



The Upper Jordan River Algal Communities are Evidence of Long-Term Climatic and Anthropogenic Impacts

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ABSTRACT

Spatial and temporal algal diversity changes were studied in the major drinking water source of Israel - the Upper Jordan River. During 2006-2009, we found 232 species and infraspecies of algae and cyanobacteria: 85 of which were new for the Upper Jordan River Basin including three new for Israel. During many years of study of the Upper Jordan River, we collected information for the database of algal diversity. Historical analysis from 1883 to 2009 shows fluctuation of the whole algal diversity. Environmental indicator species show peaks in 1951, 1965, 1978, and 2009. Salinity impact was found in 1938 and 2000; acidification was detected in 1938, 1996, and 2000, and organic pollution, in 1996. Therefore, we can conclude that 1938, 1996, and 2000 were critical periods for the Upper Jordan River ecosystem. Indication of the trophic status shows stress of organic pollution since the 1970s, which was marked by dramatic increases in eutraphentic and hypereutraphentic species. The present analysis shows three peaks in the fluctuation in diversity throughout the river canal, which correlated with the organic pollution impact from the Masade village effluence in the middle reaches and near Lake Kinneret. Pollution was significant in rainy winters and stimulated species diversity development. The different approaches in comparing diversity in each river of the Upper Jordan Basin revealed that hydrology is a major regulating factor in species composition of the algal communities, which were formed under the influence of regional climatic factors. Therefore, the river can be highlighted as a natural system with high buffering and a self-purification capacity at the present time.

KEYWORDS

Algal Communities, Bio-Indication, Climate Change, Comparative Floristic, Israel, Jordan River

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