

like). In contrast, in the industrial world today, and among the large middle classes of the developing world, consumerism is all-pervasive: indeed it defines what constitutes 'the good life' (Durning 1992). An indication of the magnitude of the growth in consumption can be gained by several indicators in the growth of global consumption of resources since 1950 (Brown *et al.* 1992) (Table 11.2-18). Particularly remarkable is the order of magnitude increases in fertilizer use and natural gas production.

Whittaker and Likens (1975) have estimated that an 'agricultural world' in which most human beings are peasants, should be able to support 5 to 7 billion people, probably more if the large agricultural population were supported by an industry-promoting agricultural activity. In contrast, a reasonable estimate for an industrialized world society at the present North American material standard of living would be one billion. At the more frugal European standard of living, 2–3 billion would be possible. These figures represent not just the contrasting material demands of developed and developing societies but also their contrasting dietary habits. Huxley (1984) considers that dietary habits lie at the root of many of our troubles and calculates that the average Westerner consumes 65 kg of grain per year while the meat consumed accounts for over 900 kg of grain per year. The average Chinese consumes 160 kg of grain and under 20 kg of meat per year. In short, the range of food required to feed 200 million in the West would feed 1500 million Chinese. However, the current change in the economic status of China and Southeast Asian countries will result in a shift towards Western levels of consumption with drastic implications for world food reserves and future demand, and resulting impacts on biodiversity.

Most Asian and African nations have predominantly rural populations (70.1% and 67.3%, respectively). In contrast, in developed countries and in Latin America about 75% of the population is urban. Over the past 40 years, there has been an unprecedented growth in the world's urban population and by the year 2000 it is estimated that nearly half of the world's population will be urban (WRI, 1994). Urbanization affects biodiversity in four main ways:

- Geographical expansion of settlements and infrastructure displaces the existing vegetation and diversity through land conversion.
- Urban activities indirectly have a significant impact on hydrological and atmospheric systems at both local and global levels.
- Urban dwellers plant many species of plants around homes, along avenues and in parks. These are largely ornamental and often introduced species which displace the native vegetation, while adding to overall diversity.

- Urban demands for biomass require fuelwood, industrial wood, sawnwood and other products such as fruits and flowers from surrounding areas. Around cities, plantations of genetically similar trees are displacing the local vegetation to meet the urban demands for biomass.

Urbanization and its effects on biodiversity are discussed in more detail below (11.2.3.3) and in Section 13.3.8.1.

Another way in which population change affects biodiversity is through population movements. Environmental degradation is both a cause and a consequence of frontierward migration. It is a *cause* when decreasing ecological capacity forces people to move elsewhere, often entailing clearing forests for settlements and agriculture. It becomes a *consequence* when increasing populations exert pressure on resources for livelihood; short decision-making time horizons prevent many poor farmers from investing in soil or forest conservation techniques, especially when payoffs are not immediate (Shaw 1989).

Resource extraction activities have motivated movement into frontier sites (Cruz *et al.* 1992), including those initiated or supported by governments and aid agencies. More than half the developing countries in the tropics with annual deforestation rates of over 90 000 ha have populations in excess of 55 million and average annual population growth rates of 2–5% since the mid-1970s. Close to 30 million people reside in forests and protected areas in India and Indonesia. In the Rondonia area in Brazil, the population of small-scale cultivators has increased by over 15% per year since 1975, a rate that is many times higher than Brazil's annual population growth rate. Similar mass movements into tropical forests and protected areas have occurred (WRI, UNEP and UNDP 1990).

While the magnitude of population pressures on the environment can be measured, and in some cases predicted, another dimension of population pressure which is relevant in the management of natural resources is the social and cultural characteristics of the population. These characteristics determine the capacity of groups in dealing with changes in resources and access rules.

Because of accessibility to markets and increased immigration, which are often linked to population pressures, very few frontier sites have culturally homogenous populations and even areas, and can show striking differences among groups in their population growth rates, migration patterns, and their land-use and resource consumption patterns. Three aspects of the composition of populations have especially important impacts on the management of biological resources: recognition of ethnicity; gender-specialized roles in conservation; and differences in socioeconomic status. In any particular habitat or ecosystem, the ways in which