Climate Change and Blue Carbon: Above-Ground Carbon Stock of Mangroves in the Lower Volta Area

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ABSTRACT

Mangroves and other blue carbon systems are under high pressure due to population pressure and coastal development. The continuous degradation of mangroves leads to the loss of the carbon stocks stored in the mangrove ecosystem. In this study, GIS based analysis using Landsat images and allometric equations were used to estimate the above-ground carbon stock of mangroves in the Lower Volta area in Ghana. The Landsat images were classified to obtain the mangrove area. An ASTER GDEM covering the mangrove was calibrated to obtain mangrove heights and the above-biomass and above-ground carbon stock was estimated using a global allometric equation. The study identified socio-economic factors that influenced mangrove exploitation as well as assessed the willingness of local residents to use Liquefied Petroleum Gas (LPG) as an alternative energy source. The carbon stock for the study area in 2014 was estimated to be 269,379.5 Mg and the carbon stock per hectare was found to be 50.102 Mg. A time series analysis of changes in carbon stock revealed that the study area has lost 161,428.65 Mg of its carbon stock between 1991 and 2014.The results indicated that increased income, commercial supply of fuel wood and supply of fuel wood for domestic use were significant factors that influenced the exploitation of mangroves. The local residents preferred mangroves as an energy source and were less likely to use LPG as an alternative due to price and safety considerations. It is recommended that all major stakeholders contribute towards the effective management and protection of the mangrove resource.

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