

Box 1.10 Domesticating the World: Conversion of Natural Ecosystems

Since the dawn of settled agriculture, humans have been altering the landscape to secure food, create settlements, and pursue commerce and industry. Croplands, pastures, urban and suburban areas, industrial zones, and the area taken up by roads, reservoirs, and other major infrastructure all represent conversion of natural ecosystems.

These transformations of the landscape are the defining mark of humans on Earth's ecosystems, yielding most of the food, energy, water, and wealth we enjoy, but they also represent a major source of ecosystem pressure.

Conversion alters the structure of natural ecosystems, and how they function, by modifying their basic physical properties—their hydrology, soil structure, and topography—and their predominant vegetation. This basic restructuring changes the complement of species that inhabits the ecosystem and disrupts the complex interactions that typified the original ecosystem. In many cases, the converted ecosystem is simpler in structure and less biologically diverse. In fact, habitat loss from conversion of natural ecosystems represents the primary driving force in the loss of biological diversity worldwide (Vitousek et al. 1997:495).

Historically, expansion of agriculture into forests, grasslands, and wetlands has been the greatest source of ecosystem conversion. Within the last century, however, expansion of urban areas with their associated roads, power grids, and other infrastructure, has also become a potent source of land transformation.

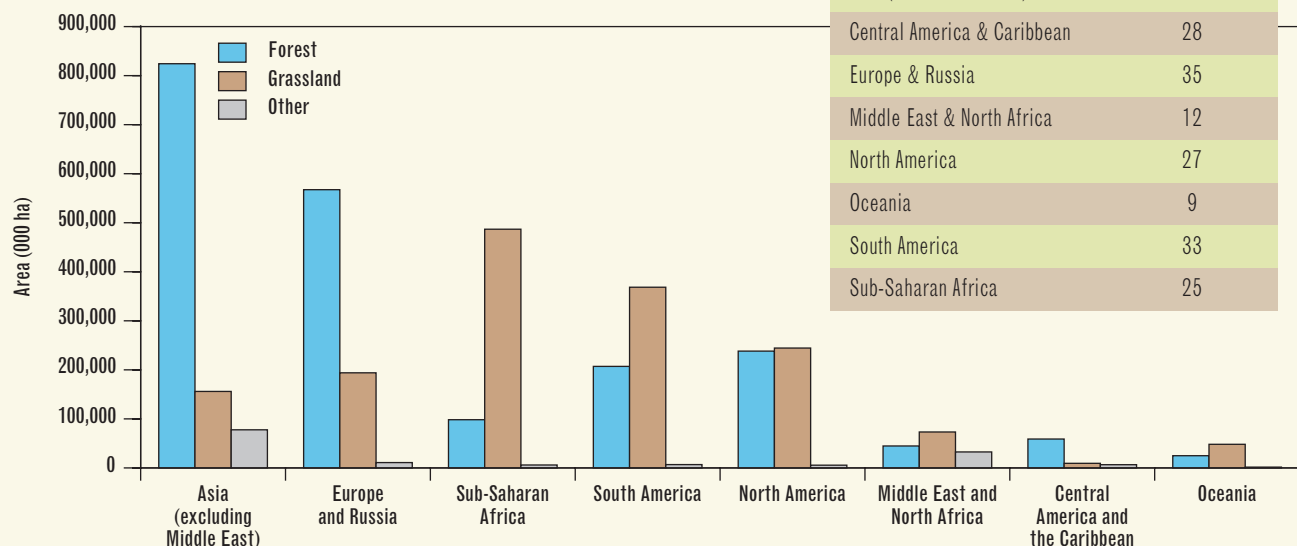
- Worldwide, humans have converted approximately 29 percent of the land area—almost 3.8 billion ha—to agriculture and urban or built-up areas (WRR calculations).

- Agricultural conversion to croplands and managed pastures has affected some 3.3 billion ha—roughly 26 percent of the land area. All totaled, agriculture has displaced one-third of temperate and tropical forests and one-quarter of natural grasslands. Agricultural conversion is still an important pressure on natural ecosystems in many developing nations; however, in some developed nations agricultural lands themselves are being converted to urban and industrial uses (WRR calculations).

- Urban and built-up areas now occupy more than 471 million ha—about 4 percent of land area. Almost half the world's population—some 3 billion people—live in cities. Urban populations increase by another 160,000 people daily, adding pressure to expand urban boundaries (UNEP 1999:47). Suburban sprawl magnifies the effect of urban population growth, particularly in North America and Europe. In the United States, the percentage of people living in urban areas increased from 65 percent of the nation's population in 1950 to 75 percent in 1990, but the area covered by cities roughly doubled in size during the same period (PRB 1998).

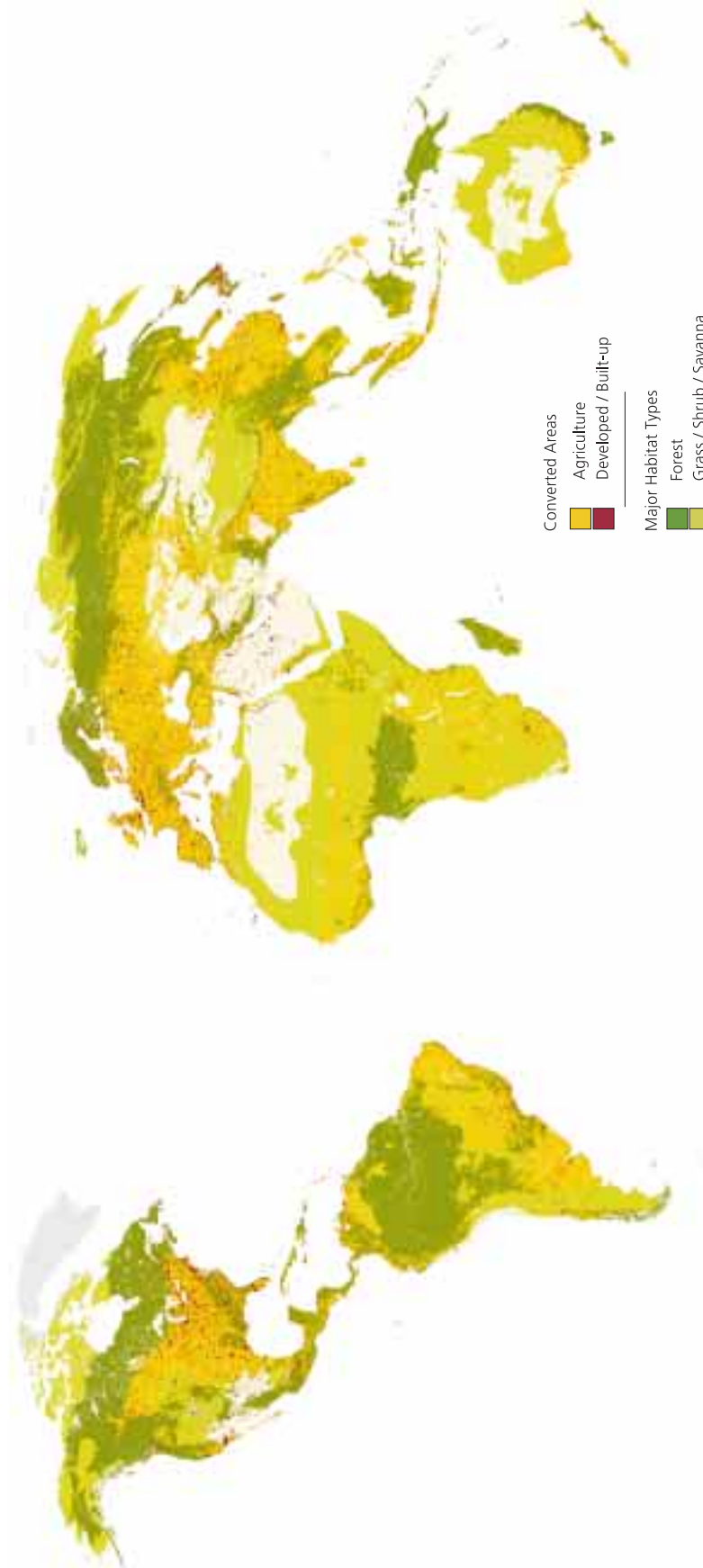
- Future trends in land conversion are difficult to predict, but projections based on the United Nations' intermediate-range population growth model suggest that an additional one-third of the existing global land cover could be converted over the next 100 years (Walker et al. 1999:369).

Area Converted by Region



Source: WRR calculations.

Global Map of Converted Areas



Source: Created for this publication by S. Murray [PAGE] based on data from Global Land Cover Characteristics Database Version 1.2 (Loveland et al. 2000); NOAA-NGDC (1998); WWF (1999).