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Carbon Loss Estimation Using Remote Sensing and GIS

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Abstract

Background: By the development process in any forest area losses of carbon stock in terms of above ground biomass and below ground biomass is obvious. Different methods already been used to quantifying these losses in past by many authors at different locations in the globe. Satellite data and carbon vector map were used to estimate deforestation and carbon stock losses in Brazil's Amazonian Settlements [1]. Remote sensing [2], multispectral remote sensing [3] and Land use patterns [4] were used in different locations by some authors to estimate carbon losses for deforestation.

Objective: In this paper Remote Sensing and Geographical Information System (GIS) have been used to estimate the carbon losses as a case study: Little Andaman where more than 35% land area has been planned to use for making a greenfield coastal city to compete with Singapore and Hong Kong.

Methodology: Landsat 8 satellite data of the study area has been collected from United States Geological Earth Explorer (UGSG) [5]. Supervised image classification maximum likelihood technique has been used to find the land use and land cover (LU/LC) date set of the study area. Another data set for carbon stock of Andaman and Nicobar Island was prepared from the Carbon Stock Report [6] of India State of Forest Report (ISFR) 2019. From these two data set total carbon stock for the study area has been calculated. QGIS, free open source software, was used for classification and designing maps.

Result and discussion: Overall accuracy of the classification was 81.4532 and kappa coefficient was 0.7656. Total 3135.634 tonnes carbon stock losses have been calculated considering 245.5 sq. km area from the east and west coast of the island for the development process. Maximum 2356.231 tonnes carbon might be loosed from the Evergreen / Semi Evergreen forest.

Future Work: In future if NITI Aayog placed the final layout of the development plan then more accurate estimation may be carries out for better environment impact assessment. To increase the kappa coefficient value future work can be done with more expertise in procedure.

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