

**Population growth and patterns of resource use both have important impacts on environmental change.**

Environmentalists have long been concerned with the human impact on the environment. Rapid population growth in developing countries and high levels of resource consumption in developed countries are considered to be important causes of environmental damage, but attempts to study the links between population and environment have demonstrated that the relationship is complex.

The following are significant environmental issues that have been linked to population growth and resource consumption on a global or regional scale.

### GLOBAL WARMING

*Most scientists now agree that a substantial proportion of the observed long-term rise in "greenhouse gases" is due to human development, and that this rising concentration will increase world atmospheric temperatures.* Uncertainties remain, however, about the magnitude of global warming and the ensuing environmental impact. A projected rise in sea level of between 0.2 m and 1 m, for example, could have devastating effects on densely populated and low-lying Bangladesh, but have a negligible impact on land-locked countries. The health risks of higher temperatures, such as the spread of tropical diseases to new populations, would probably be greatest in subtropical areas. Climatic change, however, could also affect natural ecosystems in the northern latitudes.

### POLLUTION

*Population size, growth, and patterns of resource use can have an impact on the levels of all types of pollution, including air, water, and solid pollution.* Pollutants are often concentrated in densely populated, urban areas. According to UN projections, by the year 2005 the majority of the world's population will live in urban areas, where standards of living and consumption patterns often exceed those in rural areas. Labor availability, infrastructure, and transport facilities favoring industrial development can affect the severity of urban atmospheric and water pollution. Even in the absence of population growth, poor environmental policy and management can lead to serious environmental degradation. For example, despite its negative rate of population growth (-0.5 percent), Russia faces significant environmental damage created by the industrial complex of the former Soviet Union.

### OZONE DEPLETION

*The most important causes of ozone depletion are consumption patterns and industry, not population growth. Slowing population growth is therefore unlikely to have much effect on the problem, but reducing or halting the industrial production of halocarbons (such as CFCs) can.* The long-term impact of increased ultraviolet radiation on the Earth's organisms remains unclear. Studies continue to determine the impact of UV radiation on phytoplankton and krill, which are at the base of the marine food chain. A decline in these species could have catastrophic effects on the world's food supply. Likewise, increases in UV radiation would also lead to higher incidences of skin cancer and cataracts, and cause damage to the human immune system.

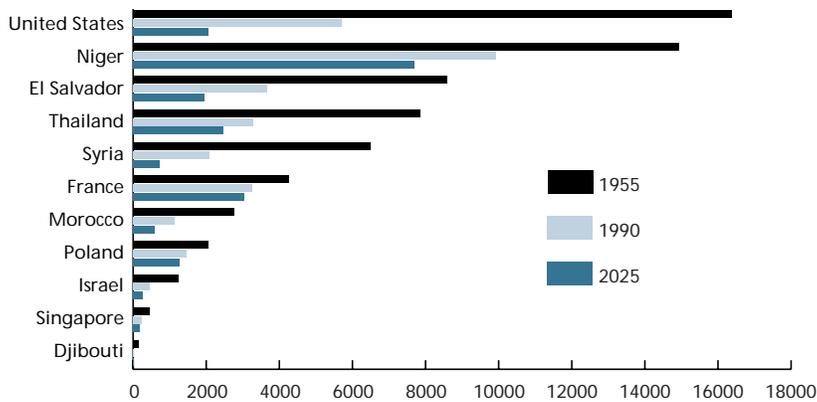
### LOSS OF BIODIVERSITY

*The concept of biodiversity encompasses not only the number and diversity of plant and animal species, but the amount of variation within the same species.* As human populations expand, they reduce biological diversity through the destruction of ecosystems such as tropical and temperate forests, tundra, wetlands, coral reefs, and marine environments. Diversity *within* species has also been an important factor, primarily in the development of agriculture and livestock. Historically, farmers have selected specimens that exhibit the "most desired traits," leading to a narrowing of the genetic field of domesticated or cultivated species. In North America, for example, virtually all beef comes from only two breeds, and most milk from just one breed. Genetic uniformity raises the danger that crop and livestock resources could become more susceptible to diseases or pests, and that a small outbreak could become a regional or global epidemic.\*

### TROPICAL FORESTS

*Population growth, and particularly migration, are clearly associated with the destruction of tropical forests. In addition to depleting a natural resource, deforestation is linked to loss of biodiversity, land degradation, and emission of greenhouse gases (where forests are burned).* The migration of farmers in search of cultivable land, domestic and commercial export demands for tropical timber, the overcutting of wood fuel, and the indirect effects of clearing activities are all causes of deforestation. Studies show that rates of tropical deforestation in

## Per Capita Fresh Water Availability (in cubic meters) for Selected Countries, 1955, 1990, and 2025 (UN medium projection)



Source: "Sustaining Water: Population, and the Future of Renewable Water Supplies" (Population Action International, 1993).

developing countries have been increasing since 1960.

### FRESHWATER RESOURCES

Water is a renewable resource, but its rate of renewal depends on the global water cycle, which often cannot keep pace with human demands. Human impact on the flow and storage of fresh water, which makes up only 1 percent of the world's water resources, has been growing significantly for centuries. Diversions, dams, irrigation works, and reservoirs have all affected the quality and quantity of fresh water available. The shrinking of the Aral Sea in central Asia, for example, is a direct result of extensive irrigated cotton cultivation along two of its principle tributaries. *Current patterns suggest that global demand for water for irrigation, household, and industrial use will increase faster than the rate of population growth. At the same time, the availability of water per capita in many countries of the world will be significantly reduced (see figure above).*

### OCEANS AND FISHERIES

*Population growth, changing consumption patterns, and more efficient harvesting technologies have dramatically increased the demand on coastal and ocean resources worldwide.* Rising populations along the world's coasts are intensifying pressures on coastal fisheries and wetlands, and at the same time pollution threatens to reduce the biological productivity of these areas. In the United States, 54 percent of the population live in counties adjacent to the coasts or surrounding the Great Lakes. Development along the coasts has directly affected the nation's wetlands, which are necessary for sustaining coastal fisheries, reservoirs, and filtering pollution.

### LAND USE

*Generalizations about the impact of population and land use must also consider the specific characteristics of*

*local environments and socioeconomic or political contexts.* While population growth and density are important, in some cases society's institutions may be more important than the numbers. In Honduras, for example, population impacts are secondary to social factors, such as land inequality and the investment patterns of large landowners, in exacerbating deforestation and soil erosion. In Zaire, where the urban population is growing more rapidly than the rural population, inappropriate use of tropical land resources to feed urban dwellers can result in erosion and reduced soil fertility. Likewise, cultivation on steeply inclined slopes in the Philippine uplands has dramatically increased erosion and land degradation. Topsoil loss from a single typhoon can leave the land unsuitable for cultivation and cause silt to build up in rivers downstream.

### CARRYING CAPACITY

Human settlements, industry, and agriculture can all affect the Earth's carrying capacity. This concept refers to the amount of life that a given ecosystem can support. Recent estimates on the Earth's carrying capacity range from less than 3 billion to more than 44 billion people, but while such global figures are often calculated, it is difficult to truly assess the Earth's capacity for human life. Estimates made at the local or regional level are often considered to be more valid.

*The extent to which human settlement has changed the Earth's natural resource base is difficult if not impossible to quantify specifically.* It is, nonetheless, an area of great importance: changes in population size, distribution, and behavior over time have all affected the environment in some way, either positively or negatively. As development work continues to better the lives of millions of people worldwide, environmentalists have feared that this very action could threaten the environment to the point that "human gains" are negated by environmental loss. In this decade, however, growing support for environmentally sustainable development is a positive sign that previously separate concerns for human development and environmental protection can be merged. ■

\* Noel Vietmeyer, "Harmonizing Biodiversity Conservation and Agricultural Development," *Biodiversity and Agricultural Intensification* (Washington, DC: The World Bank, 1996).

This paper, prepared by Kate Chalkley, is an updated summary of "Population and Consumption Issues for Environmentalists," by Alex de Sherbinin, Population Reference Bureau, Washington, DC, October 1993. For more information, contact PRB.

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