

Economic Valuation of Blue Carbon Stocks in Madu Ganga Estuary: Present and Future Scenarios

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Climate change is affecting planet Earth and it is a crucial environmental problem. Carbon storage and sequestration are two of the most important ecosystem services which contribute to mitigating climate change. Major blue carbon ecosystems such as mangroves, salt marshes, and sea grasses have a high capacity for storing and sequestering carbon. Madu Ganga wetland which spans over 990ha is a mangrove dominant area in southern province, Sri Lanka. The carbon sequestration and storage potential of such wetlands can be measured remotely, and such information are vital as Madu Ganga wetland is rapidly undergoing land use and land cover changes due to human activities and settlements. A study was conducted therefore to estimate the economic value of blue carbon in the Madu Ganga estuary for past, present and future scenarios (2002-2032) of Land Use Land Cover (LULC) changes. Madu Ganga wetland is with high abundance of human activities especially recreational activities. Multispectral satellite images from USGS Earth Explorer were used to map LULC changes in Maximum likelihood classification method. In LULC mapping, Google earth pro and LULC data from survey department were used as resource materials. Raster outputs resulting from InVEST Coastal blue carbon model were used in estimating carbon storage and sequestration in 2002–2032. Outputs revealed that carbon stock for the study area is 1,580.67, 1,841.33, 782.33, and 608.22 Mg CO₂e/ha respectively for 2002, 2012, 2022, and 2032. From 2002 to 2022, mangrove and marsh cover decreased by 8.22% and 11.54% respectively. Net carbon sequestration was revealed as 282.98, –1094.10, and –176.32 Mg CO₂e/ha respectively for 2002–2012, 2012–2022, and 2022 – 2032 time period. The economic value for net carbon sequestration was a benefit of 50778.27 \$/ha for 2012 and a cost of 258451.12, 422881.78 \$/ha for 2022 and 2032 respectively. This study highlights the importance of coastal ecosystems for climate change mitigation and finance. Accordingly, the government can develop appropriate policies and plans to manage, invest and to gain profit.

Keywords: Carbon Storage and Sequestration, Economic Value, Ecosystem services, InVEST Model, LULC Changes