

## Assessment of Hydrologic Response of a Naturalized Tropical Coastal Mangrove Ecosystem Due to Land Cover Change in an Urban Watershed

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**Abstract :** Mangrove forests thriving in intertidal zones in tropical and subtropical regions of the world offer a range of ecosystem services including carbon storage and sequestration. They can regulate the detrimental effects of climate change due to carbon releases two to four times greater than that of mature tropical rainforests. Moreover, they are effective natural defenses against storm surges and tsunamis. However, their proliferation depends significantly on the prevailing hydroperiod at the coast. In the Philippines, these coastal ecosystems have been severely threatened with a 50% decline in areal extent observed from 1918 to 2010. The highest decline occurred in 1950 - 1972 when national policies encouraged the development of fisheries and aquaculture. With the intensive land use conversion upstream, changes in the freshwater-saltwater envelope at the coast may considerably impact mangrove growth conditions. This study investigates a developing urban watershed in Kalibo, Aklan province with a 220-hectare mangrove forest replanted for over 30 years from coastal mudflats. Since then, the mangrove forest was sustainably conserved and declared as protected areas. Hybrid land cover classification technique was used to classify Landsat images for years, 1990, 2010, and 2017. Digital elevation model utilized was Interferometric Synthetic Aperture Radar (IFSAR) with a 5-meter resolution to delineate the watersheds. Using numerical modelling techniques, the hydrologic and hydraulic analysis of the influence of land cover change to flow and sediment dynamics was simulated. While significant land cover change occurred upland, thereby increasing runoff and sediment loads, the mangrove forests abundance adjacent to the coasts for the urban watershed, was somehow sustained. However, significant alteration of the coastline was observed in Kalibo through the years, probably due to the massive land-use conversion upstream and significant replanting of mangroves downstream. Understanding the hydrologic-hydraulic response of these watersheds to change land cover is essential to helping local government and stakeholders facilitate better management of these mangrove ecosystems.

**Keywords :** coastal mangroves, hydrologic model, land cover change, Philippines

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