



Recent ecological trajectory of lake Taihu and land-use history reconstructed from lake sediment DNA

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More than 80% of shallow lake ecosystems in the Yangtze floodplain suffer significant disturbances from the 50's, especially eutrophication. These environmental degradations and subsequent loss of services are related with the important and rapid development of the agriculture, industry, urban areas and the population boom in the region. Lake Taihu is one of the largest lakes of the floodplain and represents an important water resource (for drinking and fishing) for the population of the two big cities on the lake shore. This lake experimented two shifts toward the degradation of the trophic state: one in the 50-60's and a second in 80's.

In order to document the causes of these ecological shifts, we applied the DNA metabarcoding approach on lake sediments and focused on plants as proxy of land use. Whereas this proxy has been successfully applied in many lakes over the world, it has never been tested in large shallow lakes and not in China either.

We show important changes in land use in 50's and 80's related with agricultural developments (i.e. intensification) and urban expansion, respectively. In fact, in the 50's crop plants are increasing (rapeseed and/or cabbage, rice and/or wheat, barley and *Poaceae*) whereas in 80's, we record the development of several plants associated to gardens (e.g. ornamental species). Moreover, this last period is characterised by the presence of trees mostly cultivated along stream banks to protect dikes against erosion. Between the 80's and the years 2000, the plant diversity recorded in the sediment strongly increase, which may be due to higher detrital inputs (i.e. more efficient DNA transfer). The timing in land-use changes corresponds to the main shifts in lake trophic state.