Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
Ufficio federale dell'ambiente UFAM
Federal Office for the environment FOEN

Area of Artificially Regenerated Young Woodland

The E9 indicator monitors regeneration of Swiss forest stands. As a rule, natural regeneration has a favorable impact on forest biodiversity, so it is positive to note that the share of artificially regenerated young woodland has declined from an average 24% to 6% in the past twenty years. According to the last survey, the share of naturally regenerated young woodland varies between roughly 60% on the Central Plateau and 100% in the Southern Alps.

This indicator was developed in close collaboration with representatives of the Swiss National Forest Inventory (NFI). E9 indicator values are calculated at the NFI.

Status: December 2015

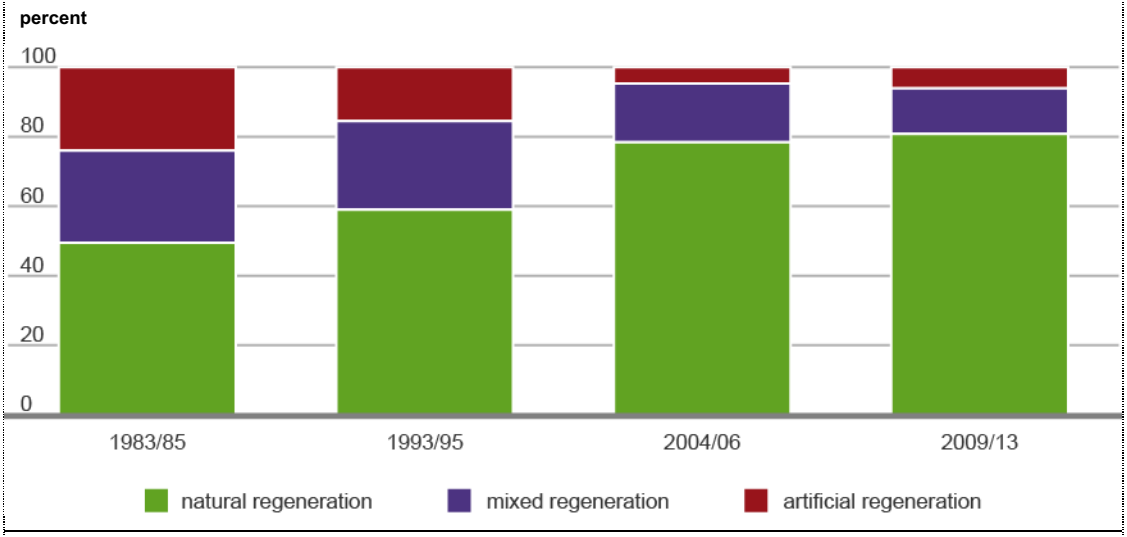
Contents

Development in Switzerland

In Switzerland's forests, artificial regeneration is declining in favor of increasing natural regeneration.

Figure 1 below illustrates shares of regeneration types in Switzerland's overall young woodland area in the 1983/85, 1993/95, 2004/06 and 2009/13 surveying periods.

Fig. 1: Young woodland in Switzerland by regeneration type



© BDM (E9 indicator). Data sources: Swiss National Forest Inventory NFI, special analyses of surveys made in 1983/85, 1993/95 and 2004/06. 26122008UU. Special analysis of the survey made in 2009/13 (NFI4b) by Fabrizio Cioldi (19.02.2015). Swiss Federal Institute for Forest, Snow and Landscape Research WSL. Status: 2015

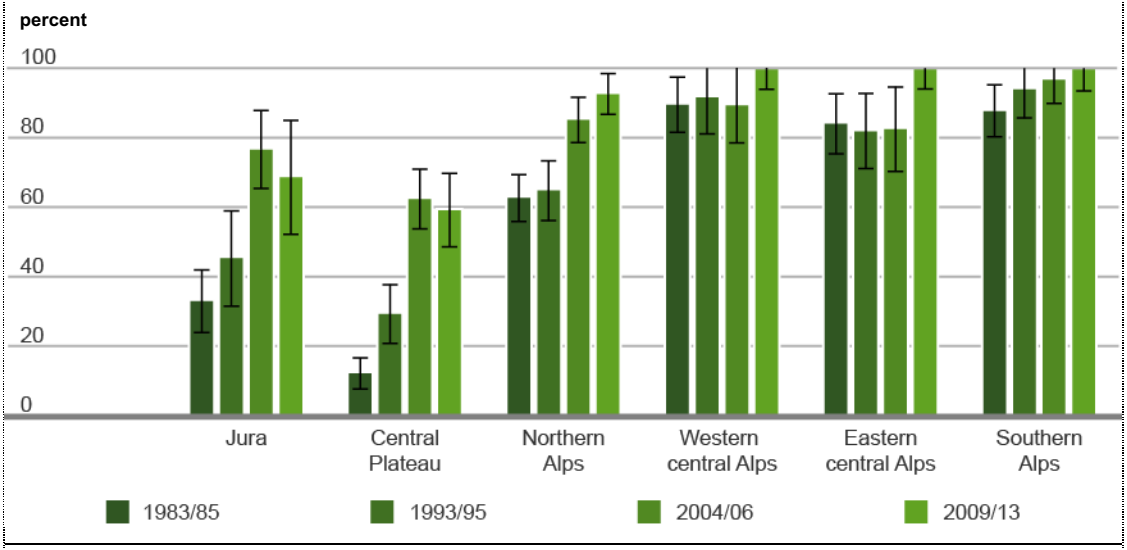
Comments

- In the surveying periods of 1983/85, 1993/95, 2004/06 and 2009/13, shares of artificial regeneration in Switzerland's overall young woodland area amounted to 24%, 16%, 5% and 6% respectively.
- Since the mid 1980s, the share of naturally regenerated young woodland has been increasing considerably. While merely half of the country's young woodland area was found to be naturally regenerated in the 1983/85 survey, that share had increased to roughly 60% in 1993/95, just under 80% in 2004/06 and 81% in 2009/13.
- Between 1983/85 and 2009/13, the area of artificially regenerated young woodland shrank by roughly 115 square kilometers.
- The share of young woodland in the overall forest stand slightly increased (from 5.9% to 6.7%) between 1983/85 and 2009/13. In the 2009/13 surveying period, roughly 870 square kilometers of Switzerland's total forest area consisted of young woodland.

Development in the regions

Naturally regenerated young woodland is gaining ground in all of Switzerland's biogeographical regions. The trend to natural regeneration is particularly marked in the Jura, on the Central Plateau and in the Northern Alps (see fig. 2). In the 2009/13 surveying period, shares of naturally regenerated young woodland were found to lie between roughly 60% on the Central Plateau and 100% in the Central and Southern Alps.

Fig. 2: Shares of natural regeneration in the overall young woodland area of Switzerland's biogeographical regions in the 1983/85, 1993/95, 2004/06 and 2009/13 surveying periods, indicated in percent with a 95% confidence interval.



Comments

- On the Central Plateau, the share held by artificial regeneration in the overall young woodland area dropped from 39-51% in 1983/85 to 2-16% in 2009/13. Natural regeneration increased from 9-17% in 1983/85 to 48-70% in 2009/13.
- Artificial regeneration is of no importance in Alpine regions. These forests mostly regenerate the natural way. Even though some extreme sites in the mountains are regenerated artificially, for example if that forest quickly needs to resume essential protective functions, the area they cover is so small they are not included in the NFI14.
- Between 2004/06 and 2009/13, no region registered a significant decline in artificial regeneration anymore.
- In the past 25 years, natural regeneration of forests in the Jura, on the Central Plateau and in the Northern Alps increased significantly at the expense of artificial and mixed regeneration.
- The share of young woodland in forest stands as a whole currently amounts to roughly 11% on the Central Plateau, 8% in the Northern Alps, 3% in the Southern Alps, and approximately 5% in all other regions.

Significance for biodiversity

Compared to the 1980s, the share of naturally regenerated young woodland has increased, while forestry plantations continue to lose in importance. Nowadays, more than 80% of Switzerland's forests are regenerated the natural way. When young trees are planted at all, they mostly serve to strengthen protective forests, selectively promote biodiversity, or produce quality timber.

In the last century, economic reasoning replaced many diverse and site-appropriate forests in the beech forest range by monotonous spruce plantations. The advent of near-natural forest management, however, has caused the Central Plateau's share of man-developed pure spruce stands to drop from 11% in 1993/95 to 6% in 2009/13. Converting such plantations into near-natural forests often demands artificial interventions.[1] By the mid 1990s, this had resulted in young stands holding a larger share of deciduous species than old stands. It appears that owing to a more near-natural type of forest management, site-appropriate habitats were increasingly allowed to form and pass through their innate development processes.

Windthrow, fires, or forest management create gaps in a forest. If such clearings are left to their own devices, they will soon be colonized by pioneer species that benefit from the light available in open spaces. After a certain period of time, pioneer plants are displaced by other species which in turn will be replaced by the slow growing "final vegetation", with each phase of this process being characterized by different plant and animal species. Even at an early stage, stands that have grown this way will be rich in structures and—typically—species, remaining diverse given appropriate care. Moreover, such natural regeneration helps to maintain local tree species which are genetically particularly well suited to site-specific conditions.

Definition

Changes in the share of artificially regenerated young woodland in the overall young woodland area of the surveyed space.

Areas are assigned to any of the three categories "artificial regeneration", "mixed regeneration", or "natural regeneration" by degree of coverage.

- Natural regeneration: upgrowth due to natural colonization by seed rain or stump shoots. Less than 20% of planted species.
- Artificial regeneration: upgrowth due to planting. Less than 20% of naturally regenerated species.
- Mixed regeneration: any area that cannot be assigned to either of the two other categories.

Surveying methods

Information on areas of artificially regenerated young woodland is based on sampling surveys made for the Swiss National Forest Inventory (NFI). Surveys were made in the periods of 1983/85 (NFI1), 1993/95 (NFI2), 2004/06 (NFI3) and 2009/13 (NFI4). While NFI4 has been ongoing since 2009, only approximately

1 Rigling, A.; Schaffer, H.P. (Eds.) 2015: Waldbericht 2015. Zustand und Nutzung des Schweizer Waldes. BAFU-Reihe Umwelt-Zustand Nr. 1512. Bundesamt für Umwelt, Bern, Eidg. Forschungsanstalt WSL, Birmensdorf. 144 S.

half of all sampling areas have been surveyed as of 2013, allowing merely initial estimates albeit characterized by wide confidence intervals.

For this purpose, only forest stands at an upgrowth/thicket stage were considered to be young woodland. Data collection on survey areas commenced using aerial photographs, followed by additional data being gathered in the field. Young woodland surveys record tree and shrub species with a height of at least 10 centimeters and a breast-height diameter of not more than 11.9 centimeters. The regeneration type is determined if regeneration coverage reaches at least 1%. This applied to 728 sampling areas in the NFI1, 380 sampling areas in the NFI2, 389 sampling areas in the NFI3 and 245 sampling areas in the NFI14. Each land-based inventory unit consists of two circles (so-called satellites) positioned at a distance of 20 meters. With the radius of each circle being 2.12 meters, the overall area monitored for upgrowth is 28 square meters per inventory unit.

Representatives of the Swiss Federal Institute for Forest, Snow and Landscape Research subsequently computed areas and standard errors relating to the three types of regeneration as found in Switzerland overall and its six biogeographical regions. Standard errors were later converted to confidence intervals.

Further information

In charge of this indicator

Lukas Kohli, kohli@hintermannweber.ch, +41 (0)31 310 13 02

Expert NFI contact: Urs-Beat Brändli, urs-beat.braendli@wsl.ch, +41 (0)44 739 23 43

Additional sources of information

> www.lfi.ch (comprehensive information on the Swiss National Forest Inventory)

Bibliography

BAFU, 2013: Waldpolitik 2020: Visionen, Ziele und Massnahmen für eine nachhaltige Bewirtschaftung des Schweizer Waldes. Bern, Bundesamt für Umwelt. 66 S.

Imesch, N.; Stadler, B.; Bolliger, M.; Schneider, O., 2015: Biodiversität im Wald: Ziele und Massnahmen. Vollzugshilfe zur Erhaltung und Förderung der biologischen Vielfalt im Schweizer Wald. Umwelt-Vollzug Nr. 1503. Bern, Bundesamt für Umwelt. 186 S.

Rigling, A.; Schaffer, H.P. (Eds.), 2015: Waldbericht 2015. Zustand und Nutzung des Schweizer Waldes. BAFU-Reihe Umwelt-Zustand Nr. 1512. Bundesamt für Umwelt, Bern, Eidg. Forschungsanstalt WSL, Birmensdorf. 144 S.

This information is based on the German-language document 1260_E9_Basisdaten_2015_v1.docx dated December 16th, 2015.