

Population and landuse

Over thousands of years, humans have occupied most of the land surface of the planet, affecting its ecosystems in ways that have ranged from the subtle management of forests to the total transformation involved in creating the urban environment. Too often humankind has tamed nature by destroying it. However, new land management strategies that seek to answer human needs while respecting natural ecosystems offer some solutions.

For much of human existence, the land available for human use has appeared limitless. Wherever population densities rose too high for comfort, or the natural resource base declined, people moved on to occupy new lands, whether a neighboring woodland or a new country.

Extensification – the expansion of arable land – has overwhelmingly been a response to fast-rising populations, with subsistence in food the main driving force. The 60 years from 1860 to 1920 saw 440 million hectares of land brought under cultivation (an area larger than India)¹. More than half of this took place in the temperate lands of North America and in the region that became the Soviet Union. A similar scale of transformation took place in the subsequent 60 years, from 1920 to 1980. By then, most of the potentially productive temperate lands of the northern hemisphere, including Europe and East Asia, were occupied and the rate of population growth was slackening. The new “frontier lands”, where population growth rates remained high, were in Africa, South Asia and South America.

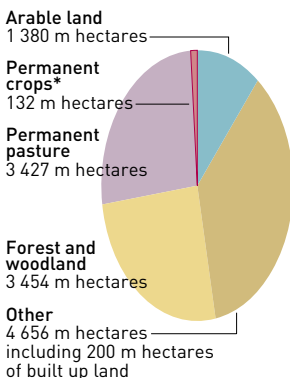
New land for arable farming has generally been obtained through the annexation of grazing pastures, deforestation and the drainage of wetlands. The largest areas of pasture “lost” to cropland were in the United States Great Plains, the South African veldt, the Russian steppe and the campos and pampas of Brazil and Argentina. This type of conversion destroys many herds of wild animals, whether bison, gazelles or elephants, while the compression of flocks into ever smaller and more arid regions contributes to soil degradation and desertification.

Drainage has been under way in Europe for many centuries, but only became a worldwide phenomenon in the late 19th century, as the global market for commodities grew and new drainage technologies emerged. These used cheap clay-tile pipes and steam-powered machines for digging ditches and other heavy work. Passage of the Swamp Lands Acts in the United States accelerated drainage of much of the Midwest, encouraging the conversion of land to agriculture at a time of rising grain prices.

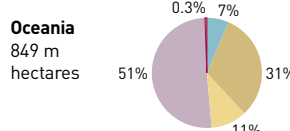
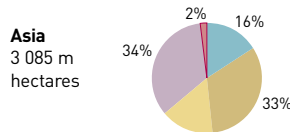
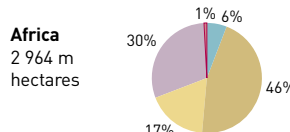
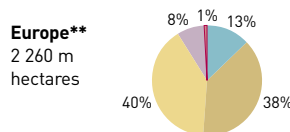
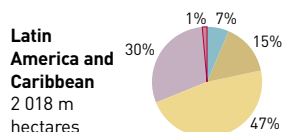
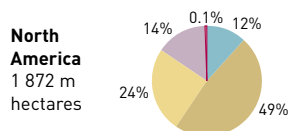
Arid lands, meanwhile, have been made agriculturally productive through irrigation. Again, the western states of the United States led the way, but equivalent areas elsewhere, including modern India, Pakistan and Egypt, also came under irrigation, largely carried out by British colonial engineers.

As the global economy has grown, ever more land has been cleared, drained or irrigated to plant cash crops for export, such as sugar and palm oil, coffee and rubber, or to grow food crops for livestock. With the potential for new colonization reduced in much of the world, farming has

WORLD LANDUSE, 1998+



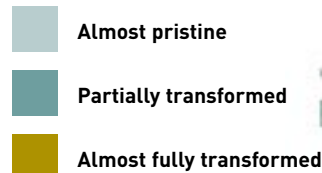
Total world land area: 13 049 million hectares



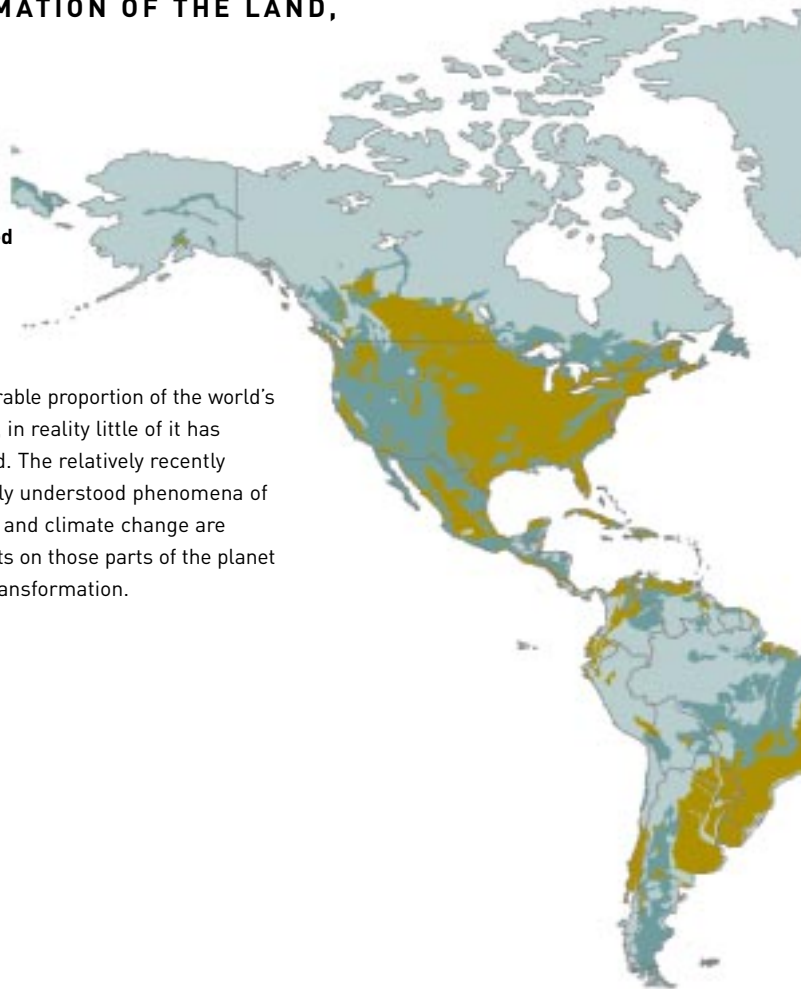
+ Figures for forests and woodland are 1995 data and are approximate
 * Crops that do not have to be re-sown each year
 ** Including Russia, where most of Europe's forest is found

Source: FAO; WRI.

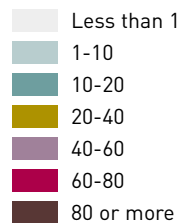
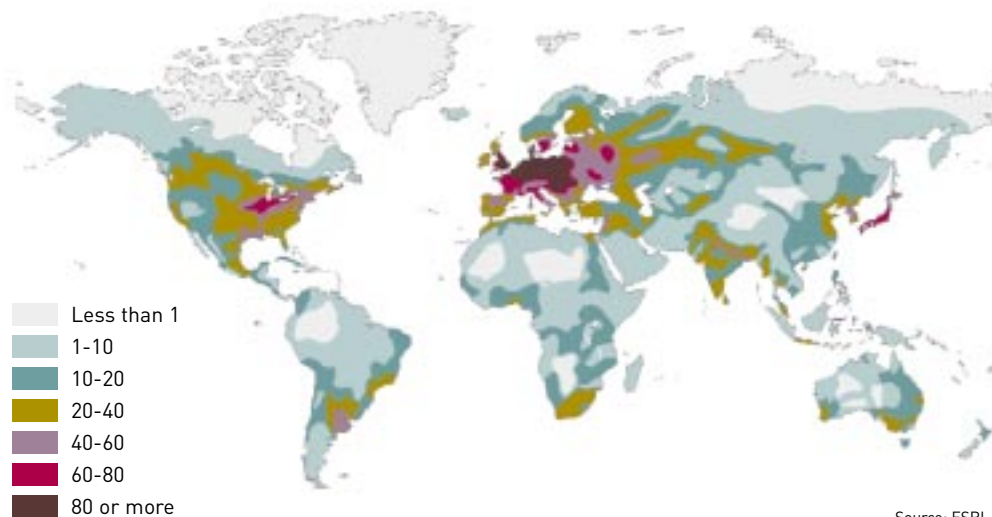
HUMAN TRANSFORMATION OF THE LAND, LATE 1990s



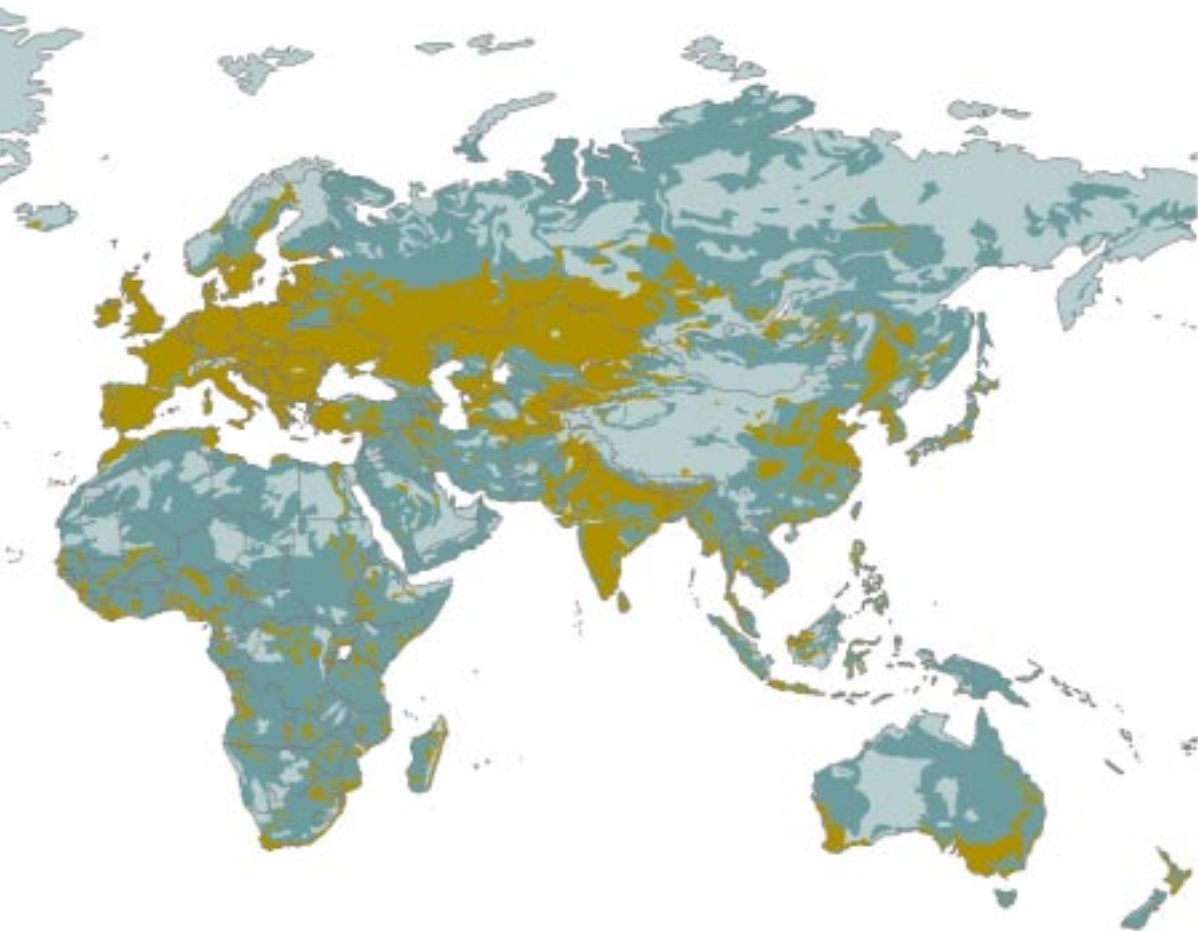
While the map shows a considerable proportion of the world's land mass as "almost pristine", in reality little of it has escaped the hand of humankind. The relatively recently discovered and still only partially understood phenomena of global distillation (see page 98) and climate change are expected to have profound effects on those parts of the planet that have escaped deliberate transformation.



ROAD NETWORK DENSITY, LATE 1990s Kilometers of route per 100 square kilometers of land area



Source: ESRI.



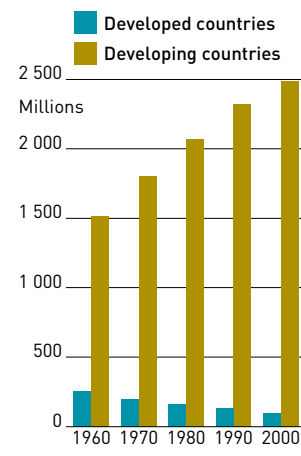
Source: ESRI.

HUMAN DISTURBANCE, BY REGION, 1990s

	Undisturbed %	Partially disturbed %	Human dominated %
Europe	15.6	19.6	64.9
Asia	42.2	29.1	28.7
Africa	48.9	35.8	15.4
North America	56.3	18.8	24.9
Latin America and Caribbean	62.5	22.5	15.1
Australasia	62.3	25.8	12.0
Antarctica	100.0	0.0	0.0
World	51.9	24.2	23.9
<i>World reduced by area of rock, ice and barren land</i>	27.0	36.7	36.3

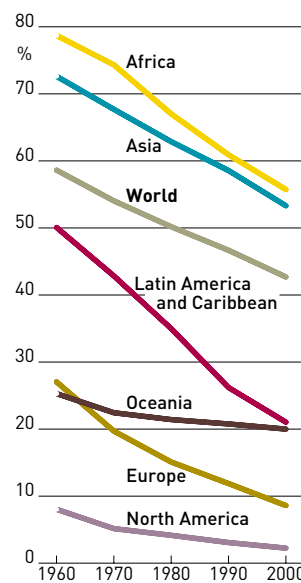
Source: UNEP.

POPULATION ENGAGED IN AGRICULTURE
Actual numbers



Source: FAO.

PROPORTION OF POPULATION ENGAGED IN AGRICULTURE



Source: FAO.

increasingly invested in intensification, through purchases of fertilizers, high-yield seeds and machinery. Most of this investment has not been by subsistence farmers, however, but by commercial farmers, both large and small, responding to market conditions². Intensification – and extensification where it is still possible – became dependent on markets, with demand driven by increased consumption per person as well as population growth.

While less important in terms of area, mining, industrial development and urbanization have also contributed to the transformation of natural ecosystems into human landscapes. For instance, Brazilian deforestation began in the 16th century and intensified with the discovery of gold. It has been estimated that 95 000 square kilometers of Brazilian rainforest were lost to gold mining in the 18th century³.

The second half of the 20th century saw an unprecedented covering of the landscape with urban concrete and tarmac, destroying or displacing wildlife and causing major disruption to drainage and rivers by preventing natural seepage. Drains replaced rivers in great urban areas such as Metropolitan Tokyo, the largest concreted area on Earth. Concrete has also been used in an effort (sometimes misguided) to manage other aspects of the environment – to prevent flooding, coastal erosion and landslides, for instance. It has been estimated that the banks and beds of a fifth of Japan's rivers are concreted⁴.

But urbanization and high population density need not mean the loss of all wildlife habitats. Though far from "natural", suburban residential areas and abandoned industrial landscapes are increasingly recognized as important reservoirs of wildlife – often more so than neighboring agricultural landscapes⁵. In England and elsewhere in Europe, a high proportion of the rare and endangered species of invertebrates and flowering plants such as orchids live in former urban industrial sites^{6,7}. Green strips of land either side of highways and railroads often act as migration corridors for wildlife through urban areas.

But even densely populated agricultural landscapes can be managed to maximize their ecological value. "Agroecology" looks to maximize biological output while lowering chemical inputs⁸. Some of the best examples have been researched by anthropologists looking at traditional farming systems, such as the "home gardens" of Java (one of the world's most densely populated islands). These gardens may grow up to 90 species of plants, including crops of coffee, mango, guava, tomatoes and so on, beneath a forest-like canopy.

Conversely, thinly populated landscapes can suffer appalling ecological degradation. Where land is not in short supply it may be wasted and degraded as if it were an essentially infinite resource. The oilfields of western Siberia are a spectacular example of a wetland landscape that, while almost uninhabited, is highly degraded – fragmented and polluted by roads, powerlines, pipelines, survey tracks, well flares and waste sumps⁹. Similarly, relatively thinly spread populations of settlers in the Brazilian Amazon have cleared huge areas of forest for pasture.

Human occupation of the land does not necessarily destroy ecosystems. It may simply transform them, creating new habitats. The growing organic farming movement in developed countries is combining quality food production with low or no chemical inputs, benefiting biodiversity as well, it is argued, as human health. Equally, sustainable forest harvesting, encouraged by the Forest Stewardship Council and others, can command premium prices for production systems geared to both ecological and human needs. Despite many failures, humankind is increasingly learning to manage ecosystems for sustainable use rather than to sacrifice them to human development.