Assessing the effects of aquatic pollution on Rhizophora mangle in Jamaica

A comparative study

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Increasingly, coastal areas are being lost to urbanization and mangroves are not being spared. It is estimated that over one-third of the world's mangrove forest have been lost since 1950. However, mangroves provide important ecosystem services such as habitat for many birds, crustaceans, snakes, and mammal species. Mangrove forests act as a barrier and protect coastlines from storms and waves by lowering their intensity as well as attenuating sediment. Several studies have highlighted the role of mangrove forests as a valuable natural carbon sink. Furthermore, several recent studies have shown mangroves' potential for remediating polluted waters. Here, we present a comparative study between a mangrove forest located at the outflow of a wastewater treatment plant in Montego Bay, Jamaica and a pristine mangrove forest in Port Antonio, Jamaica. This study aims to answer the following questions: (1) Are there differences in water chemistry and tree function between both sites? (2) Are there changes along a land-to-sea transect that can be attributed to the mangrove trees in each site? (3) Does nutrient availability influence transpiration rate? To answer these questions, I collected water and soil samples along a land-to-sea transect at each site. Three trees at each site were instrumented to continuously record temperature, humidity, and transpiration. Results show higher phosphate concentration in water and soils at Montego with maximum values of 0.98 ppm and 1.32 ppm, respectively. Additionally, soil in Portland is higher in calcium carbonate with values ranges between 15 and 28 % whereas Montego Bay's soil is higher in organic matter (19 to 39%), reflecting differences in the geologic settings at each site. Although Montego Bay has visible pollution, mangrove transpiration at each site was very similar. As countries put in place plans to decelerate the impact of climate change, protecting coastal ecosystems is a crucial part of attaining sustainability.

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