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1 Climatic and anthropogenic impacts on the hydroecological regime of a large freshwater body

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Hydrological changes may affect many aspects of the environment, such as river channels, riparian and wetland habitats, aquatic communities, as well as human health and welfare. Particularly, the seasonal and interannual water level fluctuations in a large lake are very important hydrologic features that relate to specific environmental impacts and natural disasters, such as wetlands loss and flooding events. In the past four decades, wetlands have undergone devastating stresses as a result of significant hydrologic changes. The latter are primarily caused by the increase in water irrigation demands and the climate change phenomenon. This study attempted to analyze the past climatic and water management alterations in Trichonis Lake, located in W. Greece, to quantify the exact impacts on the surrounding wetlands that belong to the NATURA 2000 protection network. Statistical elaboration of rainfall and water level time series have been applied, including regression analysis and Cumulative Sum method, to identify relevant past trends while remote sensing and GIS techniques have been used to map and illustrate the past and present morphological conditions of the riparian area. The temporal changes in the regional water management scheme such as the alterations in irrigation demands during the last 40 years have been also taken into consideration. Thus, a comparative assessment occurred between the estimated alterations in rainfall and anthropogenic water abstractions to identify the contribution of each one of these factors on the measured water level fluctuations in the lake and the associated wetlands extent changes during the study period. The results indicated that the observed decrease in the wetland area depends mainly in human activities such as

the expansion of agricultural land in the catchment, the development of a large scale irrigational network to meet the increasing water demands and the unsustainable water management strategies. These factors have led to both direct and indirect wetland loss through the extension of cropland over the riparian zone and by introducing adverse hydrologic conditions such as the significant interannual water level decrease and the fast seasonal hydrologic transitions. Particularly, after the construction of the irrigational infrastructure in the area, water level in Trichonis Lake presented a 2m decrease, which has led in drying up 3% of the lake's riparian zone where the ecologically important wetlands exist and has permanently reduced the water storages in the lake over 6.6%. Furthermore, the high annual water abstractions to meet the increasing irrigation needs raised the average annual and maximum monthly water level fluctuations to 1m 0.5m respectively while during the period April-October the lake's water level falls over 0.6m. The climate change patterns that have been identified in the area concern a slight decrease in rainfall, which indicated relatively lower impacts on the wetlands since the associated hydrologic transitions are relatively limited in temporal and spatial basis. Therefore, there is an urgent need to develop and implement an integrated environmental management plan in this lake catchment to eliminate the anthropogenic impacts and improve the hydrologic regime, which will contribute in the preservation of these significant wetlands.