 to 20 years and then gradually decline to zero.

The United States, like many other nations, has dumped its wastes into the air, water, and land over many years until today the task of cleanup inherited by the present generation is a Herculean one. The Office of Technology Assessment of the U.S. Congress estimates that it will take 300 billion dollars and 50 years to clean up the hazardous waste dumps in our country, many of which are already leaking poisons into drinking water supplies (Hirschhorn 1985). And the cumulative impact of acid rain and other air pollutants over a number of years kills freshwater fisheries, destroys forests, and corrodes buildings and monuments both here at home and across our borders.

Most of the nations of the world, including the affluent United States, whose debt has passed the two trillion dollar level, are living off borrowed money, mortgaging their children's future and making it more difficult to fund life-protecting projects. The U.S. has moved over the past five years from the world's largest creditor nation to the world's largest debtor nation.

While we talk of peace, wars rage around the world, fueled by armaments given or sold in ever-greater quantities by the big merchants of war: western Europe, the United States, and the Soviet Union. Global militarization squanders resources desperately needed for quality-of-life programs. And the raging wars -- 14 per year on the average since World War II -- slaughter, maim, and destroy property, forests, and crops, adding another huge and unnecessary demand on the world's resources (Myers et al. 1984).

These problems are all interconnected and call for an integrated approach to their solutions. One might conclude it is hopeless and put his head in the sand. But it is not hopeless. We the people of the world can turn this situation around if we work at it, if we demand action by our leaders, if we work together. Each of us can make a difference. And with the right collaborative leadership, together we can reverse the life-threatening trends of today and replace them with life-supporting ones.

Our track record should give us confidence we can do it. Clearly, we have come a long way over the years. I dare say hundreds of millions of us today enjoy a better quality of life than royalty did a few hundred years ago. Life expectancy has more than doubled, with most people on earth now likely to live out

three score years and in the process be free of most of the diseases and accompanying suffering that plagued our ancestors. Life expectancy at birth in the developing countries now averages 73 years (Haub and Kent 1987).

Thanks to the Green Revolution and the promise of the Gene Revolution it now appears that the world can produce enough food to feed its current five billion and probably its anticipated 10 billion *if* the food can be distributed to all the people when they need it (Swaminathan 1986, p. 20). Literacy has skyrocketed, and our ability to store, retrieve, and integrate information has grown to an extent inconceivable a few decades ago, making us much more qualified to define problems and their solutions. Millions annually now take the grand tour not only around Europe but around the globe, and a few have even visited the moon. Most people can, by radio and television, be in contact daily with what is happening around the world, thereby getting to know their world, its problems, and its opportunities.

We now know of successful large-scale efforts around the world to reduce human population growth, to arrest desertification and soil erosion, to replant trees, to reduce pollution and waste, and to manage cropping, grazing, and fishing in sustainable ways. And the largest success story of all is that of China's one billion people in reducing their birth rate close to the replacement level, providing adequate food for all, raising their life expectancy and literacy and lowering their infant mortality rates close to those of the affluent nations while incurring no significant foreign debt and cutting their military budget in half (Brown et al. 1986, pp. 17-21).

Of special note is the accomplishment since World War II of the peoples of the world in building for the first time a large number of governmental and private international organizations such as the United Nations and its affiliated agencies that have clearly advanced the ability of people to learn from each other, to cooperate and help each other, and to resolve conflicts.

Another noteworthy accomplishment is that of the two superpowers in not going to war with each other throughout the 70 years of their coexistence. And finally, we now know how all people and all life are interconnected and interdependent and thus know we are all afloat in the same boat.

So all is not gloom and doom. There are many positive signs to give us hope. But this doesn't mean that we can afford to be blindly optimistic. The threats to a sustainable, decent quality of life are real indeed and won't go away just because we wish it so. We must work to make it so.

None of us knows what the future will be like, but whether we like it or not, each of us will play a role in creating it, for better or worse. Let's consider the big problems, one by one, and what we can do about them.

Next to our propensity for killing each other, the worst mark on our record is the huge number of our species still living in poverty. One hundred and fifty years ago the total world population reached one billion. Today we have more than that number living in extreme poverty and half that number under conditions far below what anyone would consider human decency (IUCN 1980). The magnitude of this scar, this failure, is usually hidden by our celebration of our success in providing an ever-higher material standard of living in the developed nations.

Worldwide statistics hardly support the rising-tide theory of economics: that if we facilitate the rise of the more affluent the poor will float up with them. The Population Crisis Committee's human suffering index, based on 10 quality-of-life parameters, rates 30 countries with 519 million people as experiencing extreme human suffering and 44 additional countries with 2.85 billion people experiencing high levels of human suffering (Camp and Speidel 1987).

The time is long past due for a more direct and more adequate assault on poverty. The poor must and can do most of the job themselves, but they can benefit markedly from help and less negative interference from the more affluent.

Ample food production worldwide is not enough if the food does not get to the people when they need it. Today there are more than 300 million tons of grain reserves around the world and hundreds of millions of hungry people (Swaminathan 1986, p. 20). For each country to learn how to produce and store its own food and for nations to make food available to the poor who can't afford to buy it should be priority goals.

The smaller the population growth of a country, the less the difficulty of providing for the needs of the people. There is an almost perfect correlation (a Pearson coefficient of 0.83) between the human suffering index in a nation and its rate of population growth (Camp and Speidel 1987). More poor people must be given the knowledge and wherewithal to limit their family size, that is, to be able to exercise the same choice as the more affluent already do. Like the affluent, they also need assurance their children will live. Toward that end, the program led by UNICEF, the United Nations Children's Fund, to vaccinate all children of the world by 1995 against the childhood diseases that kill and incapacitate millions annually needs our strong support.

The poor in subsistence economies, scrounging for a living, are, through overcropping, overgrazing, and overcutting of trees, having a devastating impact on the resources on which their livelihood is dependent, causing desertification, deforestation, soil erosion, and reduced water supply.

A larger impact on the world's natural resource base and much of it in poor countries comes from the escalating demand of the affluent nations, a good share of it caused by waste and inefficient use of resources. One U.S. citizen, for example, exerts 50 times the demand on the world's natural resources as does an Indian or a Chinese (IUCN 1980).

To see that the overall annual demand for resources doesn't take more from the earth's natural systems than these systems can replenish annually is the prime challenge to providing a sustainable and decent quality of life for future generations.

A measure of the magnitude of the job to be done is the projection that even with optimistic success in family planning, the world population will double to 10 billion before it stabilizes. And nearly all this growth will be in poor countries (Haub and Kent 1987).

Poverty both causes and results from ecological decline. Population growth both causes and results from poverty. Ecological decline is exacerbated by population growth, poverty, and wasteful and inefficient use of resources. They all must be considered together. Everything is interconnected.

To deal with these problems we need to replicate on a large scale the many successful projects that have already been demonstrated around the world, such as planning families, planting trees, terracing croplands, selecting optimum crops, and limiting livestock to the grazing capacity of the land. We also need to launch a markedly expanded effort to reduce waste and inefficiency. The opportunities to do so are large. This is especially true in the industrialized nations and in the development and use of energy.

International banking institutions such as the World Bank need to stop funding projects that are ecologically destructive, such as their disgraceful cattle-raising project in Botswana (Turner Broadcasting Co. 1985).

To fund constructive activities we need to tap half of the trillion dollars now budgeted annually for the world's armed forces, which today constitute a super threat to the world's security. Remember, China and Argentina have already cut their military budgets in half. Japan spends less than one percent of its gross national product on the military, and Costa Rica doesn't spend anything on this activity.

In so doing we could put some of the one-half million scientists now working on creating better killing machines (Brown et al. 1986, p. 199) to work to improve human health, raise food where it's needed, develop better contraceptives, control pollution, and develop new energy technologies.

Of the factors contributing to poverty I believe excessive population growth in the developing countries is the most serious. All the developed nations have lowered their birth rates close to or below the replacement level (2.1 children per woman). Hundreds of millions of parents in those affluent countries, striving to build a good quality of life for themselves and their children, have, on the average, voluntarily opted for the two-child family. Now hundreds of millions of poor parents in developing countries, having been provided the knowledge and wherewithal to limit their family size, are also doing so (Haub and Kent 1987). The challenge is to provide the same opportunity for the hundreds of millions of others still experiencing high fertility.

The United States has been the world leader in furthering family planning under both Democrat and Republican presidents. Now President Reagan, through administrative action, has made us the world spoiler. He has cut off U.S. funding to the two largest and most effective international family planning groups -- the United Nations Fund for Population Activities (UNFPA) and the International Planned Parenthood Federation (IPPF). And now he has announced his plan to withhold funds from U.S. domestic clinics if they do not conform to his personal ideological commitment on the abortion issue. He does this in support of the antiabortion minority groups in the United States.

Neither UNFPA nor IPPF has used any U.S. funds for abortion-related services, in conformity with a 10-year-old U.S. law against such use. By withholding the funds, President Reagan has prevented millions of poor women from avoiding unwanted pregnancies and, in so doing, contributed to hundreds of thousands of abortions and the birth into absolute poverty of large numbers of children who will suffer and die from hunger and neglect. What a crime against humanity! What a shame that so few American leaders speak out on this presidential disservice! My choice here is to lobby the Congress to reverse the president's policy. The best way to prevent abortions is to prevent unwanted pregnancies, and the best way for us to help stabilize the world population is to expand our funding of family planning around the world.

Now let us focus on the biggest threat of all to life and to achieving a decent and sustainable quality of life in the 21st Century -- nuclear war. I don't have time to discuss this issue in any depth, but let me make a few suggestions.

First, I believe it is extremely important that much more be done to educate people everywhere, including our leaders, on the biological consequences of nuclear war, a cost to humanity far beyond any conceivable benefit that might accrue from such war. As Professor John Kenneth Galbraith has written about the results of a nuclear exchange between the superpowers, "No one, not even the most talented ideologue, will be able to tell the ashes of capitalism from the ashes of socialism."

The consequences of a U.S. and USSR nuclear exchange would include not only the billion people estimated by the World Health Organization that would be immediately evaporated, blasted, or irradiated to death but also a larger number dying from nuclear famine caused by an average 22- to 30-degree Fahrenheit drop in temperature, devastating agriculture. The temperature drop would result from dense clouds of smoke lofted into the atmosphere from fires generated by the bombs. This new scientific analysis, first reported in 1982 and subsequently confirmed by many investigators around the globe, had been missed by scientists and military planners for 37 years (Harwell and Hutchinson 1985; Scientific Committee on Protection of the Environment 1987). Calculations indicate that noncombatant India, for example, would lose more people from famine than the U.S. and USSR would together lose from the immediate impacts of a nuclear exchange.

If the people of the world really understand the consequences of nuclear war, then the presence of the nuclear bomb may well provide the means of avoiding armed conflict *of any kind* between nuclear powers, assuming that no madman or fanatic gains leadership of such a nation. For it is hard to believe that a nuclear power in the process of losing a war involving only nonnuclear weapons, would, in the hatred, fear, and confusion of the battle, refrain from using its most potent weapons -- its nuclear weapons. And it is easy to conclude that an agreement to get rid of all nuclear weapons would be the most dangerous of all, for any advanced nation in a nuclear-free world could in a few weeks produce such weapons and then hold the world hostage.

This reasoning leads to the conclusion that nuclear powers must, in order to insure their survival, avoid armed conflict of any kind with another nuclear power. This in turn calls for thorough education of the people of the nuclear powers by their leaders, educators, and journalists about the consequences of nuclear war, both immediate and long-term. And it calls for each nuclear power to maintain a small number of accurate nuclear weapons, say five percent of what the U.S. now has, to control scrupulously their potential use, and to prevent launching by mishap or malfunction.

To hold out to the people the possibility that the world might get rid of all its nuclear weapons, or that man could design a magical net that would safely intercept all offensive nuclear weapons no matter now inventive their creators might become, or that nuclear powers might settle their differences through conflict using only conventional armaments, is wrong. Those are three cruel hoaxes. They distract people from what is ultimately the only solution, that is, to learn to get along without going to war.

You and I need to contribute to this cause. We need to select carefully and then influence our leaders. We can also be citizen diplomats, arranging joint enterprises and studies with potential enemies. We can begin to look at our former enemies as fellow survivors.

Now let us look at another area that requires our attention if we are to provide for a sustainable and decent global balance in the 21st century. We must give much more attention routinely to the longer-range impact of our decisions. For example, society needs more of a say in the type of technology that is used to satisfy its needs. My experience in industry in developing and launching new technologies and as director of the Office of Technology Assessment of the U.S. Congress persuaded me of this.

Technology has important impacts over the short term and long term, locally and globally, on social, environmental, economic, and political factors. Thus, in making choices toward a sustainable society that provides livelihood security for all, we cannot leave the choice of technology strictly to consideration of the financial return to be gained by those who invest in it.

Unfortunately, such a view gets one embroiled in ideological battles over how the means of production should be controlled. The environmental movement has demonstrated the need for governmental regulation of technology to control pollution. The marketplace will not do so. Nor will the market properly represent the interests of future generations or of people who have no wherewithal to participate in market decisions.

The current major problem resulting from the dumping, over decades, of hazardous wastes in landfills, deep wells, and streams stems from short-term market-oriented decisionmaking. Now society, with growing concerns about the impacts of hazardous wastes on health, is picking up the multibillion dollar tab to clean up the inherited mess. With a little foresight, communities could have avoided this cumulative assault on their environment. Through governmental regulations and enforcement, society is now leading industry to stop the waste at its source by developing new technologies that don't produce as much hazardous waste or that recycle or recover valuable components from the previously categorized "waste stream." And in many cases the new technologies or new processes prove to be quite profitable (Leung and Klein 1975).

Another example of industry and government getting society in deep trouble because of lack of foresight is the decision to rush ahead with nuclear energy. Near-term market consideration led to the conclusion that nuclear energy would be "too cheap to meter." The promoters of nuclear energy ignored the huge government subsidies provided through the companion state-run nuclear weapons industry and failed to face up to long-term safety, waste-disposal, and plant-decommissioning problems and to the creation of large, uninhabitable areas such as those caused by the Soviet Chernobyl disaster. As a result, the U.S., which led in the development of the nuclear energy industry, is now leading in its demise. Here is how one of the world's leading business magazines, *Forbes*, described the situation in 1985: "The failure of the United States nuclear power program ranks as the largest managerial disaster in business history, a disaster on a monumental scale" (Cook 1985, front cover).

We in the U.S. and other western nations are proud of our free-enterprise, market-oriented economies and rightly so. The record clearly shows how the countless market decisions of hundreds of millions of us day after day functioning as Adam Smith's "invisible hand" have steered a course to the great benefit of most of us. But the record also shows that such a system can be corrupted by the decisions of a powerful few acting in their own self interest and/or in ignorance or denial of the long-term or global consequences of their decisions. In light of today's understanding, Adam Smith would probably have called this force the "invisible foot." It will kick us in the future if we ignore the long-term and global consequences of our present actions.

The impact of the invisible foot is well exemplified by the nuclear energy and hazardous waste disasters I have discussed. Other examples are the long-term impact of dumping pollutants into the air on human health, forests, lakes, and buildings; the cumulative impact of excessive tree cutting, excessive wetland filling, overgrazing, cropping, and overfishing in reducing nature's capacity to replenish these resources, and the impact of cigarette smoking in causing lung cancer 20 to 30 years in the future.

Certainly the biggest invisible foot we have created in our rush to satisfy a need of the moment is the threat of nuclear war, as I discussed earlier. In our desire to protect our way of life from an immediate enemy, real or perceived, our U.S. central government has planned and built a nuclear arsenal that now is the real enemy, the greatest threat of all to that which we have sought to protect. The Soviets, French, British, and Chinese have done the same and put themselves in the same predicament. Maybe now that we all have this common enemy we can work together peacefully to tame him.

If we are to provide for a sustainable global society, for global balances in the 21st century that will insure successive generations a decent quality of life, we need to stop creating invisible feet in the present. What can we do to avoid this problem? Here are several suggestions.

First, our educational institutions should produce professional generalists through rigorous undergraduate and graduate training to think comprehensively, globally, and long-term; to understand the interconnectedness and interpendence of all life and its dependence upon the air, water, soil, and sun; to be able to integrate the technical, economic, social, environmental, and political variables involved; and to assess quantitatively and qualitatively the long-term impacts and feedbacks of one's decision. This is the training required for the most important jobs in our society. Yet no institution provides it.

Universities, especially graduate schools, are bogged down in the specificity of their disciplines. Here is how that famous University of Wisconsin professor Aldo Leopold, put it: "All the sciences and arts are taught as though they were separate. They are separate only in the classroom. Step out on the campus and they are immediately fused" (Leopold 1942, pp. 487-87).

I don't mean to belittle specialized training. I spent four years here at Madison getting my Ph.D. working long hours seven days a week on my dissertation topic, "Inhibition of the Air Oxidation of Vitamin C." Such digging deeply and narrowly is important and has served us well in pushing back the frontier of knowledge. But it's not very useful for training the key decisionmakers in our society or in preparing us to be effective world citizens.

Probably the most significant scientific discovery of the past century and to which Aldo Leopold contributed was the understanding of the global interconnectedness and interdependence of all life and of the global and long-term impacts and feedbacks of individual actions. It calls for that new type of training I have mentioned -- a new discipline -- that cuts broadly across the other disciplines and can function effectively at the interfaces between disciplines, integrating their fields of knowledge. In my view the time will come when such training will rank among the highest universities provide, and the leadership positions in society will be dominated by professional generalists with Ph.D.'s in integrated studies.

My second suggestion for avoiding the invisible foot is that our society in and out of government establish institutions that will provide decisionmakers and the general public with some foresight capability. Nowhere in our government today do we have such facility. We are flying blindly into the future.

The environmental impact statement and the technology assessment are two good developments instituted by our government, but they provide only a small part of what is needed. Legislation has been introduced in Congress to establish new institutions to provide more foresight capability -- to analyze trends and interactions, to define problems and opportunities, and to present various choices for action (Senate Bill 1171, 1987) . However, it has little current support in Congress, where the paranoia about governmental planning sets us up for future catastrophes.

My third suggestion is that we recognize that a market-oriented economy and government planning and controls are complementary. Neither can do the job alone. When analysis shows that the forces of the marketplace will work, that's the way to go. For example, the heavy government subsidies for nuclear energy and fossil fuels should be removed so that the market can establish how effectively more efficient use of energy and renewable sources of energy can compete. On the other hand, when analysis shows the market won't work, such as in protecting the mental health of children by removing lead from gasoline, then government regulation should be used. After such regulation was imposed in the U.S., the lead emitted to the environment decreased by 86 percent, and a major reduction in the amount in the blood of children followed.

When world citizens are both free to vote with their money in an unsubsidized marketplace and free to vote for their governmental leaders in an unfettered polling place, then the foundation is laid for making the optimum choices between the market approach and the regulatory approach.

It is encouraging that many countries are moving from excessive or total reliance on government controls to greater use of market mechanisms, with very promising results. China, Hungary, and Zimbabwe are good examples. And recently even the Soviet Union has started to move in this direction.

The continuing conflict between environmentalists and the right wing in our country stems from the antienvironmentalists setting up a straw man and then tearing him down. They call environmentalists "doomsayers" with an "unjustified crisis viewpoint" and point to environmental cleanup successes of the past as proof that society left alone by government will also correct the current problems. They ignore the fact that those successes stemmed from citizen pressure and government action. As for environmentalists, they are proud of their role in accomplishing the past successes and are diligently applying the lessons learned to alter the threatening trends of today to prevent doomsdays. The right-wingers promote a muddle-through approach, whereas environmentalists promote an activist, solution-oriented approach. Both groups think the problems can be resolved, and both express hope that they will be.

So why all the fuss? Here's why. The right wing's all-out opposition to governmental controls makes them see environmentalists as socialists. A September, 1985, paper prepared by the American Enterprise Institute calling for the establishment of a Center for Population, Environment, and Development Studies clearly defines their hang-up. It states that environmentalism leads to drastic solutions "often involving massive applications of centralized power, to the detriment of private choice," which "breeds planning, controls and bigger government" (Wattenberg et al. 1985).

Today 80 to 90 percent of U.S. voters are in favor of more government action to clean up the environment even if it costs them more money (Louis Harris and Associates 1985, 1986). They know that market forces were at work over the decades when their environment was being progressively and seriously degraded. I believe they share the view I expressed earlier: Rely on market forces when they work, government intervention when they don't.

Now let me conclude my remarks this way.

The basic knowledge of what needs to be done to provide for desirable global balances in the 21st century, as I have tried to show, is already with us. What is missing is the will -- the will of millions of us, but especially of our leaders -- to face up to the threatening trends of today and change them.

We especially need decisionmakers with a holistic perspective -- a comprehensive, global, long-term perspective -- and the ability to integrate the many interdependent forces at work around the world and analyze their prospective cumulative impact before making choices for action.

And you and I need to stand up and be counted. It is not enough to be an expert in a discipline -- to be an author of a research paper -- to have the answers to a critical problem. One must put such competence to work -- come out of one's research lab or office to participate in the real world -- to be an effective world citizen. The world can't afford its talented people camping out in the comfort of a narrow pasture.

As Goethe wrote:

Whatever you can do, or dream you can, do it.
Boldness has genius, power and magic in it.

Our hope for the future for a sustainable, decent quality of life for future generations globally is enhanced, as I mentioned earlier, by the greatest scientific discovery of the past century, the discovery that all life is interconnected and interdependent.

Humanity will thrive as the Earth thrives, but the Earth's health is dependent upon how humanity treats her. Each of us can make a difference, for worse or for better. We can remain part of the problem or become part of the solution. By choosing the latter we can gain a good measure of self-fulfillment.

Toward this end, I wrote in 1973 a Declaration of Interdependence (Peterson 1973). In closing, let me share it with you.

We the people of planet Earth
With respect for the dignity of each human life,
With concern for future generations,
With growing appreciation of our relationship to our environment,
With recognition of limits to our resources,
And with need for adequate food, air, water, shelter,
health protection, justice and self-fulfillment,
Hereby declare our interdependence;
And resolve to work together in peace
And in harmony with our environment,
To enhance the quality of all life everywhere.

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