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The potential of pollen-based quantitative vegetation reconstructions in studies of past human settlements and use of resources – examples from Europe

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There is a long tradition of collaboration between palaeoecologists and archaeologists in many parts of the world with the purpose of reconstructing the environment of humans through time and the study of the interactions between humans and their environment. Vegetation (i.e. vegetated landscapes and plants) has long been one of the most important parts of the environment for humans' resources. Thanks to the interpretation of palaeoecological data such as pollen and plant macrofossils, it is well known that humans have used plants for their subsistence and formed many landscapes of the Earth through their activities over many millennia. Pollen analysis in particular has been used to reconstruct the landscapes of humans in order i) to learn something on their use of the landscape for building material, grazing and food (e.g. woods, grazed land, cultivated fields), and ii) to understand their influence on the landscape through deforestation in particular. Pollen data as proxy records of vegetation have been very useful to provide qualitative descriptions of cultural landscapes through time in terms of the presence of major tree, shrub and herb species, and the character of the landscape, wooded, "half-wooded" (or partly wooded), and primarily open (poorly wooded) (1). Efforts to calibrate pollen onto land-use in the 1990ies has made possible to provide more precise and detailed interpretation of pollen records in terms of land-use type (2). However, when it came to questions related to the size of cultivated land or grazed land in relation to wooded land, interpretation of pollen records has been problematic until recently. The non-linear relationship between pollen and vegetation due to inter-taxonomic differences in pollen productivity and pollen dispersion and deposition characteristics of plant taxa has long hampered estimation of the percentage cover of plant taxa or landscape units in the past. Thanks to recent developments in pollen-vegetation modelling, a new approach - the Landscape Reconstruction Algorithm (LRA) (3, 4) - makes it possible to estimate the cover of plant taxa or landscape units at both regional and local spatial scales using pollen records. The LRA has been tested and applied in various types of studies in Europe in particular. Examples from Europe and Scandinavia show that pollen-based quantitative reconstructions of vegetation cover, in combination with other palaeoecological records such as insect and plant macroremains, show the great potential of such studies to provide new insights on the use of landscapes and vegetation by humans in the past and its environmental consequences at both regional and local spatial scales (5, 6). These results provide a new environmental framework for the discussion and testing of hypotheses based on archaeological data.

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