

Forests – Land Use, Forestry Patterns

Forests are important for economic as well as for ecological reasons. Depending on the landscape and the structure of the forest economy, the forest harvesting methods and the patterns differ widely. The examples presented provide an overview of various deforestation patterns in different vegetation zones. Examples from the boreal forest, the temperate forest and the tropical forest have been selected to highlight the differences. The different deforestation patterns are closely related to the purpose and usage of the logging. Tropical forest is mainly cleared to gain land for agriculture and grazing and for timber (mahogany, teak, ebony). Commercial aspects are the driving force behind the logging of the temperate and boreal forest. The three forest types presented here have fragile environments and are sensitive to disturbance. By means of satellite images changes both in the forest cover and in the health status of a forest can be easily detected.

The examples are intended

- to give an overview of the distribution of different forest types;
- to describe different forestry methods and assess the role of the terrain for the applicability of forestry methods;
- to assess the development of intensively exploited ecosystems.

Map Descriptions

Map 1: Global natural forests and shrub cover

Satellite/Sensor: -
Acquisition Date: -
Band Combination: -
Map Information: forest and shrub classes.

Description: The global distribution of the natural forest and shrub cover (compare land use and vegetation, Atlas p. 40/41). In general, three different forest zones, the boreal forest, the temperate forest and the tropical forest, can be distinguished. The boreal forest is the largest continuous forest area in the northern hemisphere, stretching from North America to northern Eurasia. It consists mainly of needle-leaf evergreen forest (spruce, pines) and needle-leaf deciduous forest (larch). Although the forests are known as remote and inaccessible, they have become attractive for economic activities. The temperate forest is located around the globe in the temperate climate zone. It consists of a mix of needle-leaf and broad-leaf trees, mostly deciduous.

The tropical forest, which is a broad-leaf forest, is found as a belt around the equator. The rapid deforestation is a severe threat to the rainforest and its ecosystem.

Map 2: Rondônia – Large area deforestation pattern in Rondônia, Brazil

Satellite/Sensor: Landsat ETM
Acquisition Date: 01.08.2000
Band Combination: near natural colours
Map Information: -

Description: The satellite image shows parts of Rondônia in Brazil with extensive deforestation patterns. The small remaining green areas of rainforest show the massive impact of human influence. Since the 1970s Rondônia has experienced a rapid clear cutting of the natural rainforest. Three different exploitative land use patterns can be detected on the map. The northern part is characterised by large scaled commercial logging. The huge logged parcels have quadrangular shapes. The southern part of the map is dominated by smaller, irregularly shaped clear cuts. Farmers have logged and colonised areas adjacent to existing roads. The land was offered by the government to develop the country. Within the rainforest, tiny deforested areas can be detected. Mainly they have been

illegally logged to gain land for drug cultivation. The forest is also cut or burned by the remaining indigenous population (shifting cultivation). In the clear-cut areas the drainage patterns of the river systems with riparian forests and road infrastructures become visible.

Map 3a-3c: Deforestation in Rondônia – status 1973, 1986 and 2000

Satellite/Sensor: Landsat MSS, Landsat TM, Landsat ETM

Acquisition Date: 27.10.1972, 03.08.1986, 01.08.2000

Band Combination: near natural colours

Map Information: -

Description: The three satellite image maps show the rapid change in the forest cover of the region around the area of Map 2 since 1973. In this year the rainforest appears mostly pristine with a dense vegetation cover. Thirteen years later parts of the forested land have been converted to agricultural land. The development in this area started along the road system and proceeded outwards from the roads. This "fishbone" pattern of the development is shown in the south-east of the image. Large-scale logging along the roads also took place. In the satellite image map of 2000 most of the natural vegetation cover has been removed. The fishbone structure and the large deforested areas have expanded still further and partly dissolve into a generally deforested surface.

This deforestation causes a severe loss of biodiversity and habitat function. Due to the removal of the protecting forest cover the soil is prone to erosion and loss of nutrients. Therefore the arable land has to be abandoned after a few years and new land has to be cultivated.

Map 4a: Forestry near Politovo in Northern Russia, clearing patterns

Satellite/Sensor: Landsat TM

Acquisition Date: 20.07.1987

Band Combination: near natural colours

Map Information: -

Description: The example of clear-cut logging in Russia's forests shows a checkerboard pattern of deforestation. The area is located in the north-west part of Russia near the Mezen river. Between the logged areas a network of roads can be seen. In the south-western part of the image the forest has been entirely removed.

The deforestation rate has increased since the collapse of the Soviet Union. Foreign timber companies have been invited by the government to log the taiga forest. The domestic timber industry also exports large amounts of wood to the Scandinavian countries and China. Sustainable forestry management practices such as selective harvesting or reforestation are hardly used.

Map 4b: Land cover according to map 4a

Satellite/Sensor: based on Landsat TM

Acquisition Date: 20.07.1987

Band Combination:

Map Information: main forestry-relevant land cover classes.

Description: The map was derived from Landsat TM satellite image data and shows the different land cover classes in the area. As can be seen, one branch of the branching road system leads to the river. The watercourse is used to transport tree trunks. The deforested areas with bare soils are prone to soil erosion. The checkerboard pattern is only an intermediate step before complete deforestation of the area.

Map 5: Clearcuts until year 2000

Satellite/Sensor: Landsat ETM
Acquisition Date: 29.06.2000
Band Combination: near natural colours
Map Information: -

Description: Since the collapse of the Soviet Union the deforestation rate has increased. Foreign timber companies have been invited by the government to log the taiga forest. The domestic timber industry also exports large amounts of wood to the Scandinavian countries and China. Sustainable forestry management practices such as selective harvesting or reforestation are hardly used.

Map 4a: Forestry in the Alps, clearing patterns, Austria

Satellite/Sensor: Landsat TM, SPOT Pan
Acquisition Date:
Band Combination: near natural colours
Map Information: -

Description: The deforestation pattern across the Packalpe between Styria and Carinthia (Austria) differs from those in the other examples by its smaller logged areas in an elongated rectangular shape. The spruce is the dominant tree species. A small skiing area is located in the north-east part of the map. A dense network of forest roads is shown on the map. They are mostly small private roads used by the forest owners, or to reach pastures and their huts in the mountains. The roads follow the contour lines of the slopes. The road structure, together with the distribution of clear cuts, has an impact on the water runoff, causing debris flows. Forest areas in Austria are mainly owned by the state and the church. Smaller parcels belong to farmers and other private people.

In Austrian mountain regions the forest plays an important role in terms of protection against avalanches, debris flows and rock falls. Therefore, sustainable forest management based on reforestation is required to secure the infrastructure of the countryside.

Map 6b: Land cover according to map 6a

Satellite/Sensor: based on Landsat TM, SPOT Pan
Acquisition Date: -
Band Combination: -
Map Information: main forest age classes.

Description: The thematic map shows the forest age classes overlaid onto a shaded relief. The contour lining of the road network becomes visible as well as the reforested clear cuts, displayed in orange. The grey area stretching from north-west to south-east represents the mountain ridge of the Packalpe, which reaches altitudes above the natural upper tree line. In higher regions the forest retreats, and shrubs and herbaceous cover are found. Here alpine pastures are located.

Map 7: Speikkogel, 1 993 m

Satellite/Sensor: photograph
Acquisition Date:
Band Combination:
Map Information:

Description: The photograph shows large deforested areas on the slopes of the Speikkogel in Austria.