

CO₂ exchange between the atmosphere and terrestrial waters - Case studies in the Ganges, Brahmaputra, and Meghna rivers

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In the context of the carbon cycle, terrestrial water is typically considered as the horizontal export of carbon from the continents to the ocean. Also, recent studies reported significant vertical exchange of abundant CO₂ between the terrestrial water and the atmosphere. Thus in order to capture the whole picture of terrestrial water in the carbon cycle, CO₂ exchange between the waters and the atmosphere remains open. However, the study areas with regard to CO₂ exchange have not been evenly distributed geographically in the world. In addition, the effect of biogeochemical processes in the water to CO₂ partial pressure (*PCO₂*) in the water has not studied well.

In this study world largest rivers flowing in Bangladesh were investigated: the Ganges, Brahmaputra, and Meghna rivers. These rivers originate from the high Himalaya, the region having high rates of uplift. Reflecting such geological settings, the river waters showed an active chemical weathering of carbonate. Although chemical weathering consumes CO₂, higher *PCO₂* values were observed in the river water than the atmospheric level. Through the spatial and seasonal variations of *PCO₂* and dissolved matters in this study, we propose that soil respiration, which supply CO₂ to the water, is the dominant factor controlling river water *PCO₂*, while in situ biological activity has a minor impact on river water *PCO₂*.

Keywords: PCO₂, river, weathering, soil respiration, Bangladesh, carbon cycle