ABSTRACT

Spatial and Temporal Variability of Soil and Water Quality Parameters in Relation to Vegetation Zonation in a Tropical Estuarine Swamp

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Coastal wetland vegetation ecosystems are important tropical habitats forming an interface and buffer between the land and ocean. Due to degradation, restoration is often needed which requires an understanding of vegetation ecology and of abiotic and ecohydrological regimes in these ecosystems. This thesis attempts to quantify mangrove density and boundary change between 1962 and 2009 in the tropical Godineau swamp using aerial photos. The research (i) compared measurements of surface water quality for two river channels (2 km and 6 km) emanating from the tropical wetland and from forest/agricultural land respectively as well as (ii) related the soil properties in a selected field to vegetation communities present. Using a novel geophysical approach, a spatially exhaustive river/estuarine salinity dataset was collected. Water quality parameters: salinity, pH, dissolved oxygen (DO) were compared with vegetation surveyed along the course of the rivers to determine relationships between plant zonation and water quality. Comparisons with plant zonation were also made for soil properties (salinity, pH, particle size, bulk density, redox, water content, electrical conductivity of the soil solution extract and pore space) at the wetland field site.

Results show that apparent electrical conductivity (ECa) was higher in the 2 km channel (27.11 to 31.78 dS/m) than in the 6 km channel (17.76 to 27.11 dS/m) while pH and DO levels were lower in the 2 km channel than in the 6 km channel due to higher levels of decomposition in the stagnant shorter channel. Of the three mangrove species, the red mangroves (*Rhizophora mangle*) were observed to be best adapted to a range of salinity. Analysis revealed that salinity is a major soil factor that differentiates vegetation communities. Additionally grasses thrived at higher elevations and salt levels while sedges dominated under lower elevations and salt levels. In conclusion, vegetation distribution was dependent on the spatio-temporal variation of salinity.

Keywords: Tropical wetland; Vegetation zonation; Electrical conductivity; Electromagnetic induction; Geophysical methods