

Interaction of hydrological regime and vegetation in a seasonally flooded lake wetland (Poyang Lake) in China

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Hydrological regime has been widely recognized as one of the major forces determining vegetation distribution in seasonally flooded wetlands. To explore the influences of hydrological conditions on the spatial distribution of wetland vegetation, an experimental transect in Poyang Lake wetland, the largest freshwater lake in China, was selected as a study area. In-situ high time frequency observations of climate, soil moisture, groundwater level and surface water level were simultaneously conducted. Vegetation was sampled periodically to obtain species composition, diversity and biomass. Results show that significant hydrological gradient exists along the experimental transect. Both groundwater level and soil moisture demonstrate high correlation with the distribution of different communities of vegetation. Above- and belowground biomass present Gaussian models along the gradient of groundwater depth in growing seasons. It was found that the optimal average groundwater depths for above- and belowground biomass are 0.8 m and 0.5 m, respectively. Numerical simulations using HYDRUS-1D further indicated that the groundwater depths had significant influences on the water usage by vegetation, which suggested the high dependence of wetland vegetation on groundwater, even in a wet climate zone such as Poyang Lake. The study revealed new knowledge on the interaction of hydrological regime and wetland vegetation, and provided scientific support for an integrated management of balancing wetland ecology and water resources development in Poyang Lake, and other lake floodplain wetlands, with strong human interferences.