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Forest and land use mitigation and adaptation in Sri Lanka

Aspects in the light of international climate change policies

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ABSTRACT

As a developing island nation, Sri Lanka is vulnerable to the possible impacts of climate change. The land use and forestry sector accounts for a large part of Sri Lanka's greenhouse gas emissions and can play a major part of Sri Lanka's strategy to mitigate and adapt to climate change. Data and information on land use and forests in terms of area extent and carbon stock variability between different ecosystems is limited in Sri Lanka. The research conducted and presented in this thesis was motivated by a shortage of data on these aspects.

The overall objective of this thesis is to primarily analyze environmental parameters and secondly to investigate livelihood aspects of forest and land use to evaluate the climate mitigation and adaptation potential in the land use and forestry sector in Sri Lanka. Specific objectives were to; investigate the environmental status and participatory views and aspirations on land use and forest cover change; estimate structural characteristics and above ground biomass carbon stocks for various forest ecosystems and land uses and to estimate a historical reference level to estimate the costs and earnings for implementation of reducing emissions from deforestation and forest degradation in Sri Lanka. An additional objective were to explore the potential of and barriers to including forests and land uses in climate mitigation schemes while securing multiple environmental and economical benefits for local land users. Data were collected during three periods of field work between 2006 and 2011 in different parts of Sri Lanka and consists of an assessment of soil and well water salinity, biomass carbon estimations as well as participatory assessments and spatial analysis of land use changes.

Results show that vulnerable coastal areas could be rehabilitated through Afforestation and Reforestation Clean Development Mechanism using coconut trees or homegardens. This is due to their multi-purposes and carbon sequestration potential as well as the role they play in environmental protection. Also, there is a large range in above ground biomass carbon stock between forest types and homegardens with a high variation of carbon stocks within forest types. This variation is due to the heterogeneity of forest ecosystems as well as different forest usage in the recent past causing variations in successions. Calculating carbon stock depends on the allometric equation used, included variables and adaptation to the specific life zone. Forest conservation policies have had a positive effect on forest cover through reduced encroachment and reduced illegal felling of timber in forests around two protected forest areas. Simultaneously the process has threatened the livelihoods of many local people around the forests. The forestry sector in Sri Lanka has a large mitigation potential, but reference level setting for reducing emissions from deforestation and forest degradation is hampered by erratic, few, and often incompatible forest inventories that lower the potential to describe past forest carbon content in a credible way. Accordingly, Sri Lanka needs further work and assistance in the form of technical advice and capacity-building for monitoring the nation's forest resource and the drivers of deforestation.

The findings presented in this thesis can contribute to a better understanding of potential options and approaches that Sri Lanka can use to realize its climate change mitigation and adaptation potential in the land use and forestry sector.

Keywords: Carbon stock, biomass, forest, land use, deforestation, Sri Lanka, REDD+, CDM