



Effect of Future Changes in Shrublands' Composition and Management Changes on Carbon Stocks, Carbon Sequestrations, and Greenhouse Gas (GHG) Fluxes: Alternative Mitigation Scenarios for the Regional Administrative Council of Dire Dawa, Ethiopia

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Increased reliance on forests for energy, income generation and construction constitutes a growing threat to the physical integrity, richness, biological diversity and productivity of woodlands and shrub lands of Dire Dawa administration. Furthermore, cultivation for subsistence agriculture places intense, competing demands on the remaining vegetation of the administration. Global greenhouse gas emissions from forests, either as a result of deforestation or forest degradation, account for nearly 20% of annual global carbon dioxide emissions. In an effort to stem this contribution to CO₂ levels, and thereby to complement the Climate Resilient Green Economy (CRGE) strategy of Ethiopia, payment for ecosystems services (PES) initiatives, such as the reduced emissions from deforestation and degradation (REDD) and other mechanism, have considerably elevated the interest in forest carbon monitoring in the country, resulting in an increased demand from national and sub-national forest management programs to quantify GHGs emission and reduction levels from their jurisdiction.

This paper presents field inventory results of the existing vegetation resources over the regional administrative council, and an evaluation of GHG emissions and reduction potentials of the business as usual (BAU) as well as alternative forest development and management pathways for the Dire Dawa administrations' forestry sector, over the period of the second Growth and Transformation Plan (GTP) of Ethiopia (2016-2020). Accordingly two sets of reference (BAU) forest land use and management scenarios and six alternative future forest land use and management scenarios (mitigation scenarios) are developed by downscaling changes from macro-scale global environmental change assessments to the regional and sectoral level. The "prescriptions" for the alternative mitigation scenarios considered include, but not limited to, the use vacant socio-ecological niches (homestead & school forestry), preserving existing forests (i.e. avoiding deforestation), rehabilitation of extremely degraded shrub lands, etc. Subsequently an assessment of the resulting differentials in carbon storage, carbon sequestration, and fluxes of carbon dioxide (CO₂), owing to potential implementations of the BAU and alternative future forest LU and management scenarios, are evaluated quantitatively from these scenarios using a spreadsheet carbon accounting tool that incorporates properties of forest management activities integrated with the forest LU projections developed. The BAU and alternative forest land use and managements projections are now fully integrated within the administrations' regional Growth and Transformation Plan (GTP) of the forestry sector, serving as bases to analyze potential GHG impacts of forest based land use and management strategies across the region.