

Rich Planet, Poor Planet

Christopher Flavin

A visit to Brazil's tropical state of Bahia provides contrasting views of the state of the world at the dawn of the new millennium. Bahia's capital, Salvador, has a population of over 3 million and a thoroughly modern veneer. Its downtown is full of large office buildings and busy construction cranes, and its highways are crammed with sport utility vehicles. The state is also rich in natural resources: the wealth provided by gold and sugarcane made Salvador the obvious location for colonial Brazil's leading port and capital for two centuries.¹

Once a backwater—slavery was not outlawed until the end of the nineteenth century, one of the last regions to ban this practice—Bahia's economy is now booming. The state has a prospering manufacturing sector and has become popular with many leading multinationals, including automobile companies that have put some of their most advanced factories there. The informa-

tion economy is in a particularly competitive frenzy. Brazilian Internet service providers are connecting customers for free, and cell phones appear to be almost as common as they are in many European cities.

Scratch the surface, however, and another Bahia is still there. The large favelas that ring Salvador's outskirts are crowded with thousands of poor people who lack more than cell phones and computers: toilets, running water, and schoolbooks are among the basic services and products that are unavailable to many of Bahia's poor. Similar gaps can be seen in the low hills that run south of Salvador along Bahia's rugged coast: the collapse of many of the country's rich cacao farms due to a devastating pathogen called witches'-broom and a sharp decline in world chocolate prices have left thousands of farm workers jobless and unable to provide for their families.

Bahia's environmental condition is just as uneven. Considered by ecologists to be one of the world's biological "hot spots," the Atlantic Rain Forest covers more than

Units of measure throughout this book are metric unless common usage dictates otherwise.

RICH PLANET, POOR PLANET

2,000 kilometers of Brazil's subtropical coast. In 1993, biologists working in an area south of Salvador identified a world record 450 tree species in a single hectare. (A hectare of forest in the northeastern United States typically contains 10 species.) In the last decade, Bahia's political and business leaders have come to recognize the extraordinary richness of their biological heritage—wildlands are being protected, ecological research facilities are being set up, and ecotourist resorts are mushrooming. A sign at the airport even warns travelers that removing endemic species from the country is a felony.²

And yet, signs of destruction are everywhere: cattle ranches sprawl where the world's richest forests once stood; 93 percent of the Atlantic forest is already gone, and much of the remainder is fragmented into tiny plots. Pressure on these last bits of forest is enormous—both from powerful landowners and corporations eager to sell forest and agricultural products in the global marketplace, and from poor families desperately seeking a living.³

This picture of Bahia in the year 2000 is replicated at scores of locations around the globe. It is the picture of a world undergoing extraordinarily rapid change amid huge and widening disparities. Unprecedented economic prosperity, the emergence of democratic institutions in many countries, and the near instantaneous flow of information and ideas throughout a newly interconnected world allow us to address challenges that have been neglected for decades: meeting the material needs of all 6 billion members of the human race, and restoring a sustainable balance between humanity and Earth's ecological systems.

This moment is historic, perhaps even evolutionary, in character. Tragically, it is not being seized. Despite a surge in eco-

economic growth in recent years and significant gains in health and education levels in many developing nations, the number of people who survive on less than \$1 of income per day—the poverty threshold used by the World Bank—was 1.2 billion in 1998, almost unchanged since 1990. In some parts of the world, including sub-Saharan Africa, South Asia, and the former Soviet Union, the number living in poverty is substantially higher than the figures recorded a decade ago.⁴

The struggle to restore the planet's ecological health presents a similar picture: a number of small battles have been won, but the war itself is still being lost. Double-digit rates of growth in renewable energy markets, plus a two-year decline in global carbon emissions, for example, have failed to slow the rate of global climate change. Indeed, recent evidence, from the rapid melting of glaciers and the declining health of heat-sensitive coral reefs, suggests that climate change is accelerating. The same pattern can be seen in the increased commitment to protection of wild areas and biological diversity: new laws are being passed, consumers are demanding eco-friendly wood products, and eco-tourist resorts are sprouting almost as quickly as dot-com companies. But foresters and biologists report that this host of encouraging developments has not reversed the massive loss of forests or the greatest extinction crisis the world has seen in 65 million years.⁵

Long considered distinct issues, consigned to separate government agencies, ecological and social problems are in fact tightly interconnected and mutually reinforcing. The burden of dirty air and water and of decimated natural resources invariably falls on the disadvantaged. And the poor, in turn, are often compelled to tear down the last nearby tree or pollute

the local stream in order to survive. Solving one problem without addressing the other is simply not feasible. In fact, poverty and environmental decline are both embedded deeply in today's economic systems. Neither is a peripheral problem that can be considered in isolation. What is needed is what Eduardo Athayde, General Director of Bahia's Atlantic Forest Open University, calls "econology," a synthesis of ecology, sociology, and economics that can be used as the basis for creating an economy that is both socially and ecologically sustainable—the central challenge facing humanity as the new millennium begins.⁶

The challenge is made larger by the fact that it must be met simultaneously at national and global levels, requiring not only cooperation but partnership between North and South. Responsibility for the current health of the planet and its human inhabitants is shared unequally between rich and poor countries, but if these problems are to be resolved, the two groups of nations will need to bring their respective strengths and capabilities to bear. This will require a new form of globalization—one that goes beyond trade links and capital flows to strengthened political and social ties between governments and civil society.

A select group of large industrial and developing countries—a collection that can be called the E-9, given that they are key environmental as well as economic players—could have a central role in closing the North-South gap. Together, this group of countries accounts for 57 percent of the world's population and 80 percent of total economic output. (See Table 1-1.) This chapter uses data on these nine diverse countries and areas to illuminate key economic, social, and ecological trends. But this grouping has more than just analytical value. As argued at the end of the chapter,

Table 1-1. The E-9: A Population and Economic Profile

Country or Grouping	Population, 2000 (million)	Gross National Product, 1998 (billion dollars)
China	1,265	924
India	1,002	427
European Union ¹	375	8,312
United States	276	7,903
Indonesia	212	131
Brazil	170	768
Russia	145	332
Japan	127	4,089
South Africa	43	137

¹Data for European Union do not include Luxembourg.

SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 10-12; Population Reference Bureau, "2000 World Population Data Sheet," wall chart (Washington, DC: June 2000).

E-9 cooperation could be a key to achieving accelerated economic and environmental progress in the new century.⁷

A Tale of Two Worlds

Halfway through the year 2000, two stories from the Philippines made headlines around the world. In June, a computer virus dubbed the "love bug" appeared almost simultaneously on every continent, crashing the computer systems of scores of multinational corporations and government offices, ranging from the U.S. Pentagon to the British Parliament. The estimated total cost of the resulting disruptions: \$10 billion. Computer security experts and FBI agents quickly traced the diabolical love bug to a small Manila technical college and a 24-year-old student named Onel de Guzman. For computer experts, this may have

RICH PLANET, POOR PLANET

been an indication of the vulnerability of the global Internet, but in the Philippines it quickly became a source of national pride. People took the love bug debacle as an encouraging sign that their developing nation was leapfrogging into the top ranks of the global economy's hottest sector.⁸

Economic successes and social failures are found side by side around the world in this supposed time of plenty.

Across town, a Manila neighborhood called the Promised Land was hit by a different kind of news a month later: more than 200 people were killed in a massive landslide and subsequent fire. Although this tragedy was precipitated by Typhoon Kai-Tak, it was anything but a natural disaster. The Promised Land, it turns out, is a combination garbage dump/shantytown that is home to 50,000 people, most of whom make their living by scavenging the food and materials discarded by Manila's growing middle class. When two days of heavy rain loosened the mountain of garbage, it came crashing down on hundreds of homes as well as the dump's electrical lines, starting a massive fire. Scores of Promised Land residents were buried, others were burned alive, and still more were poisoned by toxic chemicals released by the fire.⁹

Economic successes and social failures are now found side by side, not just in the Philippines, but around the world in this supposed time of plenty. The annual output of the world economy has grown from \$31 trillion in 1990 to \$42 trillion in 2000; by comparison, the total output of the world economy in 1950 was just \$6.3 trillion. And in 2000, the growth of the world economy surged to a 4.7-percent annual rate, the highest in the last decade. This increase in economic activity has allowed

billions of people to buy new refrigerators, televisions, and computers, and has created millions of jobs. Global telephone connections grew from 520 million in 1990 to 844 million in 1998 (an increase of 62 percent), and mobile phone subscribers went from 11 million to 319 million in that time (up 2,800 percent). The number of "host" computers, a measure of the Internet's expansion, grew from 376,000 in 1990 to 72,398,000 in 1999—an increase of 19,100 percent.¹⁰

The economic boom of the last decade has not been confined to the rich countries of the North. Much of the growth is occurring in the developing nations of Asia and Latin America, where economic reforms, lowered trade barriers, and a surge in foreign capital have fueled investment and consumption. Between 1990 and 1998, Brazil's economy grew 30 percent, India's expanded 60 percent, and China's mushroomed by a remarkable 130 percent. China now has the world's third largest economy (second if measured in terms of purchasing power parity), and a booming middle class who work in offices, eat fast food, watch color television, and surf the Internet. China alone now has 420 million radios, 344 million television sets, 24 million mobile phones, and 15 million computers.¹¹

Still, the global economy remains tarnished by vast disparities. (See Table 1–2.) Gross national product (GNP) per person ranges from \$32,350 in Japan to \$4,630 in Brazil, \$2,260 in Russia, and just \$440 in India. Even when measured in purchasing power terms, GNP per person among these countries varies by a factor of 10. Per capita income has increased 3 percent annually in 40 countries since 1990, but more than 80 nations have per capita incomes that are lower than they were a decade ago. Within countries, the disparities are even more

Table 1–2. Economic Trends in E–9 Nations

Country	GNP per Person, 1998	Purchasing Power per Person, 1998	Population Earning Below \$2 per Day, 1993–99 ¹	Share of Income or Consumption	
				Lowest 20 percent, 1993–98 ¹	Highest 10 percent, 1993–98 ¹
	(dollars)		(percent)		(percent)
Japan	32,350	23,592	–	10.6	21.7
United States	29,240	29,240	–	5.2	30.5
Germany ²	26,570	22,026	–	8.2	23.7
Brazil	4,630	6,460	17.4	2.5	47.6
South Africa	3,310	8,296	35.8	2.9	45.9
Russia	2,260	6,180	25.1	4.4	38.7
China	750	3,051	53.7	5.9	30.4
Indonesia	640	2,407	66.1	8.0	30.3
India	440	2,060	86.2	8.1	33.5

¹Data are from a single year within the time frame. ²Comparable data for European Union not available; Germany is most populous EU member.

SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 10–12, 62–64, 66–68.

striking. In the United States, the top 10 percent of the population has six times the income of the lowest 20 percent; in Brazil, the ratio is 19 to 1. More than 10 percent of the people living in “rich” countries are still below the poverty line, and in many, inequality has grown over the last two decades.¹²

The boom in global consumption over the past decade has been accompanied by improvements in living standards in many countries and declines in others. The U.N. Development Programme estimates that the share of the world’s population suffering from what it calls “low human development” fell from 20 percent in 1975 to 10 percent in 1997. Still, World Bank figures show that 2.8 billion people, nearly half the world’s population, survive on an income of less than \$2 per day, while a fifth of humanity, 1.2 billion people, live on less than \$1 per day. An estimated 291 million sub-Saharan Africans—46 percent of the region’s

population—now live on less than \$1 a day, while in South Asia, the figure is 522 million. This is a staggering number of people to enter the new century without the income needed to purchase basic necessities such as food, clean water, and health care.¹³

Worldwide, some 1.1 billion people are currently estimated to be malnourished. Most of these are poor people in rural areas who have insufficient land to grow the food they need, and not enough income to buy it from others. Many of these people live in countries with food surpluses, but while well-off farmers sell their products to middle-class consumers in distant nations, the proceeds have no benefit for millions of starving children. In some African countries, such as Kenya, Zambia, and Zimbabwe, as much as 40 percent of the population is malnourished.¹⁴

Roughly 1.2 billion people do not have access to clean water. In China, the portion that fall in this category is 10 percent (125

RICH PLANET, POOR PLANET

million people), in India it is 19 percent, and in South Africa, 30 percent. Toilets are even rarer in many countries: 33 percent of Brazil's population does not have one, nor does 49 percent of Indonesia's or 84 percent of India's.¹⁵

Polluted water is a major contributor to one of the largest disparities today's world faces: the health gap. Although infant mortality rates have dropped 25–50 percent in many countries in the past decade, they still stand at 43 per thousand live births in China and 70 per thousand in India. (See Table 1–3.) Much of the wide difference in this number around the world results from undernutrition and common infectious diseases that remain rampant in many poor countries. More intractable diseases such as cholera and tuberculosis are also becoming epidemic in many areas.

More alarming still is the fact that AIDS, which has been brought under control in some rich countries, is spreading rapidly in

many developing nations. The crisis is particularly acute in southern Africa, which a decade ago had relatively low rates of infection. By 2000, HIV infection rates had reached a stunning 20 percent in South Africa, 25 percent in Zimbabwe, and 36 percent in Botswana. Decades of rising life expectancy are being reversed in a matter of years, as hundreds of thousands of young adults and children succumb to the disease. Health care budgets are being overwhelmed, and education undermined by the early deaths of many teachers. It is no accident that the countries most ravaged by AIDS are those with high rates of social disruption and limited government health services. In China, poor people who sell their blood in order to make ends meet are paying a high price in the form of HIV infection from contaminated needles. Ironically, in parts of Africa, it is those who are just emerging from poverty that are being hit the hardest—devastating a generation of

Table 1–3. Health Indicators in E–9 Nations

Country	Health Expenditures	Infant Mortality		Tuberculosis	HIV Prevalence
	per Person, 1990–98 ¹	1980	1998	Incidence, 1997	Among Adults, 1997
	(dollars of purchasing power)	(per thousand live births)		(per 100,000)	(percent)
United States	4,121	8	4	7	0.76
Germany ²	2,364	12	5	15	0.08
Japan	1,757	13	7	29	0.01
South Africa	571	42	31	394	12.91
Brazil	503	70	33	78	0.63
Russia	404	22	17	106	0.05
China	142	90	43	113	0.06
India	73	115	70	187	0.82
Indonesia	38	67	51	285	0.05

¹Data are from the most recent year available. ²Comparable data for European Union not available; Germany is most populous EU member.

SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 90–92, 102–04, 106–08.

educated young workers, a cataclysm that may forestall the growth of an economically secure middle class.¹⁶

One of the key ingredients of economic progress is education, and on this front, the world is doing better than it was two decades ago. (See Table 1–4.) In India, the share of children in secondary school has risen from 41 percent to 60 percent; in China, it has gone from 63 to 70 percent; and in South Africa, from 62 to 95 percent. But even with these improvements, many countries are failing to invest adequately in their young people, who are unlikely to be able to participate in or benefit from today's most vibrant economic sectors, which demand not only basic literacy but often specialized training. Girls in particular are receiving inadequate education in many countries. Adult female illiteracy rates remain as high as 25 percent in China and 57 percent in India, levels that virtually guarantee a host of social and economic problems—and that make environmental threats more difficult to address.

Testing the Limits

When the Russian icebreaker *Yamal* reached the North Pole in July 2000, the scientists aboard were confronted with a strange sight: an expanse of open, calm water in place of the two or three meters of pack ice that is common to the region even at the height of summer. In the 91 years since Robert Peary and Matthew Henson reached the North Pole by dogsled in 1909, nothing like this had been reported. But human memory is the wrong scale on which to measure this development: scientists estimate that the last time the polar region was completely ice-free was 50 million years ago.¹⁷

The dynamic, shifting character of the Arctic ice pack suggests that the open water over the pole itself was, for now, a fleeting phenomenon. But recent scientific evidence confirms the underlying trend: Earth's frozen top is melting at an extraordinary rate. Submarine sonar measurements

Table 1–4. Education in E–9 Nations

Country	Adult Illiteracy Rate				Share of Children in Secondary School	
	1980	1998	1980	1998	1980	1997
	(percent)				(percent)	
Germany ¹	–	–	–	–	82	95
Japan	–	–	–	–	93	100
United States	–	–	–	–	94	96
Russia	2	1	1	0	98	88
Brazil	27	16	23	16	46	66
South Africa	25	16	22	15	62	95
Indonesia	40	20	21	9	42	56
China	48	25	22	9	63	70
India	74	57	45	33	41	60

¹Comparable data for European Union not available; Germany is most populous EU member.
SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 74–76, 82–84.

RICH PLANET, POOR PLANET

indicate a 40-percent decline in the average thickness of summer polar ice since the 1950s, far exceeding the rate of melting previously estimated. Based on these observations, scientists now estimate that by the middle of this century the Arctic could be ice-free in summer.¹⁸

Among the myriad signs of human-induced global climate change—fossil fuel combustion was recently estimated to have raised atmospheric concentrations of carbon dioxide to their highest levels in 20 million years—this one may be the most dramatic. In late 2000, the Intergovernmental Panel on Climate Change (IPCC), the scientific body that advises government negotiators, produced its latest report. It included the strongest consensus statement yet that societies' release of carbon dioxide and other greenhouse gases "contributed substantially to the observed warming over the last 50 years." By the end of the century, the IPCC concluded, temperatures could be 5 degrees Celsius higher than in 1990—an increase greater than the change in temperature between the last Ice Age and today.¹⁹

While the shipping industry is already beginning to view the Arctic meltdown as a potential short-term opportunity—perhaps cutting the transit distance between Europe and the Far East by as much as 5,000 kilometers—the full economic and ecological consequences would be far more extensive and hard to predict. Scientists have recently learned that Arctic ice is a key part of the "engine" that drives the powerful oceanic conveyor belt—the warm Gulf Stream—that provides northern Europe with the relatively temperate and stable climate that allowed European societies to flourish. Shutting it down could change the climate of Europe more than at any time since the last Ice Age. And because the Gulf Stream is a dominant feature in the oceanic circula-

tion system, any major change in its course would have ripple effects globally. Moreover, with less ice to reflect the sun's rays, the warming of Earth that caused the ice to melt in the first place would accelerate.²⁰

Some 10,000 kilometers south of the North Pole lies a very different environment—the world's tropical oceans and their abundant coral reefs, a biologically rich ecosystem that has been described as the rainforest of the ocean (65 percent of fish species are reef dwellers). One of the richest is the Belize Barrier Reef on the Yucatan Peninsula in the Caribbean, the site of a recent diving expedition by marine biologist Jonathan Kelsey and journalist Colin Woodard. What was intended to be an exciting exploration of the region's spectacular, multihued marine life turned out to be a disturbing disappointment: "Bright white boulders dotted the seascape in all directions, a sign of severe coral distress," Woodard reported. "A centuries-old stand of elkhorn coral as big as an elephant was now dead and smothered in a thick two-year growth of brown algae....Across the plane, the corals appeared to be dying."²¹

Around the world, from the Caribbean to the Indian Ocean and Australia's Great Barrier Reef, similar observations have been reported in the past two years. Coral polyps are temperature-sensitive, and often sicken or die when ocean surface temperatures rise even slightly. The temporary warming of ocean waters that accompanies El Niño anomalies in the Pacific is generally hard on coral reefs, but the 1998 El Niño was something different: reports of sick coral were soon being filed by marine biologists around the world, who estimated that more than one quarter of the coral reefs were sick or dying. In some areas of the Pacific, the figure is as high as 90 percent. For many small island nations, the loss in income

from fishing and tourism, as well as increased storm damage from the loss of coral reefs, may be enough to trigger the collapse of their economies.²²

Following another serious episode of coral bleaching just a decade earlier, this recent epidemic of coral disease is another strong indication that the world is warming. But it is more than that: coral reefs are sort of a marine version of the famous canary in a coalmine—vulnerable to many environmental stresses that now run rampant, including urban sewage, agricultural runoff, and the sedimentation that comes from deforestation. The recent decimation of coral reefs and the growing frequency of such events suggest that the world's ecological balance has been profoundly disturbed.

Whether it is Arctic ice, tropical corals, oceanic fisheries, or old-growth forests, the forces driving ecological destruction are varied, complex, and often dangerously syner-

gistic. Population is one factor. The nearly fourfold expansion in human numbers over the past century has drastically increased demands on natural resources. The combination of population growth and deforestation, for example, has cut the number of hectares of forest per person in half since 1960—increasing pressures on remaining forests and encouraging a rapid expansion in plantation forestry. Demand for water, energy, food, and materials have all been driven up by the unprecedented expansion in human numbers. And increasingly, it is in the world's developing countries that natural systems are declining the fastest and people face the most serious environmentally related stresses. (See Table 1–5.)²³

Population growth alone could not have tested environmental limits this severely, however. The pressures it imposes have been magnified by rising consumption levels as each individual demands more from

Table 1–5. Ecological Health of E–9 Nations

Country	Share of Land Area That is Forested, 1995 ¹	Change of Average Annual Deforestation, 1990–95	Share of Mammals Threatened, 1996	Share of Flowering Plants Threatened, 1997	Share of Land Area Nationally Protected, 1996
			(percent)		
Russia	22	0	11.5	–	3.1
Brazil	16	0.5	18.0	2.4	4.2
United States	6	–0.3	8.2	4.0	13.4
China	4	0.1	19.0	1.0	6.4
Germany ²	3	0	10.5	0.5	27.0
Indonesia	3	1	29.4	0.9	10.6
India	2	0	23.7	7.7	4.8
Japan	0.7	0.1	22.0	12.7	6.8
South Africa	0.2	0.2	13.4	9.5	5.4

¹Data may refer to earlier years. ²Comparable data for European Union not available; Germany is most populous EU member.

SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 126–28.

RICH PLANET, POOR PLANET

nature. Meat-based diets and automobile-centered transportation systems are among the highly consumptive practices first adopted by the billion or so people living in rich countries, and now proliferating quickly in many parts of the developing world. Meanwhile, government regulations and emission control technology have lagged well behind the pace of adoption in richer countries. As a consequence, the most serious air pollution is now found in cities such as Jakarta and São Paulo. (See Table 1–6.)

The combination of population growth and increased consumption is projected to cause the number of people living in water-deficit counties to jump from 505 million to over 2.4 billion in the next 25 years. In countries that already face severe water shortages, such as Egypt, India, and Iran, water scarcity is likely to require large-scale food imports. In northern China, the water table under Beijing fell 2.5 meters in 1999, bringing the total decline since 1965 to 59 meters. Similarly, surging demand for oil—particularly in North America and East

Asia—contributed in the year 2000 to the highest sustained oil prices the world has seen since the early 1980s. Beyond the proximate political reasons for higher oil prices, the underlying cause is clear: world oil production is nearing its eventual all-time peak, and producers are struggling to meet the combined demands of first-time car owners in China and those who are buying the large SUVs now found in nearly half of U.S. garages.²⁴

While the last decade's growth in affluence contributed to many environmental problems, keeping people poor is not the answer—either morally or practically. In impoverished areas around the world, the rural poor are pushed onto marginal, often hilly lands, from which they must hunt bushmeat, harvest trees, or clear land for pasture or crops in order to survive. A 2000 study on the root causes of biodiversity loss, sponsored by the World Wide Fund for Nature (WWF), concluded that together with other forces, poverty often plays a major role.²⁵

Table 1–6. Air Pollution in E–9 Nations

Country	Sulfur Dioxide, 1995	Suspended Particulates, 1995 (micrograms per cubic meter)	Nitrogen Dioxide, 1995
Germany (Frankfurt) ¹	11	36	45
Japan (Tokyo)	18	49	68
South Africa (Cape Town)	21	–	72
United States (New York)	26	–	79
India (Mumbai)	33	240	39
Brazil (São Paulo)	43	86	83
China (Shanghai)	53	246	73
Russia (Moscow)	109	100	–
Indonesia (Jakarta)	–	271	–

¹Comparable data for European Union not available; Germany is most populous EU member.
SOURCE: World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 162–64.

In the Philippines, for example, the country's rich array of coral reefs, forests, and mangroves—home to an estimated 40,000 species—are shrinking rapidly in area, while the remaining pockets lose much of their original diversity. According to the WWF study, rural poverty and the unequal distribution of land in the Philippines are among the major causes of biodiversity loss that must be remedied if the country's natural wealth is to be preserved for future generations. Similarly, a study in the southern Mexican state of Campeche found that much of the pressure on the Calakmul Biosphere Reserve is coming from the efforts of local indigenous people to meet their material needs. Meeting those needs sustainably is a key component of any effective program to reverse environmental decline.²⁶

Seizing the Moment

The last year has been marked by a roiling worldwide debate on the merits of economic globalization and how best to assure accelerated human and ecological progress in the decades ahead. Virtually every important meeting of international financial institutions has been met by thousands of protesters seeking to influence or shut down the discussions. While the demonstrations have been colorful, the endless argument over whether market liberalization and globalization are good or bad for people and the planet is not a particularly productive note on which to start a new century. Each side tends to simplify and demonize the position of the other, resulting in a rhetorical standoff.

There can be little doubt that opening markets in countries with weak governments, inadequate legal systems, and rampant corruption can exacerbate both social and environmental problems. However,

more-open markets are at the same time potentially powerful tools for building economic and social opportunities for the poor and contributing to the development of civil society. In many parts of the developing world, capital is now more available to start small businesses, new ideas are flowing more freely, and the number of nongovernmental organizations (NGOs) is burgeoning. People are excited and energized as they consider future possibilities, in ways they were not a decade ago.

The multifaceted debate that has flowed from the protests about globalization has been echoed within the World Bank, where preparation of the annual *World Development Report*—focused in 2000 on the theme of poverty—created a vigorous internal and external debate that led its main author, Cornell economist Ravi Kanbur, to resign in protest. At the center of the World Bank debate was the view of Kanbur and other experts and NGO representatives that market liberalization and economic growth are insufficient by themselves to reduce poverty.²⁷

To the surprise of many, the published version of the Bank's report, which appeared a few months later, acknowledged the failure of economic growth to reduce the numbers in poverty or close the equality gap in many nations. The report urged a broader, more comprehensive strategy to fight poverty, noting that, "facilitating the empowerment of poor people—by making state and social institutions more responsive to them—is also key to reducing poverty." Around the world, a strengthened consensus is emerging that reducing poverty is a complex undertaking that requires extensive but delicate government interventions, including investments in education and health, strong legal and financial systems, land reform, and strong anti-corruption

RICH PLANET, POOR PLANET

policies. The experience of Russia, where market liberalization has been accompanied by an increase in poverty rates of 50 percent, is an important reminder that a healthy political system in which all of a society's interests are adequately represented and a strong legal and regulatory structure are key ingredients to meeting the needs of the poor.²⁸

In southern India, a group called Myrada is a broker between banks and groups of poor people who use the money they borrow to start small businesses.

Social and ecological progress will also require a shared commitment to an agreed set of goals—goals that go beyond the expansion-of-wealth model that predominates in many political systems today. Expanding human options, eliminating poverty, and bringing the human economy into balance with Earth's natural systems are challenges large enough to frame a new millennium, but pressing enough that they must be met within the current century. Together, these changes would represent a revolution as fundamental as any in human history—an “Econological” Revolution that will test our technological abilities, our economic capacities, and even our humanity.

Transitions of this magnitude do not occur without strong pressures to change, since people generally resist disruptions to their existing patterns unless there is a clear need to do so. (See also Chapter 10.) Anthropologists believe that the Agricultural Revolution occurred in regions where environmental stress or population pressures were making the traditional hunter-gatherer way of life less viable. Similarly, the Industrial Revolution was precipitated in part by the social and economic limits of the prevailing eighteenth-century economy.

An Econological Revolution must be accompanied by wide recognition that change is necessary—that without it, human progress will slow and then reverse. But it is also essential that people understand the opportunities that lie ahead if the revolution succeeds. As a Greenpeace representative told a conference in Oslo in June 2000, “If you want people to build boats, you must first create a longing for the islands.”²⁹

This should not be difficult. The world at the dawn of the millennium is extraordinarily dynamic, and despite the continued deterioration reflected in many ecological and social indicators, hundreds of success stories can be pointed to—seeds of change that will grow and spread if properly nurtured.

One of the most encouraging success stories of recent years is the growing attention to directly meeting the needs of the poor in many countries. Government investments in education and health care have increased substantially in some nations, spurred in part by increased commitments by international financial institutions. Latin America, in particular, which has historically been marked by enormous inequalities, has been closing the gap by investing more heavily in people. Since 1980, for example, the share of Brazilian children in secondary school has risen from 46 to 66 percent, while the proportion of women who are illiterate has fallen from 27 to 16 percent. And in the poor northeastern state of Ceara, a preventive health program that relied on 7,300 community health agents, 235 trained nurses, and a media campaign contributed to a decline in infant mortality from 102 per thousand live births to 65.³⁰

Closing the large gender gaps that still exist in many countries is one of the keys to social progress. In many parts of Asia, Africa, the Middle East, and Latin America,

women still lack many of the legal rights that men enjoy, and they are denied equal access to education, credit, and other ingredients to economic progress. This not only disadvantages half the human population, it impedes the advance of small business and agriculture, which are female-dominated in many countries. But this situation, too, is beginning to change, as women organize NGOs such as the Self-Employed Women's Association in India, which has provided day-to-day support for women as well as giving them a voice within the established political system. Around the world, many of societies' impediments to women's progress are slowly being erased.³¹

One of the recent social innovations that has proved particularly helpful to women is micro-credit, a concept pioneered by the Grameen Bank in Bangladesh and Bolivia's BancoSol. Over the last decade, this approach has been adapted to scores of countries, reaching over 10 million borrowers with tiny loans that turn them into small entrepreneurs, able to own and operate their own businesses. In southern India, a group called Myrada is serving as a broker between banks and groups of poor people who use the money they borrow to start small businesses. Such efforts have helped educate many policymakers to the fact that lack of access to affordable capital is limiting economic progress in many poor communities. International financial institutions and industrial countries are now providing funds to support many micro-credit programs.³²

Social progress also requires a healthy environment, particularly in rural areas where the poor generally depend on local resources to provide food, water, shelter, and energy—a factor that is left out of the develop-

ment equations used by most economists. In many cases, deforestation, soil erosion, and groundwater depletion have left villagers unable to meet basic needs, and without the financial resources needed to invest in social progress. Experience in India, however, has shown that empowering communities and providing them with assistance in managing their local forests and watersheds can lead to rapid improvement in living standards.³³

Another innovation that has taken root in recent years is organic farming. More than 7 million hectares of farmland are now devoted to organic agriculture, up roughly 10-fold over the last decade. Recent food scares, particularly in Europe, have spurred consumer demand for food that is free of artificial pesticides and fertilizer, as has growing recognition of the ecological benefits of these new methods of farming. Government agencies have contributed to the growth in organics by certifying organic foods, and in some cases providing subsidies. Private farmers have taken advantage of the higher prices for organic crops by planting more land using the new techniques. (See Figure 1-1.) And with nation-

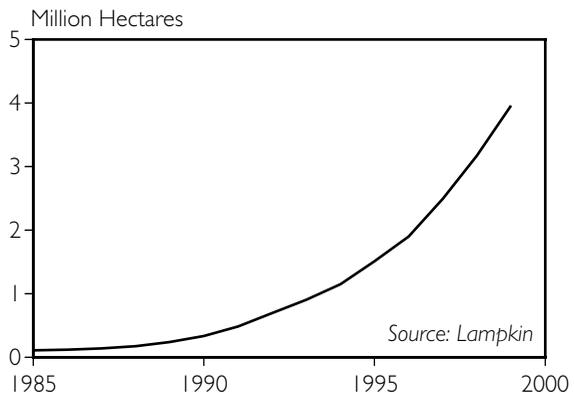


Figure 1-1. Certified Organic Agricultural Area in European Union, 1985-99

RICH PLANET, POOR PLANET

al trade barriers falling, farmers in countries such as Argentina, India, and Uganda are growing organic foods for export to industrial countries. At an estimated \$22 billion annually, the global organic food market is still a tiny fraction of the total, but recent growth rates suggest a critical mass is being reached that may soon make it possible for most food to be grown in this way.³⁴

Matching the boom in organic agriculture is the recent surge in interest in environmentally certified wood products. What started slowly with a small number of consumers who were upset about wood products that came from old-growth forests has recently mushroomed, attracting large buyers such as Home Depot and two of the largest U.S. home building companies. The key to this shift in the wood products market is the Forest Stewardship Council, which set up the first certification system in the early 1990s. Working with the World Wide Fund for Nature in the United Kingdom, it set up the first buyers' groups; more than 600 different companies in 18 countries now belong to the Global Forest and Trade Network, and some 25 countries are developing sustainable forestry standards. Currently, 20 million hectares of forest are under independently certified sustainable management, a number that is projected to grow to 200 million hectares by 2005.³⁵

The greening of the wood products market is being followed by the more recent emergence of a market for "green" power. Electricity, which is mainly generated from coal and nuclear power in most countries, has in the past been sold as a single, undifferentiated commodity. But some governments are now requiring "labeling" of electricity on power bills, and allowing both elec-

tric utilities and independent power producers to market electricity from different sources—renewable energy from biomass, wind, and solar energy generally being the most popular. Among the countries where sizable numbers of power customers have signed up for green power are the United States (particularly in California, Colorado, and Pennsylvania), Australia, Germany, Japan, and the Netherlands. Green power is proving popular both with businesses and with consumers, who are sending a strong signal to the market about the energy sources they prefer. Over the next few years, this is likely to lead to substantial additional investment in renewable energy.³⁶

One manifestation of the growing interest in green energy is the booming market in wind power in the last two years (see Figure 1-2); in 1999, wind turbine sales grew by 65 percent—almost as fast as mobile phone sales. Although the more than 18,000 megawatts of wind power that was projected to be in place by the end of 2000 produces less than 1 percent of the world's electricity, the share has already surpassed 2 percent in Germany, and exceeds 10 percent in Denmark.³⁷

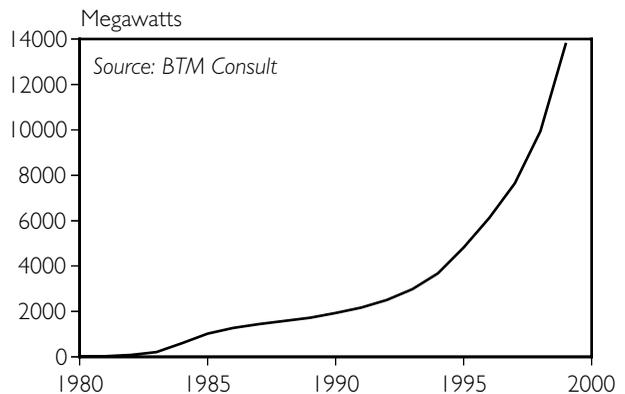


Figure 1-2. World Wind Energy Generating Capacity, 1980-99

The concentration of wind energy development in just a few countries is a reflection of policies that provide market access at favorable terms, motivated by the local jobs and tax revenues generated by wind energy investments. However, because wind power technology is based on standard components and manufacturing techniques, it has been disseminated rapidly from one nation to others as electricity policies are changed. In 2000, sizable wind energy projects started up in China, Japan, India, and the United States, suggesting that some of the world's largest power markets are becoming more favorable for wind development. Another sign of the times is the announcement by the power equipment giant ABB that it is shifting from its historical focus on multibillion-dollar thermal power plants to smaller scale generators, including wind power and other renewable energy technologies.³⁸

From micro-credit to micro-power, the lesson of the past few years seems to be that rapid change is possible—when the conditions are right. Even as the sudden melting of the North Pole reminds us that environmental problems do not proceed in a neat, linear progression, we can take some comfort in knowing that environmental and social solutions can also unfold at exponential rates. This process of change—and how to accelerate it—is explored at length in Chapter 10.

North Meets South

Scientists studying the early evolution of technologies have noted that some of the most successful new devices and practices emerged when one human society took an idea developed elsewhere, and then adapted and improved upon it. Indeed, even before the age of exploration opened much of the globe to rapid diffusion of ideas, the slow

spread of innovation from one village to the next allowed cultures as distant as those of Western Europe and China to learn from each other. But such diffusion has always occurred more rapidly in an East-West direction than between North and South, where variations in climate and difficult-to-cross deserts made travel and communication more difficult.

In today's world, these traditional barriers are largely gone. A person can travel physically to most points on the globe within a day, and the Internet has provided nearly instantaneous connections between diverse cultures in distant places. The question now is whether this potential for communication, and the growing level of commerce between nations, can be translated into a common effort to tackle shared problems.

The greatest benefits would come from a shared North-South commitment to a sustainable world, since differences in perspective between rich and poor countries have plagued efforts to deal effectively with issues ranging from population growth to biological diversity and climate change. In many international negotiations, finger-pointing has delayed action and slowed the adoption of effective policies. It is time for industrial countries to accept their historical responsibility for the current state of the planet—and time for developing countries to recognize that they are at great risk from environmental problems but will also benefit from the economic opportunities unleashed by a new development path. Shared burdens and leadership are now critically important.

Take one example: Climate change is an unequally distributed problem if ever there was one. Industrial countries produced most of the global warming gases that cause climate change, and yet it is developing countries that are likely to feel the most

RICH PLANET, POOR PLANET

severe effects. The densely populated nations of South Asia, East Asia, and West Africa, where millions of people live on vast deltas at or below sea level, are most vulnerable to rising sea levels. In Bangladesh, for example, a 1-meter sea level rise would inundate 3 million hectares and displace 15–20 million people. In Viet Nam's Mekong Delta, the figure is 2 million hectares and 10 million people. In Nigeria, up to 70 percent of the coast could be covered and close to 4 million people displaced, including many residents of Lagos, the capital. Another North-South discontinuity is seen in the fact that the technologies to combat climate change, such as more benign industrial chemicals, fuel cells, and solar photovoltaics, are coming primarily from the R&D centers of northern countries, and yet the booming industrial and energy markets where they are most needed are in the South.³⁹

Bridging these gaps between North and South will require a combination of innovative market reforms and a common commitment by governments to fill the gaps left by the private sector. Most of the recent emphasis has been on the market, pointing to developments such as the certified forest products market and booming consumer interest in ecotourism. And even government-negotiated treaties such as the Kyoto Protocol on climate change now rely on market mechanisms as primary tools for achieving their goals. Greenhouse gas trading schemes are being viewed as a way of not only trimming emissions as efficiently as possible, but also distributing the burden of addressing the problem among various countries.

Market mechanisms are often effective, and private innovation is key to solving many problems, but North-South cooperation will have to be based on something more than commercial relationships if the

world's current problems are to be surmounted. Cooperation among NGOs, for example, allows innovative social programs and political techniques to be transferred rapidly from one country to another, dramatically speeding the rate of progress. The recent surge in the number of these groups in the developing world is being spurred by the support of foundations in industrial countries, as well as by the spread of democracy in many poor nations. And the Internet is proving a boon to the spread of civil society in countries where it has been weak in the past. The ability of citizens to communicate easily among themselves—and with people in distant lands with similar concerns—is rapidly transforming the political equation in many countries, and is creating more favorable conditions for addressing social and ecological problems.

Government leadership is also key: governments need to forge strong partnerships and provide sufficient funding to invest in the public infrastructure needed to support a sustainable economy. The failure of many industrial countries to meet the financial commitments they have agreed to under various international agreements and the failure of some developing countries to carry through on political and economic reforms have left a residue of distrust that must be overcome. Although it is unlikely that foreign aid levels will ever return to the figures that were typical in the 1960s and 1970s, a steady flow of well-targeted grants is essential to sustain progress. And with private capital taking up much of the burden of industrial growth and large-scale infrastructure, government aid can be targeted at pressing needs, with multiplier effects on human progress and environmental protection: areas such as education, health care, the status of women, micro-credit, and broad Internet access. One essential step is

reducing the developing-country debt burden, which has reached onerous levels in recent years. (See Chapter 8.)

The economic and political weakness of many developing countries has prevented them from taking the more central position on the world stage that is now logically theirs. With 80 percent of the world's population, the bulk of its natural resources, and an opportunity to learn from the historical mistakes of today's industrial countries, it seems clear that the South will increasingly dominate the twenty-first century. Today's industrial powers will likely resist this shift, but they will soon find that they cannot achieve their own goals without the cooperation of the South. The summer of 2000 saw an intriguing sign of the changing balance of power when Mexico elected its first president from outside the traditional ruling party. Vicente Fox, a charismatic modern leader, traveled to Washington and called for allowing workers to travel as freely across the Mexico-U.S. border as capital now does.⁴⁰

The existing structure of international institutions such as the World Bank and the World Trade Organization will have to be reformed to allow developing countries to take the more central role that is now essential to solving the world's most difficult problems. With shared power will come shared responsibility—a role that seems far more achievable today than it did two decades ago, when participatory political systems were still rare in the developing world.

One new organizing principle for countries that is particularly appropriate is the E-9 group described earlier—a coalition of northern and southern countries that between them have far greater impact on global social and ecological trends than do the Group of Eight (G-8) industrial countries. Between them, the E-9 have 60 per-

cent of the world's population, 73 percent of the carbon emissions, and 66 percent of higher plant species. (See Table 1-7.) They have both the ability and the responsibility to lead the world in addressing the main challenges of the twenty-first century.

North-South cooperation will have to be based on something more than commercial relationships if the world's current problems are to be surmounted.

It is time for the E-9 to be organized as a semi-official group of nations that meets regularly to consider the range of economic, social, and environmental issues facing the world. Although such meetings may be less harmonious and more freewheeling than the current G-8 meetings, they would also be far more consequential, as they would involve a group of countries with the ability to shape global trends and to help forge a worldwide, North-South consensus on key issues. Under this model, the E-9 would not be a substitute for wider international bodies that represent all nations large and small, but rather it would spur those broader institutions, as well as the private sector, to action.

One example of the potential impact is climate change, where the E-9 accounts for nearly three quarters of the world market for oil, coal, and natural gas, whose combustion is the principal cause of climate change. A commitment by these nine to shift rapidly to energy efficiency, renewable energy, and zero-emission cars would put the global climate on a new trajectory. Similarly, a strong commitment by the E-9 to address the underlying causes of poverty—implementing economic and legal reforms and providing resources—would go far to close the equity gap.⁴¹

Table 1-7. The E-9: Leaders for the Twenty-first Century

Country	World Population, 1999	PPP Gross Domestic Product, 1998	Share of		
			World Carbon Emissions, 1999	World Forest Area, 1995	World Vascular Plant Species, 1997
			(percent)		
China	21.0	10.2	13.5	4	11.9
India	16.5	5.4	4.5	2	5.9
European Union	6.3	20.5	14.5	3	—
United States	4.6	21.3	25.5	6	6
Indonesia	3.5	1.3	.9	3	10.9
Brazil	2.8	2.9	1.5	16	20.8
Russia	2.4	2.4	4.6	22	—
Japan	2.1	8.0	6.0	0.7	2.1
South Africa	0.7	0.9	2.0	0.2	8.7
E-9 Total	59.9	72.9	73	56.9	66.3

SOURCE: Worldwatch calculations based on Population Reference Bureau, "1999 World Population Data Sheet," wall chart (Washington, DC: June 1999); World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 10–12; BP Amoco, *BP Amoco: Statistical Review of World Energy* (London: June 2000), 38; U.N. Food and Agriculture Organization, *State of the World's Forests 1999* (New York: 1999), 125–30; World Conservation Union–IUCN, *1997 IUCN Red List of Threatened Plants* (Cambridge, U.K.: 1998), xvii, xxvii–xxxiii.

In the end, the greatest challenge will not be technological or even economic. As University of Maryland economist Herman Daly has written, a sustainable economy "would make fewer demands on our environmental resources, but much greater demands on our moral resources." One of those demands will be to reorganize international institutions so that power is based not on who has the biggest GNP but on a

human sense of fairness, balance—and what is ultimately needed to ensure a healthy future for humanity and the planet. This may seem like a big leap in the first few years of the new century. But as we leave a century that began with women prohibited from voting in most countries, and with war viewed as the accepted means of settling differences among major powers, we should set a high standard for the decades ahead.⁴²

Notes

Chapter I. Rich Planet, Poor Planet

1. Based on author's visit to Bahia, August 2000.
2. James Brooke, "Brazilian Rain Forest Yields Most Diversity for Species of Trees," *New York Times*, 30 March 1993.
3. "Latin America and the Caribbean: Brazil," The Nature Conservancy, <www.tnc.org/brazil/forest.htm>, viewed 12 October 2000.
4. World Bank, *World Development Report 2000/2001* (New York: Oxford University Press, 2000), 21–23.
5. Christopher Flavin, "Wind Power Booms," and idem, "Solar Power Market Jumps," both in Lester R. Brown, Michael Renner, and Brian Halweil, *Vital Signs 2000* (New York: W.W. Norton & Company, 2000), 56–59; Seth Dunn, "Carbon Emissions Fall Again," in *ibid.*, 66–67; Clive Wilkinson, *Status of Coral Reefs of the World, 2000: Executive Summary*, 9th International Coral Reef Symposium, 23–24 October 2000, Bali, Indonesia; National Snow and Ice Data Center, "Mountain Glacier Fluctuations: Changes in Terminus Location and Mass Balance," <www-nsidc.colorado.edu/NASA/SOTC/glacier_balance.html>, viewed 2 February 2000; Alexander Wood, "An Emerging Consensus on Biodiversity Loss," in Alex Wood, Pamela Stedman-Edwards, and Johanna Meng, eds., *The Root Causes of Biodiversity Loss* (London: Earthscan, 2000), 2.
6. Eduardo Athayde, Atlantic Forest Open University, Salvador, Bahia, Brazil, discussion with author, 10 August 2000.
7. The E–9 concept was first introduced as the E–8 in *State of the World 1997*. This chapter adds South Africa to the group and substitutes the European Union (EU) for Germany, which substantially extends its breadth of economic and ecological coverage. The sector-specific tables that follow, however, use statistics for Germany (the EU's most populous member), due to the lack of comparable data for the EU as a whole.
8. "‘Love Bug’ Suspect Charged," *Associated Press*, 29 June 2000; Mark Landler, "A Filipino Linked to ‘Love Bug’ Talks About His License to Hack," *New York Times*, 21 October 2000.
9. Casualties from "Payatas Relocation Coordination Ordered," *Manila Bulletin*, <www.mb.com.ph/umain/2000%2D07/mn071805.asp>, viewed 10 September 2000; Typhoon Kai Tak from Roli Ng, "Garbage Slide Kills 46 in Manila's Promised Land," *Planet Ark*, <www.planetark.org/dailynewsstory.cfm?newsid=7412&newsdate=11-Jul-2000>, viewed 10 September 2000; number of residents from "Manila Urges Payatas Residents to Get Out of Dumpsite," *China Daily Information*, <www.chinadaily.net/cover/storydb/2000/07/15/>

NOTES, CHAPTER I

wnmanilla.715.html>, viewed 10 September 2000.

10. Growth of world economy from Angus Maddison, *Monitoring the World Economy 1820–1992* (Paris: Organisation for Economic Co-operation and Development (OECD), 1995), 227, and from Angus Maddison, *Chinese Economic Performance in the Long Run* (Paris: OECD, 1998), 159, using deflators and recent growth rates from International Monetary Fund (IMF), *World Economic Outlook* (Washington, DC: October 1999); growth estimate for 2000 from IMF, *World Economic Outlook* (advance copy) (Washington, DC: September 2000); International Telecommunications Union (ITU), *World Telecommunication Indicators '98*, Socioeconomic Time-series Access and Retrieval System database, downloaded 24 August 1999, and ITU, *World Telecommunication Development Report 1999* (Geneva: 1999); number of host computers from Internet Software Consortium and Network Wizards, "Internet Domain Surveys," <www.isc.org/ds/>, viewed 20 February 2000.

11. Growth of various economies from World Bank, *World Development Indicators 2000* (Washington, DC: 2000), 182–83; China's economy from *ibid.*, 10–12; consumer products in China from *ibid.*, 300, and from Population Reference Bureau, "2000 World Population Data Sheet," wall chart (Washington, DC: June 2000), with computers from Ye Di Sheng, "The Development and Market of China's Information Industry and its Investment Opportunity," <www.caspa.com/event/augdin2.htm>, viewed 10 November 2000.

12. Wealth disparities from World Bank, *op. cit.* note 4, 282–83; trends in per capita income from U.N. Development Programme (UNDP), *Human Development Report 1999* (New York: Oxford University Press, 1999), 2–3; income disparities from World Bank, *op. cit.* note 11, 66, 68; 10 percent based on UNDP, *op. cit.* this note, 149, 197; inequality growth from *ibid.*, 3.

13. UNDP, *op. cit.* note 12, 25; number of people living on less than \$1 per day from World

Bank, *op. cit.* note 4, 3, 23.

14. Number of people malnourished is a Worldwatch estimate based on U.N. Administrative Committee on Coordination, Sub-Committee on Nutrition in collaboration with International Food Policy Research Institute (IFPRI), *Fourth Report on the World Nutrition Situation* (Geneva: 1999), and on Rafael Flores, research fellow, IFPRI, Washington, DC, e-mail to Brian Halweil, Worldwatch Institute, 5 November 1999, and discussion with Gary Gardner, Worldwatch Institute, 3 February 2000; selected countries with chronic hunger from Gary Gardner and Brian Halweil, *Underfed and Overfed: The Global Epidemic of Malnutrition*, Worldwatch Paper 150 (Washington DC: Worldwatch Institute, March 2000), 17.

15. Number without access to clean water from Peter H. Gleick, *The World's Water 1998–1999* (Washington, DC: Island Press, 1998), 40; percentages by country from World Bank, *op. cit.* note 11, 14–16; toilets from World Bank *op. cit.* note 11, 94–96.

16. Joint United Nations Program on HIV/AIDS, *Report on the Global HIV/AIDS Epidemic—June 2000* (Geneva: June 2000), 124; Elizabeth Rosenthal, "In Rural China, a Steep Price of Poverty: Dying of AIDS," *New York Times*, 28 October 2000.

17. John Noble Wilford, "Ages-Old Polar Icecap Is Melting, Scientists Find," *New York Times*, 19 August 2000.

18. D.A. Rothrock, Y. Yu, and G.A. Maykut, "Thinning of the Arctic Sea-Ice Cover," *Geophysical Research Letters*, 1 December 1999, 3469; Ola M. Johannessen, Elena V. Ahalina, and Martin W. Miles, "Satellite Evidence for an Arctic Sea Ice Cover in Transformation," *Science*, 3 December 1999, 1937; Lars H. Smedsrud and Tore Furevik, "Toward an Ice-Free Arctic?" *Cicerone*, February 2000.

19. Paul N. Pearson and Martin R. Palmer, "Atmospheric Carbon Dioxide Concentrations Over the Past 60 Million Years," *Nature*, 17

- August 2000, 695; Andrew C. Revkin, "A Shift in Stance on Global Warming Theory," *New York Times*, 26 October 2000.
20. Carsten Rühlemann et al., "Warming of the Tropical Atlantic Ocean and Slowdown of Thermohaline Circulation During the Last Glaciation," *Nature*, 2 December 1999, 511.
21. Percentage of fish species as reef dwellers from Norman Myers, "Synergisms: Joint Effects of Climate Change and Other Forms of Habitat Destruction," in Robert L. Peters and Thomas E. Lovejoy, eds., *Global Warming and Biological Diversity* (New Haven, CT: Yale University Press, 1992), 347; Colin Woodard, "Fall of the Magic Kingdom: A Reporter Goes Underwater in the Belize Barrier Reef," *Tuftsia*, summer 2000, 20.
22. Daniel Cooney, "Coral Reefs Disappearing," *Associated Press*, 23 October 2000; Wilkinsson, op. cit. note 5; Ove Hoegh-Guldberg et al., *Pacific in Peril*, available at <www.greenpeace.org>.
23. Hectares of forest per person from Robert Engleman et al., *People in the Balance: Population and Natural Resources at the Turn of the Millennium* (Washington, DC: Population Action International, 2000), 12.
24. Number of people living in water-deficit countries from ibid., 9; Beijing water table from James Kynge, "China Approves Controversial Plan to Shift Water to Drought-Hit Beijing," *Financial Times*, 7 January 2000; oil prices from U.S. Department of Energy, *Monthly Energy Review*, September 2000; near peak production of oil from Colin J. Campbell and Jean H. Laherrere, "The End of Cheap Oil," *Scientific American*, March 1998, 78–83.
25. Pamela Stedman-Edwards, "A Framework for Analysing Biodiversity Loss," in Wood, Stedman-Edwards, and Meng, op. cit. note 5, 15–16.
26. Wood, Stedman-Edwards, and Meng, op. cit. note 5, 283, 231–54.
27. Kanbur resignation from Joseph Kahn, "A Fork in the Road to Riches: Redrawing the Map," *New York Times*, 25 June 2000.
28. World Bank, op. cit. note 4, 3; Russian poverty rate data from Nora Lustig, Director, *World Development Report 2000/2001* team, World Bank press conference, Washington, DC, 12 September 2000.
29. Agricultural revolution from Jared Diamond, *Guns, Germs and Steel: The Fate of Human Societies* (New York: W.W. Norton & Company, 1997), 110–12; Retze Koen, Greenpeace Switzerland, at Seventh International Symposium on Renewable Energy Education, Oslo, 15–18 June 2000.
30. World Bank, op. cit. note 11, 74–76, 82–84; Ceara program from World Bank, *World Development Report 1998/1999* (New York: Oxford University Press, 1998), 122.
31. Lustig, op. cit. note 28.
32. World Bank, op. cit. note 30, 125, 128.
33. Anil Agarwal, "The Poverty of Amartya Sen," *Down to Earth*, 15 December 1998.
34. Area of organic farmland is a Worldwatch estimate based on Helga Willer and Minou Yussefi, *Organic Agriculture World-Wide* (Bad Durkheim: Stiftung Ökologie & Landbau, 2000), and on Catherine Greene, Economic Research Service, U.S. Department of Agriculture, discussion with Brian Halweil, Worldwatch Institute, 11 January 2000; Figure 1–1 from Nic Lampkin, University of Wales, Aberystwyth, e-mail to Brian Halweil, Worldwatch Institute, 25 January 2000 (includes area "in conversion" or "transition"); sales figure is Worldwatch estimate based on Willer and Yussefi, op. cit. this note, and on the International Trade Centre, *Organic Food and Beverages: World Supply and Major European Market* (Geneva: U.N. Conference on Trade and Development, 1999).
35. Global Forest and Trade Network, Home Depot, Centex, and 2005 goal from David A.

NOTES, CHAPTERS 1 AND 2

Ford “Certified Wood: State of the Marketplace,” *Environmental Design+Construction*, July/August 2000, 49, 51; number of hectares certified from Forest Stewardship Council, <www.fscoax.org/principal.htm>, viewed 13 October 2000.

36. Andrew Evans, “Buying and Selling Green: Deregulation and Green Power Marketing,” *Renewable Energy World*, January 2000; Green-e Renewable Energy Program, “Switch to Green Power,” <www.green-e.org/switch/index.html>, viewed 13 October 2000.

37. Figure 1–2 based on BTM Consult ApS, *International Wind Energy Development: World Market Update 1999* (Ringkoping, Denmark: March 2000).

38. Wind power projects from *Wind Power Monthly*, various issues; ABB Group, “ABB Sees Billion-Dollar Growth Opportunity in Alternative and Renewable Energy,” press release (London: 8 June 2000).

39. Don Hinrichsen, “The Oceans are Coming Ashore,” *World Watch*, November/December 2000.

40. Developing-country share of population from United Nations, *World Population Prospects: The 1998 Revision* (New York: December 1998); Fox proposal from Mary Jordan, “Mexican Touts Open Borders: Visiting President-Elect Pushes N. American Convergence,” *Washington Post*, 25 August 2000.

41. E–9 share of energy markets from BP Amoco, *BP Amoco Statistical Review of World Energy* (London: Group Media Publications, June 2000), 9, 25, 33.

42. Herman E. Daly, “Toward a Stationary State Economy,” in John Harte and Robert Socolow, eds., *Patient Earth* (New York: Holt, Rinehart and Winston, 1971), 237.