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Water uptake by trees of coastal forested wetlands in Guadeloupe, French West Indies.

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In the Caribbean islands, coastal wetlands comprise two main ecosystems: the mangrove forest and the freshwater swamp forest dominated by the legume Pterocarpus officinalis. These forest ecosystems make an interface between sea and land, providing significant ecological and socioeconomic functions. During the last centuries, human activities have modified the hydrologic connections of these wetlands by digging canals to drain waterlogged soils and by cutting forests to promote cattle grazing and waterfowl hunting. Peat formation is associated to the highest water-table levels. The thickest peat deposits occur seaward as a result of the Holocene marine transgression into Pleistocene coastal plains and estuaries. Landward, soils overlay volcanic or calcareous bedrocks and are mainly clayey. Such differences in soil formation and physical characteristics (especially porosity) confer to the system its hydraulic properties. Furthermore, the dual origin of water (tides and watershed runoff) gives way to a complex pattern of groundwater salinity.
In five forest stands of Guadeloupe wetlands, we have traced water uptake using the stable isotopes of water (d18O and dD). Preliminary results reveal that evapo-transpiration process in the swamp forest is compensated by fresh groundwater coming out from springs scattered around and inside the forest. In the mangrove forest, the highest evaporation rates are located in the Avicennia pure stand and the mixed scrub stand; the mixed tall stand is located where fresh and salt water melt. Measurement of xylem sap also suggests that mangrove trees uptake groundwater where salinity is the lowest. The low tidal range and the absence of large watershed, like in most wetlands of Caribbean islands, certainly explain the poor hydro-dynamics and resilience of the system.