Variations of fish composition and diversity related to environmental variables in shallow lakes in the Yangtze River basin

Variations in fish communities of shallow lakes in the Yangtze basins were investigated from September 2007 to September 2009. Six lakes were chosen for comparative study of species composition and diversity in relation to environmental variations. Lake heterogeneity was described with environmental physico-chemical variables, using principal component analysis. Sixteen families, composed of 75 species of fish were found in the studied lakes, Cyprinidae being the dominant group. Fish species were divided by habitat preference and trophic guild: benthopelagic and herbivorous fish were the most common guilds in all lakes. Species diversity and richness were significantly higher in spring, while the evenness, expressed by equitability of Simpson's index, was not significantly different among seasons. Species richness and diversity were significantly higher in vegetated lakes (e.g. Liangzihu Lake) than in non-vegetated lakes (e.g. Biandantang Lake), with the largest area (Liangzihu Lake) harbouring the largest species richness and the greatest diversity. The relationship between environmental variables and fish assemblage were analysed using canonical correspondence analysis (CCA). The dominant gradients describing species composition and abundance among the sampling sites were: total phosphorus, total nitrogen, chlorophyll a, transparency and water depth. Our study led to the following conclusions: 1) the water quality was better - i.e. high transparency, low total phosphorus (TP) and total nitrogen (TN) and chlorophyll a- in vegetated lakes than in unvegetated lakes; 2) vegetated lakes had higher fish diversity than unvegetated lakes; 3) fish relative abundance (CPUE: number of fish per fishing pass) was significantly related to water chemical parameters. Consequently, the details of the findings are useful and relevant for developing suitable conservation strategies to sustain the integrity of fish communities in these lakes.

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