Extreme water-level fluctuations determine aquatic vegetation in modified large-river floodplains

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With 5 figures and 2 tables in the text

Abstract: Water bodies in large-river floodplains are typically dominated by aquatic vegetation. The proportion of macrophyte-dominated lakes varies between years, depending on annually different water-level fluctuations within the lakes. We reanalysed aquatic-vegetation inventories made over five decades in floodplain lakes along the Lower Rhine, and related them to summer inundation and drawdown events. We observed a lower probability of submerged macrophyte dominance (lake cover > 20\%) after inundation in summer, with contrasting responses for different species. Lake-bottom exposure during prolonged low water stages had an opposite effect, resulting in an increased probability of dominance by submerged vegetation and a decrease of nymphaeid vegetation. Our results indicate that under the current, hydromorphologically modified, conditions a small proportion of water bodies in the floodplains has abundant aquatic vegetation, unless new sites are repeatedly created which provide opportunities for colonization. The results are important for management as they help in defining the ecological status of floodplain lakes.

Introduction

Large-river floodplains generally harbour a high diversity of plants and animals, linked to the multi-scale transitions between aquatic and terrestrial ecotopes (TOCKNER et al. 2000). Water bodies in floodplains are often characterized by extensive submerged and floating vegetation. These macrophyte-dominated, clear-water lakes may have a great conservation value compared to macrophyte-poor, algal-dominated lakes.

Hydrological disturbance may trigger shifts in shallow lakes between the macrophyte-dominated and the macrophyte-poor state (SCHEFFER 1998). In floodplains along large rivers, disturbance may come from both high- (floodplain inundation) and low-water periods (sediment exposure). Deep and long-lasting in-

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