

Biogeochemical Processes in Water-Soil Interface in Mboro littoral wetlands from Senegal

Kaba M¹., Mesnage V²., Laignel B²., Faye S¹.

1 – Cheikh Anta Diop University Geology Department BP 5005 Dakar-Fann Senegal

2 –Normandie University UNIROUEN, UNICAEN, CNRS, M2C, 76 000 Rouen, France

Corresponding Author: mariama.kaba@ucad.edu.sn

Wetlands are ecosystems rich in plant and animal biodiversity where the water remains the determining factor. In Senegal, “Niayes” are depressed wetlands where the groundwater table is shallow. This coastal strip is characterized by a Sudanian-Sahelian climate in the south to Sahelian in the North. It contains 80 % of the national horticultural production and therefore contributes to the socio-economic growth of the country. These highly vulnerable wetlands are however threatened by high anthropogenic pressure as well as climatic and environmental changes associated with the development of the agricultural and mining sectors. Thus, to maintain this ecosystem and preserve natural resources, it is important to understand its hydrogeological and biogeochemical functioning. The study area is Mboro, a wetland in the Southern part of the North Littoral, with sampling stations on the versant, center and bottom areas of the depression. The objective of this study is to understand the bio-geochemical processes in the water-sediment interface by specifically (i) determining the sedimentological and mineralogical facies, (ii) evaluating quantitatively and qualitatively the organic matter, (iii) identifying forms of phosphorus and quantifying nutrient fluxes at the water-sediment interface (iv) linking water chemistry and soil quality of these wetlands.

The Mboro sediments are essentially silty-sandy. The Dissolved Organic Carbon content is higher on the surface, 710, 202 and 158 mg/l, respectively, of the Niaye versant, center and bottom stations. Furthermore, the maximum concentrations of Particular Organic Carbon are recorded in the central zone reaching 34 % in depth. The diffusion flows of PO₄ are more important on versant and center areas while NH₄ rates are higher in the bottom zone. Iron bound phosphors are generally dominant over those associated with calcium and organic matter. This zone is thus subjected to various biogeochemical processes such as reduction of iron and sulfate, ammonification and high bacteria activity. It has an important mineralization and a richness of nutrients on the versant area, a central zone is rich in organic matters and a bottom area dependent to the fluctuation of the groundwater. This system operates in a heterogeneous way according to the geographical position, the intrinsic conditions of the environment and contributes to better management of coastal and agricultural wetlands.

Key words: Wetlands - Biogeochemistry - Hydrochemistry - Organic matter - Littoral - Senegal