Holocene trends in European land cover and human demography: regional reconstructions and syntheses

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Abstract

Europe's primaeval forests have been progressively cleared and fragmented since the first appearance of Neolithic farming activities before 6000 years ago. In turn, this has had major consequences for biogeochemical and material fluxes across the landscape, and for lake, floodplain and coastal socio-ecosystems. Reconstructing spatial and temporal changes in land cover, and their causes, is therefore essential to understanding past human-environment interactions; this is a primary goal of the PAGES LandCover6k programme.
We have synthesised natural and anthropogenic land cover changes by transforming multiple pollen records across Europe at 200-year time steps using the pseudobiomization (PBM) approach (Fyfe et al., 2015) and also by a new data-led land-cover classification methodology. These pollen-based results can be compared against proxies for rural population trends within defined regions. Among the demographic proxies are archaeological 14C "dates as data", that can be transformed to generate probability density functions (PDFs)(e.g. Shennan et al 2013). In this presentation we use the catchment area of the river Rhône as a regional case-study to compare and integrate long-term trends population and land cover, and to examine the consequences for landscape (in-)stability. They reveal intra-regional contrasts as well as similarities, both spatial and altitudinal.

The outlined methodology for regional data integration has potential applications elsewhere in Europe and beyond, but requires that data are a) relatively numerous, b) accessible and harmonised (e.g. taxonomically) and c) are spatially congruent. This in turn requires open and coordinated data sharing.

References

Fyfe RM, Woodbridge J and Roberts N (2015) From forest to farmland: pollen-inferred land cover change across Europe using the pseudobiomization approach. Global Change Biology 20, 1197-1212.

Shennan, S. et al. 2013 Regional population collapse following initial agriculture booms in mid-Holocene Europe. Nature Communications, DOI 10.1038/ncomms3486

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