

5. Fine Spatial Scale Modelling Of Trentino Past Forest Landscape (TRENTINOLAND)

Modélisation spatiale à une échelle fine du paysage forestier passé du Trentin

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Trentino is an Italian Alpine region (about 6200 Km²) with a forest coverage exceeding 60% of its whole surface. In the past, forest landscape has changed dramatically, especially in periods of forest over-exploitation.

Previous studies in some Trentino sub-regions (Val di Fassa, Paneveggio) have identified these changes and the current trend of forest growth at the expenses of open areas, such as pastures and grasslands, due to the abandonment of rural areas. This phenomenon leads to the reduction of the habitats of some endangered species and profoundly affects the ecological features of mountain ecosystems. To be able to monitor and to take future actions about this trend it is fundamental to know in detail the historical situation of the progressive changes on the land use that occurred over Trentino.

The work aims to comprehensively reconstruct the forest cover of whole Trentino at high resolution (5m x 5m pixels) using a series of maps spanning a long period, consisting in historical maps, aerial images, remote sensed information and historical archives. Historical maps include “Atlas Tyrolensis” (dated 1770), “Theresianischer Kataster” (dated 1859) and Italian Kingdom Forest Map (IKFM) of 1936. The aerial imagery dataset includes aerial images taken in 1954, which have been orthorectified during this research, and orthophotos available for years 1973, 1994, 2000, 2006, 2010 and 2016. Remote sensed information includes Landsat and recent Lidar data, while historical archives consist mostly in Forest Management Plans available since around 1950.

The datasets were archived, processed and analyzed using the Free and Open Source GIS GRASS and QGIS. Part of the dataset was digitized manually (historical maps), while supervised classification was carried out on aerial and remote sensed imagery to detect the forest coverage. Quantifying forest change in the timespan of our dataset can be used to perform further analysis on ecosystem services, such as protection from soil erosion, and on modification of biome diversity and to create future change scenarios. We present the current state of this research highlighting achieved results and future challenges.