



Wetlands as a large carbon source for inland waters

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Recent estimates suggests that up to 3 PgC y⁻¹ could be emitted as CO₂ from global inland waters, offsetting the carbon uptake by terrestrial ecosystems. It is generally assumed that inland waters emit carbon previously fixed upstream by land plant photosynthesis and subsequently transported downstream with runoff. But the observed carbon fluxes from first-order streams do not account for all of the CO₂ outgassing at the scale of entire watersheds. Three-quarters of the world's flooded land are temporary wetlands. However, the contribution of these productive ecosystems to the inland water carbon budget has been largely overlooked. Based on observations in rivers and floodplains of the central Amazon, we suggest that wetlands pump large amounts of atmospheric CO₂ into river waters. Indeed, the magnitude of CO₂ outgassing in Amazonian waters is spatially and temporally related to their connection with the semi-aquatic vegetation that performs aerial photosynthesis (Flooded forests and floating macrophytes). These wetlands export half of their gross primary production to waters as dissolved CO₂ and organic carbon, compared to only a few percent of gross primary production in upland ecosystems. Global carbon budgets should explicitly address temporary or vegetated flooded areas, as these ecosystems combine high aerial primary production with a large and fast carbon export capacity, potentially supporting a significant fraction of CO₂ evasion from inland waters.