River-floodplain interactions: nutrient concentrations in the Lower Paraná River

Carlos A. Villar¹*, Laura de Cabo², Panchabi Vaithiyathan³ and Carlos Bonetto¹

Instituto de Limnología “Dr. Raúl A. Ringuelet”

With 3 figures and 4 tables in the text

Abstract: Changes in water chemistry along the lower 500 km stretch of the Paraná River were assessed. The water composition of the river and of a representative floodplain marsh were compared. Short-term changes in nutrient concentrations were monitored in marsh enclosures filled with river water in order to simulate the nutrient dynamics under floodplain inundation. Experiments were performed by resuspending river suspended matter (SM) in synthetic river water acidified to floodplain pH values and short term changes in soluble reactive phosphorus (SRP) and calcium recorded. Marsh water exhibited strong depletions of oxygen and nitrate. Dissolved free CO₂ was an order of magnitude higher and pH lower than in river waters. In the marsh, the net heterotrophic metabolism below the water surface seems to be the most plausible explanation for such features. The lack of a significant downstream increase in nitrate concentration in the river, in spite of large cultural inputs, was consistent with the low nitrate concentrations observed in marsh waters and the fast nitrate disappearance in enclosure experiments, suggesting large losses by denitrification. A decrease in SM along the Lower Paraná River would indicate high sediment retention within the floodplain. Calcium, bicarbonate, and soluble reactive phosphorus (SRP) concentrations were higher in the marsh than in the river. High marsh SRP concentrations are likely to originate from the weathering of river SM upon sedimentation, in response to the reducing and acidic marsh environment. The observed release of calcium and SRP upon acidification of SM is consistent with the higher contents observed in the marsh. Downstream increases in calcium, bicarbonate, and SRP along the river course.

* Becario CIC.
³ Duke University Wetland Center. 16139 Okeechobee Blvd. Loxahatchee, FL-33470, U.S.A.
DOI:10.1127/archiv-hydrobiol/142/1998/433
(c) 2015 www.schweizerbart.com

0003-9136/98/0142-0433 $ 4.50
© 1998 E. Schweizerbartsche Verlagsbuchhandlung, D-70176 Stuttgart