Ecological past of Czechia and Western Norway

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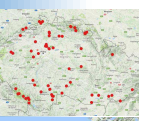


Czechia and Norway are both European countries, sharing macroclimatic parameters and their variation since the last ice age; although, climate of Czechia is generally warmer and dryer. Czechia and Norway have mostly the same species but species that are rare in Czechia are usually common in Norway and *vice versa*. The history and culture are similar from a global perspective but differ in details. Together, Czechia and Norway therefore form an ideal laboratory to study relationships between ecology, climate and culture. Our research shows that the impact by people was smaller in Norway than in Central Europe.

Species Richness of a Small Site

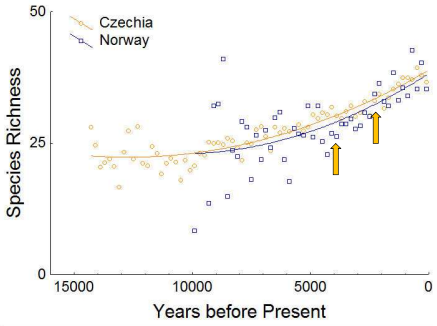
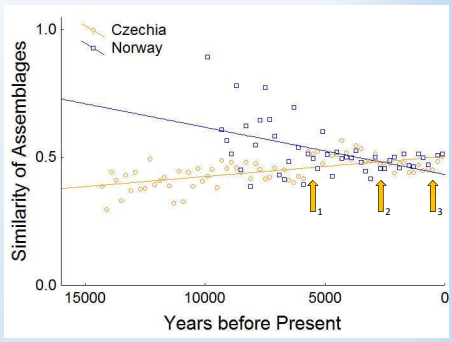


Fig 1: Species Richness (# of species) of a small site (0.3 km^2 in our research) is called alpha-diversity and it is an important ecological parameter showing how many species can coexist at a site. Alpha diversity in Norway is consistently smaller than in Czechia in all periods, which agrees with Latitudinal Diversity Gradient (i.e. decreasing species richness towards poles). Alpha diversity in Czechia shows slight periodicity. In both the regions, we can see significantly smaller species richness than predicted by long term average trend (full lines) during Bronze and Iron Ages (app 4.000 and 2.000 years ago; between arrows).

Similarity between two Assemblages of Plants

The best practice of ecology when one compares two regions is study of similarity indices. The Jaccard index of similarity between two plant assemblages is defined as the percentage of species that are common to both regions or two subsequent periods. We studied average similarity between two Assemblages at plots of 0.3 km^2 at distance 0.3 km.

Fig 2: similarity of two assemblages measured by Jaccard Index has been significantly changing in both the regions. But it is increasing in Czechia and decreasing in Norway towards present (0 at the horizontal axis), meeting each other at about 6,000 years ago. In about 6,000 years ago, arable agriculture was invented to the Czechia, which is indicated by sudden increase in Jaccard index (arrow 1). Since then the development of Czechia and Norway in terms of plant assemblages was similar. The only exception is the Migration Period (app. AD 400 - 570), when Jaccard index in Czechia significantly decreased (between arrows 2 and 3).



Speed of Changes in Assemblages of Plants

In ecology, speed of changes in assemblages is measured by Successional Sequences. Successional sequences are sequences of assemblages that systematically change in time. We distinguish short term successions (several years), long term successions (thousand years) and successions with time span in the middle. We measure speed of succession by dissimilarity (one minus Jaccard Index of similarity) of assemblages that are separated by 50 years. Our research showed that the speed of the changes steadily increased in Western Norway but decreased in Czechia.

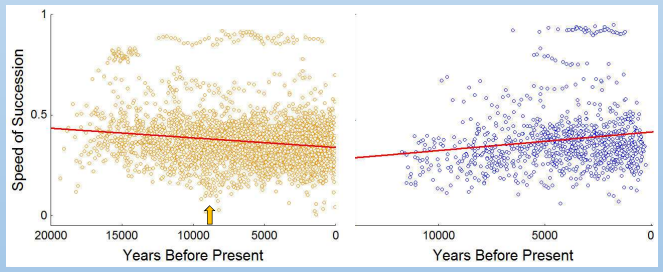


Fig 3: In Western Norway (right), the speed of fifty-years successions has increased since the last ice-age, without noticeable change when people started to modify their environment. This is in contrast to the speed of succession, which has decreased in Czechia (right) since the end of the last ice age. The arrow points at a break in the change of speed at about 8,000 BP.

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