ABSTRACT

PERRINE MANGION

The rapid population growth and associated activities has dramatically increased the nutrient delivery to coastal waters thereby threatening coastal ecosystems with eutrophication. Fortunately, part of these nutrients is retained by coastal wetlands, such as mangrove systems, that help in maintaining water quality and prevent coastal eutrophication. This ecosystem function could be particularly useful in the surroundings of coastal African cities that lack adapted wastewater treatment systems and typically discharge their sewage in creeks lined by mangrove forests. However, many questions remain to get the full picture of how the phytoremediation function works in mangrove environments and of the ecological consequences of sewage discharge on mangrove biota. Moreover, methods to trace anthropogenic N inputs and to assess their impact on mangrove ecosystems are required. This PhD research thus investigated the carbon oxidation mechanisms and nitrogen cycle in peri-urban and pristine mangrove settings and also used carbon and nitrogen stable isotopes of mangrove biota as an indicator of environmental conditions and anthropogenic influence. The main achievements of the present work were:

(i) a confirmation that natural peri-urban mangrove systems can act as a sink for dissolved inorganic nitrogen.

(ii) a better understanding of the potential filtering function of mangrove ecosystems and the processes involved. Denitrification was stimulated by nutrient enrichment but accounted for limited N-removal (12 – 19 %) of DIN inputs in the sediment. Thus most of the dissolved inorganic nitrogen was removed through other processes such as sediment retention or trees and/or phytoplankton uptake.

(iii) a contribution to the description of the different carbon oxidation pathways in peri-urban and pristine mangrove which didn't appeared affected by these amounts of nutrient loadings.

(iv) the demonstration that δ15N of mangrove leaves, sediment and epifauna could be used as an ecological indicators of sewage discharge in mangrove environments.