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Soil and water related forest ecosystem services and resilience of social ecological system in the Central Highlands of Ethiopia

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In the central highlands of Ethiopia, deforestation and forest degradation are occurring and accelerating during the last century. The high population pressure is the most repeatedly mentioned reason. However, in the past 30 years researchers agreed that the absence of institutions, which could define the access rights to particular forest resources, is another underlying cause of forest depletion and loss. Changing forest areas into different land use types is affecting the biodiversity, which is manifested through not proper functioning of ecosystem services. Menagesha Suba forest, the focus of this study has been explored from various perspectives. However the social dimension and its interaction with the ecology have been addressed rarely. This research uses a combined theoretical framework of Ecosystem Services and that of Resilience thinking for understanding the complex social-ecological interactions in the forest and its influence on ecosystem services. For understanding the history and extent of land use land cover changes, in-depth literature review and a GIS and remote sensing analysis will be made. The effect of forest conversion into plantation and agricultural lands on soil and above ground carbon sequestration, fuel wood and timber products delivery will be analyzed with the accounting of the services on five land use types. The four ecosystem services to be considered are Supporting, Provisioning, Regulating, and Cultural services as set by the Millennium Ecosystem Assessment. A resilience based participatory framework approach will be used to analyze how the social and ecological systems responded towards the drivers of change that occurred in the past. The framework also will be applied to predict future uncertainties. Finally this study will focus on the possible interventions that could contribute to the sustainable management and conservation of the forest. An ecosystem services trade-off analysis and an environmental valuation of the water regulation and soil erosion control services will be made to propose solutions for increasing the social-ecological system resilience of Menagesha Suba forest.