Assessing the impact of a tidal power plant operation on sedimentary organic matter characteristics in Lake Shihwa (South Korea)

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ABSTRACT

The artificial Lake Shiwha located close to the Yellow Sea, one of the most polluted areas in South Korea, is typically under the strong anthropogenic pressure with the continuous organic matter inputs from industrial, urban, rural and reed wetland areas. The Shihwa tidal power plant was built in 2011 to improve the water quality in Lake Shiwha. In this study, we aimed to disentangle diverse organic matter sources in lake sediments and thus to assess the impact of the Shihwa tidal power plant on sedimentary organic matter characteristics in Lake Shiwha. For this purpose, we investigated sediments collected from four streams flowing into Lake Shihwa in 2016, surface sediments collected at three sites in Lake Shihwa in 2009, 2012 and 2016, and sediment cores collected at the same sites in 2009 and 2016. We applied both bulk (contents of total organic carbon (TOC) and total nitrogen (TN), δ13CTOC and δ15NTN) and molecular (concentrations and δ13C of n-alkanes) parameters. Our results indicate that stronger anoxic conditions prevailed in Lake Shiwha in 2009 than in 2012 and 2016. Accordingly, it appears that the construction and operation of the tidal power plant influenced the sedimentary organic matter characteristics in Lake Shiwha, by improving the water circulation and thus the water quality.

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