

Significant Contribution of Wastewater Treatment Plants to Dissolved Carbon Loading in China's Major River Systems

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Rivers are essential to the global carbon cycle, serving as conduits for substantial carbon fluxes. However, with rapid economic development and population growth, rivers are now receiving vast quantities of wastewater, which includes significant amounts of dissolved carbon. The contribution of this carbon fraction to the watershed's overall carbon dynamics is often overlooked, as the proportion of dissolved carbon fluxes from wastewater to the total riverine dissolved carbon export remains uncertain and subject to change. Here, we review of previously published data with regard to effluent dissolved organic carbon and dissolved inorganic carbon concentrations, and estimated mass inflows of dissolved organic carbon and dissolved inorganic carbon from wastewater treatment plant effluents in seven major river basins of China. The dissolved inorganic carbon concentrations in effluent water generally range from 31.34 to 67.08 mg C/L (5th to 95th percentile), with a median of 44.23 mg C/L. In comparison, dissolved organic carbon shows a wider range from 2.91 to 17.08 mg C/L (5th to 95th percentile), with a median of 7.28 mg C/L. In China's seven major river basins, urban effluent contributes nearly 7% of the total DIC and 4% of the total DOC exports to rivers in the East Asian region. Effluents from these seven basins account for an average of 12% of the total DIC and 16% of the total DOC exports. These findings underscore the significance of effluent-derived dissolved carbon in both regional and global riverine carbon accounting.