

Impacts of Agricultural Drainage on Trophic Structure in the Coastal Wetlands: A Case Study of Kızılırmak Delta in Turkey

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Aim of the study: The aim of this study is to assess the impact of agricultural drainages have on coastal shallow waters in the Kızılırmak Delta, located in the central Black Sea region of Turkey.

Material and Methods: Within the Kızılırmak Delta area (about 56 000 ha) can be found many shallow lakes, the surroundings wetlands are unique biological resources and highly important for sustaining biodiversity. Delta coastal areas are subject to many types of anthropogenic disturbances. High nutrient concentrations in the coastal waters are derived from external inputs from the watershed. There are many drainage canals connected to the lakes. These coastal lakes typically are located in lowland areas that are readily used for agriculture and other human activities as fishery. Nutrients and different biological components are brought by canals into the lakes. With the increasing water usage and growing population in the delta, ecosystem degradation occurs. Furthermore, the different types of pollution problems occur in the wetlands due to the modern international trade of agricultural chemicals, heavy metals inputs, ubiquitous dispersion of persistent contaminants and changing hydrological cycles, etc. It is targeted in this field study methodology to discuss the steps that have been taken for solution of these issues in order to evolve suggestions that will provide guidance over and support to the action plans developed to ensure consistency of the Delta.

Results: Despite the fact that coastal wetlands are ecosystems with high environmental values, they are actually among the most vulnerable and threatened habitats. Nutrients, sediments and pollutants are washed off the landscape during rain events and often times enter drainage systems that are connected to the Delta aquatic systems. Eutrophication is still a major problem in these shallow waters. Agricultural non-point source pollution is a major contributor to the eutrophication of these coastal systems. Also, various fertiliser applications and other agricultural activities such as pesticide spraying have been linked to losses of the wetland biodiversity. At the end of the ongoing works in the field, physico-chemical results indicated a extremely-eutrophic status for the shallow lakes with a range of chlorophyll-a varied from 40 µg/L (at Balık Lake) to 90 µg/L (at Cernek Lake) as annual average. Unfortunately, there are still significant threats and problems concerning the conservation and management of the shallow lakes. Finally, all authorities must be developed large-scale management strategies to determine long-term trends in water and sediment quality and to relate observed trends to human activities as a basis for informed decision making for that target conservation of these lakes. Preventing or alleviating the problem of trophic structure in the coastal areas requires more efficient monitoring combined with effective pollution prevention strategy. However, it is necessary to continue the monitoring studies on the agricultural drainage pollution effects on the lake trophic status comparatively with other lakes in Kızılırmak Delta before reaching an exact conclusion. For this reason, the use of natural treatment applications for the treatment of agricultural drainage outlets could improve the quality of water discharged into constructed canals and coastal wetlands, since they are very efficient and inexpensive solutions to reduce nutrients.

Keywords: Agricultural Drainage, Eutrophication, Nutrients, Wetland, Kızılırmak Delta.