

# VEGETATION OF SLOVENIA

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The natural vegetation in Slovenia is forest, which is the primary vegetation on more than nine tenths of our territory. As with the majority of other features, Slovenia is also distinctly transitional in terms of its vegetation, which is therefore correspondingly diverse. Because Slovenia lies at the contact of four major landscape units, Wraber (1960) divided Slovenia into six phytogeographical areas based on vegetation associations: Alpine, Subalpine, Dinaric, Subdinaric, Submediterranean, and Subpannonian. In 1987, Zupančič and his colleagues laid the foundations for a new division of Slovenia into three regions and four provinces:

- Alpine-High Nordic region,
  - Alpine province,
- Euro-Siberian-North American region,
  - Central European province,
  - Illyrian province,
- Mediterranean region,
  - Adriatic province.

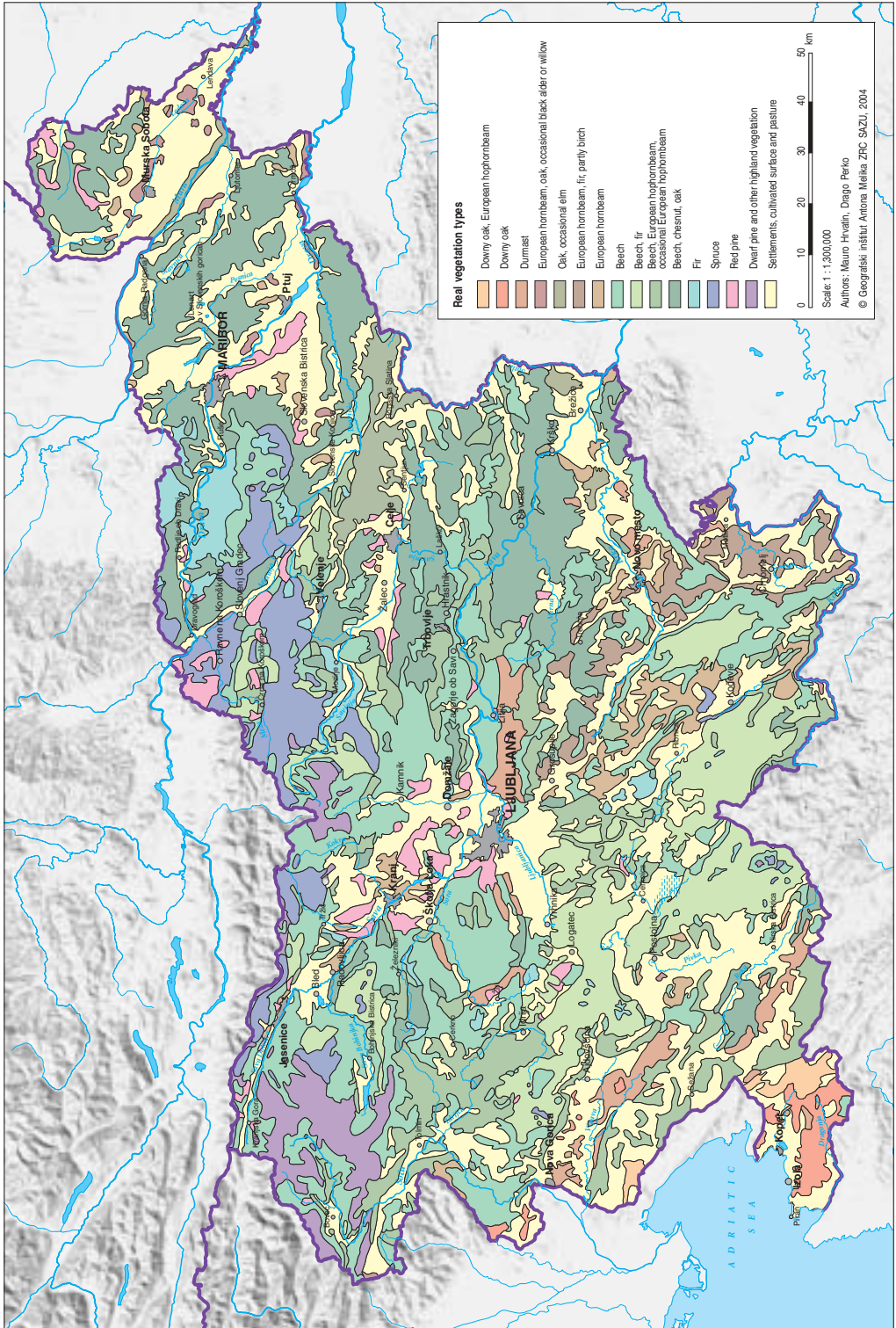
## Habitat factors

Basically, all the physiogeographical elements contribute to the diversity of the forest vegetation cover but first place goes to climate, which dictates the main zonation of the vegetation cover. The interweaving of alpine, continental, and Mediterranean climate influences is of special importance since it influences the distribution and quantity of precipitation, the course of temperatures and with it the length of the vegetation period, potential evapotranspiration, etc.

Relief, which influences vegetation according to altitude, position, inclination, and insolation, is directly connected with the climate, primarily the mezzoclimate and microclimate. Thus, altitude vegetation belts often formed in hilly and mountainous areas. Because of the short vegetation period, low temperatures, the long and abundant snow cover, and the constant and strong winds, the forests end in a distinct upper tree line. It is lower in Dinaric Slovenia, where it is composed of beech stands (*Fagus sylvatica*) at altitudes up to 1,600 meters but is considerably higher in the alpine areas where spruce and larch (*Picea abies* and *Larix decidua*) forests grow to the altitude of 1,900 meters. Dwarf pine (*Pinus mugo*) grows above the upper forest limit, followed by a belt of mountain grassland. Microclimatic conditions, especially in the dolines and collapsed dolines of the Dinaric area, are fostered by the occurrence of temperature inversions, and corresponding vegetation inversions appear where vegetation belts follow one another in the reverse order.

Horizontal and vertical zonation is interrupted by geological, pedological, and water conditions. The latter influence the vegetation primarily in connection with the formation of the relief and with the bedrock where the water flow is hindered and the groundwater is close to the surface. Such conditions enable the growth of various higrophytic and hydrophytic (marsh and moor) plants, mostly meadow plant associations.

The soils directly reflect the geological parent material and foster the formation of azonal edaphic associations that form mainly due to variations in the texture and soil reaction, the supply of nutrients, and the water-air conditions.



Today, man is the greatest transformer of forest in Slovenia. Since the distant past, he has exploited and cut down forests for his needs, clearing forest areas and converting them to meadows and pastures. He introduced rapidly growing and economically interesting species, particularly the Norway spruce (*Picea abies*), thus reducing biotic diversity and greatly increasing the threat to forests. Through drainage and the lowering of the water table, some hydrophytic stands have completely disappeared (e. g., forests of black alder, *Alnus glutinosa*, in Prekmurje). Through characteristic and constant exploitation, man degraded primary plant associations and completely changed the appearance of the landscape (litter forests of birch and eagle fern, *Betula pendula* and *Pteridium aquilinum*, in Bela Krajina) or deliberately created completely new associations (forests of black pine, *Pinus nigra*, in Kras). Due to the pollution of the air, water, and soil, poisonous materials accumulate in plants and cause disturbances in physiological processes, hinder their growth, or even cause their destruction (drying of silver fir, *Abies alba*, in the Dinaric area).

## Types of natural vegetation in Slovenia

Slovenia is a natural habitat for over sixty forest associations, in which grow 45% deciduous trees and 55% conifers. Three quarters of these habitats are overgrown with beech forests (*Fagetum*) with beech (*Fagus sylvatica*) as Slovenia's most frequent naturally occurring tree (32% of the wood stock). In former beech habitats, man largely introduced Norway spruce (*Picea abies*), which today is the most numerous tree in Slovenia (33% of the wood stock).

Table 1: Most extensive tree associations in Slovenia.

Forest association	Surface area [ha]
<i>Castaneo sativae-Fagetum</i>	321,979
<i>Omphalodo-Fagetum</i>	146,608
<i>Ostryo-Fagetum</i>	129,231
<i>Blechno-Fagetum</i>	91,057
<i>Lamio orvalae-Fagetum</i>	82,653
<i>Anemono trifoliata-Fagetum</i>	64,857
<i>Hacquetio epipactidis-Fagetum</i>	60,326
<i>Ostryo carpinifoliae-Quercetum pubescentis</i>	50,361
<i>Avenello flexuosae-Piceetum</i>	42,879
<i>Galio rotundifolii-Abietetum albae</i>	36,505
<i>Abio albe-Carpinetum betuli</i>	36,372
<i>Seslerio autumnalis-Fagetum</i>	31,659
<i>Ranunculo platanifoliae-Fagetum</i>	30,296
<i>Homogyno sylvestris-Fagetum</i>	25,963
<i>Vaccinio myrtilli-Pinetum sylvestris</i>	22,883

Source: Marinček, Čarni 2002.

Various forms of thermophilic submediterranean forests grow in the Primorska area, mostly consisting of downy and sessile oak (*Quercus pubescens*, *Quercus petraea*) and hop hornbeam (*Ostrya*

◀ Figure 1: Distribution of vegetation in Slovenia.



Figure 2: The beech forests (Fagetum) are the most frequent (photography Luka Pintar).

*carpinifolia*) and flowering ash (*Fraxinus ornus*). Autumn moor grass (*Sesleria autumnalis*) dominates the herbaceous layer. The bottoms of the valleys and basins in central Slovenia are overgrown with lowland forests of sessile oak and hornbeam (*Carpinus betulus*), which to a large degree have been cleared since these are the main areas of settlement and agriculture. Flood plain forests of English oak (*Quercus robur*), hornbeam, and black alder (*Alnus glutinosa*) are characteristic of the plains of northeastern Slovenia.

In the high mountains, the most frequent associations are those with Norway spruce (*Picea abies*), silver fir (*Abies alba*), European larch (*Larix decidua*), and beech, which transform into associations with dwarf pine (*Pinus mugo*) above the upper tree line.

In the rest of Slovenia, beech forests in various forms are absolutely dominant. On non-carbonate bedrock, mostly in central and northeastern Slovenia, these are acidophilic beech groves with deer fern (*Blechnum spicant*) and sweet chestnut (*Castanea sativa*), often mixed with Scotch pine (*Pinus sylvestris*). On carbonate bedrock, the lowest lying are submontane beech forests with *Hacquetia epipactis*, *Lamium orvala* or hop hornbeam (*Ostrya carpinifolia*). In the montane belt of the subalpine area, they transform into an association with the *Anemone trifolia* that often reaches to the upper tree line. In the Dinaric karst region of Slovenia, the belt to the upper tree line is formed by the largest areas of unbroken forest in Slovenia, the Dinaric fir-beech forests (*Abieti-fagetum*) or the association of beech with *Omphalodes verna*.

## Changes in the proportion of forest in Slovenia

Before the appearance of man, forests covered more than 90% of the surface of Slovenia. The only exceptions were distinctly wet habitats and the mountains above the upper tree line.



Figure 3: A typical mountain forest landscape (photography Jurij Senegačnik).

From the first human settlement to the beginning of the 20<sup>th</sup> century, the proportion of forest in the territory of Slovenia fell continuously. The main reasons were primarily the spread of agriculture and stock farming, as well as the cutting of forests for various needs (heating, construction, industry, etc.). The lowest proportion, recorded in the late 19<sup>th</sup> century (ZGS 2002), was 36%, which is still high compared with the rest of Europe and points to the distinctly protective function of the forest.

With the start of the Industrial Revolution and even more after World War II, agriculture began to wane heavily and farmland was abandoned, at first the less favourable and later even the best farmland. In spite of attempts to expand agricultural areas through land improvement and the drainage of wetlands, the proportion of forest began to rise steeply.

Table 2: Changes in the proportion of forest in Slovenia after World War II.

Year	Forest [km <sup>2</sup> ]*	Year	Forest [km <sup>2</sup> ]*
1875	36.4	1990	52.8
1947	43.4	1995	54.2
1953	42.0	1998	54.8
1956	43.7	1999	55.0
1958	45.3	2000	55.9
1961	46.5	2001	56.4
1980	51.6	2002	56.7

\* – not including overgrowing surfaces

Source: *Statistical Yearbook 2003*.

Today, forests cover more than 60% of the country, which ranks Slovenia among the most heavily forested countries in Europe (among European countries, only Sweden and Finland have more forest), and the proportion is still increasing.

*Table 3: Proportion of total surface area (Slovenia covers 20,273 km<sup>2</sup>) according to categories of ground cover [%].*

Forest together with overgrowing surfaces	Agricultural	Open	Waters	Built up	Transportation infrastructure
63.3	30.5	1.6	0.7	2.8	1.1

Meadows and pastures are disappearing, cultural landscapes are disappearing, and many areas of Slovenia are threatened with the loss of their traditional appearance. Furthermore, the unchecked spread of cities and the transportation infrastructure threatens to eliminate the few remaining green oases at the bottoms of valleys and basins that at least to some extent help improve the quality of life of the urban population.

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