



Hydrological and geomorphological controls on a mangrove forest maintenance during the dry season in the Pacific Coast of Nicaragua

Heyddy Calderon (1,2), Ruben Weeda (), Stefan Uhlenbrook (1,3)

(1) UNESCO-IHE, Water Sciences and Engineering, Netherlands (h.calderonpalma@unesco-ihe.org), (2) 2. Nicaraguan Aquatic Resources Research Center at the National Autonomous University of Nicaragua (CIRA-UNAN). P.O. Box 4598. Managua, Nicaragua, (3) 4. Delft University of Technology, Section of Water Resources, P.O. Box 5048, 2600 GA Delft, The Netherlands

Hydrological and geomorphological processes are key to mangrove forest growth and development. However, very few studies have been carried out in Central American mangroves to understand their hydrological functioning. Here, a small mangrove forest (0.2 km²) in the South Pacific coast of Nicaragua was investigated to determine sources of freshwater inputs and fluxes of water and nutrients to the sea during the dry season. The general groundwater flow direction is from NE to SW towards the sea. The aquifer is composed of clay and alluvial deposits overlying a fractured shale unit. Shallow groundwater is influenced by a nearby town through infiltration of grey water and pit latrines. Groundwater from the mangrove showed Mn²⁺ and Fe²⁺ presence indicating occurrence of denitrification and the role of the mangrove as a nutrient sink. Also, refreshing and salinization processes were identified near the river, indicated by different water facies. Freshwater inputs from precipitation and groundwater discharge maintain adequate salt gradients. The water balance showed an increase of around 619 m³ d⁻¹ in storage during a 22 study period during the dry season, which is reflected by increased hydraulic heads and river stage. Water storage is fostered by low conductivity soil materials and beach ridges parallel to the coast line, whereby the latter occasionally breach due to overtopping of surface water. These conditions favor forest subsistence during the dry season, allowing the mangrove to continue to provide ecological and economic benefits in terms of protection against flooding, habitat for numerous species and tourist attraction.