

Abstract

# Assessment of carbon stock and its relationships with forest conditions in the leasehold forest user groups (A case study from Nawalpur district)

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**Abstract:** Introduction and implementation of REDD+ (Reduced emission from the deforestation and forest degradation) program has resulted in investigation of forest carbon from local to global scale. Being the most productive terrestrial ecosystem, forest plays an important role in mitigating climate change as it acts as the major carbon store. Leasehold forestry (LF) is a participatory model of forest management whereby patches of degraded forest are handed over to groups of poor household to improve forest condition and to reduce poverty. Plantation of grasses in forest floor and plantation of fodder species and promotion of natural regeneration by the removal of shrubs have contributed towards increased plant diversity and higher economic return in leasehold forest. This improved condition of forest might significantly increase the environmental services provided by the forest including carbon sequestration. However studies on quantification of carbon stock in leasehold forestry is lacking. This study aims to quantify the carbon stock in leasehold forest and analyze its relationship with forest condition and disturbances. Study will be carried out in Nawalpur district as this district has a long history of implementation of leasehold forestry. A total of 10 leasehold forests (five *Shorea robusta* forest and five *Schima-Castanopsis* forest) will be selected and field level data will be collected from concentric sample plots by taking 0.5% of sampling intensity in each forest. At each plot, field inventory will be carried out to gather information on biomass of leaf litter, herbs and grass, regeneration status (species and its number), sapling status (species and diameter at breast height (dbh)) and status of trees (species name, dbh, height and quality). Disturbances mainly grazing, lopping and fire present on the plot will be noted. From this data, above ground carbon stock of leasehold forest will be quantified by following allometric equations. Forest condition will be assessed by calculating regeneration density, sapling density, tree density and plant species diversity. Variation in carbon stock between two forest types will be examined using t-test. Further, relationship of carbon stock with forest condition and disturbances will be examined by using multiple regression model. This study will provide baseline information on potentiality of leasehold forest in carbon sequestration which will help in realizing the role of leasehold forestry in mitigating climate change.

**Keywords:** carbon stock; diversity; leasehold forest; Nepal

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