(86)

Wetland Degradation and Impacts on Ecosystem Services: A Case Study from Bellanwila-Attidiya Wetland and Boralesgamuwa Lake in Colombo District

Ranasinghe R.R.[1]*, Wickramasinghe D.D.[1], Maltby E.[2], Witharana A[1], Dharmarathne G.[3]

[1]Department of Zoology and Environment Sciences, University of Colombo, Colombo 03, Sri Lanka
[2]School of Environment Sciences, University of Liverpool, United Kingdom
[3]Department of Statistics, University of Colombo, Colombo 03, Sri Lanka
**rasadarii96@gmail.com*

Abstract

Wetlands are productive ecosystems and provide valuable Ecosystem services (ES) to society. They provide fresh water, flowers, fisheries, fuel, educational value, recreational value, tourism, and mental relaxation. Urban wetlands are increasingly threatened by human activities impacting their quality and quantity. Alterations in the structure and function of wetlands can affect their ability to provide ecosystem services. Against this background, the current study investigated the effects of Land Use and Land Cover (LULC) changes on ESs in the Bellanwila-Attidiya (BA) wetland and Boralesgamuwa Lake, two significant ecosystems of the Colombo wetland network. This study examined the LULC of BA wetland and Boralesgamuwa Lake and their surroundings over two decades, from 2000 to 2020, using remote sensing and the Geographical Information System (GIS). Questionnaire surveys with 100 local residents and six national experts with research experiences with regard to wetlands were performed to asses ESs, which were analyzed using Principal Component Analysis. The results revealed the drastic transformation of natural areas into other land uses in the wetlands. In BA wetland and surroundings, settlements have expanded by 3.73% at the expense of paddy fields and open areas that have reduced by 3.94% and 0.65% respectively. Similarly, the provision of ESs has been changed, which was identified through statistically analyzed communities' perceptions of ESs of wetlands. The results indicated that provisioning services (freshwater, fisheries, fiber, and medicine) and cultural services (aesthetic, recreational, and religious values) have significantly changed over time. Clear trends of changes in LULC could be observed within the Boralesgamuwa Lake and its surroundings as well, where the extent of water bodies and open areas has increased by 22.41% and 5.51%, respectively, at the expense of vegetation and paddy fields, which have decreased by 27.18% and 1.05%, respectively. Similarly, the delivery of ESs has been affected over the years in response to public perception. Statistical analysis of public responses indicated that the provisioning of food, fresh water, fiber, fisheries, and aesthetic and historical values have significantly changed in Boralesagmuwa Lake over time. This study, where public perception was a major concern, clarifies the relationship between land use and ESs and emphasizes the importance of getting community input for wetland conservation and management initiatives.

Keywords: Urban wetlands, Land use and land cover change, Ecosystem services, GIS, Public perception