

poverty, economic growth, rural development, urbanization, and the environment in developing countries. We next look at the applicability of traditional economic models of the environment, depict some typical environmental situations, and provide some relevant data. We then broaden our scope to examine the global environment and explore policies for seeking worldwide sustainable development. The end-of-chapter comparative case study of Haiti and the Dominican Republic—two nations sharing one island—examines the role of environment as one of the dimensions of their very different development outcomes.

Eight basic issues define the environment of development. Many grow out of the discussions in the preceding chapters. The first is the concept of sustainable development; the others involve linkages between the environment and population and resources, poverty, economic growth, rural development, urbanization, the global economy, and the nature and pace of greenhouse gas-induced climate change. We briefly discuss each in turn.

### Sustainable Development and Environmental Accounting

The term *sustainability* reflects the need for careful balance between economic growth and environmental preservation. Although many definitions exist,<sup>2</sup> *sustainability* generally refers to “meeting the needs of the present generation without compromising the needs of future generations.”<sup>3</sup> In a classic definition, a development path is sustainable “if and only if the stock of overall capital assets remains constant or rises over time.”<sup>4</sup> But in this regard, natural resources and other forms of capital are substitutes only at a limited scale and to a limited degree. Rather, after the environment has been degraded to some extent, *natural resources and other forms of capital likely act as complements*. Manufactured capital is generally unproductive without a minimum of available environmental services. While future technological fixes may be imagined, there is certainly no guarantee that they will emerge.<sup>5</sup>

Implicit in these statements is the fact that future growth and overall quality of life are critically dependent on the quality of the environment. The natural resource base of a country and the quality of its air, water, and land represent a common heritage for all generations. To destroy that endowment indiscriminately in the pursuit of short-term economic goals penalizes both present and, especially, future generations. It is therefore important that development policymakers incorporate some form of **environmental accounting** into their decisions. For example, the preservation or loss of valuable environmental resources should be factored into estimates of economic growth and human well-being. Alternatively, policymakers may set a goal of no net loss of environmental assets. In other words, if an environmental resource is damaged or depleted in one area, a resource of equal or greater value should be regenerated elsewhere.

Overall capital assets are meant to include not only manufactured capital (machines, factories, roads) but also human capital (knowledge, experience, skills) and **environmental capital** (forests, soil quality, rangeland). By this definition, **sustainable development** requires that these overall capital assets not be decreasing and that the correct measure of **sustainable net national income (NNI\*)**

#### Environmental accounting

The incorporation of environmental benefits and costs into the quantitative analysis of economic activities.

**Environmental capital** The portion of a country’s overall capital assets that directly relate to the environment—for example, forests, soil quality, and ground water.

#### Sustainable development

A pattern of development that permits future generations to live at least as well as the current generation, generally requiring at least a minimum environmental protection

**Sustainable net national income (NNI\*)** An environmental accounting measure of the total annual income that can be consumed without diminishing the overall capital assets of a nation (including environmental capital).

is the amount that can be consumed without diminishing the capital stock. Symbolically,

$$\text{NNI}^* = \text{GNI} - D_m - D_n \quad (10.1)$$

where  $\text{NNI}^*$  is sustainable national income,  $D_m$  is depreciation of manufactured capital assets, and  $D_n$  is depreciation of environmental capital—the monetary value of environmental decay over the course of a year.  $\text{NNI}^*$  includes costs of activities to reverse or avert environmental decay.

An even better measure, though more difficult to calculate with present data collection methods, would be

$$\text{NNI}^{**} = \text{GNI} - D_m - D_n - R - A \quad (10.2)$$

where  $D_m$  and  $D_n$  are as before,  $R$  is expenditure required to restore environmental capital (forests, fisheries, etc.), and  $A$  is expenditure required to avert destruction of environmental capital (air pollution, water and soil quality, etc.).<sup>6</sup>

In light of rising consumption levels worldwide combined with high rates of population growth, the realization of sustainable development will be a major challenge. We must ask ourselves, what are realistic expectations about sustainable standards of living? From present information concerning rapid destruction of many of the world's resources, it is clear that meeting the needs of a world population that is projected to grow by over 2 billion in the next 40 years will require radical and early changes in consumption and production patterns. We discuss these needed changes later in the chapter.

## Population, Resources, and the Environment

Much of the concern over environmental issues stems from the perception that we may reach a limit to the number of people whose needs can be met by the earth's finite resources. We may or may not reach this point, given the potential for new technological discoveries, but it is clear that continuing on our present path of accelerating environmental degradation would severely compromise the ability of present and future generations to meet their needs. A slowing of population growth rates would help ease the intensification of many environmental problems. However, the rate and timing of fertility declines, and thus the eventual size of world population, will largely depend on the commitment of governments to creating economic and institutional conditions that are conducive to limiting fertility (see Chapter 6).

Rapidly growing populations have led to land, water, and fuelwood shortages in rural areas and to urban health crises stemming from lack of sanitation and clean water.<sup>7</sup> In many of the poorest regions of the globe, it is clear that increasing population density has contributed to severe and accelerating degradation of the very resources that these growing populations depend on for survival. To meet expanding needs in developing countries, environmental devastation must be halted and the productivity of existing resources stretched further so as to benefit more people. If increases in GNI and food production are slower than population growth, per capita levels of production and food self-sufficiency will fall. Ironically, the resulting persistence of poverty would be likely to perpetuate high fertility rates, given, as noted in Chapter 6, that the poor are often dependent on large families for survival.