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Urban rivers are hotspots of riverine greenhouse gas (N₂O, CH₄, CO₂) emissions in the mixed-landscape chaohu lake basin

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Growing evidence shows that riverine networks surrounding urban landscapes may be hotspots of riverine greenhouse gas (GHG) emissions. This study strengthens the evidence by investigating the spatial variability of diffusive GHG (N₂O, CH₄, CO₂) emissions from river reaches that drain from different types of landscapes (i.e.,

urban, agricultural, mixed, and forest landscapes), in the Chaohu Lake basin of eastern China. Our results showed that almost all the rivers were oversaturated with dissolved GHGs. Urban rivers were identified as emission hotspots, with mean fluxes of $470 \mu\text{mol m}^{-2} \text{d}^{-1}$ for N_2O , $7 \text{ mmol m}^{-2} \text{d}^{-1}$ for CH_4 , and $900 \text{ mmol m}^{-2} \text{d}^{-1}$ for CO_2 , corresponding to similar to 14, seven, and two times of those from the non-urban rivers in the Chaohu Lake basin, respectively. Factors related to the high N_2O and CH_4 emissions in urban rivers included large nutrient supply and hypoxic environments. The factors affecting CO_2 were similar in all the rivers, which were temperature-dependent with suitable environments that allowed rapid decomposition of organic matter. Overall, this study highlights that better recognition of the influence that river networks have on global warming is required-particularly when it comes to urban rivers, as urban land cover and populations will continue to expand in the future. Management measures should incorporate regional hotspots to more efficiently mitigate GHG emissions.

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