Synthesis

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In June 1992, at the United Nations Conference on Environment and Development (UNCED, or Earth Summit) in Rio de Janeiro, the nations of the world agreed to implement an ambitious plan for sustainable development. The United States was one of those countries. Has the United States moved toward or away from sustainable development in the 10-year period since Rio? What should the country do next? The book has sought to answer both questions.

Sustainable development is ecologically sustainable human development; it includes but is not limited to economic development. Sustainable development affirms the basic goals of development since the end of World War II, but changes them in one key way. Development is based on peace, economic development, social betterment, and effective national governance. Its goals are human freedom, opportunity, and quality of life, and it has succeeded in many ways.

Unfortunately, we now face growing environmental degradation around the world, and a growing gap between rich and poor. Increasingly, these problems undermine and hinder traditional methods of economic and social development. Deforestation and overfishing mean that many people and businesses can no longer earn a livelihood. Pollution impairs human health and thus human betterment. Conflicts over water and other resources lead to violence and civil strife. These and other problems are profoundly destabilizing because they mean less freedom and opportunity and lower quality of life.

Sustainable development responds to these problems by adding environmental protection to the goals of traditional development. Instead of development at the environment's expense, or environmental protection at the expense of development, sustainable development would achieve both traditional development and environmental protection or restoration at the same time. Sustainable development affirms the importance of freedom, opportunity, and quality of life, for both present and future generations.

Sustainable development should matter to the United States because freedom, opportunity, and quality of life are among our core goals as a nation. Providing a better life for those who come after us is also a basic American value. Sustainable development would lead to a stronger, more efficient, and more productive America, because this country's economic, environmental, social, and security goals would support each other in greater and greater degrees over time, rather than undermine one another. Sustainable development would also both require and promote effective governance and legal systems, which Americans also value. By addressing the destabilizing effects of poverty and environmental degradation around the world, the United States could help make the world more secure. In addition, U.S. economic and military power, as well as the ethical and religious foundations for sustainability, suggest a special obligation to work for sustainable development.

The United States has, unquestionably, begun to take some steps toward sustainable development. In fact, those who see sustainable development as including prior and ongoing efforts, such as conservation and pollution control, could rightly say that the 1990s saw a continuation of activities that began before the Earth Summit. Yet, on balance, the United States is now far from being a sustainable society, and in many respects is farther away than it was in 1992.

While there is "good news" and "bad news" to report, the bad news is told in general trends, broad studies, and for entire economic sectors or program areas. All too frequently, the good news is limited to specific examples and particular programs. The United States has not responded in a way that corresponds to the seriousness of the problems we face or to the opportunities provided by sustainable development. Nev-

ertheless, legal and policy tools are available to put the United States on a direct path to sustainability, to our great advantage and without major dislocations—if we can muster the will and the vision to use them.

This synthesis begins with an overview of the book's findings and recommendations, followed by an explanation of sustainable development and its importance to the United States. It then summarizes each of the book's major sections, which concern consumption and population; international trade, finance, and development assistance; conservation and management of natural resources; waste and toxic chemicals; education; institutions and infrastructure; and governance. Throughout, the synthesis summarizes and often excerpts from individual chapters.

Overview

A Little Good News

In virtually every area of American life, a few people and organizations are exercising leadership for sustainability. A small number of federal agencies, state governments, local governments, corporations, universities, and others have taken a leadership role in moving toward sustainable development over the past decade. Nearly all of these efforts contain room for improvement. Still, they demonstrate that it is both possible and desirable to reconcile environmental, social, and economic goals. For instance:

> The federal government greatly expanded its use of habitat conservation plans in the past decade to reconcile conflicts between economic development and endangered species protection.
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> A few states have begun to implement strategies for sustainable development and use indicators for sustainability.
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> At the community level, some sustainability initiatives have been undertaken, and are yielding some positive results.
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> A handful of major corporations are seriously embracing the "triple bottom line" of environment, economy, and society or equity as a way of setting and achieving goals.
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> A small minority of primary schools, high schools, and higher education institutions are teaching students to perform the kind of integrated and interdisciplinary analysis needed to make decisions that simultaneously further social, economic, and environmental goals.

In a few areas, the United States has played a significant and constructive international leadership role. These include the protection of high seas fisheries, the prevention of lead poisoning, integration of environmental considerations into trade agreements, and incorporation of environmental impact reviews and public participation in World Bank projects.

The President's Council on Sustainable Development (PCSD), an advisory council that existed between 1993 and 1999, developed hundreds of recommendations that would foster national security, economic development, job creation, and environmental protection at the same time. The PCSD and others outlined a policy framework showing that the United States actually could make significant progress toward sustainable development.

There is much better information about many environmental problems now than there was 10 years ago, and generally greater access to it. We also have a much better idea of the steps needed to achieve sustainable development, and have made significant progress in creating the policy and legal tools necessary to do so.

A Lot of Bad News

Energy and materials consumption grew substantially in the past decade, and reduced or outweighed many specific environmental achievements. With 5% of the world's population, the United States was at the time of the Earth Summit responsible for about 24% of the world's energy consumption and almost 30% of the

world's raw materials consumption. Since the Earth Summit, materials use has increased 10%, primary energy consumption has increased 21%, and energy-related carbon dioxide (CO_2) emissions have increased by 13%. Over and over, increases in materials and energy efficiency, and in the effectiveness of pollution controls for individual sources, are outweighed by increases in consumption. Despite a significant increase in municipal waste recycling in the past decade, for example, the U.S. generation and disposal of municipal solid waste per capita have been growing since 1996. U.S. population—the number of people consuming resources and energy—grew by 32.7 million, or 13.2%, from 1990 to 2000, the largest single decade of growth in the nation's history.

Moreover, the United States has not exercised the kind of international leadership necessary to encourage or support sustainable development around the world. The United States is not a Party to many treaties and international agreements that are intended to foster sustainable development in specific contexts, including the Convention on Biological Diversity and the Kyoto Protocol. Current patterns of international trade cause environmental harm and impair sustainable development in part because U.S. trade policy tends to put short-term domestic economic goals ahead of sustainable development. U.S. official development assistance has declined since Rio. Although the United States was the second largest provider of official development assistance in 2000, its contribution was the lowest of all industrialized countries, measured as a percentage of gross domestic income.

U.S. law and policy continue to encourage unsustainable development in a variety of ways. These include subsidies, "grandfather" provisions for existing and more-polluting facilities and activities in pollution control laws, and fragmented local decisionmaking that encourages sprawl. Such laws and policies mean that individuals and corporations have fewer choices, and less sustainable choices, than they would otherwise.

The United States has no national strategy for achieving sustainable development, and no generally accepted indicators to mark progress along the way. Nor does the United States have a meaningful or effective strategy to address climate change, biodiversity, and many other issues. Neither the executive branch nor the U.S. Congress systematically analyze proposed activities to find ways to make significant progress on economic, environmental, social, and security goals at the same time.

As a whole, the condition of America's natural resources and ecosystems has not improved, and appears to have deteriorated slightly, over the past decade. There was no discernible improvement in our rivers, streams, and lakes, and the quality of our ocean coastal waters appears to have deteriorated. Greenhouse gas (GHG) emissions increased, and a large number of plant and animal species continue to be at risk of extinction. U.S. agriculture is less sustainable, and urban sprawl continues relatively unabated. Air quality improved slightly, but not enough to fully protect human health.

The social and institutional infrastructure and supports needed for sustainable development continue to cause environmental degradation and underserve the poor. The negative environmental impacts of transportation increased during the past decade, despite significant legislative changes. The U.S. sanitation system remains vulnerable to breakdowns, the level of communicable diseases is high when compared to other developed countries, and there has been no discernible progress in improving access to medical care.

Recommendations for the Next Decade

The path to sustainability is not an easy one, but it is marked by basic American values. These include freedom, opportunity, and quality of life; greater efficiency; more effective and responsive governance; a desire to make a better world for those who follow us; a willingness to find and exploit opportunities; a quest for a safer world; and a sense of calling to play a constructive role in international affairs. All of these are underscored by our ethical and even religious obligations toward each other and the environment.

The United States would take a large and decisive step toward sustainability if individuals, businesses, educational institutions, local and state governments, federal agencies and others would simply adopt and build on the leading sustainability practices of their counterparts here and in other nations.

A national strategy for sustainable development, with specified goals and priorities, would harness all sectors of society to achieve our economic, social, environmental, and security goals. The strategy could be modeled on that of the European Union (EU) and states such as New Jersey, and specifically address climate change, biodiversity, and other major issues. An executive-level entity would be needed to coordinate and assist in the implementation of the strategy. A counterpart entity in Congress would also be helpful. The strategy would more likely be effective if there were a set of indicators to measure progress in achieving its goals. Comparable state and local strategies and indicators are also needed.

The United States needs to recognize that its substantial consumption levels, coupled with domestic population growth, have serious environmental, social, and economic impacts. Americans also need to understand that human well-being can be decoupled from high consumption of materials and energy. A shift in taxes from labor and income, on one hand, to materials and energy consumption, on the other, would encourage both greater efficiency and reduced negative environmental impacts.

Congress should repeal or modify laws, policies, and subsidies that encourage unsustainable development. The elimination of subsidies would also have positive budgetary impacts. The repeal or modification of such laws would provide more and better opportunities for individuals and corporations to act in a more sustainable manner, and would remove an important set of barriers to sustainability.

Protection of natural resources and the environment must focus more holistically on the resources to be protected, and on understanding those resources. Congress and the states need to assure that these resources are protected from all significant threats, and are protected from those threats to the same degree. In addition, the type of substantive goals that exist in the air and water pollution control programs, as well as supportive implementing mechanisms, should be applied to biodiversity, climate change, oceans under U.S. jurisdiction, forests, and other natural resources. The United States also needs to fund or support the development of more complete and reliable information about ecosystems as well as about the connections among its economic, environmental, social, and security goals.

Social infrastructure, institutions, and laws should be designed and operated to further economic, environmental, and social goals at the same time. Public health services and, at a minimum, basic medical services should be available to all. Transportation infrastructure should be more efficient and diverse, and provide people with more choices.

The United States needs to take a stronger and more constructive leadership role internationally, not only on terrorism but on the broad range of issues related to sustainable development. The United States should further increase its official development assistance, while taking measures to ensure that the money is spent effectively and for sustainable development. More broadly, U.S. foreign policy, including trade policy, needs to be more supportive of the development aspect of sustainable development. The United States should also become a Party to many of the international treaties that would foster sustainable development, including the Convention on Biological Diversity, the Cartagena Protocol on Biosafety, the Aarhus Convention on Access to Information, the Rotterdam Convention on Prior Informed Consent, the Stockholm Convention on Persistent Organic Pollutants, and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes.

Some longer term changes are also needed if the United States is to achieve sustainable development. They include the evolution of judicial understanding of property to update expectations about the productive value of ecosystems and the establishment of more inviting avenues for public participation in and challenge to decisions affecting sustainability.

What Is Sustainable Development?

Sustainable development is human development that is ecologically sustainable. Its aims are human freedom, opportunity, and higher quality of life. It is not another name for economic development, although it includes economic development.

Because "sustainable" modifies "development," it is first important to understand what development means. Although Americans understand development to mean the transformation of a field or woodlot into housing or a mall, development has a different meaning at the international level. Since the end of World War II, the United States and most of the world community have successfully sought greater peace and security, economic development, and social development or human rights. They have also sought national governance that supports these goals, even though they recognize that international efforts are also needed. As understood internationally, these are the four elements of development. This understanding of development grew out of the experiences of the last world war and the great depression that preceded and contributed to it, and a firm desire to ensure that the conditions that led to them would not occur again. More positively, development is intended to foster human freedom, opportunity, and quality of life.

For more than half a century, we have measured progress by the extent to which we have realized these goals. And there has been a great deal of progress. The world is more free, there is more opportunity, and most humans have a higher quality of life now than they did in 1945.

But until recently, protecting and restoring the environment was not among these goals. Indeed, progress in achieving these other goals was considered to outweigh or even justify any environmental degradation that may have occurred.

As the World Commission on Environment and Development concluded in 1987, progress in the past half century has come with a price we cannot ignore and can no longer afford—massive and growing environmental degradation, and a growing number of people in poverty. The commission concluded that countries should seek sustainable development—"development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development would thus meet human needs over the long term; the present generation would not benefit at the expense of future generations. When nations of the world endorsed sustainable development at the Earth Summit in 1992, they redefined progress to include environmental protection and restoration.

Sustainable development is based on a sober and realistic appraisal of how humans need to approach the problems of the next half century or more. Like traditional development, it is premised on a recognition of what can happen when freedom, opportunity, and quality of life are inequitably realized or are diminishing.

Every major international and regional report on the condition of the environment shows continuing and deteriorating environmental conditions. The gap between the rich and poor continues to grow. Poverty and environmental degradation are mutually reinforcing; poor people live in the most polluted or degraded environments, and this contributes to their poverty. Although poverty and environmental degradation are important in their own right, they also can cause or contribute to wars, starvation, ethnic tensions, and terrorism, which are more likely to get headlines than their underlying causes. Like terrorism, poverty and environmental degradation are destabilizing. The pressures caused by poverty and environmental degradation are likely to increase in the next half century. Global population is expected to grow from roughly six to nine billion, or 50%, by 2050. The global economy is likely to grow by a factor of three to five in the same period. As difficult and challenging as things now appear, they are likely to become much more difficult and challenging in the decades ahead.

Sustainable development also has deep ethical and religious roots. Sustainable development leads to two major shifts in ethical thinking and action. It recognizes the connections between humanity's social, ecological, and economic obligations, and it recognizes responsibility for future as well as present genera-

tions. Agenda 21, the blueprint for sustainable development adopted at the Earth Summit, thus calls for distributive justice, or a fair sharing of environmental resources by humans. The distributive justice theme was in response to demands by developing countries that they have the same right to use natural resources as developed countries. Agenda 21 also suggests that humans have a moral responsibility to limit activities that, if not curtailed or redirected, will severely degrade or even destroy ecosystems. Because human damage to the environment also hurts other humans, sustainable development recognizes the relationship between environmental protection and social justice.

The sacred texts and beliefs underlying the world's religions also support sustainable development, even if that has not been true of their practices. These religious traditions support appreciation for all life; human stewardship of creation; harmony among humans, their communities, and their environment; and a caring for place. They also indicate that the natural world is valuable in itself, not simply insofar as humans may value it. They articulate the importance of deep respect for creation, both human and nonhuman, and living in a manner that is ecologically sustainable. These texts and beliefs also indicate the importance of fair and equitable sharing of resources, which would mean both ceilings and floors for consumption. Finally, they suggest that people be given an opportunity to participate in decisions that will affect their lives and their communities.

To achieve sustainable development, nations at the Earth Summit endorsed two important but nonbinding texts, Agenda 21 and the Rio Declaration. (They also agreed to a separate set of principles for forestry.) As a global plan of action for sustainable development, Agenda 21 is intended to be carried out primarily, but not exclusively, by countries within their own borders. Agenda 21, which contains 40 separate chapters, runs several hundred pages regardless of how it is printed. These chapters focus on the social and economic dimensions of sustainable development, e.g., poverty, human health, and population; conservation and management of natural resources, e.g., atmosphere, forests, biological diversity, and various wastes and toxic chemicals; the role of major groups, e.g., children and youth, women, farmers, workers, and business and industry, in attaining sustainable development; and means of implementation, e.g., financial resources, technology transfer, science, education, and public information. Each chapter identifies specific actions to be taken, explains generally why these actions are necessary, identifies the persons or institutions who are to take action, and describes specific means of implementation.

The Rio Declaration is a set of 27 principles for sustainable development. Key principles include the integration of environment and development in decisionmaking, sustainable patterns of resource production and consumption, the polluter-pays principle, the precautionary approach or principle, developed country leadership, intergenerational equity, and public participation. The polluter-pays principle would have polluters bear the costs of preventing and cleaning up environmental problems rather than impose the costs of those problems on others. According to the precautionary principle, the absence of complete scientific certainty about serious problems is not an excuse for refusing to take action. These principles also are woven into Agenda 21.

In Rio, the international community also established a process for reviewing national and international progress toward sustainable development. Agenda 21 has been, and continues to be, the focal point of that process.

When countries agreed to Agenda 21 and the Rio Declaration, they agreed to implement these agreements, both at home and in their foreign policy. The United States, under the leadership of President George H.W. Bush, was one of those countries.

Why Should Sustainable Development Matter to the United States?

Americans should care about sustainable development because its goals—human freedom, opportunity, and quality of life—are also our goals. We sought independence for these purposes, established a legal and economic system premised on their importance, endured a civil war to protect that system and expand its

opportunities to others, and fought two world wars and numerous other conflicts to protect ourselves and help make those same opportunities available to others.

Sustainable development, moreover, is not just about *us*, the current generation of Americans. It is, in the U.S. Constitution's words, about "ourselves *and* our posterity," our children, grandchildren, nieces, nephews, and others not yet born who will someday inhabit this country. We pride ourselves on providing our descendants greater opportunities and a better quality of life. Sustainable development would do precisely that. Without it, we cannot assure our children and grandchildren a better life, and are likely to leave them a poorer one.

Sustainable development would lead to a stronger and more efficient America because we would be pursuing social, economic, environmental, and security goals in ways that are more mutually reinforcing or supportive over time, not contradictory or antagonistic. The result would be a stronger, more efficient country that provides its citizens and their descendants increasingly more opportunities in a quality natural environment. Increased energy efficiency would reduce energy costs for manufacturers and consumers, and would also mean reduced pollution. In addition to securing an ongoing supply of timber and paper products, sustainable forestry matters because we rely on forests for watershed maintenance, pollution abatement, climate control, jobs, and recreation. Similarly, a sustainable transportation system would make it easier, less expensive, and less environmentally damaging for people of all incomes to travel from home to work and other destinations. Cleaner production is likely to be less costly and more efficient, reduce the economic and social burdens created by human exposure to hazardous wastes and substances, and improve the occupational health and safety of workers.

Sustainable development would also lead to better and more responsive governance, which is another basic American value. Ensuring that our economic, social, environmental, and security goals are mutually supportive would require that the government does not subsidize with one hand what it controls on the other. It would also require more public involvement in many decisionmaking processes because public input is more likely to ensure that these goals are harmonized.

Sustainable development would also lead to a safer, more stable and secure world outside American borders. That would have important and positive consequences for both ourselves and others, particularly after September 11, 2001. The world is deeply divided between haves and have-nots, and the risk of evolution toward an unstable, two-class world, with a huge global underclass, is quite real. Americans have a large stake in the prevention or avoidance of humanitarian emergencies, national and regional conflicts, environmental deterioration, terrorism, illicit drugs, the spread of diseases, illegal migration, and other disasters. These threats to our security do not need passports to cross borders. None of the goals that this country has pursued around the world—peace and stability, human rights and democratization, expansion of trade and markets, environmental protection, or putting an end to hunger and extreme deprivation—can be accomplished effectively except in the context of sustainable development. Thus, while sustainable development assistance in developing countries can be justified on humanitarian grounds, it is also consistent with the strategic interests of the United States.

Americans have a special role to play in sustainable development. We have the largest economy and the most powerful military in the world. Not only do we have enormous capability to bring to bear in the pursuit of sustainable development, we also bear a significant share of the responsibility for the global environmental problems that sustainable development is intended to address. The United States is the world's largest producer and consumer of materials and energy. Since the U.S. model of production and consumption is widely emulated throughout the world, U.S. domestic actions could also have a major international effect.

It is often said that nations or individuals can lead, follow, or get out of the way. The United States is in an unparalleled position to play a key international leadership role on sustainable development. The United States could instead permit the EU, Japan, and other developed countries to play the leadership role, and follow their lead. That would be unpalatable to many, but it would be better than doing nothing. Because of its dominant role

in international affairs, however, the United States cannot simply get out of the way. If the United States does not lead or follow, it will be an obstacle to international efforts to achieve sustainable development.

The ethical and religious justifications for sustainable development also provide a reason that Americans should care. U.S. actions do not simply affect us; they affect others as well. Historic and continuing U.S. emissions of GHGs are likely to adversely affect others by contributing to rising sea levels and higher temperatures around the world, for example. Moreover, the texts and beliefs of each of the world's major religions teach responsibility toward other humans as well as the environment. Because Americans see themselves as a religious people, they should respond accordingly.

Finally, our government agreed to Agenda 21 and the Rio Declaration at the Earth Summit. These texts are not legally binding, but a nation's political commitment is not a trivial thing. Indeed, it is in the national interest to honor international political commitments.

The decisions we make about sustainable development are defining decisions for the United States. They will define the values for which our country stands.

Summary

The major sections of this book focus on consumption and population; international trade, finance, and development assistance; conservation and management of natural resources; waste and toxic chemicals; education; institutions and infrastructure; and governance. What follows is a summary of each section, including a summary or excerpts from relevant individual chapters. For almost all chapters, the summary includes a review of efforts over the past decade and recommendations. While most of the recommendations are directed to the United States, a few are directed to the international community.

Consumption and Population

"To achieve sustainable development and a higher quality of life for all people," the Rio Declaration states, governments "should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies." As Agenda 21 observes, "the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries." Agenda 21 also describes world population growth, in combination with unsustainable consumption patterns, as placing "increasingly severe stresses on the life-supporting capacities of our planet."

A simple model developed in the 1970s describes the relationship between population and consumption. The model is expressed as a formula: I = PAT. The formula expresses a community's overall environmental impact (I) as the product of its population size (P), its affluence or per capita level of consumption (A), and the technology and social arrangements that underlay each unit of consumption (T). While consumption of materials, consumption of energy, and population are not wholly determinative of environmental impacts, they are enormously influential.

Materials

Sustainable use of materials or resources can be measured by answering two questions. First, how is the rate of resource use related to the overall stock of resources? Second, what portion of resources in use are lost to the environment? The first question measures utilization of resources, and the second measures consumption. Put another way, the first reflects the sustainability of supply, and the second the sustainability of the receiving ecosystems. Almost all levels of resource use and many types of environmental impacts in the United States have increased from levels already generally agreed to be unsustainable.

At the time of the Earth Summit, the average American was responsible for the extraction and employment of more than 100 pounds of material daily, which is more than any other country in world. These materials include metals, wood products, paper, agricultural products, construction materials, and fossil fuels. Ten years later, the quantity has increased by about 10%. The biggest increase over the past decade was for nonrenewable organic materials (including fossil fuels). The hike in overall materials use is also due in part to increases in the use of construction materials, such as sand, gravel, and stone, whose utilization requires large amounts of energy. Iron, steel, and other heavy metals continue to be used less, while light metals (particularly aluminum), plastics, and composites are used more. This latter trend is favorable, because the depletion time for heavier metals is shorter than that for aluminum.

Environmental impacts of resource consumption in the United States appear to have increased by about 15% over the past decade because of population growth and an increase in gross domestic product (GDP) per capita. Americans produce more municipal waste per capita than any other country, are the leading producer of GHG emissions, and are probably the world's largest producer of toxic wastes. This increase in U.S. consumption has occurred despite a movement from more resource-intensive production to greater use of services.

U.S. government programs and policies have promoted inefficient utilization and use of natural resources. These policies include many types of direct and indirect subsidies for, among other things, timber cutting, agriculture, hard rock mining, and extraction and use of fossil fuels. While there are success stories in reduction of materials use and environmental impacts in the past decade (specific eco-industrial parks, corporate programs, and even government programs), these efforts have not changed the overall pattern or result.

To make significant progress toward sustainability, the U.S. government should gain a better understanding of what resource sustainability really means, and should put in place a framework for achieving specific goals related to sustainability of materials. The United States should also lead international efforts to discuss and achieve sustainable production and consumption patterns in this and other developed countries.

Subsidy reform and restructuring existing taxes are two of the biggest challenges to sustainable consumption and production. Environmentally harmful subsidies need to be phased out gradually. In addition, the United States should begin shifting taxes from labor and income to materials and energy. This tax shift should result in more efficient use and reuse of materials and energy. Norway, Sweden, and other countries have already begun such a tax shift.

Public education is also essential to this effort, and is perhaps needed more than anything else. The principal cause of unsustainable resource use is largely a social system that promotes "conspicuous consumption" rather than intelligent, conservative resource use. Technological innovation can modify this trend somewhat, as can policy initiatives. But true sustainability will require that we satisfy our needs, not by increased use of resources, but by more intelligent use. Laws and policies alone will not lead to that understanding, but they might result from it.

Energy

Primary energy consumption in the United States increased by approximately 20% between 1992 and 2000, an annual average rate of 2.4%. This growth rate was higher than the 0.8% average annual growth rate of the two prior decades. At the same time, the average annual GDP increase for 1992 to 2000 was 50% higher than it was between 1972 and 1992, indicating that economic growth drove energy consumption.

For the production and consumption of energy, the journey toward sustainability can be measured by progress toward three goals: increased energy efficiency (or reduced energy intensity), increased renewable energy use, and reductions in energy-related CO_2 emissions. For the first goal, progress in the past decade continued at the same pace as the previous two decades. Energy efficiency, measured in terms of amount of energy consumed per dollar of GDP, continued to decline at the same steady pace it has declined since

1972—about 2% per year. While the United States is improving energy efficiency at a faster rate than other industrialized countries, it is less energy-efficient (or more energy-intensive) than these countries. For the second and third goals, the United States achieved less since 1992 than it did in the two decades that preceded the Earth Summit, and appears to be moving away from sustainability. Renewable energy consumption grew at a slower annual pace since 1992 (1.3%) than in the previous two decades (1.6%). In fact, renewable energy's share of total U.S. energy consumption actually declined from 7.2% in 1992 to 6.9% in 2000. In addition, energy-related CO_2 emissions increased by 13% since 1992. The annual rate of increase in CO_2 emissions since 1992 (1.8%) is more than three times the annual increase of the previous two decades (0.5%).

In every major sector, energy use grew over the past decade. Energy use for residential and commercial buildings increased because of population growth and the trend toward larger and more energy-consuming homes as well the proliferation of electricity-using devices. These trends offset energy efficiency and energy conservation gains for appliances and home building materials. Energy use for passenger transportation increased because of the popularity of sport utility vehicles and light trucks and an increase in vehicle miles traveled. Energy use for freight transport increased because of rapid growth in the volume of freight shipped and a shift toward more energy-intensive trucking. Industrial use of energy increased, despite a shift away from energy-intensive industry, because of growth in manufacturing.

While the United States had in place numerous energy conservation and renewable energy laws at the time of the 1992 Earth Summit, the country has done little to strengthen those laws since then. Many of these early laws grew out of the Arab oil embargoes of the 1970s. Among other things, these laws established corporate average fuel economy (CAFE) standards for automobiles, required the U.S. Department of Energy (DOE) to develop mandatory energy efficiency standards for home appliances, provided tax credits to encourage investments in solar and wind technologies, and required utilities to make greater use of renewable energy and energy conservation. A few major changes in law and policy have occurred since 1992. Federal research and development funding for energy efficient technologies has increased, and standards continue to be issued for increasingly more efficient appliances. But CAFE standards for new vehicles have not been improved, despite substantial improvements in automotive technology.

Progress in sustainability for production and consumption of energy in coming decades can be measured in terms of progress in reduction of energy-related CO_2 emissions. Because reducing such emissions would require increases in energy efficiency and renewable energy, a decrease in CO_2 emissions is a useful way of summarizing progress toward all three goals. Analyses have shown that vigorous implementation of cost-effective energy efficiency and renewable energy policies could result in reduction of energy-related CO_2 emissions in the United States to 1990 levels by 2020 or earlier, which would be a major step toward energy sustainability goals. However, U.S. emissions in 2000 were more than 15% above 1990 levels, and are projected to continue to increase under business-as-usual scenarios.

The policies needed to achieve energy production and consumption sustainability goals are indicative of the seriousness of the needed effort. They include a carbon fee or charge that begins at a relatively low level and then increases over time. Money received from this fee or charge could be returned to the taxpayer in the form of lower income taxes or used to support sustainable energy programs. An emissions trading system should be coupled with the fee or charge to enhance its economic efficiency. Increased spending for federal research and development for energy efficiency and renewable energy would likely lead to the development of more efficient, less costly, and more reliable technologies. In addition, a variety of policies should be employed to improve energy efficiency in buildings, industry, transportation, and electrical generation. Energy efficiency policies include a mix of tax credits, voluntary programs, increased energy efficiency standards for motors and appliances, improved fuel economy standards for motor vehicles, policies to increase use of telecommuting, and a requirement to increase the percentage of electricity generated by renewable energy.

Population

U.S. population reached 281.4 million in 2000, an overall increase of 32.7 million, or 13.2%, since 1990. This is the largest population increase in any 10-year period in U.S. history, surpassing even the postwar baby boom. U.S. population is growing more rapidly today than is the Chinese population. One American consumes 17 times as much energy as the average Indian, and 9 times as much as the average Chinese. Thus, while the billion-plus populations in China and India obviously raise serious concerns, at the margin population growth is a bigger issue in the United States than in China or India. The reason is simple: an additional American consumes so much more than an additional Chinese or Indian.

In 2000, the average number of children born per woman in the U.S. population was 2.1, which is the replacement rate. Population grew significantly because of the "population momentum" caused by the higher birthrates of previous generations and because of immigration. Immigration is currently contributing roughly one-half of the annual population growth.

The sustainability of the current U.S. population can be questioned on a variety of grounds. The United States depends increasingly on imports of oil and other natural resources. Americans and other residents of industrialized countries are also living beyond their means, depleting vital ecosystems and nonrenewable resource stocks. A U.S. population with grossly disproportionate consumption patterns slated to grow by 10% or more per decade, while striving to raise its per capita consumption even further, is not a recipe for sustainability.

While the United States has no explicit policy regarding population size or growth, it does have one in practice. The tax code as well as laws on women's rights, inheritance, and labor all indirectly influence people's choices regarding family size. The legality and availability of family planning and abortion services have more direct influences on family size choices. Immigration laws and policies also play a large role in determining U.S. population.

The most basic thing the United States can do is simply recognize that population is a domestic as well as a foreign issue, and that the domestic and foreign aspects of population are linked. People seek to immigrate to the United States, for instance, because conditions in their own countries are not tolerable to them. The United States also needs to examine seriously its carrying capacity. The United States cannot claim that it is taking steps toward sustainable development without first analyzing its environmental resource base. This country should develop policies to ensure that the population does not exceed its carrying capacity, including its ability to draw on foreign resources. Immigration policies should be analyzed and developed in this context, and not the other way around.

International Trade, Finance, and Development Assistance

For better and for worse, America's domestic activities have a great influence on domestic activities in other countries. But U.S. foreign policy also has direct consequences for sustainable development. As Agenda 21 and the Rio Declaration make clear, a country's sustainable development commitments extend to both its domestic and foreign policy. This section summarizes U.S. international efforts regarding trade, official development assistance, and family planning assistance. It also summarizes U.S. efforts concerning an issue that has gained importance since the Earth Summit—private financial flows to developing countries.

International Trade

The United States has played a leading and generally positive role in steering trade rules in the direction of sustainable development, with modest success. Yet 10 years after Rio, the discrepancy between the vision of sustainable development and reality is too obvious to deny—current patterns of international trade cause environmental harm and impair sustainable development. By decreasing rather than increasing its attention to the profound problems of global underdevelopment and poverty, U.S. policy over the past de-

cade has not only failed to serve the substantive policy goal of sustainable development but has also contributed to the polarization of international diplomacy between rich and poor.

Two major trade agreements were adopted in the past decade, and provide a context for this analysis. The United States negotiated the North American Free Trade Agreement (NAFTA) with Mexico and Canada to reduce trade barriers among the three countries, and then ratified it. Several environmental issues were directly addressed in NAFTA, and the Parties also concluded two separate environmental agreements. In addition, the United States and other countries concluded the long-running Uruguay round of trade negotiations, which established the World Trade Organization (WTO). The Clinton Administration secured congressional approval of the Uruguay Round results.

The United States has taken significant positive steps over the past decade to enhance consideration of the environmental and developmental consequences of its trade policy, and has actively supported institutions and polices that would promote such procedural integration of policy in other governments and international organizations. In 1992, the worlds of trade policy and environmental policy still knew very little about each other and seldom interacted. The use of an environmental assessment for NAFTA deepened awareness of the issues at stake for both government officials and the public. These and other experiences led President William J. Clinton to issue an Executive Order in 1999 requiring the preparation of an environmental review for most major trade agreements. On the other hand, the United States continues to subsidize and thus protect domestic agricultural producers and others that perpetuate environmental harms in the United States.

The United States has also been a pioneer in opening up its international trade processes to public participation and has been the leading proponent of participatory reforms in international institutions. The United States enhanced and structured the access of environmental interests to trade policy during the 1990s. The United States has also been the most active and persistent proponent of increased public participation in dispute settlement procedures under WTO and NAFTA.

Yet America's substantive trade policies are very uneven in fostering sustainable development. Promoting the economic interests of the United States remains the central consideration in trade policy. As a result, U.S. trade policies often put short-term and purely domestic goals ahead of a broader sustainable development strategy. The widely publicized failure of the 1999 WTO ministerial meeting in Seattle occurred in large part because developing countries saw the U.S. position as giving short shrift to their needs.

In a broad sense, too, the structure of international trade still works against sustainable development. The fault, though, does not lie exclusively, or even primarily, with trade officials and trade policies. What goods are produced where and what services are provided where are influenced not by trade policy but by the economic, social, and geographical conditions of each country and the economic and social policies of national governments. A major problem has been the insistence by the United States and other developed countries that trade should replace aid as the main vehicle for transferring economic resources to developing countries, without attending in a timely or adequate manner to other conditions that must also be addressed if the resource flows of trade are to promote development on a sustainable basis. These other conditions include debt repayments and deteriorating environmental conditions in developing countries.

Domestically, the United States needs to deepen and institutionalize its policy integration. The United States should establish a sustainable development coordinating entity within the executive office of the president that would include the U.S. trade representative. Congressional responsibility for trade policy should also be reallocated to better incorporate environmental and developmental considerations. The United States should continue to advocate in all forums for increased transparency, including public availability of documents and summaries of confidential deliberations, enhanced access for the public to key processes, and nongovernmental organization (NGO) representation on national delegations at every appropriate international negotiation on trade issues.

To exercise greater international leadership, the United States needs to observe more faithfully in its domestic policies the policy prescriptions it advances for international trade and economic development in other countries, especially by removing barriers to access to the U.S. market and by eliminating substantial subsidies to key trade-relevant sectors of the American economy. The United States also needs to work more actively and constructively with developing countries to resolve key impediments relevant to international trade that are restricting their economic development and leading to continued environmental degradation. Moreover, while the "trade, not aid" mantra has substantial validity, aid continues to be a vital policy element, substantively and symbolically. As part of its trade policy, the United States needs to increase its official development assistance.

Official Development Assistance

U.S. official development assistance (ODA) has declined significantly since Rio. Developed countries agreed at Rio to provide ODA to developing countries in an amount equal to 0.7% of their GDP. The provision of this aid was part of the Rio bargain between developed and developing countries; developing countries were unwilling to have environmental conditions imposed on their development, but agreed to integrate environmental considerations and outcomes into their development process if they received financial help. The United States specifically declined to accept the 0.7% commitment, however. Part of the developed world's broad responsibility for sustainable development under Agenda 21 nonetheless includes assisting developing countries, especially when these countries are asked to respond to environmental threats that are largely not of their own making.

More broadly, sustainable development includes the antipoverty agenda of traditional development. The gap between rich and poor continues to grow. Among the 4.6 billion people who live in developing countries, three-fifths live in communities without basic sanitation, one-third are without safe drinking water, one-quarter lack adequate housing, and one-fifth are undernourished. One-half of humanity "survives" on less than $2 per day. The eradication of poverty is a worthy goal in itself. But from a strategic perspective, the eradication of poverty would also help reduce conflicts, social disruption, and disease. In addition, improved economic conditions may reduce the pool of the disillusioned and disaffected from which terrorist campaigns have frequently drawn.

Average annual U.S. ODA disbursements from 1990-1992 (set at 1999 prices) were approximately $12.38 billion; from 1998-2000, U.S. disbursements averaged approximately $9.27 billion, representing slightly more than a 25% drop in real dollars. The United States still provides more ODA than any other country except Japan. As a percentage of gross domestic income, however, U.S. ODA declined from an average of .22% in 1984-1988 to .10% in 1998-2000, the lowest of all industrialized countries.

ODA does not account for all U.S. governmental assistance that could contribute to sustainable development. For example, it does not include U.S. aid to former Soviet bloc countries or the peacekeeping operations in Kosovo and Afghanistan. Nor does ODA include private financial flows to developing countries. Nevertheless, ODA levels indicate general trends and help identify the extent to which the United States is engaged with the rest of the world. ODA also does things that private financial flows do not; ODA supports peace and security, alleviates health and environmental crises, encourages educational improvements, and rewards countries that move toward democracy and the rule of law. In this way, it can help provide the infrastructure that will attract or encourage private investment.

Two funds for international environmental assistance were made permanent after Rio. The U.S. record in fostering sustainable development under these funds is mixed. The Montreal Protocol's Multilateral Fund exists to aid developing countries in meeting their obligations to reduce their production and consumption of substances that cause depletion of stratospheric ozone. Funds are disbursed for approved projects that contribute to phasing out ozone-depleting substances. Over the life of the fund, the United States has contributed its full assessed share—$327 million, or slightly more than one-quarter of the entire fund. The Global Envi-

ronment Facility (GEF) provides funds to developing countries for specific projects to reduce GHG emissions and to protect biodiversity, international waters, and the stratospheric ozone layer. The United States paid its full share during the GEF's pilot phase, but has paid much less than its share since then. Because the United States was in arrears, other countries held off paying some of their commitment.

The United States should increase ODA for sustainable development, although it needs to ensure that this aid is actually effective. President George W. Bush's commitment in early 2002 to an additional $5 billion in foreign assistance is a step in the right direction. The United States would reap benefits from increased aid in the form of a more stable world and improved environmental conditions. By resolving questions concerning its financial commitments to multilateral organizations, the United States would also send a message that it is engaged in global issues and follows through on its international obligations. In addition to continuing its aid under the Multilateral Fund, the United States should clear up its arrears with respect to the GEF.

Beyond resources, there needs to be a new structure for development cooperation, not just an architecture for international finance. It should include not only development assistance but also trade, debt management, private investment and capital flows, private sector development, and access to technology. Instead of operating on a government-to-government basis, development assistance should be synergistic with private sector development and the strengthening of civil society as a whole. Development assistance must also be based on common interests and the complementary needs of the rich and the poor, defined to some extent by international agreements. In that sense, development assistance is part of the price we pay to prevent the root cause of threats to our security. Development assistance should, in addition, support sustainable *human* development, and not simply build economies and dams. Economies exist for people, not vice versa. Growth should replenish environmental heritage, not replace it. Development cooperation should also promote democratization and good governance, and it should be driven by the needs of the receiving country. Finally, for much of the world, development assistance should be recognized as an essential building block to a vibrant private sector and successful financial markets.

The international community should set firm financial and other commitments for developed countries to help realize the goals set by the U.N. General Assembly in its 2000 Millennium Declaration. These include, for example, the goal of reducing by one-half, by the year 2015, the proportion of the world's people whose income is less than $1 a day and the proportion of people who suffer from hunger. The international community should also ensure adherence to these commitments. At day's end, the only world that works is one in which the aspirations for fairness and opportunity by poor people and developing nations are being realized. Such commitments should, in addition, help strengthen developing country interest in cooperation on environmental objectives.

The results of aid matter a great deal. Accordingly, there should be some type of specific and regular reporting on how aid is used in developing countries, and what results it is achieving. This aid should foster sustainable development; it should not support environmentally harmful activities or be lost to corruption. Such information should help inform and persuade the public and policymakers in developed countries about the benefits of international assistance for sustainable development.

Family Planning Assistance

Since 1992, the United States has provided an average of $430 million annually for family planning programs, and is the largest single donor to such programs. Still, the world's population is expected to grow to 9.3 billion by 2050, and nearly all of that growth will occur in developing countries. In addition to contributing to increases in poverty, resource consumption, and pollution, population growth plays a critical role in generating urbanization, migration, and political instability. At the 1994 Cairo Conference on Population and Development, countries agreed to curb population growth, not by setting numerical targets and focusing on birth control efforts, but rather by improving people's (particularly young women's) education,

health, and social standing, on the theory that this would lead to smaller families. Developed countries agreed to provide one-third of the cost of implementing the Cairo program ($5.7 billion annually). Developed countries together, though, are providing only about one-third of what they promised in Cairo. And twice in the past decade, the United States has reversed its position on whether this family planning assistance can go to organizations that perform or actively promote abortion as a family planning method. The United States needs to be a more generous and consistent contributor to international family planning.

The international community should also build on the work of the Cairo Conference on Population and Development, which connected population growth to women's roles, rights, and reproductive health issues. Countries should collectively consider the relationships among population growth, distribution, and mobility; environmental degradation; and the spread of diseases. Two key sets of connections involve fresh water and global warming. Population growth is an exceedingly important factor in increasing demand for fresh water, and causing environmental degradation that compromises its availability. Population growth is also related, directly or indirectly, to national rates of fossil fuel use as well as land clearing and conversion, both of which are major sources of GHG emissions. It should also be noted that the populations most vulnerable to global warming and least able to adapt are among the most rapidly growing ones.

Private Finance

At the time of the Earth Summit, about one-half of the net flow of capital from developed to developing countries was ODA, and about one-half was private. By 2000, despite a series of financial crises in the late 1990s, private investment outstripped public assistance by a factor of almost seven to one. In 2000, private flows from the United States constituted 38% of total private financial flows to developing countries (as well as countries in transition to a market economy, such as Russia and Poland), a much larger portion than any other country. National-level capacity to promote sustainable development in many countries has lagged behind the rapid pace of economic globalization, and many investments affect transboundary or global ecosystems for which there is no governance infrastructure.

This surge in private finance was not anticipated in Rio. As a consequence, Agenda 21 provides little explicit guidance regarding the goals or policies that developed country governments should undertake to ensure that private North-South flows promote sustainable development. The Rio Declaration, however, provides some guidance, stating the importance of integrating sustainability into mainstream economic decisionmaking and of public participation in those decisions. Although there are many policy levers for influencing private finance, the two most significant institutions for influencing the environmental character of private financial flows to developing countries are bilateral export and investment promotion agencies and multilateral financial institutions.

The United States supports two key bilateral export and investment promotion agencies—the Overseas Private Investment Corporation (OPIC), an investment promotion agency, and the Export-Import Bank (Ex-Im), an export credit agency. Environmental and social evaluation and disclosure requirements for OPIC and Ex-Im have strengthened over time, particularly in the past decade. Projects funded by both are subject to environmental impact statements and detailed environmental reviews, for example. Some disclosure requirements, in fact, represent international best practice. But while reforms at OPIC and Ex-Im have provided a basis for challenging environmentally and socially damaging projects, they fall short of an explicit mandate to promote sustainable development.

Multilateral development banks (MDBs), particularly the World Bank Group, also play a significant role in channeling private financial flows through their direct participation in a variety of private sector transactions. MDBs have also played a significant indirect role in influencing North-South financial flows, particularly through their promotion of the "Washington consensus." The Washington consensus emphasizes the role of capital market and trade liberalization, privatization, and removal of other constraints on

integration into the international economy. The United States controls the largest single share of capital subscription as well as the largest number of votes on the World Bank Group boards.

Even before Rio, the United States demonstrated significant international leadership in MDB reform by advocating environmental impact reviews and public participation in projects, but the United States has not yet adequately addressed the role of MDBs in leveraging private finance. For instance, environmental impact statements are still not required for structural adjustment loans from any of the MDBs, even though such loans are arguably the most potent vehicle for leveraging the policy environment in which private investment takes place. Experience during the 1980s and 1990s, moreover, showed that the Washington consensus could undermine sustainable development if not accompanied by strong independent regulatory capacity and other improvements in governance. In some cases, U.S. policy has promoted the Washington consensus at the expense of sustainable development.

The United States should work for further progress with both bilateral agencies and MDBs to move private finance toward sustainable development. For OPIC and Ex-Im, the United States should move private financial flows to developing countries in a more sustainable direction by maintaining high environmental and disclosure standards. It should also promote the upward harmonization of sustainable development policies and procedures for export credit agencies. The United States should push harder for the integration of sustainability objectives into the private sector development activities of MDBs. The United States should proactively monitor the performance of MDBs in complying with agreed policies and strategies. Finally, OPIC and Ex-Im, and the private sector arms of MDBs, should go beyond mere compliance with environmental standards and disclosure requirements, and shift their portfolios toward investments in sustainability.

Conservation and Management of Natural Resources

Our environment provides the basis for our lives and well being, and also helps give meaning and context to our lives. Fresh water is essential for human life, for the growing of food and other "natural services" to humans, and for natural communities. Oceans and estuaries provide food, recreation, and jobs for humans. We need to be able to breathe healthy air. A stable climate has provided part of the basis for our civilization, ensuring reasonably consistent temperatures and precipitation from year to year, and thus providing a predictable basis for agriculture and other human essentials. Biodiversity can provide valuable products to humans, but it also has intrinsic value. Forests and agriculture provide necessary products and food, as well as a source of human livelihood. The land provides a basis for almost all human activities, and its proper use can make life easier or harder. Each of these is addressed here.

Fresh Water

Relatively little change in fresh water quality or the law governing fresh water has occurred in the decade since Rio. Agenda 21 promotes more sustainable, reliable, and healthy water supplies for both human consumption and economic uses, while seeking to restore and sustain the health of aquatic ecosystems. In 1992, the United States already had in place a detailed set of laws and institutions designed to protect and manage fresh water resources that implemented the basic tenets of Agenda 21 and the Rio Declaration. They include the Clean Water Act (CWA) and other federal statutes, as well as state laws governing allocation and protection of water supplies. These measures laid the framework for sustainable use and protection of fresh water resources. As a result, most Americans have access to adequate supplies of fresh water of at least acceptable quality relative to much of the world, and U.S. agriculture and industry have similar adequate quantity and quality. These laws and institutions also provide the basis for integrated decisionmaking in the area of water resources, watershed-based restoration and protection programs, and aquatic ecosystem integrity. Legal tools exist to implement the precautionary principle for some, but not all, sources of water pollution.

The law governing fresh water has changed in only marginal ways since Rio, partly because legal tools for water resource protection were relatively sophisticated at the time. The lack of significant legal change is also due in part to political barriers to further improvements designed to address issues and problems that have evaded solutions under existing law. While additional regulations have been implemented to address more point sources of pollution, a comprehensive regime to tackle runoff from agriculture, city streets, and other land uses remains elusive. Moreover, efforts to address the cumulative impacts of multiple sources of pollution on specific water bodies have been reinvigorated, but progress has been slow due to legal and political controversy. Similarly, legal tools to address physical impairments to U.S. aquatic ecosystems remain fragmented and poorly implemented. Some of the gaps in national and state programs to protect water resources have been filled by a wellspring of local and regional watershed programs around the country designed to promote collaborative, holistic solutions to problems in individual watersheds.

Little improvement has been realized in actual water quality since 1992. Long-term ambient water quality trends are difficult to evaluate, but available data suggest that, on a nationwide basis, there has been no clear trend in water quality over the past decade. Meanwhile, between 35% and 45% of the nation's rivers and lakes remain impaired for at least some beneficial uses. Threats to human health continue through contamination of swimming waters, fish and shellfish, and drinking water. Similarly, fresh water aquatic species and the ecosystems on which they depend remain impaired due to chemical pollution as well as widespread habitat loss and impairment. Indeed, fresh water ecosystems are among the most, if not the most, threatened ecosystems in North America.

The United States could make progress in reducing these problems through changes and improvements in U.S. freshwater policy. In addition to continued efforts to control industry and sewage treatment plants, an analogous comprehensive program to reduce polluted runoff from rural and urban sources remains imperative if additional water quality improvements are to be realized. These programs should involve both new pollution controls and changes in agricultural policy designed to prevent or to discourage farming of surplus crops on environmentally sensitive lands. Integrated, holistic watershed protection efforts need to be strengthened both by encouraging and supporting existing and new watershed programs, and by strengthening the legal tools in the CWA designed to address pollution from multiple sources. Aquatic habitat can be restored by including a broader range of impairments within the broad definition of "pollution" in the CWA. In addition, there should be improvements in federal and state programs to protect wetlands, floodplains, and other habitats; to restore aquatic ecosystems that have been modified by dams, channelization, and other artificial structures; and to protect critical minimum-instream-flow regimes.

Oceans and Estuaries

Although the United States has played a leading role in protecting high seas fisheries, the ocean under its control appears to be in poorer shape now than it was in 1992. The United States controls more than four million square miles of ocean, an area larger than the country's land mass. Agenda 21 identifies four program areas that are particularly relevant to U.S. responsibilities for this area: integrated management and sustainable development of coastal areas, controlling marine pollution, protecting marine living resources of the high seas, and protecting marine living resources under national jurisdiction.

Coastal Areas

Existing laws have been insufficient to prevent the overall degradation of the nation's coastal zones or to make significant progress in restoring degraded areas, particularly degraded wetlands. Through Agenda 21, nations committed themselves to integrated management and sustainable development of coastal areas, including the application of preventive and precautionary measures to protect and preserve sensitive offshore ecosystems. Even before Rio, the United States had laws in place to encourage coastal zone management and to protect its wetlands and estuaries. However, one-half of the U.S. population lives in a

county that has an ocean coastline, and the coastal population is growing faster than the nation as a whole. If current projections are correct, population pressures are likely to result in further degradation of coastal wetlands, beaches, and waters and the services they provide, despite fairly extensive state and federal regulation. To address these problems, Congress should decide that (1) preserving viable coastal zones for future generations is a national priority, and (2) preserving functional nearshore and offshore ecosystems and the services that they provide for the future requires buying, restoring, and preserving coastal property now, particularly functional wetlands and other buffer areas between the land and the sea.

Marine Pollution

Agenda 21 seeks to halt and reverse degradation of the marine environment from various sources of pollution. By the time of the Rio conference, the United States already had a reasonably effective legal structure in place to control pollutants from identifiable industrial, municipal and ship-based sources of marine pollution, and from oil pollution. Runoff, however, is not effectively addressed. Most marine pollution now comes from sources that are not well regulated under the CWA—especially urban runoff and agricultural runoff. Congress thus should require states to have enforceable measures to control runoff, and should give private citizens a right to sue such polluters when they impair ocean quality. Congress should also amend the CWA to require the establishment of water quality standards for the part of the ocean that is under U.S. control.

Marine Species on High Seas

The United States was a world leader in international conservation of marine species before Rio, and it maintained that role throughout the last decade. Agenda 21 encourages sustainable use and conservation of living resources of the high seas. A number of commercially important fish species, such as tuna, mackerel, and marlin, as well as the great whales, spend much of their lives in waters outside any nation's regulatory jurisdiction. U.S. efforts over the last few years have included initiating new programs to protect species, such as sharks, that have only relatively recently become commercial fishing targets. But basic status of one-half of the fished highly migratory species is unknown. The United States should thus fund, or help fund, comprehensive international scientific research to obtain basic information about international marine living resources, and to reduce, and encourage other nations to reduce, catch limits for all species known to be or suspected of being in danger of being overfished.

Marine Species Under U.S. Jurisdiction

Fish stocks under U.S. federal management are suffering, and there is insufficient information to determine the status of 65% of U.S. fish stocks. Yet there is reason to believe that federal fisheries and fishery management may have improved since 1992. As Agenda 21 explains, although the marine living resources and nearshore fish existing mostly within a nation's jurisdiction can help meet a nation's nutritional and social needs, they can do so only if they are not overfished or overharvested. The 1976 statute governing fisheries was amended by the 1996 Sustainable Fisheries Act to incorporate sustainable thinking and a precautionary approach into U.S. domestic fisheries management. Still, it may take a decade before we can measure the true biological effects of legal changes in fisheries management, and the unintentional catching of nontarget species remains a problem. To make further progress, the United States needs to fund and support research to discover the complex interactions of marine living species and their environment. Without understanding marine ecosystems, truly sustainable management measures cannot be implemented. To facilitate comprehensive ecosystem management of its seas, the United States should also work toward overhauling its current species-by-species, medium-specific, multistatute, multigovernment, and multiagency legal regime for the oceans.

More generally, the United States currently lacks two visions of the ocean necessary to promote sustainable development—visions that it should articulate in the next few years. First, the United States needs a

philosophical vision of the marine environment as an integrated ecosystem that should be used with caution. Second, the United States needs a more concrete vision of what the oceans under its territorial control should be. The Oceans Act of 2000, which establishes a commission whose sole function is to make recommendations for a coordinated and comprehensive ocean policy, offers the federal government a means to identify and articulate these two visions.

In the last years of the decade, and especially since 2000, the federal government has shown decidedly more interest in protecting its marine resources. This interest appears in the Oceans Act of 2000, in the Coral Reef Conservation Act of 2000, in President Clinton's Marine Protected Area Executive Order (which the Bush Administration has now adopted), and in the two-year-long effort to turn the northern Hawaiian Islands into a national marine sanctuary. While recovery of ocean ecosystems can take decades, these recent legislative and executive efforts to protect the ocean suggest that the issue of sustainable ocean ecosystems may finally have arrived on the U.S. political agenda.

Air Pollution

Air pollution can make life unsustainable by harming the ecosystem upon which all life depends and harming the health of both future and present generations. The air pollution control activities described in Agenda 21 are broadly consistent with long-term U.S. law and policy, particularly the Clean Air Act (CAA). Several Rio Declaration principles taken together, including the right to a healthy and productive life in harmony with nature and the elimination of "unsustainable patterns of production," suggest the importance of focusing on the economic activities and technologies that produce air pollution. The overwhelming majority of air pollution comes from a single class of activities—burning fossil fuels. Emissions of most air pollutants declined somewhat over the past decade. Despite these improvements, the United States has not achieved the goals of the Rio Declaration because we have generally failed to do what we need to do—substitute clean sustainable technologies for the basic dirty ones in use when the CAA was enacted more than 30 years ago.

Since the Earth Summit, the United States has reduced emissions contributing to urban air pollution and acid rain, except for nitrogen oxides. Air pollution levels are still too high, however, to ensure all human beings have a healthy and productive life. In spite of strong economic growth and growing population, carbon monoxide declined by 2%, volatile organic compound emissions by 13%, particulate matter by 7 to 13%, and hazardous air pollutants by perhaps 39%. Still, large sections of the country are not in compliance with health-based air quality standards. If the U.S. Environmental Protection Agency (EPA) succeeds in an effort it began several years ago to strengthen air quality standards, the CAA may deliver further benefits in the future.

An ambitious program to reduce sulfur dioxide emissions, created by the 1990 Amendments to that Act, resulted in an overall reduction of emissions from all sources by 17% between 1992 and 1999. This program has not stopped transboundary harms, however, and has not fully protected ecosystems; most lakes and ecosystems remain damaged. By contrast, the United States has made substantial progress in reducing pollutants responsible for stratospheric ozone depletion.

The United States has made only very modest progress toward deployment of sustainable technology. It has made substantial technological changes in sectors once served by ozone-depleting chemicals, and some progress with respect to sustainable vehicle technology (thanks to California's low emission vehicle (LEV) program), but almost no progress in changing how electricity is generated. New electric-generating facilities, which are built and operated to meet increased demand, tend to rely on less polluting fuels, particularly natural gas. Still, less efficient and more polluting electrical generating plants that were operating in 1970 continue to do so.

To move toward sustainable development on air quality, the country must move away from its dependence upon fossil fuels, especially fuels that produce such large contributions to urban air pollution, acid

rain, and global warming. As a first step, the United States should phase out coal-fired power generation, which supplied 51% of the power generated by electric utilities in 1998. The United States should also expand and strengthen the LEV program in order to replace the internal combustion engine. Government policy should be used to ensure that new technologies are continuously more efficient and less polluting than existing ones, and that existing technologies are actually retired on a periodic basis rather than allowed to operate indefinitely. Several legal mechanisms have the potential to create an economic dynamic favoring such a change. These include increasingly stringent mass-based limits, pollution taxes, and an "environmental competition law."

Climate Change

In late 1992, the United States became the fourth country in the world to ratify the U.N. Framework Convention on Climate Change (UNFCCC). Five years later, in 1997, the United States agreed to a protocol in Kyoto, Japan, under which developed countries would reduce their GHG emissions by about 5% from 1990 levels by 2008-2012, and the United States would reduce its emissions by 7% from 1990 levels in the same period. Although President Bush repudiated the Kyoto Protocol in 2001, the United States is still a Party to the UNFCCC. While the convention is a framework on which more explicit agreements are to be based, it nonetheless contains commitments. And these commitments are different from those in Agenda 21 and the Rio Declaration, because they are legally binding. For GHG emissions, the United States has failed to comply with the spirit, if not the letter, of the convention.

The United States is the world's single largest producer of GHG emissions. By 2000, U.S. GHG emissions were 13.6% higher than 1990 emissions measured in carbon equivalents. More recently, U.S. emissions were projected to exceed 1990 levels by more than 46% by 2020. (CO_2, a principal GHG, is not directly regulated under the CAA.)

The United States has generally adhered to UNFCCC obligations that are not related to emissions. Parties agreed to annually report their national GHG emissions and to develop plans to mitigate climate change. The United States has done so. In addition, Parties agreed to support and further develop research on global warming. The United States has consistently supported scientific research and has shared information about global warming with other Parties.

Although the UNFCCC contains no "hard" or "numerical" emission limitations, it does contain two commitments regarding emissions. First, developed countries agreed on a short-term goal—to "aim" to reduce GHG emissions to 1990 levels by 2000. The United States and other developed countries thus promised to adopt policies and measures that had a reasonable expectation of reducing GHG emissions to 1990 levels by 2000. A strong case can be made that the United States has failed to abide by this promise. President Clinton's proposed energy tax was rejected in 1993 by Congress. Then the Clinton Administration initiated a climate change program based on voluntary initiatives, but emissions continued to increase significantly.

The UNFCCC also contains a long-term goal, and commitments that go with it. Developed countries agreed to adopt policies and measures "consistent with the objective of the Convention." The convention's objective is "stabilization of [GHG] concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." However, the U.S. actions described above, including repudiation of the Kyoto Protocol, are inconsistent with achieving the convention's long-term objective. In early 2001, the Intergovernmental Panel on Climate Change (IPCC), an international group of climate scientists organized under the United Nations, concluded that the earth's average surface temperature could rise by 2.5 to 10.4 degrees Fahrenheit (F) from 1990 to 2100, which is higher than the IPCC's estimate of five years earlier. This report also strengthened the IPCC's prior conclusion that human-caused global warming is already happening. A strong case can be made that the IPCC's projections of future climate change would constitute "dangerous interference with the climate system" even toward the lower end of the IPCC projection, and that it is already too late to prevent some atmospheric damage from global

warming. The likely effects of global warming include rising sea levels, more frequent floods and droughts, and an increase in tropical diseases.

The excuses used by the United States for not acting are also inconsistent with the convention. Many U.S. decisionmakers have said it would be unfair to the United States to have to reduce GHG emissions if developing nations aren't required to do so. But in the UNFCCC, developed countries agreed to take the lead in reducing GHG emissions because they are responsible for the largest share of historic and current emissions, and because they have greater capability to reduce them. Many decisionmakers also claim that global warming science is too uncertain to justify programs that might turn out to be an unnecessary drag on the U.S. economy. Yet the United States and other UNFCCC Parties specifically agreed to take "precautionary measures" to reduce GHG emissions, and recognized that the "lack of full scientific certainty should not be used as a reason for postponing" cost-effective measures. Notably, many such cost-effective measures are available.

The United States should adopt GHG emission reduction programs that will reduce U.S. GHG emissions to 1990 levels as soon as technically feasible. Because the United States is already 13.6% above 1990 levels, and because a business-as-usual approach to GHG emissions is expected to significantly increase this difference in the next six years, the United States will also need to participate in emissions trading and use carbon sequestration projects, coupled with aggressive policy responses, to achieve this reduction. In addition, the United States should commit to make further reductions to achieve the Kyoto target of 7% below 1990 levels as soon as possible after achieving the first goal. This would allow the United States to merge with the approach taken by the rest of the world pursuant to the Kyoto Protocol even though it may be technically infeasible for the United States to comply with the Kyoto goal between 2008 and 2012. The United States needs to make it clear that it will eventually catch up with commitments being made by the rest of the world.

The record on voluntary global warming programs has demonstrated that they alone cannot be relied upon to achieve the type of reductions required. Therefore, the United States needs to adopt both emissions caps for various sectors and a mix of financial incentives and regulatory requirements. Moreover, the United States should take leadership on getting an international consensus on what atmospheric concentrations of GHGs will not present a dangerous interference with the climate system. That would help the international community better understand what national obligations will be needed to prevent dangerous interference with the climate system.

Biodiversity

The Convention on Biological Diversity, which seeks to ensure both the conservation and sustainable use of biodiversity, was opened for signature in Rio. The convention is a major innovation because it provides a legal foundation that did not previously exist in the United States and in most other countries for the conservation of biodiversity. The United States has signed, but not ratified, the Convention on Biological Diversity. Agenda 21, which the United States did agree to, also provides for biodiversity conservation. Both Agenda 21 and the Convention on Biological Diversity would have nations adopt national strategies for the conservation and sustainable use of biological resources. Key elements of a national strategy include an inventory and monitoring of important biodiversity resources, and the creation of in situ (in place) biodiversity reserves. Ten years after Rio, the United States has no explicit comprehensive biodiversity conservation program in place, and a great many species and ecosystems are at risk.

Biodiversity conservation is still not a generally accepted legal standard in the United States. At best, it is an objective which may be considered along with other competing objectives when resource managers make allocation decisions that promote or impair biodiversity. The reason is simple. Biodiversity emerged as a concept after the basic public land and environmental laws were in place, and domestic politics have prevented

ratification of the Convention on Biological Diversity and all efforts to develop a national biodiversity conservation strategy.

The Endangered Species Act (ESA) of 1973 does not provide a complete foundation for such a strategy. The ESA imposes a duty on public and private parties to prevent the extinction of a limited number of endangered or threatened species—those that are listed under the Act. In 2000, more than 1,200 species were listed, but an estimated 66,000 were at risk of extinction. The ESA is also a backward approach to biodiversity because it only indirectly addresses the major cause of biodiversity loss—habitat destruction—and it does not address other causes such as the invasion of exotic species and air and water pollution. Since 1992, however, the ESA has evolved to encourage the use of large-scale multispecies habitat conservation plans and other forms of ecosystem management. By the end of 2000, the U.S. Department of the Interior had approved habitat conservation plans covering 20 million acres. While this suggests that it is possible to move from individual species to general biodiversity conservation within the framework of the ESA, the results of this approach have yet to be tested by time.

Since the Earth Summit, many biodiversity conservation initiatives have been started in the United States by all levels of government and by private parties. But they are often ad hoc efforts to solve a single example of past environmental degradation, such as the restoration of sheet flows to the Everglades, or efforts to avoid a worst-case enforcement scenario under the ESA. The U.S. government has also tried to manage large blocks of public lands on an ecosystem basis and has participated in ecosystem restoration experiments on a collaborative stakeholder basis. These efforts have occurred in national forests, wilderness areas, national parks, and Bureau of Land Management lands—areas that in many cases could be turned into public land biodiversity reserves. These efforts are extremely fragile because they lack a firm legal foundation, can be modified in response to changed political conditions, and include no clear performance standards to measure their success should they endure. Thus, the future of many of the biodiversity-related conservation initiatives implemented since 1992 is in doubt.

To implement the Earth Summit's objectives, the United States should immediately take four steps. First, it should ratify the Convention on Biological Diversity. Ratification would establish biodiversity conservation as an overarching legal objective in the United States and stimulate the development of a comprehensive national biodiversity conservation strategy. Second, the legal mandates of the major federal land management and regulatory agencies should be revised to require them to conserve biodiversity to the maximum extent consistent with due process and the sustainable use of natural resources. This would include clarifying the role of state and local governments as well as private parties in habitat conservation plans. Third, the United States should create a Biological Survey, equal in stature to the U.S. Geological Survey, to inventory the nation's biodiversity heritage and to provide the necessary scientific support for the establishment of biodiversity indices and conservation performance standards. Finally, although biodiversity conservation is primarily a national responsibility, private land stewardship must be recognized and supported.

Forestry

The United States made halting steps in law reform and in the implementation of forest sustainability during the past decade. The governments meeting in Rio agreed to a separate set of principles for sustainable development of forests. In general, sustainable forestry is based on ecosystem integrity, economic viability, and social responsibility. Other principles relevant to the United States include opportunity for stakeholder participation in forestry decisions, "timely, reliable, and accurate" information, comprehensive assessment of forest values, integration of forest management with management of adjacent areas to protect viability or unique ecosystems, and the incorporation of environmental costs and benefits into market mechanisms.

Forest ecosystems cover one-third of the land area of the United States, and two-thirds of that land is productive enough to have value as commercial timberland. Public forests account for 42.4% of the forest area

in the United States; they are owned and managed by the federal, state, and local governments; and have contributed disproportionately to sustainability through demonstration programs and innovative practices. Private forests account for the rest. The basic structure of forestry law, firmly established prior to 1992, provides the background against which to discern recent trends.

The physical area of forests changed little in the past decade. Data on species diversity, forest structure, water quality, and many other dimensions of ecological sustainability are not cumulated nationally for forests in a way that invites evaluation of changes since 1992. Information on economic viability and social responsibility is even more elusive.

After the Rio Summit, the U.S. Forest Service began a slow, but steady, shift toward general sustainable development principles. The most important legal vehicle for promoting this change is the Government Performance and Results Act, which was enacted in 1993. The legislation requires all agencies to set both long- and short-term measurable performance objectives and to conduct periodic assessments and revisions. This spurred the Forest Service to employ adaptive management to monitor and evaluate its activities based on parameters relating to such sustainability criteria as the health of the land, quality of water, and user satisfaction. These changes help provide "timely, reliable, and accurate information" about forests. The Forest Service also shifted its emphasis under the ESA from interagency coordination and prohibitive policy to the broader use of habitat conservation plans. In 2000, the Forest Service promulgated a new framework for planning that establishes maintenance and restoration of ecological sustainability as the first priority for management. The 2000 rule, and a 2001 rule prohibiting logging and road building in many roadless areas of the national forests, constitute the single most important positive development in the application of substantive standards to promote sustainable development of public lands. The Bush Administration, however, has indicated that it will alter both regulations.

On private lands, a slight strengthening of state forest practice laws and increased promotion of best management practices have improved the legal regime, but these changes tended to be overwhelmed by market forces. Until water pollution control begins to force abatement and mitigation of runoff, private forest owners will not face significantly heightened incentives for sustainable practices. On the other hand, new certification systems for sustainable practices have arisen in the past decade; under these programs, third parties such as the Forest Stewardship Council certify forest products as "sustainable," and major purchasers confine their purchases to certified products. These systems have begun to reshape market demand.

In the coming decade, the United States should strengthen its legal mechanisms for promoting public participation, citizen enforcement, best forestry management practices, and landscape-level planning. These recommendations are top priorities for facilitating sustainable development. Existing property, market, and administrative regimes can all be deployed in the service of more sustainable forestry by flexibly demanding that environmental performance indicators be achieved through mitigation, ecosystem services, and adaptive management. In addition, the 2000 and 2001 rules should be supported, not altered. These regulations are important because large-scale, e.g., forestwide, planning is needed to implement ecosystem management. Federal and state governments should also throw their purchasing weight behind the Forest Stewardship Council's certification program.

Agriculture

The United States has a diverse and dynamic system of agriculture. If it is to be sustainable, it must meet at least three criteria that are explicit in or logically derived from Agenda 21 and the Rio Declaration. Agriculture must become internally sustainable, which requires that it preserve its resource base; avoid pollution, salinization, or other degradation of the soil and water; and be able to respond to plant and animal disease, pests, periodic climate variation, and changing market conditions. Agriculture must also be externally sustainable. That is, it must not impose external costs on nonagricultural society or surrounding natural resources. Finally, agriculture must exhibit responsive sustainability; it must be sufficiently dynamic

and flexible that it is able to respond to change and help the nation respond to crises in other sectors of the economy, e.g., to participate in global warming remedies through the use of sequestered carbon.

Internal sustainability is being challenged in the West by competing demands for irrigation water, although the increased use of water conservation practices eases this somewhat. From 1992 to 1997, however, one-quarter of all agricultural land converted to urban uses was prime farmland.

U.S. agriculture is not externally sustainable. Since 1985, there has been a gradual and fundamental change unfolding in federal agricultural policy. A series of programs (evidenced by the 2002 farm bill) now encourage farmers to adopt conservation or environmental protection practices on some of their land. Taken together, these mostly voluntary agricultural programs represent a vast investment in conserving practices. Still, farm policy continues to direct farmers away from sustainability. The system of support payments, which will grow even larger now that the 2002 farm bill has become law, encourages farmers to grow commodity crops, which have greater adverse environmental effects, and drives small, family farms out of business. There are larger and fewer farms employing ever more intensive practices, usually in the form of monoculture. There is almost universal reliance on inorganic fertilizers to replace lost natural soil nutrients. Chemical pesticides are heavily relied on to deal with the vulnerability of monocultures to pests. Pollution of both surface and groundwater from agricultural sources may be the single largest source of pollution in the nation. Waterways of all types suffer from sedimentation.

Responsive sustainability is challenged by several uncertainties, perhaps the clearest of which is climate change. Rapid changes in climate, including more frequent droughts and floods, could be disastrous for agriculture. Another example of uncertainty is the effect of specialization in the use of genetic stock. Because the United States operates an agricultural system that is close to monocultural, future pests, diseases, or human dilemmas could create large problems unless we preserve the broader genetic stock, or germplasm, from which current plant varieties are derived. Other sources of uncertainty are created by the increased use of genetically modified organisms and by world markets.

Steps needed to move the United States toward sustainable agriculture include the stabilization of irrigation agriculture through greater water conservation and protection against salinity. The United States should also renew its campaign to reduce erosion. Prime agricultural land must be protected against urban and suburban development. The nation's larger drainage systems should be re-engineered to achieve systematic control of polluted runoff. In addition, affirmative steps should be taken to protect germplasm. More generally, the internalization of environmental costs should be an obligation of contemporary agriculture. For the long term, the science of ecology must be fully integrated into agricultural research.

Land Use

Sprawl continued during the past decade. The "smart growth" movement has led to some legislative and policy changes, particularly at the state level. But there is a wide gap between the talk of reform and actual reform, and not enough time has elapsed to fairly assess whether any of the policy changes are making a meaningful difference.

Sustainable land development requires consistent integration of social, environmental, and economic considerations in decisionmaking to produce a sound, coordinated, and harmonious built environment. Our system of land use controls and decisionmaking must be consistent both horizontally (among and between neighboring jurisdictions) and vertically (from one level of government to the next). Achieving this result requires heightened levels of intergovernmental cooperation, coordination, and support. Effective sustainable land development policies must minimize sprawl and maximize sound development opportunities so that the United States may conserve important lands, preserve the natural environment, protect air and water quality, promote affordable housing through compact development and urban renewal, and encourage urban "infill" rather than rural development.

Agenda 21 asserts that national governments should delegate "planning and management responsibilities to the lowest level of public authority consistent with effective action." This is the lightning rod of land use reform debate in the United States—whether traditional local land use planning and decisionmaking can achieve sustainable development.

The smart growth movement is proving to be, at least in rhetoric, a solution for both the disorganized and inefficient system of land use controls of the past and a framework for a new future paradigm. In general, smart growth principles mirror many of the implementation strategies for sustainable land development under Agenda 21.

At the national level, there has been a lot of talk, some bits and pieces of reforms, but overall very little action. The federal government has taken notice of allegations of environmental injustice in the siting of various locally unwanted land uses, and has taken initial steps to foster greater social equity.

There is a much greater level of activity in many states than at the national level. While there were some state-level comprehensive land use planning reforms before 1992, the last decade has witnessed an unprecedented level of attention and activity at the state level. Some states have undertaken a comprehensive recodification of state planning and zoning enabling statutes that provide local governments with tools to promote sustainable land use. More than one-half the states explored reform options through task forces or study commissions. Some states have adopted changes through public referendum initiatives. Yet on balance states are just starting to make significant statutory changes that offer the promise of promoting more sustainable land development practices. It will take even more time for these reforms to translate into observable and quantifiable changes in our neighborhoods and communities once states have provided the opportunity for changed behaviors.

Sustainable land use will require continued leadership for, and interest in, meaningful land use reforms. States must create a new culture of cooperative and intergovernmental decisionmaking at the local level. State and federal governments must target spending on initiatives and programs that promote urban renewal and infill, and thus revitalize our cities. The federal government should also modify existing programs so that, where state and local participation is optional, access to federal money is conditioned on implementation of sustainable land use plans.

Waste and Toxic Chemicals

According to Agenda 21, the root cause of waste and toxic chemicals problems is unsustainable patterns of production and consumption. These patterns are unsustainable because they harm humans and ecosystems, deplete materials and energy, and, in some cases, may threaten national security. This section summarizes U.S. efforts concerning toxic chemicals as well as pesticides. It also summarizes U.S. efforts concerning three types of waste—hazardous waste (including Superfund), municipal solid waste, and radioactive waste. In addition, it summarizes state and federal legislation facilitating private cleanups of brownfield sites—sites contaminated with hazardous substances.

Toxic Chemicals and Pesticides

The United States made significant progress in moving toward a more sustainable approach to chemicals and pesticides over the past decade, but still has a long way to go. The most relevant sustainable development principles are the precautionary principle, intergenerational equity, access to information, integrated decisionmaking, and control of trade of hazardous chemicals in international trade. They apply with particular force to chemicals and pesticides because of incomplete information about their risks, their potential to cause future harms, and the need for public information about them.

Little progress was made in reducing the risks of chemicals that are currently being used in commerce. The 1976 Toxic Substances Control Act (TSCA) requires manufacturers of new chemicals to submit infor-

mation about the environmental and health risks of these chemicals to EPA before they can be manufactured. Relatively little information exists concerning the 60,000 or so chemicals already in commerce that were grandfathered under TSCA, and little progress was made in assessing their risks over the past decade. Several voluntary information collection initiatives—one for high production volume chemicals and another for chemicals to which children are commonly exposed—are promising, but it remains to be seen whether anything more than assessments will be conducted.

Similarly, little progress was made concerning the introduction of new chemicals into commerce. Although premanufacture approval is required under TSCA for new chemicals, the United States requires relatively little information before giving that approval. While both EPA and the EU have concluded that requiring better information would reduce risks, EPA has not taken steps to do so. The EU runs a premarket approval program rather than, in the case of the United States, a premanufacturing approval program. Because only 10% of new chemicals are likely to go to market, the EU program focuses more intensely on fewer chemicals, and thus permits a more certain hazard prediction than the system of review used in the United States.

The toxics release inventory (TRI) led to continued reductions in chemical releases over the past decade. Under TRI, manufacturing facilities with 10 or more employees report releases and transfers of several hundred toxic chemicals. Between 1988 and 1999, total releases of the "core" set of chemicals that were reported consistently over that time declined by 45.5%, although total production waste increased slightly. The TRI was expanded in the 1990s to include hundreds of new chemicals, federal facilities, and new industry groups. These expansions have increased the information available to citizens, which may lead to further reductions.

Pollution prevention would further many of the goals of sustainable development because it relies on more efficient processes and practices to reduce the amount of pollution that is created. Although much progress was made in the development of pollution prevention tools and education, it is not clear to what extent pollution prevention has been adopted in practice.

Use of pesticides in agriculture has leveled off since 1985, and utilization of the most highly toxic pesticides has declined. But the most important change in pesticide regulation over the past decade occurred with the adoption of the 1996 Food Quality Protection Act. The Act focuses on pesticide residues in food, and requires EPA to assess the aggregate and cumulative risks of these pesticides, rather than assessing safety based on one pesticide and one medium at a time. The Act also requires safety factors, reflecting both the precautionary principle and intergenerational equity.

The United States made some progress in the regulation of genetically modified organisms (GMOs) under TSCA, but it did not put in place a framework for regulating the new GMO plants that are being bred to produce chemicals. Such organisms are increasingly the technology of choice for the manufacture of chemicals and pesticides.

In the international arena, the United States has been at the table for negotiations and has been among the world's leaders in developing and adopting international standards for chemicals, some legally binding, and some not. However, the United States has not yet ratified certain recent treaties and protocols. These include the Rotterdam Convention on Prior Informed Consent (prohibiting the export of specified chemicals without explicit agreement by the importing country), the Stockholm Convention on Persistent Organic Pollutants (protecting health and environment from specified pollutants), the Cartagena Protocol on Biosafety (setting up an international framework for managing trade of GMOs and seeds), and the Biodiversity Convention on which the Cartagena Protocol is based.

To make progress, or further progress, toward sustainable development, Congress should modify TSCA to provide a clearer standard for health and safety to encourage greater pollution prevention. TSCA should also be amended to shift the presumption that chemicals are "innocent until proven guilty" to a bur-

den on manufacturers to prove that chemicals are safe as used in the market. In addition, TSCA should be amended to level the playing field between new and existing chemicals; the present approach perversely creates disincentives for bringing new and safer technologies to market. New chemicals should be reviewed on a premarket, not a premanufacture, basis, and manufacturers should be required to submit the same kind of information they would to the EU. EPA also needs to broaden its use of tools for the management of chemical risks, including labels and hazard classification. As new chemical hazard information is generated by EPA through voluntary screening initiatives, TRI listings should be modified accordingly.

The United States should evaluate its pollution prevention efforts to determine where they have succeeded and failed. The United States also needs to expand efforts to integrate pollution prevention into core regulatory efforts for air, water, and waste management. EPA needs to implement the Food Quality Protection Act on a priority basis, in a transparent manner, and with full public disclosure. In addition, the United States needs to revise the regulatory framework for regulation of biotechnology and assure that it will effectively cover both new and existing products. Moreover, the United States needs to seriously consider whether a labeling approach might have a place in enhancing consumer confidence, if not the safety, of such foods. Finally, the United States should ratify the agreements described above. In the longer term, the United States needs to recognize that many of the major chemical risks do not respect national boundaries.

Lead

In the past 10 years, the United States has used its domestic efforts on lead poisoning prevention and abatement to help support efforts in other countries. Lead poisoning remains a serious threat to health and development, particularly but not exclusively in developing countries. Because lead poisoning is expensive and difficult if not impossible to cure, prevention is the best approach. The United States should maintain and intensify its leadership role on lead poisoning prevention in an internationalized context by supporting adoption of a Global Lead Initiative (GLI) and by playing a leadership role in implementing it thereafter. The GLI should be designed to complete a worldwide phaseout of leaded gasoline on an expedited basis, and use the momentum from that success to address the multiple other sources of lead exposure. The United States should continue to support the global phaseout of leaded gasoline in all relevant international fora. The United States should also support such complementary activities as the development of an international network dedicated to raising public awareness and exchanging best practices for phaseout and prevention, including those based on U.S. experience.

In addition to the United States, the international community should support the establishment and implementation of a GLI to complete the phaseout of leaded gasoline and then other sources of lead poisoning. While the conquest of lead poisoning would constitute a signal victory in itself, its concrete achievement should also serve as an optimism-engendering model of international cooperation adaptable to solving other threats to sustainable development.

The project should initially convene a technical advisory group to work in partnership with identified government focal points, as well as NGOs and the private sector, to prepare action plans for phaseout that include milestones and timelines for national action. Mandating, not merely recommending, the formation of the technical advisory process and funding, not merely morally encouraging, the GLI as a sustained project are essential to its success.

Hazardous Waste and Superfund

The basic structure of U.S. domestic laws with respect to hazardous waste was established in the 1970s and 1980s. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or the Superfund Act) created a multifaceted scheme for eliminating dangerous conditions created by hazardous waste spills and improper disposal of hazardous substances. The Resource Conservation and Recovery

Act (RCRA) focused on "cradle-to-grave" regulation of ongoing hazardous waste generation, transportation, and disposal.

Agenda 21 is premised on an "overall cleaner production approach," with the goal of preventing or minimizing further hazardous waste generation, which would have the United States go further. Rio Declaration principles supporting integrated decisionmaking and the reduction and elimination of unsustainable patterns of production and consumption provide a foundation for that. Indeed, a zero level of hazardous waste generation appears to be a worthwhile long-term goal. In addition, Agenda 21 calls for environmentally effective management of the waste that is generated. Agenda 21 also urges ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Waste, which sets forth more effective rules with respect to the transboundary shipping of hazardous wastes.

Cleanup activity under CERCLA has been completed on about one-half of all Superfund sites listed on the national priority list, and more than 6,400 removal actions have been undertaken since 1993 to remove immediate and direct public health and environmental threats. Although CERCLA has been very modestly amended in the decade since Rio and subject to some intermittent administrative "fine tuning," those legal changes have diminished or, for the most part, left unimproved the statute's overall environmental effectiveness. While the legislation was amended in early 2002 to encourage private cleanups at contaminated or "brownfield" sites, the statute still excludes oil-based wastes at non-brownfield sites, and the exemption for secured creditors was actually broadened in 1996. Moreover, EPA's tax-based Superfund trust fund has not been replenished since the special Superfund taxes expired at the end of 1995, and the fund will run out of money in 2003 unless significant changes are made.

Similarly, RCRA has never been comprehensively amended with a view to implementing sustainable development for hazardous waste. While the statute intensively regulates certain wastes, the legal definition of hazardous waste creates many regulatory uncertainties, and the statute excludes "solid or dissolved material in domestic sewage" and "solid or dissolved materials in irrigation return flows"—two major and environmentally unsound loopholes. Moreover, the statute lacks any enforceable provisions directly intended to decrease or eliminate the generation of hazardous wastes. EPA's biennial hazardous waste reports reflect relatively little recent progress in decreasing the generation of hazardous wastes. Nor has the United States ratified the Basel Convention.

To move toward sustainable development, CERCLA should be amended to narrow its exemption for secured creditors, to eliminate the statute's "petroleum exclusion," and to provide a stable source of funding for the Superfund program, at realistic levels, for at least another decade. RCRA (and CERCLA) should be altered to mandate phased decreases in the generation of hazardous wastes (by dates certain) at U.S. industrial facilities, to provide that hazardous wastes in domestic sewage and irrigation return flows be made subject to RCRA regulation, and to replace RCRA's current regulatory definition of "hazardous waste" with a consistent, straightforward, and comprehensive definition. The United States should also ratify the original version of the Basel Convention and amend domestic hazardous waste laws to conform with the convention.

Brownfields Redevelopment

The United States has as many as 500,000 brownfield sites, properties that are underdeveloped or abandoned because of actual or potential contamination from past industrial or commercial use. Because of CERCLA and counterpart state laws, ownership or use of these properties could result in significant liability. In the past decade, virtually every state has adopted laws to facilitate the reuse of brownfield sites through voluntary cleanup programs. These laws confer three principal advantages on private sector actors and others who are willing to remediate a site—streamlined administrative cleanup procedures, relaxed cleanup standards, and liability protection. Brownfields revitalization is widely viewed as successful, as thousands of sites have been remediated in state programs. In early 2002, similar provisions under CERCLA were signed into law.

Each decision to remediate and reuse a brownfield site eliminates environmental health risks while promoting reinvestment, creating jobs, slowing the acceleration of suburban "greenfields" development, decreasing polarization of communities, and fostering public involvement in every aspect of redevelopment efforts. Brownfield redevelopment thus involves integrated decisionmaking, promotion of sustainable human settlements, and public participation—all central features of sustainable development. In principle, too, state leadership in brownfields revitalization fulfills the Agenda 21 recommendation that national governments delegate institutional responsibility for sustainable development "to the lowest level of public authority consistent with effective action."

States should modify their programs in three ways to make them more fully consistent with sustainable development, however. First, a higher level of government oversight is needed to ensure early, simultaneous, and coordinated consideration of social, environmental, and economic goals. There is typically no comprehensive review of the project and little if any supervision of the cleanup process. The assumption is that redevelopment will result in less contamination, but that is merely an assumption. States should modify their laws to provide for state oversight throughout the process.

Second, a shortcoming of virtually every brownfields program is the relative lack of concern for future generations. State and federal programs define success in terms of short-term results based on specific uses that could change over time or with future ownership. States should modify their laws to guarantee long-term protection of sites where remediation has taken place.

Third, there is relatively little opportunity for public participation in the cleanup process. Public participation is especially important because many brownfield sites are located in neighborhoods with higher than average concentrations of persons of color and other minorities. Public involvement helps ensure equity in the decisionmaking process and helps ensure consistency between community plans and developer plans. States should thus require full and active citizen participation throughout the revitalization process.

Municipal Solid Waste

Solid waste, according to Agenda 21, is all waste that is not radioactive or legally hazardous. In the United States, the term encompasses nonhazardous industrial, oil and gas, mining, agricultural, and municipal solid wastes. While municipal solid waste, also known as trash or garbage, comprises only a fraction of these wastes, it is easily the best known and best studied of these types of waste. Accordingly, this part of the review focuses on municipal solid waste.

Agenda 21's objectives for solid waste are contained in a hierarchy of (1) minimizing wastes that are produced, (2) maximizing environmentally sound reuse and recycling of wastes, and (3) the environmentally sound disposal and treatment of wastes that cannot be used or reused or recycled. Underlying this hierarchy are estimates of relative environmental impact and cost. Each successive tier of the hierarchy involves more materials use and loss. That, in turn, means more loss of economic value and, generally, more environmental impact than the previous level.

Based on this hierarchy, the following three indicators or goals appear to be a useful way of measuring a move toward sustainable waste management: (1) decreasing per capita generation; (2) decoupling of waste generation from GDP; and (3) even if waste generation rises, decreasing per capita waste disposal though increased recycling, composting, and resource recovery.

A threshold problem in analyzing U.S. efforts in meeting these three goals is a lack of standardization about what is and should be counted. Three prominent data sources that should be useful in analyzing sustainability trends at the national level collect data in different ways and make different assumptions in accounting. Still, it is possible to discern basic trends.

First, per capita waste generation in the United States declined somewhat from 1990 to 1995, but has increased steadily since 1996, perhaps owing to the strong economy. Second, there does not appear to be any decoupling of waste generation from GDP; in fact, GDP increases seem to automatically include commensurately increasing waste generation rates. A trend toward lighter packaging appears to have been offset by increases in purchasing and waste. Finally, even after recycling and composting, the numbers of pounds of waste generated per capita per day have been increasing since 1996, according to both California and EPA data.

These three trends are particularly notable, because the past decade saw large changes in how municipal solid waste is managed. The trash capacity crisis that the country faced in the late 1980s created tremendous enthusiasm for recycling and waste reduction programs. These programs have had a significant and positive effect. EPA reports that, in 1999, although 230 million tons of municipal solid waste were generated, 50 million more tons of waste were not created due to waste prevention programs. The trash capacity crisis also led to the development of larger, more environmentally protective landfills and incinerators, as a result of which capacity is no longer a significant issue. That growth in infrastructure, however, has reduced pressure for recycling and waste reduction.

To move toward sustainability, the United States should make progress on all three goals or indicators. To reduce per capita waste generation, states could follow the lead of an Oregon statute that sets goals for stabilizing and reducing per capita waste generation. To decouple waste generation from GDP growth, the United States should explore examples of where decoupling has already occurred, e.g., yard waste, and develop programs that are targeted at specific waste streams. To reduce per-capita waste disposal, more recycling and composting is needed, coupled with incentives to reduce waste being disposed. Better and more nationally consistent data is necessary for all of these recommendations, and for all solid wastes.

Radioactive Waste

Radioactive waste results from nuclear-powered electric generation and other civilian uses as well as the manufacture and disposal of nuclear weapons. In addition to its radioactive nature, it differs from other wastes because it can be highly dangerous for thousands of years and because some radioactive waste can be used to make new nuclear weapons. As a result, the control of radioactive waste deeply implicates the security aspects of sustainable development.

While the cold war ended just before the 1992 Earth Summit, the full meaning of this change had not yet permeated the nuclear establishment. Since 1992, an enormous rethinking of the role of nuclear technology and the management of nuclear waste has begun. Enormous stockpiles of "special nuclear materials" and other radioactive materials that were painstakingly built up for nuclear weapons arsenals have been rendered surplus, raising difficult questions about what to do with them. Moreover, Agenda 21 focused only on commercial nuclear waste, not on radioactive waste from nuclear weapons production. Because of greater public awareness and disclosure about problems related to nuclear weapons production since the Earth Summit, it is now apparent that the cost of radioactive waste cleanup at nuclear weapons production sites far exceeds the costs of civilian radioactive waste controls.

In the 10 years since Rio, the United States took a number of actions that move the country closer to sustainability in nuclear waste control, if measured by the limited recommendations set forth in Agenda 21. Among other things, Agenda 21 calls on countries to minimize radioactive waste, transfer radioactive waste control technologies, and support international efforts for radioactive waste control. Private industry has reduced the amount of low-level commercial waste per unit of activity. The amount of high-level nuclear waste from nuclear weapons material production was reduced largely by DOE's lower level of nuclear weapons production, but not by efficient operations. The United States has generally supported technology transfer in radioactive waste control. On the other hand, some technologies promoted for radioactive waste control may present significant risks of facilitating nuclear proliferation. The United States pro-

vided significant and broad support for international and regional cooperation and coordination, even though its efforts were uneven.

When measured against the broader principles in the Rio Declaration, however, the United States has fallen short of making significant progress toward sustainability in radioactive waste controls. U.S. controls on most radioactive waste generally contain explicit, if imperfect, requirements that intergenerational or long-term impacts be considered. The issue of intergenerational impacts has been a focus of debates about the effectiveness of proposed geologic repositories for such wastes. However, neither a complete understanding of the implications, nor a mature ability to deal with this issue, have yet evolved.

Significant progress has been made in opening up radioactive waste control to public knowledge and participation. Much remains to be done, however, and some backsliding has already begun. DOE began an "openness" initiative to provide the public more information about radioactive waste control, but that effort has waned, and large amounts of information that were previously available on websites from the United States have been eliminated, ostensibly for security purposes.

Since 1992, two events have improved worker safety, but the overall problem of DOE self-regulation remains intractable. First, DOE has begun to encourage modern integrated safety management techniques to involve all workers in safety planning. Second, Congress passed a landmark worker compensation bill that provides federal compensation for cancer, chronic beryllium disease, and silicosis to current and former nuclear workers and their surviving family members. Unfortunately, DOE is retreating toward its traditional insular culture of self-regulation and contractor self-assessments, thus reversing the momentum toward greater contractor accountability and safety that was developed in the 1990s.

The polluter-pays principle is particularly problematic in the case of radioactive waste. The intergenerational nature of radioactive waste almost guarantees that some of the costs will be borne by future generations rather than by those who benefitted from electric power or nuclear weapons. A limited trust fund was established for one site, and there were proposals for other trust funds. To the extent that waste and liability producing practices fail to internalize the full costs of doing business, the same practices will continue to produce environmental problems.

To make progress toward sustainability in radioactive waste control, the United States will need to rely on existing laws and institutions more effectively. But new organizations and institutions will likely be required to operate new facilities for plutonium disposition and for long-term stewardship of facilities where radioactive waste has been stabilized or contained, but not removed. A dedicated trust fund and politically insulated organization will likely be required to ensure the availability of funds for post-cleanup stewardship of nuclear facilities. The United States needs to invest in better science and technology to provide a stronger and more publicly acceptable basis for decisionmaking. The government needs to acknowledge the seamless connection between certain aspects of radioactive waste control and nuclear weapons proliferation. It should therefore support changes in the International Atomic Energy Agency to separate its regulatory safety and safeguards functions from its nuclear promotion activities. Finally, the government should seek to bridge the gap between current policies and the public's understanding and support for those policies. A major challenge is whether technical concerns about the security of radioactive wastes and related nuclear operations are compatible with open and democratic decisionmaking processes.

Nongovernmental Actors

As Agenda 21 and the Rio Declaration recognize, an informed and active civil society plays an integral role in realizing sustainable development. A democratic society can only accomplish the far-reaching individual and organizational changes required for sustainable development by making readily available the information that citizens need to make their own choices and by involving citizens in making societal choices. More generally, sustainable development is not simply the responsibility of governments. Every

part of civil society has a role to play, not just in influencing government decisions, but also in the activities it conducts on a daily basis. Public access to information and governmental decisionmaking processes is one key aspect of this issue. Another is the role played by business and industry. A third is the extent to which sustainable development is understood in ethical or religious terms.

Public Access to Information, Participation, and Justice

In 1992, the United States already had in place basic laws and practices to promote transparency, participation, and accountability. These include the Freedom of Information Act (FOIA), the Administrative Procedure Act, the Government in the Sunshine Act, and access provisions in most environmental laws. During the past decade, FOIA was amended to include electronic as well as written material. Executive Orders began to build a structure to incorporate the goals of the environmental justice movement into the federal government, and bring some new voices into decisionmaking.

Yet overall change in the past decade was not measured primarily by new laws, but rather by practical changes in access to information. The 1990s brought a dramatic growth in access to information through the Internet. Research on indicators to track sustainable development flourished. As an alternative to litigation, collaborative decisionmaking processes became more common, bringing more perspectives, information, and ideas for finding solutions to the table. Environmental Defense, an environmental advocacy organization, developed a web-based scorecard that allows residents to find emissions from factories or power plants in their community.

Even as new technology greatly increased the public's ability to share and use data, though, public reporting and analysis of information and participation in decisions stalled or lost ground in some respects. It proved difficult to develop a more unified and integrated information system that would give citizens easier access to government information. Such efforts often faced bitter political divisions and an entrenched legacy of fragmented information systems and structures developed around separate laws and programs of an earlier era. In a period of declining civic engagement, much of the country's innovative energy and investment went into technical developments rather than improving governance structures and norms, despite efforts to reinvent government to serve citizens. Judicial action made it more difficult to utilize established citizen suit provisions. Internationally, the United States sometimes took the lead but often stood on the sidelines on access issues.

The United States has not taken the basic step of adopting—let alone using—a set of indicators and institutionalizing a process to involve the public in decisions aimed at sustainable development. A new Administration refused to make public the list of companies consulted in developing its energy plan, constrained access to presidential records, and adopted a narrower interpretation and application of FOIA.

The assumptions for expanding access were abruptly reframed following September 11 as the country struggled to address the potential use of information by terrorists. After the first, hurried decisions to remove some information from the Internet, the debate has begun to be reframed in terms of identifying specific types of data for which the danger of generalized public availability outweighs the public's interest in access. Yet this framing also recognizes that public access is, itself, a way to reduce risk by providing information that spurs public awareness and action.

In this changed setting, the United States can take seven steps to put information and participation at the center of action to achieve sustainability, both at home and internationally. The United States should develop, adopt, and make regularly available to the public indicators of sustainable development. The United States should also develop environmental indicators and use them in preparing and publishing an annual state of the environment report. More broadly, the United States needs to adopt a set of principles that reflect the significant role of information in good governance and in enabling the public to play its role in sustainable development. The United States should also make significant investments in developing websites

and web-based tools to tailor information to the needs of individuals and organizations. In addition, the United States should establish a national forum to engage citizens and NGOs on sustainable development. The government should find ways to strengthen public access to justice, reversing the past decade's general trend toward restricted public access to the courts. Finally, the United States should play a lead international role in promoting transparency, public participation, and accountability. To do so, the United States should, among other things, ratify the Aarhus Convention on Access to Information, Public Participation in Decisionmaking and Access to Justice in Environmental Matters.

Business and Industry

Sustainable development can only be accomplished with the support of business and, as some firms are beginning to discover, there are profits to be made from sustainability. Agenda 21 charted a course of action for business and industry in five main areas: (1) global corporate environmental management; (2) environmentally sound production and consumption patterns; (3) risk and hazard mitigation; (4) full cost accounting; and (5) international environmental support activities. For its part, American business has tended to ignore sustainable development since Rio. Of the firms that have engaged the concept, most have concentrated exclusively on its environmental dimension. That is not to say there has not been meaningful advancement since Rio, particularly in business' ability to manage the environmental aspects of operations, goods, and services. In addition, some American companies are among those pioneers working on the sustainability frontier. But the journey is in its early stages, and the U.S. business community is by and large still formulating a case for, and a plan of action on, sustainable development.

Over the last several years, many large and medium-sized firms, and to a lesser extent even smaller enterprises, have been continuously improving techniques to promote compliance with environmental laws. More recently, and particularly in the last five years, leading firms have begun to focus on nonregulated aspects of operations, and are experimenting with new methods to reduce their environmental footprint, increase competitiveness, and capitalize on opportunities created by next-generation policy initiatives that work with the grain of the market. Some of these firms can point to significant progress toward sustainability, especially in areas such as eco-efficiency, environmental management systems, communications with stakeholders, and transparency. Changing internal and external perceptions of social equity, the prospect of cost reductions and market share growth through innovation, increased shareholder value, positive brand recognition, and a variety of other factors are gradually but perceptibly prompting business to adopt strategies founded on sustainability principles. Only a limited number of companies have endeavored to incorporate sustainable development into operations and strategy, however, and some of these firms have been much more active than others.

Building on insights gained in dealing with globalization, and guided by a sharper perspective of national security and the benefits of multilateral action in the wake of the terrorist attacks of September 11, government and private enterprise need to come together to forge a tighter alliance on all three dimensions of sustainable development: the social, the economic, and the environmental. To make further progress, government, business, and other interested stakeholders should consider the following framework. First, business needs to operationalize the concept of sustainable development in practical business terms. Second, the Administration, together with leaders from business and environmental organizations, needs to build a stronger constituency for sustainable development in the business community and Congress. Third, the Administration and business both need to gain a better understanding of the interdependent relationship between globalization and sustainable development. Fourth, Congress, the executive branch, and the business community need to work together to promote and facilitate good governance through national implementation and international cooperation.

Fifth, business, working with government, financiers, investors, insurers, consumers, NGOs, and the public needs to develop sustainability indicators, data, and communication techniques that will enable informed

distinctions among companies, goods, and services. Sixth, business, working with NGOs, supply chains, and other stakeholders, needs to significantly expand the web of existing partnerships and strategic alliances in order to promote new and better techniques and tools, and to spread best practices more widely. Seventh, lawmakers and policy decisionmakers (at the federal, state, and local levels) need to work with leaders from business, NGOs, the bar, and the community to achieve consensus on a satisfactory blend of policy instruments to foster sustainable business practices. Eighth, changes in the nature of management education are needed so that graduates emerge from business schools with the ability to incorporate sustainable development and considerations of corporate social responsibility as elements of competitive strategy.

Sustainability as a Religious and Ethical Concern

The United States should support, and the U.N. General Assembly should endorse, the Earth Charter. The Earth Charter, which was completed in 2000 after a five-year process that involved extensive consultations and outreach, articulates the inspirational vision, basic values, and essential principles needed for a global ethic to support sustainable development. The Earth Charter contains 16 principles and 61 supporting principles, and has broad resonance among the world's major religions and ethical systems. Its main purpose is to establish a sound ethical foundation for the emerging global society, and to help build a sustainable world based on respect for nature, universal human rights, economic justice, and a democratic culture of peace. The Earth Charter is intended to help people of all ages in every walk of life to better understand the spirit and implement the substance of truly sustainable development. Besides showing what sustainable living is all about, it offers a coherent, integrated standard for evaluating possible responses to particular issues. And, as one of its drafters stated, the Earth Charter is intended "to give the emerging global consciousness the spiritual depth—the soul—needed to build a just and peaceful world community and to protect the integrity of Earth's ecological systems."

Endorsement of the Earth Charter by the U.N. General Assembly would not, of course, make it legally binding. But it would signal recognition by the world's leaders that sustainable development has a compelling ethical and religious foundation. That, in turn, could have a powerful and positive effect on efforts to move toward sustainable development, including efforts in the United States.

Education

Aside from the word "government," "education" appears more often than any other term in Agenda 21. Education underlies and has the potential to reinforce every other priority. Education also provides future voters and decisionmakers with the intellectual tools needed to achieve a sustainable society. Government can help educate people by providing information and ideas. But our educational institutions for kindergarten through twelfth grade, as well as our institutions for higher education, also have a crucial role to play.

Kindergarten Through Twelfth Grade

Education for sustainability at the primary, middle school, and high school level builds on environmental education by helping students understand and address the relationship between natural systems and the effect of human social and economic activities on those systems. Agenda 21 seeks to reform educational systems and practices accordingly. Happily, U.S. resources—tangible and intangible, financial and human—could be instrumental in solving these problems. Kindergarten through twelfth grade (K-12) education is a major shaper of the truths, attitudes, ethics, concepts, and behaviors of American society. By reshaping K-12 education in the United States so that it systematically and effectively fosters sustainability, we will be able to make greater progress toward the achievement of a sustainable world.

Groundwork has been laid in the 10 years since Rio for sustainability education. Some recent changes in educational practices, e.g., service learning, a focus on literacies and skills, standards that support interdis-

ciplinary understanding and complex thinking, and growing recognition of the importance of systems thinking, help to prepare our youth to understand and implement sustainable development. Several organizations, and a network for those organizations, now exist that attempt to define and develop skills and dispositions in youth that will enable them to create a more sustainable world as future workers and citizens.

In the past decade, an understanding of what sustainability education should mean has also been developed in the United States. A broad consensus can be seen among the goals of sustainability education theoreticians and practitioners on some key student outcomes and some essential knowledge, skills, and dispositions. These include ecological literacy, including human-environment relationships; system dynamics and "systems thinking"; the ability to truly value and learn from others; an understanding of the importance of place; sustainable economics; citizenship; and creativity and visioning. Each of these is being taught, to some degree, in some classrooms.

Overall, however, education for sustainability has only a toe-hold in mainstream K-12 education in the United States. The United States has not adopted sustainability education as a clearly stated, broadly applied, national goal. Very few K-12 educators in the United States have ever heard of sustainability education; few educators have worked explicitly to implement education for sustainability in their classrooms. While our educational system works to develop many of the discrete skills that future problem solvers will need to diagnose and solve our global problems, as a nation we lack the systematic understanding that explains these complex threats to sustainability. Our educational system, moreover, is often inappropriately focused on basic literacy and easily testable knowledge, which does not adequately prepare future voters and decisionmakers to understand current problems and to craft solutions for them. We do not prepare teachers to create experiences for students that help them engage with the rich, complex, interdisciplinary world in which they live. We do not fund the infrastructure needed to support a sustained and nationwide implementation of an educational program for sustainability. Only a single state, Vermont, has educational standards that explicitly address sustainability. Even environmental education, an important and well-established component of sustainability education, is increasingly eclipsed in importance and increasingly slighted in funding.

To make significant progress on sustainability education, schools of education need to ensure that teachers understand sustainability, and can apply this knowledge and skill in the work they do with students. State education organizations should approve standards for sustainability education. Statewide assessments of student learning should be modified to reflect this goal. These efforts should also connect students with work being done in the community to foster sustainability. While some first-rate work has been done to create and distribute curriculum units, much remains to be done. Of course, public and private funding is needed to support this effort. A change in the knowledge and skills that colleges and universities expect from entering students could also help move K-12 education for sustainability forward.

Higher Education

Higher education for sustainability is like environmental education because it draws on an environmental foundation. But it is different from much environmental education because it includes the social and economic dimensions of sustainability, and is designed to help students think about problems in an integrated manner. Since higher education to date largely fails to expose students to issues and considerations outside the narrow confines of their disciplines, it consequently fails to produce integrated decisionmakers. Higher education for sustainable development primarily involves teaching students to understand ecological, social, and economic problems through the many lenses of an interdisciplinary framework. It assumes that integrated decisionmaking is not possible without integrated thinking. Effective and rigorous teaching of integrated thinking—without becoming soft and watering down the disciplines—is both a powerful intellectual challenge and a profound necessity.

A genuine commitment to creating a sustainable future would be evidenced in most of the following seven critical dimensions of institutional life. These are based on Agenda 21 and various national and international conferences. Disciplinary, professional, liberal arts, and general education requirements at the university would involve interdisciplinary decisionmaking and reflect a fundamental concern for sustainability. Research at the institution would focus significantly on sustainable development. Faculty and staff development rewards would cultivate an understanding of, and contributions to, sustainable development. Campus operations would be oriented toward reducing the institution's "ecological footprint." Student opportunities and engagement on campus would reflect a deep commitment to sustainability through new student orientation, scholarships, internships, and job placement counseling. The institution's outreach and service would support local, regional, and global partnerships to enhance sustainability. The university's mission, structure, and planning would communicate and promote sustainability.

Since the Earth Summit, however, education for sustainable development in the United States has been underfunded and undersupported, both within and outside the academy. Tensions have arisen between environmental educators and sustainability educators, and no consensus has been reached on who or what institutions should guide higher education for sustainability. The U.S. government has shown little interest in pursuing this agenda. For the most part, pressure on universities and colleges to begin to embrace the challenge of sustainable development has originated from within. At a small minority of institutions, highly motivated and committed presidents, faculty members, staff members, and students have effected change in significant ways. At a larger minority, there is evidence of increased eco-efficiency in operations or new offerings in environmental studies. Colleges and universities in America are increasingly adopting sustainability initiatives in one or more of these seven critical dimensions of institutional life. But an authentic institutional commitment to sustainable development is rare.

A deeper commitment to sustainable development in higher education requires three broad changes. First, higher education must commit itself to steady reform in teaching, research, faculty and staff hiring and development, operations, student opportunities, outreach, and mission and structure. Second, sustainability must become a priority of the specialized academic organizations, disciplines, and professions that influence universities. Third, external stakeholders, including opinion leaders, alumni, employers and funders, should pressure federal and state governments to move the education and research agenda of higher education toward a greater focus on sustainability. Since the federal government provides more than 90% of the funding for academic research, it influences deeply the priorities for research and helps shape academic fields.

Institutions and Infrastructure

In a sustainable society, effective governmental and nongovernmental institutions deliver essential services to people on an equitable basis. The built infrastructure for necessary public services in a sustainable society should also be durable, available and affordable to all, and environmentally protective or restorative. Two key examples are transportation and medical and public health services.

Transportation

The traditional approach to transportation planning in the United States has been to maximize roadway capacity, travel speed, and mobility, generally within the context of large subsidies to motorized transportation. A sustainable transportation system, by contrast, seeks to maximize efficiency in overall resource use. In Agenda 21's words, it is "more efficient, less polluting and safer." Its basic components include increasing modal diversity, with more emphasis on public transit, walking, and bicycling; paying more attention to the pattern of transportation and land use; encouraging use of efficient transportation modes whenever practical; charging users the true costs of transportation; and encouraging better connectivity between modes.

American transportation policy has become increasingly cognizant of these patterns. Just as Agenda 21 was being adopted, the United States was entering the beginning stage of a fundamental change in federal transportation policy. While the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 authorized substantial federal funding for highway expansion, its name suggested the beginning of a new direction—a greater emphasis on all modes of travel, not just highways, and an emphasis on environmental and economic efficiency. In general, ISTEA eschewed substantive regulatory requirements in favor of procedural ones intended to assure the consideration of nationally important goals, along with appropriate funding mechanisms to enable regions and states to put efficiency strategies into effect. The cornerstone of this approach was (and remains) a planning process established for metropolitan areas and states that is intended to "minimize transportation-related fuel consumption and air pollution." The Transportation Equity Act for the 21st Century (TEA-21), adopted in 1998, reauthorized the 1991 law with only minor changes to these key provisions.

Despite some positive trends in the past decade, however, the environmental impacts of transportation generally increased. From 1995 through 2000, transit use grew 21% while driving increased by just 11%. The growth rate in vehicle miles traveled per capita slowed somewhat from what it had been in the 1980s. On the other hand, a number of trends all point to increased inefficiency in travel patterns. The number of vehicle miles traveled grew from 2 to 2.6 trillion miles between 1990 and 1998. Other negative trends include an increase in average trip length, growth in the number of vehicle trips taken per person and per household per year, and a decline in average vehicle occupancy. Transportation is by far the largest consumer of petroleum products in the United States, accounting for some two-thirds of our oil consumption. Transportation is also responsible for rising CO_2 emissions and continuing unhealthy air quality. In some communities, parking lots now constitute the largest single category of land use. Increased driving also means increased congestion; Americans now spend roughly one of every eight waking hours in cars.

The United States is moving toward sustainability in transportation in some respects; there have been measurable improvements in process, in mode shifts, and even in some environmental indicators. But with long-term trends foretelling a dramatically growing population and a growing economy, mere motion toward the goal is not enough, because the goal is itself moving farther and farther away, and becoming more difficult to achieve.

To move the United States to an effective course for sustainability in transportation, Congress and the federal agencies must build upon the policy reforms of the 1990s through a suite of measures. The first step is to recognize clearly that travel choices available to most Americans have been sharply curtailed by past policies, from high subsidies to housing to tax polices and zoning laws, that have made it unattractive or impossible to choose more sustainable options such as walking, cycling, riding transit, living close to our jobs, and driving smaller, more efficient motor vehicles. Another step is to establish and work toward specific transportation goals, such as increased energy efficiency, equal access to jobs, and a safe walking route to school for each child. The United States should also adopt policy measures that would reduce demand for motorized transportation; encourage the use of alternative transportation modes; and reduce the environmental, social, and economic costs of transportation.

Medical and Public Health Services

The U.S. health system works very well, compared to the developing world. But the comparison to the remainder of the developed world, especially to the wealthier European countries, is not as favorable. The health provisions of Agenda 21 focus not only on environmental pollution but also on basic medical care, preventive medicine, and improving mental as well as physical health. Equality in access to basic goods and services is part of sustainable development, both as an issue of fairness and because sustained inequalities impede development and destabilize society. Thus, basic medical and public health services are critical to a more just and economically sound nation.

While no bright line separates public health services from personal medical services, medical services are those that treat diseases and injuries in the individual. Public health is concerned with the community. Public health services are not a substitute for personal medical services, but they can prevent the need for medical services, and they are less expensive and more widely available than medical services.

The U.S. sanitation system works well, with outbreaks of water and foodborne illnesses happening infrequently enough to be front page news. Yet the public health system has suffered from decades of neglect, a lack of national standards, fragmentation of staffing and resources among thousands of legal jurisdictions, and a general lack of public support and funding. As a result, the system is vulnerable to breakdowns and has a limited ability to cope with new threats, including terrorism and climate change.

The level of communicable diseases in the United States, especially human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), is high for a developed country, and affects sustainable development. Communicable diseases are transmitted by people to other people, and are thus different from sanitation or environmental diseases. The poor suffer disproportionately from such diseases, both because access to medical care services is limited for the poor, and because environmental factors increase the spread of communicable diseases among the poor. Ironically, past success in eradicating smallpox and polio, and in dramatically reducing measles and tuberculosis, has undermined public support for communicable disease control spending and programs.

Over the last 10 years, there has been no progress in improving access to medical care in the United States. Indeed, there are some indications that the quality of available care has diminished due to economic pressures. The United States does not guarantee universal access to medical care. Instead, it relies on a combination of voluntary, employer-paid health insurance, government entitlement through Medicare for the elderly, and a limited program for indigent persons not covered by employer-paid health insurance. Approximately 40 million persons are not covered by any of these plans, and many persons with some coverage still do not have adequate access to medical care. Congress has been unwilling to assume the burden of universal access or of increasing employer mandates, and the states do not have the economic resources to bridge the gap. This results in a less healthy workforce and distorts economic development because it disproportionately harms low wage earners.

To move closer to sustainability, the United States should retain local enforcement for public health, but provide standards, funding, and oversight at the federal level. There should be a national civil service system for public health professionals, especially those who manage health departments. The United States also needs to fund proper postmortem examination procedures to diagnose every death from a communicable disease. In addition, the United States should set standards on antibiotic usage to identify patterns of disease spread and to limit the development of antibiotic-resistant organisms. Universal health insurance would improve individual health and the health of the population, which would be good for development and might reduce projected incremental costs as preventive services improve. If the United States is not prepared to do that, it should at least make routine care and preventive services universally available. This would include providing education and support to improve health habits, such as better nutrition, exercise, and the cessation of dangerous habits such as smoking. By doing so, the United States would improve health and productivity, serve distributive justice, and bring the country closer to sustainability for basic medical services.

Governance

The national government, as well as state and local governments, needs to play an important role in sustainable development. Perhaps the most important thing they can do, Agenda 21 says, is integrate their decisionmaking on environmental, social, economic, and security issues. National governments are also urged to delegate "responsibilities to the lowest level of public authority consistent with effective action." In

the past 10 years, no level of government in the United States has provided strong support for sustainable development. State and local efforts, though, have been more widespread and effective than national ones.

Local Governance

Integrated decisionmaking should, at least in principle, be easier at the local level, because the connections between economic, social, and environmental issues are easier to understand and most of the relevant stakeholders live or work nearby. Agenda 21 calls on localities to consult with key stakeholders to arrive at a consensus on local strategies for sustainable development, and states that by 1996 most local authorities in each country should have developed "a local Agenda 21" for their community. However, Agenda 21 does not generally address the reality of multiple municipalities within a specific metropolitan region. Fragmented decisionmaking among municipalities in the same region causes sprawling growth patterns that increase traffic, cause air and water pollution, increase water consumption, and destroy wetlands. Communities and regions across the country also continue to be largely divided along economic and racial lines, both physically and socially.

National policies to foster community sustainability did not change significantly in the past decade. Significant progress was made in promoting the redevelopment of brownfields and providing alternatives to highway transportation, but many federal laws continue to be obstacles to local sustainability. The federal mortgage interest deduction, for instance, favors wealthier home buyers over those who are less wealthy, renters, multifamily property owners, and people who rehabilitate existing structures.

Many states enacted "smart growth" laws to control some of the environmental effects of sprawl. But all too often, these laws leave untouched a framework of state laws that encourage the creation of largely autonomous municipalities, and require that these municipalities raise revenue by property taxes to support services within their boundaries. Such laws encourage municipalities to compete for property wealth and exclude less expensive housing, a tactic that fosters sprawl and impedes intermunicipal cooperation. The lack of laws requiring coordination in housing, education, regional revenue sharing, and land use remains a major obstacle to local sustainable development efforts.

At the local level, a few communities adopted "local Agenda 21s" through broad participation, but municipalities in the United States are beginning to show great creativity and innovation on local sustainability. Municipal sustainable development efforts—in locations such as Burlington, Chicago, and Santa Monica—were encouraged by the PCSD. Those municipalities and others employed techniques such as inclusionary zoning, providing incentives to developers to use existing sewer and water infrastructure, and reducing water usage. But most municipalities have a long way to go. For example, although mixed use zoning promotes walkable, pedestrian-friendly neighborhoods, most municipalities still require single use zoning.

Achieving local sustainability will require more than local efforts. Congress and the federal government should use conditional funding mechanisms to provide incentives for municipalities to cooperate and grow smartly. The federal mortgage interest deduction should be changed so that it does not encourage single-family housing. States need to move toward a system that better promotes regional governance and shares taxes within a region. States should also create regional planning commissions and empower them to use various regulatory and fiscal incentives and disincentives to encourage cooperation among municipalities and channel growth in particular ways. States, in addition, should modify their zoning laws to encourage more mixed-use zoning. Municipalities should charge, and be empowered to charge, fees requiring developers to pay the full cost of new services and infrastructure. As municipalities move toward a regional approach, each municipality in a region should also accept its "fair share" of affordable housing units. And at all levels, more must be done to provide incentives for the establishment of public/private partnerships and broad-based consensus-building efforts.

State Governance

The goals of sustainable development—simultaneously achieving economic, social, environmental, and security goals while maintaining the ability of future generations to attain such goals—are the goals of state governments. Except for the national security element of the security goal, states have great responsibility for achieving those goals in the United States. The decentralized decisionmaking recommended by the Rio Declaration and Agenda 21 is also consistent with the constitutional structure of U.S. governance, which gives substantial authority to states.

Before the Earth Summit, many states promoted integrated decisionmaking through laws requiring environmental impact statements for major projects, constitutional provisions concerning the environment, planning laws, and statutes encouraging pollution prevention. They did not necessarily result in the type of integrated decisionmaking envisioned by the Rio Declaration and Agenda 21, but they did substantially increase the level of consideration of environmental issues in economic development decisions. Many state constitutional provisions and statutes also contained aspirational language concerning intergenerational equity. Federal pollution control statutes adopted in the 1970s and 1980s used a federal-state partnership model that strongly encouraged states to improve their environmental programs and allowed them to continue exercising authority in areas where there is no federal regulation.

Since the Earth Summit, a number of states have made substantial progress in creating and implementing policies aimed at achieving sustainable development. As a group, states are fulfilling their role as laboratories for experimenting with programs and are, to an extent, leading policy development in the United States. Minnesota, New Jersey, and Oregon have established or expanded planning, decisionmaking, and goal-setting efforts for sustainable development. Maryland enacted a series of programs intended to reform land development practices by encouraging development in existing centers and discouraging development of greenfields. Many states have undertaken supportive policy-specific initiatives that are consistent with sustainable development, including laws and policies to foster smart growth, recycling, energy efficiency, renewable energy, watershed protection, pollution prevention, and redevelopment of brownfields. A report by the Resource Renewal Institute evaluating the "shifting emphasis toward sustainability" in all 50 states, however, shows a substantial gap between the leading and lagging states.

Devolution, or transferring power to states to deal with environmental issues, also dominated discussions of environmental law in the 1990s. The National Environmental Performance Partnership System (NEPPS) was established in 1995 to provide states the opportunity to negotiate greater flexibility within the context of existing federal pollution control laws.

Maryland, Minnesota, New Jersey, and Oregon have also established indicators to track progress toward sustainability. Minnesota's Progress Indicator suggests that the state's gross domestic product may overstate that state's actual progress toward environmental, economic, and social goals. In 2000, the state reported that, according to the Progress Indicator, the state's performance peaked in the mid-1980s, and had declined to a point where by 1995 the levels were similar to the indicator's values for the early 1960s.

In the next 5 to 10 years, states need to make sustainable development an explicit goal. More states need to follow the examples set by leading jurisdictions and adopt and implement strategies and policies promoting sustainable development and holding themselves accountable (through the use of indicators) for achieving sustainability. Governors must ensure adequate and effective interagency cooperation by designating a cabinet-level person who will be responsible for fostering sustainable development, including sustainable land development. States should also make greater use of environmental impact assessment, particularly to bring intergenerational equity into their development and policy decisions. Finally, states should work with EPA and other federal agencies to use NEPPS to improve federal-state environmental governance for achieving goals, and for monitoring and reporting progress.

National Governance

In a world of sovereign nations, sustainable development cannot be achieved unless it is actively supported by national governments. In a basic sense, the requirements for good governance for sustainable development are the same as those for good governance in general. These include effective governmental institutions, national laws, a favorable investment climate, public access to information, public participation in governmental decisionmaking, and access to justice. But sustainable development requires more than that. Most basically, it requires that national governments integrate the environment into national decisionmaking in broader and deeper ways over time. Agenda 21 recommends that they do so through national strategies. At the five-year review of Earth Summit commitments in 1997, nations agreed to have such strategies in place by 2002. National strategies would guide governmental decisionmaking on a range on issues, include priorities and timetables, change in response to changing conditions, and harness the energy and creativity of nongovernmental actors, including the private sector.

The United States has no such strategy. Sustainable development is not actively supported by the president or congressional leaders. There is no strategic thinking or action on behalf of the federal government. There is no governmental coordinating or implementing mechanism for a national strategy, and little public education.

The PCSD (1993-1999), an advisory council established by President Clinton, might have provided (and, if resurrected, could still provide) the basis for a national strategy. The PCSD brought together diverse stakeholders from around the country and fashioned a detailed set of recommendations for sustainable development in the United States. But it had no authority to implement its own recommendations, and neither President Clinton nor Vice President Al Gore showed interest in seeking implementation. Nor was there much interest in Congress during the same period.

The Council on Environmental Quality (CEQ), which until 1995 was required to issue national reports on the state of the nation's environment, has not issued such reviews on a regular basis for years. On the other hand, a 1993 statute, the Government Performance and Results Act (GPRA), requires federal agencies to engage in a strategic planning process, and some agencies have used sustainable development to guide that process.

The United States should adopt and implement a national strategy for sustainable development. It should include meaningful goals, indicators of progress toward those goals, legal and institutional mechanisms for achieving them, and public education. The strategy should be built on existing laws and legal authority, and thus should ensure wider use of the GPRA to move agency planning toward sustainable development. It should prioritize those issues that are of greatest importance. Some executive level entity, perhaps the CEQ, should be responsible for coordinating its development and implementation. But CEQ's now-extinguished annual reporting function should be transferred to an independent and properly funded entity, either in or out of the federal government. That would help ensure that a long-term perspective is brought to bear in national decisionmaking—one of the most important prerequisites for sustainable development.

The international community would add significant value to the national sustainable development strategy process if countries were to agree that implementation of national sustainable development strategies should begin no later than 2005. It would also help if countries would agree that national trends for the degradation and loss of natural resources should be reversed by 2015. Such goals would give more specific content to the national strategy process, and would also incorporate a specific and easily understood goal into the meaning of sustainable development. This goal would help focus national and international efforts, and would help galvanize citizens, NGOs, and corporations in countries around the world.

Looking Ahead

A defining characteristic of a sustainable society is that it can successfully adapt to new and different conditions. We have grown and prospered as a nation because we have been able to take advantage of opportunities and respond to threats that our founders could not have imagined. The challenges of growing global environmental degradation, and the growing gap between rich and poor are quite obvious. But the opportunity is equally real—to build an ecologically sustainable framework that provides greater freedom, opportunity, and quality of life for all. Law and policies are not the only means of achieving a sustainable society, but they will play an important role.

The essential missing ingredient thus far, and which needs to be supplied in the coming decade, is commitment—commitment by government at all levels, educational institutions, business and industry, NGOs, and individuals. We know what we need to do, and we also know why. As Americans, we are called to face these challenges, and to seize this opportunity.