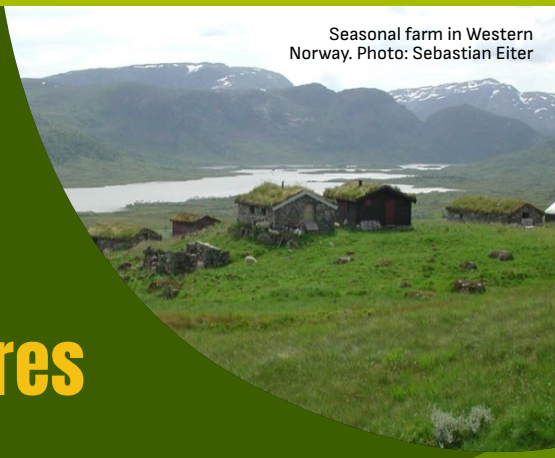
TRANSFARM

Regrowth of mountain pastures



Seasonal farm in Western Norway. Photo: Sebastian Eiter

The role of land use

Mountain areas worldwide have been used for, among other purposes, livestock grazing. This practice, together with, for example, firewood collection, has impacted elevational treelines and forest lines. Treelines and forest lines and forest cover have been declining as a result of this use.

More recently, in a European perspective, tree and forest lines have mainly been rising and forest and shrub cover has been expanding at the expense of grasslands and open shrublands. The abandonment of traditional land-use practices such as grazing and other extensive rural activities have been pointed out as an important factor for these changes.

Climate change

Tree and forest lines are climatic boundaries meaning their elevational advance is restricted by temperature. Rising temperatures will, thus, result in an upward shift of tree and forest lines in the same manner as declining grazing pressure. This makes identifying the role of climate change vs. land-use change a challenging issue.

Effects of forest and shrub expansion

Forest expansion can be beneficial in terms of carbon sequestration and promoting several aspects of ecosystem services mainly related to soil protection. At the same time, forest and shrub expansion increase the amount of biomass and wildfire risk. In addition, forest and shrub expansion negatively alter the traditional form of pastoral landscapes in terms of species diversity, cultural heritage, and the sustainable development of livestock husbandry.

The Greek case

The spatiotemporal changes of the grazed Greek landscapes in the last 75 years are similar to those in most parts of the northern Mediterranean region, where woody vegetation expanded on open areas changing landscape structure and diversity. These landscape transitions are profoundly influenced by demographic and socioeconomic changes due to the abandonment of traditional management practices including transhumant livestock farming and wood harvesting. The study area for the Greek case study was a typical grazed landscape of northern Greece studied for a period from 1945–2020. Cartographic material in various forms, such as historic aerial photographs (1945, 1960 and 1993), and satellite images (Google Earth images from 2017 to 2020) was analyzed with Geographic Information Systems software and landscape metrics.

Socioeconomic inventory data and grazing animal numbers were also collected and analyzed from diachronic census reports of Greek authorities. Spatiotemporal changes in the Lagadas landscape showed that grasslands, open shrublands and silvopastoral areas decreased during the studied period in favor of dense shrublands and forests, causing a significant reduction in landscape diversity and heterogeneity. Main demographic and socioeconomic drivers were the decrease of the local population, population aging and a significant reduction of employment in the primary economic sector over time. These changes were coupled with reductions in the number of grazing animals (sheep, goats, and cattle) especially transhumant, firewood harvesting and charcoal production and were identified as the main reasons for landscape change.

Grasslands have become increasingly fragmented and isolated over the years. Future sustainable livestock husbandry in the area is seriously threatened by the ongoing reduction of grasslands and open shrublands.

The Norwegian case — changes in tree cover

The study area for the Norwegian case is in the mountains of Western Norway. The area has a long history of livestock grazing. Archaeological investigations indicate that livestock grazing may go back to AD 140–380.

A mapping project carried out in 2009 revealed a large number of sites that had been used as seasonal farms. The grazing period was from about the first half of July to the end of August/mid-September. Common types of livestock were cattle, sheep, and goats. Dairymaids stayed with the livestock, milked, and processed

the milk. Seasonal farming declined strongly in the first half of the 20th century. This process lasted until the 1970s. Grazing intensity declined strongly after the abandonment of seasonal farming. Grazing by cattle and goats terminated and the number of sheep declined. The extent of forest cover in the study area was mapped on aerial photographs in the field. Past forest cover maps were derived from old aerial photographs for the years of 1947 and 1971. Comparing the forest cover maps reveals an increase in forest cover from 1947 to 2008. Forest cover increase was smaller between 1947 and 1971 (9%) than between 1971 and 2008 (17%).

New forest established:

- closer to seasonal farmsteads
- with increasing distance from existing forest at greater altitude
- in areas with high solar radiation
- at moisture conditions reflecting mid-slope position
- in flat or slightly sloping terrain

Land use history is reflected in these re-growth patterns. Prior to abandonment, grazing intensity was highest close to the seasonal farmsteads.

In 1947, the distance between forest and the seasonal farmsteads was at least 500 m. Forest occurred at higher elevations than the seasonal farms. Thus, forest growth close to the seasonal farms was not restricted by climate. Growth of forest closer to the seasonal farmsteads in later years and space available for colonization on all curvatures, at all altitudes, in all degrees of wetness and at all levels of solar radiation point to the fact that only grazing could have hampered tree establishment and growth in the vicinity of the seasonal farmsteads.

The regrowth of forest in the vicinity of existing forest indicates that regrowth is mainly based on vegetative reproduction and height growth of existing shrubs. Increasing distance to the old forest and more even distribution of the new forest may mean that establishment and growth of seedlings becomes important as a way of reproduction.

For more information:

https://transfarm-erasmus.eu/

Summer tranhumant farm in Northern Greece. Photo: Maria Karatassiou

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