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PUTTING THE BITE ON PLANET EARTH: **Rapid Human Population Growth is Devouring Global Natural Resources**

By Don Hinrichson

The United Nations International Conference on Population and Development (ICPD) convenes in Cairo, Egypt, this September, gathering political readers from around the globe to explore how human population growth is likely to affect society and the environment, among other topics. One of the policy issues participants will discuss is the links between human population, sustainable development and the environment. In anticipation of the event, International Wildlife turned to Don Hinrichson, a UN consultant on environment and population issues, for this special report on the connections between human expansion and natural resources:

Each year, about 90 million new people join the human race. This is roughly equivalent to adding three Canadas or another Mexico to the world annually, a rate of growth that will swell human numbers from today's 5.6 billion to about 8.5 billion by 2025.

These figures represent the fastest growth in human numbers ever recorded and raise many vital economic and environmental questions. Is our species reproducing so quickly that we are outpacing the Earth's ability to house and feed us? Is our demand for natural resources destroying the habitats that give us life? If 40 million acres of tropical forest—an area equivalent to twice the size of Austria—are being destroyed or grossly degraded every year, as satellite maps show, how will that affect us? If 27,000 species become extinct yearly because of human development, as some scientists believe, what will that mean for us? If nearly 2 billion people already lack adequate drinking water, a number likely to increase to 3.6 billion by the year 2000, how can all of us hope to survive?

The answers are hardly easy and go beyond simple demographics, since population works in conjunction with other factors to determine our total impact on resources. Modern technologies and improved efficiency in the use of resources can help to stretch the availability of limited resources. Consumption levels also exert considerable impact on our resource base. Population pressures work in conjunction with these other factors to determine, to a large extent, our total impact on resources.

For example, although everyone contributes to resource waste, the world's bottom-billion poorest and top-billion richest do most of the environmental damage. Poverty compels the world's 1.2 billion bottom-most poor to misuse their environment and ravage resources, while lack of access to better technologies, credit, education, health care and family-planning condemns them to subsistence patterns that offer little chance for concern about their environment. This contrasts with the richest 1.3 billion, who exploit and consume disproportionate amounts of resources and generate disproportionate quantities of waste.

One example is energy consumption. Whereas the average Bangladeshi consumes commercial energy equivalent to three barrels of oil yearly, each American consumes an average of 55 barrels. Population growth in Bangladesh, one of the poorest nations, increased energy use there in 1990 by the equivalent of 8.7 million barrels, while U.S. population growth in the same year increased energy use by 110 million barrels. Of course, the U.S. population of 250 million is more than twice the size of the Bangladeshi population of 113 million, but even if the consumption figures are adjusted for the difference in size, the slower growing U.S. population still increases its energy consumption six or seven times faster yearly than does the more rapidly growing Bangladeshi population.

HUMAN NUMBERS: The crowd swells

Population density varies by region but is a deceptive factor.

Many nations, from Europe to Africa, expand their land bases by importing food.

* Projected average yearly increase in human numbers for the next 40 years: 90 million

* Total world human population today: 5.6 billion

* Projected population in 2100 assuming reduced fertility: 11.2 billion

* Projected population in 2100 at current rate of fertility: 40 billion

* Percentage of total world population today living in developing nations: 78

In the future, the effects of population growth on natural resources will vary locally because growth occurs unevenly across the globe. Over the course of the 1990s, the Third World's population is likely to balloon by more than 900 million, while the population of the developed world will add a mere 56 million. Asia, with 3.4 billion people today, will have 3.7 billion by the turn of the century; Africa's population will increase from 700 million to 867 million; and Latin America's from 470 million to 538 million. By the year 2000, the Third World's total population is expected to be nearly 5 billion; only 1.3 billion people will reside in industrialized countries.

The United Nations estimates that world population will near 11.2 billion by 2100. However, this figure is based on the assumption that growth rates will drop. If present rates continue, world population will stand at 10 billion by 2030 and 40 billion by 2110.

The United Nations Population Fund estimates that to achieve the 11.2 billion projection, the number of couples using family planning services—such as modern contraceptives—in the developing world will have to rise to 567 million by the year 2000 and to 1.2 billion by 2025. In sub-Saharan Africa this means a 10-fold increase by 2025 in the number of people who use family planning. If these measures do not succeed, human population growth could blast the 11.2 billion figure clear out of the ball park.

Perhaps the most ominous aspect of today's unprecedented growth is its persistence despite falling annual population growth rates everywhere except in parts of Africa, the Middle East and South Asia. Annual global population growth stands at 1.6 percent, down from 2 percent in the early 1970s. Similarly, the total fertility rate (the average number of children a woman is likely to have) has dropped from a global average of six only three decades ago to slightly more than three today.

Population continues to grow because of tremendous demographic momentum. China's annual growth rate, for example, is only 1.2 percent. However, the country's huge population base—1.2 billion people—translates this relatively small rate of growth into a net increase in China's population of around 15 million yearly. Clearly, any attempt to slow population growth is a decades-long process affected by advances in medicine, extended life spans and reduced infant, child and maternal mortality.

The following pages survey the effects of human population growth on a wide range of natural resources.

Plants and Animals: The Shrinking Ark

Biologists have catalogued 1.7 million species and cannot even estimate how many species remain to be documented. The total could be 5 million, 30 million or even more. Yet, we are driving thousands of species yearly to extinction through thoughtless destruction of habitat.

A survey conducted recently in Australia, Asia and the Americas by the International Union for Conservation of Nature and Natural Resources—The World Conservation Union (IUCN) found that loss of living space affected 76 percent of all mammal species. Expansion of settlements threatened 56 percent of mammal species, while expansion of ranching affected 33 percent. Logging and plantations affected 26 percent.

IUCN has declared human population growth the number one cause of extinctions. The 10 nations with the worst habitat destruction house an average of 189 people per square kilometer (250 acres), while the 10 that retain the most original habitat stand at only 29 people per square kilometer.

Future population growth poses a serious threat to wildlife habitat. Every new person needs space for housing, food, travel, work and other needs. Human needs vary widely from place to place, but a US survey found that the average person requires about 0.056 hectares (a hectare is a standard unit of land measurement equal to about 2.47 acres) of nonfarm land for daily living. To this must be added land for food production. This varies with land quality and available technologies, but each newborn person probably will need at least 0.2 hectare of cropland unless food production per acre increases in the years ahead. This will require the conversion of more and more wildland into cropland. In East Asia, for example, the amount of irrigated, high-yield cropland per person is already near the 0.2 hectare limit.

UN consultant and author Paul Harrison estimates, very conservatively, that each new person will need at least a quarter of a hectare. Thus, every billion people that we add to the planet in the years ahead will require 250 million hectares more of agricultural land. Most of this land will have to come from what is currently wildlife habitat. The UN's projected population of 11.2 billion by 2100 would require creation of roughly 20 million square kilometers (8 million sq. ml.) of new cropland—equivalent to more than 80 percent of all forest and woodland in developing countries today.

PLANTS AND ANIMALS: What we protect

Using this tree as a symbol of the Earth's land shows that the 4.8 percent of the globe that lies in protected areas is a mere stump of the whole.

- * Percentage of existing parks and reserves subject to agricultural encroachment and other human disruptions: 33
- * Percentage of all species likely to become extinct within the next 30 years: 25
- * Number of lives saved yearly in the United States by plant-derived anticancer drugs: 30,000
- * Number of plant species used by Southeast Asian herbalists for medicinal purposes: 6,500
- * Number of edible fruit species found in rainforests: 2,450

Conversion of natural habitat for human use can even reduce the value of remaining wild areas for wildlife. When development chops wild lands into fragments, native species often decline simply because the small remnants do not meet their biological needs. For example, studies of U.S. forest birds indicate that species that prefer to nest in forest interiors are more subject to predation and lay fewer eggs when habitat fragmentation forces them to nest along forest edges. A study in southern California indicated that most canyons lose about half of native bird species dependent on chaparral habitat within 20 to 40 years after the canyons become isolated by development, even though the chaparral brush remains. Biologist William Newmark's 1987 study of 14 Canadian and U.S. national parks showed that 13 of the parks had lost some of their mammal species, at least in part because the animals could not adapt to confinement within parks surrounded by developed land.

Habitat loss in North America and in Latin American tropics has caused declines in many bird species

that migrate between those regions. The Breeding Bird Survey, a volunteer group that tabulates nesting birds each June, found that 70 percent of neotropical migrant species monitored in the eastern United States declined from 1978 to 1987. So did 69 percent of monitored neotropical migrants that nest in prairie regions. Declining species include such familiar songbirds as veeries, wood thrushes, blackpoll warblers and rose-breasted grosbeaks. As human population growth continues to push development into wild areas, fragmentation will increase and its effects on wildlife survival will intensify.

Land Loss: A Food Crisis

Land degradation, a global problem, is becoming acute in much of the developing world. Population pressures and inappropriate farming practices contribute to soil impoverishment and erosion, rampant deforestation, overgrazing of common lands and misuse of agrochemicals.

Worldwide, an estimated 1.2 billion hectares, an area about the size of China and India combined, have lost much of their agricultural productivity since 1945. Every year, farmers abandon about 70,000 square kilometers (27,000 sq. ml.) of farmland because soils are too degraded for crops.

Drylands, including grasslands that provide rich pastures for livestock, have been hardest hit. Although not as extensive as once thought, desertification—the ecological destruction that turns productive land into deserts—still threatens the Middle East and parts of Africa and Asia.

Because of land degradation, large portions of the Sahel, including Burkina Faso, Chad, Mali, Mauritania, Niger and Senegal, can no longer feed their people. Although annual fluctuations in rainfall may interrupt the trend of cropland loss, the Sahel could suffer agricultural collapse within a decade. Sahelian croplands, as presently farmed, can support a maximum of 36 million people. In 1990 the rural population stood at an estimated 32 million and will exceed 40 million by the end of the decade even if annual population growth slows from the current 3 percent to 2 percent.

LAND: Farmland diminishes

Though human numbers are growing, the amount of land suitable for agriculture is finite, and so hunger can grow faster than crops.

* Number of nations experiencing a decline in food production per capita during the 1980s: 75

* Number of farmers worldwide with too little land to meet subsistence needs for food and fuel: 200 million

* Number of people in those farmers' families: 1 billion

* Number of children who died in 1993 from nutrition-related diseases: 10 million

* Current annual increase in human population in Sahelian Africa: 3 percent

* Estimated current annual increase in food production in Sahelian Africa: 2 percent

Since 1961, food production has matched world population growth in all developing regions except sub-Saharan Africa. In the early 1980s, the UN Food and Agriculture Organization (FAO) predicted that more than half of all developing nations examined in its study of carrying capacity (62 out of 115) may be unable to feed their projected populations by 2000 using current farming technology. Most of the 62 countries probably will be able to feed less than half of their projected population without expensive food imports.

As a direct result of population growth, especially in developing nations, the average amount of cropland per person is projected to decline from 0.28 hectares in 1990 to 0.17 by 2025.

Three factors will determine whether food production can equal population growth:

1. **New Croplands.** Currently, the amount of new land put into production each year may equal the amount taken out of production for various reasons, such as erosion, salt deposits and waterlogging. Thus, the net annual gain in arable land, despite wide-spread habitat destruction to create it, may be zero.
2. **New Water Sources.** Agricultural demand for water is expected to double between 1970 and 2000. Already more than 70 percent of water withdrawals from rivers, underground reservoirs and other sources go to crop irrigation.
3. **Agrochemical Use.** Pesticides and fertilizers are boosting crop yields. However, in many areas agrochemicals are too expensive to use, while in other areas they are overused to prop up falling yields. Agrochemicals can pose health hazards, creating another expense for developing nations.

Forest: The Vanishing World

The quest for more crop and grazing land has sealed the fate of much of the world's tropical forests. Between 1971

and 1986, arable land expanded by 59 million hectares, while forests shrank by at least 125 million hectares. However, consultant Harrison estimates that during the same period, land used for settlements, roads, industries, office buildings and other development expanded by more than 50 million hectares as a result of growth in urban centers, reducing the amount of arable land in surrounding areas. Consequently, the amount of natural habitat wiped out to produce the 59-million-hectare net in arable land may have exceeded 100 million hectares.

FORESTS: ending forests into fuel

Wood accounts for a high percentage of total energy use in many nations.

Every year, more than a billion people use wood faster than trees can grow.

- * Number of people worldwide who depend on fuelwood as primary energy source: more than 2 billion
 - * Percentage of original primary forest remaining in Haiti: 0
 - * Amount of remaining Ecuadorian forest to be cut by 2000: half
 - * Percentage of original tropical forest already destroyed in Bangladesh: 95
 - ...in India and Sri Lanka: almost 100
 - ... in Philippines: 80
 - * Percentage of all plant species found in tropical forests: 45

If current trends continue, most tropical forests will soon be destroyed or damaged beyond recovery. Of the 76 countries that presently encompass tropical forests, only four—Brazil, Guyana, Papua New Guinea and Zaire—are likely to retain major undamaged tracts by 2010, less than a generation away.

Population pressure contributes to deforestation not only because of increased demand for cropland and living space but also because of increased demand for fuelwood, on which half of the world's people depend for heating and cooking. The majority of sub-Saharan Africa's population is dependent on fuelwood: 82 percent of all Nigerians, 70 percent of Kenyans, 80 percent of all Malagasies, 74 percent of Ghanaians, 93 percent of Ethiopians, 90 percent of Somalians and 81 percent of Sudanese.

By 1990, 100 million Third World residents lacked sufficient fuelwood to meet minimum daily energy requirements, and close to 1.3 billion were consuming wood faster than forest growth could replenish it. On average, consumption outpaces supply by 30 percent in sub-Saharan Africa as a whole, by 70 percent in the Sudan and India, by 150 percent in Ethiopia and by 200 percent in Niger. If present trends continue, FAO predicts, another 1 billion people will be faced with critical fuelwood shortages by the end of the decade. Already, growing rings of desolation—land denuded for fuelwood or building materials—surround many African cities, such as Ouagadougou in Burkina Faso, Niamey in Niger and Dakar in Senegal. By 2000, the World Bank estimates, half to three-quarters of all West Africa's fuelwood consumption will be burned in towns and cities.

According to the World Bank, remedying the fuelwood shortage will require planting 55 million hectares—an area nearly twice the size of Italy—with fast-growing trees at a rate of 2.7 million hectares a year, five times the present annual rate of 555,000 hectares.

Troubled Oceans: Disappearing Resources

Population and development pressures have been mounting in coastal areas worldwide for the past 30 years, triggering widespread resource degradation. Coastal fisheries are overexploited in much of Asia, Africa and parts of Latin America. In some cases—as in the Philippines, Indonesia, Malaysia, China, Japan, India, the west coast of South America, the Mediterranean and the Caribbean economically important fisheries have collapsed or are in severe decline. "Nearly all Asian waters within 15 kilometers of land are considered overfished," says Ed Gomez, director of the Marine Science Institute at the University of the Philippines in Manila.

Overfishing is not the sole cause of these declines. Mangroves and coral reefs—critical nurseries for many marine species and among the most productive of all ecosystems—are being plundered in the name of development.

In 1990, a UN advisory panel, the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), reported that coastal pollution worldwide had grown worse over the decade of the 1980s. Experts pointed to an overload of nutrients—mainly nitrogen and phosphorus from untreated or partially treated sewage, agricultural runoff and erosion—as the most serious coastal pollution problem. Human activities may be responsible for as much as 35 million metric tons of nitrogen and up to 3.75 million metric tons of phosphorus flowing into coastal waters every year. Even such huge amounts could be dissolved in the open ocean, but most of the pollution stays in shallow coastal waters where it causes massive algal blooms and depletes oxygen levels, harming marine life near the shores.

OCEANS: Rushing to the sea

The 4 billion people who live near coasts today will jump to 6.4 billion by 2025, increasing ocean pollution and other marine problems.

- * Number of people worldwide living on coasts in 1990: 3.6 billion
- * Projected number of people worldwide who will live on coasts in 2025: 6.4 billion
- * Percentage of original coastal mangrove swamps, important to the breeding of commercial fish and shellfish, that remain worldwide: 50
- * Number of the world's 17 major fishing areas that have reached or exceeded natural limits: 17
- * Percentage decline in coral reefs worldwide since World War II: 50

Although the world still possesses an estimated 240,000 square kilometers (93,000 sq. mi.) of mangrove swamps—coastal forests that serve as breeding grounds and nurseries for many commercially important fish and shell-fish species—this represents only about half the original amount. Clear-cutting for timber, fuelwood and wood chips; conversion to fish and shellfish ponds; and expansion of urban areas and croplands have claimed millions of hectares globally. For example, of the Philippine's original mangrove area—estimated at 500,000 to 1 million hectares—only 100,000 hectares remain: 80 to 90 percent are gone.

Some 600,000 square kilometers (230,000 sq. milt) of coral reefs survive in the world's tropical seas. Unfortunately, these species-rich ecosystems are suffering widespread decline. Clive Wilkinson, a coral reef specialist working at the Australian Institute of Marine Science, estimates that fully 10 percent of the world's reefs have already been degraded "beyond recognition." Thirty percent are in critical condition and will be lost completely in 10 to 20 years, while another 30 percent are threatened in and will be lost in 20 to 40 years. Only 30 percent, located away from human development or otherwise too remote to be exploited, are in stable condition.

Throughout much of the world, coastal zones are overdeveloped, overcrowded and overexploited. Already nearly two-thirds of the world's population—some 3.6 billion people—live along coasts or within 150 kilometers (100 ml.) of one. Within three decades, 75 percent, or 6.4 billion, will reside in coastal areas—nearly a billion more people than the current global population.

In the United States, 54 percent of all Americans live in 772 coastal counties adjacent to marine coasts or the Great Lakes. Between 1960 and 1990, coastal population density increased from 275 to nearly 400 people per square kilometer. By 2025, nearly 75 percent of all Americans will live in coastal counties, with population density doubling in areas such as southern California and Florida.

Similarly, nearly 780 million of China's 1.2 billion people—almost 67 percent—live in 14 southeast and coastal provinces and two coastal municipalities, Shanghai and Tianjin. Along much of China's coastline, population densities average more than 600 per square kilometer. In Shanghai they exceed 2,000 per square kilometer. During the past few years, as many as 100 million Chinese have moved from poorer provinces in central and western regions to coastal areas in search of better economic opportunities. More ominously, population growth is expected to accelerate in the nation's 14 newly created economic free zones and five special economic zones, all of them coastal.

Water: Distribution Woes

Nearly 75 percent of the world's fresh water is locked in glaciers and icecaps, with virtually all the rest underground. Only about 0.01 percent of the world's total water is easily available for human use. Even this tiny amount would be sufficient to meet all the world's needs if it were distributed evenly. However, the world is divided into water "haves" and "have nots." In the Middle East, north Asia, northwestern Mexico, most of Africa, much of the western United States, parts of Chile and Argentina and nearly all of Australia, people need more water than can be sustainably supplied.

WATER: The thirst grows

Water availability per person is dropping. Already, some 2 billion people live with water constraints each year.

* Percentage of the world's water that is freshwater: 3

* Percentage of the world's freshwater that is easily accessible as surface water: 1

- * Percentage of easily accessible freshwater that comes from rivers and marshes: 13
- * Percentage of easily accessible freshwater that comes from lakes: 87
- * Number of nations whose water use exceeds 100 percent of their renewable supplies: 9
- * Percentage of its renewable water supplies that Libya uses yearly: 374
- * Years required for Libya to double its population: 20.4

As the world's human population increases, the amount of water per person decreases. The United Nations Educational, Scientific and Cultural Organization (UNESCO) estimates that the amount of fresh water available per person has shrunk from more than 33,000 cubic meters (1.2 million cu. ft.) per year in 1850 to only 8,500 cubic meters (300,000 cu. ft.) today. Of course, this is a crude, general figure. But because of population growth alone, water demand in more than half the world's countries by 2000 is likely to be twice what it was as recently as 1971.

Already some 2 billion people in 80 countries must live with water constraints for all or part of the year. By the end of the 1990s, Egypt will have only two-thirds as much water for each of its inhabitants as it has today, and Kenya only half as much. By then, six of East Africa's seven nations and all five nations on the south rim of the Mediterranean will face severe shortages. In 1990, 20 nations suffered water scarcity, with less than 1,000 cubic meters (35,000 cu. ft.) of water per person, according to a study by Population Action International. Another eight experienced occasional water stress. The 28 nations represent 335 million people. By 2025, some 48 nations will suffer shortages, involving some 3 billion residents, according to the study.

China—although not listed as water short because of the heavy amount of rain that falls in its southern region—has, nevertheless, exceeded its sustainable water resources. According to Qu Geping, China's Environment Minister, the country can supply water sustainably to only 650 million people, not the current population of 1.2 billion. In other words, China is supporting twice as many people as its water resources can reasonably sustain without drawing down groundwater supplies and overusing surface waters.

Fossil Fuels: Energy Breakdown

Human society runs on energy, principally fossil fuels such as oil, gas and coal. These three account for 90 percent of global commercial energy production. Nuclear power, hydro-electricity and other sustainable resources provide the rest.

The industrialized nations, with less than a quarter of the world's people, burn about 70 percent of all fossil fuels. The United States alone consumes about a quarter of the world's commercial energy, and the former Soviet Union about a fifth. In terms of per capita consumption patterns, Canada burns more fuel than any other nation—in 1987 the equivalent of 9 metric tons of oil per person—followed by Norway at 8.9 metric tons of oil per person and the United States at 7.3. By contrast, developing nations on average use the equivalent of only about half a metric ton of oil per person yearly.

Known oil reserves should meet current levels of consumption for another 41 years, up from an estimated 31 years in 1970 thanks to better energy efficiency and conservation measures, along with new oil fields brought into production. Natural gas reserves should meet current demand for 60 more years, up from 38 years in 1970. Coal reserves should be good for another 200 years.

But our addiction to fossil fuels has resulted in chronic, sometimes catastrophic, pollution of the

atmosphere, in some cases far beyond what natural systems or man-made structures can tolerate. A noxious atmospheric cocktail of chemical pollutants is primarily responsible for the death and decline of thousands of hectares of European forests. Acid rain—caused by a combination of nitrogen and sulfur dioxides released from fossil-fuel combustion—has eaten away at priceless monuments and buildings throughout Europe and North America, causing billions of dollars in damage.

FOSSIL FUELS: Who's doing what with oil?

- * Percentage of the world's population that resides in industrialized nations: 25
- * Percentage of annual global fossil-fuel production used by industrialized nations: 70

- * Nation with the highest per capita consumption of fuels: Canada
- * Average amount of fuels used per Canadian, expressed in metric tons of oil: 9
- * Average amount of fossil fuels used yearly per person in the developing nations, expressed in metric tons of oil: 0.5

Urban air contains a hazardous mix of pollutants everything from sulfur dioxide and reactive hydrocarbons to heavy metals and organic compounds. Smog alerts are now commonplace in many cities with heavy traffic. In Mexico City, for example, smog levels exceeded World Health Organization standards on all but 11 days in 1991. Breathing the city's air is said to be as damaging as smoking two packs of cigarettes a day, and half the city's children are born with enough lead in their blood to hinder their development.

The only way to stretch fossil fuel reserves and reduce pollution levels is to conserve energy and use it much more efficiently than we do now. Some progress has been made, but the benefits of energy conservation have been realized in only a few industrialized countries.

Recent history has shown what can happen. In the decade following the first oil shock, per capita energy consumption fell by 5 percent in the member states of the Organization for Economic Cooperation and Development (OECD)—consisting of the industrialized countries of Western Europe and North America, plus Japan, Australia and New Zealand—while their per capita gross domestic product grew by a third.

Buildings in the OECD countries use a quarter less energy now than they did before 1973, while the energy efficiency of industry has improved by a third. Worldwide, cars now get 25 percent more kilometers per gallon than they did in 1973. In all, increased efficiency since 1973 has saved the industrialized nations \$250 billion in energy costs.

Even more savings could be realized through concerted efforts to conserve energy and improve efficiency. Three relatively simple, cost effective measures could be introduced immediately: 1) making compact fluorescent lamps generally available in homes and offices; 2) tightening up building codes to require better insulation against cold and heat; and 3) requiring lean-burn engines, which get up to 80 kilometers per gallon (50 mpg), in all new compact cars. These three "technical fixes" could save billions of dollars in energy costs.

Policy: Building a Future

The main population issues—urbanization, rapid growth and uneven distribution—when linked with issues of environmental decline, pose multiple sets of problems for policymakers. The very nature of

these interrelated problems makes them virtually impossible to deal with in balkanized bureaucracies accustomed to managing only one aspect of any problem. Population and resource issues require integrated, strategic management, an approach few countries are in a position to implement.

Sustainable-management strategies, designed to ensure that resources are not destroyed by overexploitation, are complicated to initiate because they require the cooperation of ministries or departments often at odds over personnel, budgets and political clout. Most governments lack institutional mechanisms that ensure a close working relationship among competing ministries. Consequently, most sustainable-development initiatives never get beyond words on paper. "We talk about integrated resource management, but we don't do it," admits one Indian official in Delhi. "Our ministries are like fiefdoms, they seldom cooperate on anything."

Fragmented authority yields fragmented policies. Big development ministries—such as industry and commerce, transportation, agriculture, fisheries and forestry—rarely cooperate in solving population and resource problems. Piecemeal solutions dominate, and common resources continue to deteriorate.

POLICY: Fertility begins to decline

The world's fertility rate (the number of children born per woman) is falling, but not enough to halt population growth.

* Goals of the United Nation's 20-year population plan:

1. Provide universal access to services for family planning and reproductive health
2. Reduce infant, child and maternal mortality
3. Promote primary and, if possible, secondary education, particularly for young girls
4. Ensure that all nations can meet minimum goals by 2015

* Reasons cited for Thailand's success in cutting its annual population growth rate from 3 percent to

1.4 percent: high literacy among women, increasing economic role for women and availability of family planning

The world's population and resource problems offer plenty of scope for timely and incisive policy interventions that promise big returns for a relatively small investment. As little as \$17 billion a year could provide contraceptives to every woman who wants them, permitting families throughout the globe to reduce births voluntarily. This approach might produce the same or better results than would government-set population targets, according to one study. Moreover, population specialists recognize that educating girls and women provides a higher rate of return than most other investments. "In fact, it may well be the single most influential investment that can be made in the developing world," says Larry Summers, a former World Bank economist.

But time is at a premium. The decision period for responding to the crises posed by rapidly growing populations, increased consumption levels and shrinking resources will be confined, for the most part, to the next two decades. If human society does not succeed in checking population growth, the future will bring widespread social and economic dislocations as resource bases collapse. Unemployment and poverty will increase, and migrations from poorer to richer nations will bring Third World stresses to the developed world.

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