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Analysis on impacts of the Three Gorges Reservoir on water temperature in the middle reach of the Yangtze River

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Water temperature, a crucial environmental factor, has a direct impact on almost all ecological and biogeochemical processes. The hydrological and thermal regimes in the Yangtze River have changed greatly due to the constructions of the Three Gorges Reservoir (TGR). To quantify the impact of TGR on the water temperature regime, we present a regression-modeling framework to reconstruct the temporal pattern of flow and temperature variation along the middle reach of the river in the absence of the TGR. By comparing reconstructed water temperatures to observed water temperature for the post-impounded period, the influence of impoundment on water temperature was estimated. Results show that TGR has had a greater impact on water temperature than natural changes in air temperature and discharge. The reservoir acts as a source of cold water in spring, summer and autumn and a warm source in winter. The results of this study illustrate the pronounced effect of the TGR on the temperature regime of the Yangtze River. We hope this study could provide a scientific reference for ecological operation of TGR facing biological conservation.

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