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RELATION BETWEEN INUNDATION FREQUENCY AND HABITAT CONDITIONS OF FLOODPLAIN LAKES - A CASE STUDY OF THE LOWLAND BIEBRZA RIVER (NE POLAND)

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Abstract

Seasonal flooding of riverine waterbodies is important in maintaining habitat diversity of aquatic ecosystems. This study was aimed at the assessment of habitat status of 161 floodplain lakes adjacent to the Biebrza River in NE Poland in relation to flood frequency within the period 1966–2013, based on remote sensing data from the IKONOS satellite. The parameters of floodplain lakes such as morphometry, hydrological connectivity, water transparency and degree of vegetation cover were selected as the most important descriptors of trophic conditions of floodplain lakes. The results were analysed in relation to the daily flood extent and water depth obtained from 1D hydrodynamic model. The layer of digitalized oxbow lakes and mean flood frequency map were overlaid in ArcGIS 10.1.

The results showed that habitat conditions of oxbow lakes are strongly correlated with inundation frequency and hydrological connectivity with the river channel. The lakes properties were ordinated using Principal Components Analysis (PCA). The ordination showed a strong adverse relationship appeared between the degree of aquatic vegetation cover and water transparency. The inference drawn from our study indicates that both inundation frequency and lateral connectivity of lakes with the Biebrza River channel are the main factors determining the floodplain lakes development. The use of satellite remote sensing appeared as a cost-effective way to obtain generalized information needed for aquatic ecosystems assessments.

Key words: floodplain lake, GIS, inundation frequency, remote sensing, the Biebrza River, vegetation cover, water transparency

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