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ASSESSING THE ANTHROPOGENIC IMPACTS ON THE FLUVIAL WATER AND SEDIMENT FLUXES INTO THE THERMAIKOS GULF, NORTHERN GREECE

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Abstract

The impacts of anthropogenic activities on the water and sediment fluxes in coastal areas have caused significant economic and environmental damages over the last century. The development of large-scale water abstraction and sediment retention infrastructures has facilitated phenomena such as coastal erosion, frequent eutrophication events and sea water anoxia. The present work investigates the alterations that have been observed over the last 50 years in the area of Thermaikos Gulf, Northern Greece, with emphasis on water overexploitation impacts on the coastal system. For this purpose two different water management scenarios have been set up; one prior and one after the significant human interventions in the Thermaikos Gulf catchment (includes Aliakmonas and Axios river catchments). The hydrodynamic model ‘MIKE SHE’, and the RUSLE sediment erosion model have been used in order to quantify and assess the human impacts on the water and suspended sediment discharges into the Inner Thermaikos Gulf, according to the aforementioned scenarios. The results indicated that both water and sediment discharges have severely diminished, with reductions reaching approximately 51 and 90% for the Axios River as well as 39 and 76% for the Aliakmon River, respectively. Agricultural and hydropower production activities with the associated dams are the main actors of these impacts. As a result, the natural system has started responding with subsidence and coastal erosion, frequent eutrophication events and sea water anoxic conditions. Inevitably, this leads to economic losses for other users of the local ecosystem services, such as aquaculture farmers, fishermen and tourists.

Key words: coastal zone, fluvial suspended sediment, impact assessment, integrated management, river discharge

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