



Reconstruction of spatio-temporal habitat dynamics of the Danube river-floodplain system in the Austrian Machland 1812 - 1991

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The 350-km-long Austrian Danube river section has been changed dramatically by channelization in the 19th century and hydropower plant construction since the 1950s. A research project on the alluvial Machland floodplain (Upper/Lower Austria) is currently striving to reconstruct former habitat turnover (structural habitat regeneration and succession) of the Danube river-floodplain system based on the analyses of historical sources between 1715 and 1991.

The focus is on the question whether - under natural conditions - certain types of habitats experienced a significant trajectory towards higher successional states rather than a limited development due to the strong hydromorphological dynamics that constantly regenerate specific elements of the river landscape. Furthermore, a key issue is the consequences of human interferences on habitat turnover and habitat age. Here, a combined vector/raster GIS approach was employed to model changing habitat area shares and habitat age distributions.

This study points to a dynamic equilibrium between structural habitat succession and permanent regeneration of habitats related to intensive fluvial disturbances prior to channelization. This equilibrium can be referred to as a “shifting habitat mosaic” at a broader spatio-temporal scale. Natural fluvial dynamics not only altered habitat area shares, but also resulted in high habitat age diversities.

The reconstructed age distributions indicate very short life spans of certain aquatic and terrestrial habitat types. Over the long term, the varying intensity of disturbances presumably yielded a range of spatio-temporal patterns of typical habitat compositions and age distributions that was characteristic for the Danube river ecosystem. This balance between destruction, formation and developmental processes contributed to the meta-stability of the overall river-floodplain system and thus represents a primary factor in the ecological integrity of riverine landscapes.

First channelization measures between 1826 and 1838 led to strengthened channel dynamics and partly increased habitat turnover. These processes decreased substantially as river straightening progressed. Today, the Danube river ecosystem in the Machland is characterized by terrestrialization processes and habitat fragmentation, which is expressed in largely missing habitat dynamics and in a considerably increased habitat aging.