



## **Spatial and temporal characterisation of the hydrological regime of an unregulated European floodplain meadows with implications for plant communities**

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Floodplains provide numerous essential ecosystem services, including flood attenuation and biodiversity protection. A thorough understanding of the hydrology of wetlands is necessary to assess its impacts on biodiversity. Lowland floodplains along the River Shannon which are largely unregulated, support rare and endangered bird and plant life, and are of ecological importance on a European scale. This study characterises the hydrological regime of this low-nutrient floodplain using three methods and relates these findings to plant communities. Using Shuttle Radar Topography Mission (SRTM) data, a digital elevation model was built for the entire River Shannon catchment. Daily river-level data for the 20-year period 1990-2009 were used to characterise the longitudinal gradient and seasonal dynamics in flooding. Using a differential global positioning system, fine-scale variations in the topography of selected meadows were recorded, and combined with river level data to calculate flood variables within meadows. Detailed digitised flood models allow visualisation of the inundation dynamics of the flood meadows with respect to flood duration. The catchment topography, including a wide flat river basin and low longitudinal gradient of the river, is an important determining factor in maintaining the hydrological functioning of the floodplains. The spatial and temporal variability of the hydrological regime, in conjunction with microtopography, is responsible for plant community composition and species richness. A clear relationship between flood variables and plant community assemblages is demonstrated, whereby flood duration and depth determine species distributions along the floodplain.