Long term vegetation changes in the Bilina River region, Czech Republic

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Summary: *The Bilina River region has been continuously inhabited since the Palaeolithic. The present study reconstructs the effects of a long term settlement on vegetation in the Bilina River region by means of pollen and anthracological analyses with respect to archaeological data. The anthracological analysis has provided a better potential for recording human induced shifts in contrast to pollen analysis which reflects rather better general trends in plant succession in the region.*

Key words: *anthracology, pollen analysis, Bilina River region, vegetation changes, human impact*

INTRODUCTION/BACKGROUND

The history of human induced changes in the environment is as old as the history of mankind. The Bilina River region including the large (max. extent *ca*. 25 km^2) Komořanské Lake has been continuously inhabited since the Palaeolithic. The study here presented focuses on the environmental changes during the Neolithic to the Medieval period (resp. Atlantic-Subatlantic interval, *ca*. 7000 – 600 BP).

The principal aim is to reconstruct the effects of long term settlement on the vegetation in the study region by the means of pollen and anthracological analyses with respect to archaeological data.

DATA AND RESULTS

The number of archaeological sites was derived using information from the Czech Archaeological Database (Kuna and Křivánková, 2009).

Pollen analyses

In the Atlantic period *Quercus* sp., *Ulmus* sp., *Tilia* sp. and *Fraxinus excelsior* dominated in the vicinity of the lake. *Fagus sylvatica* became one of the steady forest components in the region in the end of the period. The fast entry of *Abies alba* into the region was typical for the Subboreal period (SB). The originally widespread mixed oak forest was gradually replaced by *Picea abies*, *Abies alba* and *Fagus sylvatica*. However, an expansion of *Picea abies* was limited by the better adapted to the local conditions *Picea abies* and *Abies alba*. *Carpinus betulus* appeared in insignificant amounts in this period. A continuous human activity since the SB is evidenced by uninterrupted pollen curves of cereals and other synanthropic plants.

During the Early Subatlantic, vegetation cover was deeply affected by anthropogenic activity. A sudden decrease was noted for *Abies alba*, *Fagus sylvatica*, *Picea abies*, *Quercus* sp. and other woody forest species. Increase of cereals and other synanthropic pollen was recorded.

Fir, spruce and beech were abundant in surrounding forests in the Late Subatlantic along with very common *Carpinus betulus* appearing in the piedmont zones and alder colonizing the swampy periphery of Komořanské Lake.

Anthracological analysis

Anthracological analysis was focused on eight archaeological localities in the study region located at 180-270 m asl. Samples were dated to the Neolithic, Bronze Age, La Tene, Roman and Medieval periods.

Neolithic localities are typical with the presence of *Quercus* sp., *Acer* sp., *Tilia* sp., *Ulmus* and *Fraxinus* excelsior (*Quercetum mixtum*). Samples dated to the Bronze Age are distinctive by the strong dominance of *Quercus* sp. with *Pinus sylvestris*, *Fagus sylvatica*, *Carpinus betulus* and *Corylus avellana* also commonly preserved. La Tene samples are similar to the Bronze Age ones, although *Abies alba*, *Acer* sp., *Ulmus* sp., *Alnus* sp., *Salix/Populus* sp., *Tilia* sp., *Betula* sp. and *Picea abies* reach higher percentages. *Prunus* sp., Rosaceae, Pomoideae and *Cornus* sp. are rarely found.

Oak remains are dominant during the Roman period; however, *Fagus sylvatica*, *Pinus sylvestris*, *Carpinus betulus*, *Abies alba*, *Populus/Salix* and *Corylus avellana* are widespread too. *Fraxinus excelsior*, *Acer* sp., *Alnus* sp., Pomoideae, *Ulmus* sp., *Tilia* sp., *Betula* sp., *Picea abies*, *Juniperus* sp. decline in the corresponding samples. Early Medieval forest can be characterized as a bright oak-hornbeam forest with lower amounts of *Tilia* sp., *Ulmus* sp., *Cornus* sp., *Prunus* sp. and *Frangula alnus*. Higher abundance of *Abies alba*, *Carpinus betulus*, *Fagus sylvatica*, *Betula* sp. distinguish the samples from earlier periods.

Oak and beech prevailed in the High Medieval samples. A large amount of fir, birch, spruce, alder, and poplar/willow was also found.

DISCUSSION

Our study documents evident differences between results of pollen and anthracological analyses. Palynological results are heavily influenced by the origin of a sediment profile gathered from the large lake. Such samples necessarily combine pollen from the extensive and fuzzy spatial scale. In contrast, anthracological analysis shows only the vegetation changes in the vicinity of archaeological sites, deeply influenced by human activities.

Neolithic charcoal assemblages significantly differ from other samples. The species composition occurring in the Bronze Age remains more or less similar until the High Medieval Ages. Oak remains the dominant species with slight fluctuations in abundance over time affecting the abundances of light-demanding trees. Early Medieval samples have similar character as prehistoric samples, but fir, hornbeam, birch and beech reach higher abundances. A significant change was detected in the High Medieval samples, which were influenced by importing timber from the forests at higher altitude. On the contrary, pollen analysis reflects abrupt species succession without any remarkable record of an anthropogenic impact.

CONCLUSION

Analysis of large assemblages of charcoals provides valuable data for the reconstruction of vegetation changes. It provided better potential for recording human induced shifts in contrast to pollen analysis, which reflects rather better general trends in plant succession in the region. This implies the necessity of combining various methods to document an authentic picture of vegetation cover in the past since each single approach tends to overestimate or down weight some studied aspect.