

Biodiversity and ecosystem functioning under different land management regimes -Case study in grazing lands in northern Ethiopia

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Biodiversity improves ecosystem functions such as productivity and soil erosion resistance, while loss of biodiversity induces decrease of ecosystem functions through several pathways, depending on the state of functional diversity and process of species loss. However, no prior research conducted on application of positive relationship between biodiversity and ecosystem functioning to grazing land management under framework of sustainable land management (SLM). In northern Ethiopia, severe vegetation degradation and soil erosion have been induced by free grazing in communal lands, where pasture lands have been continuously grazed all year round. Recently seasonal grazing has been proposed as alternative grazing management system to mitigate grazing impact on lands. However, little is known about the effectiveness of seasonal grazing on land conservation through altering biodiversity and ecosystem functions.

Here we addressed the following research question; "how do the differences in grazing management regimes affect ecosystem functions through the changes of biodiversity?" and conducted a field investigation (1) to compare biodiversity (species and functional traits) between free grazing and seasonal grazing systems and explore non-random process of biodiversity loss, (2) to compare ecosystem functions between those systems and explore non-linear process of changes of ecosystem functions, (3) to analyze trade-off/synergy between ecosystem functions and identify key species/functional groups that play key roles in maximizing bundle of ecosystem services, and (4) to compare above results in grazing system with those in tree plantation system, which has been causing land use conflict in grazing land. This paper introduces the outline of the survey and preliminary results of comparison of species and functional diversity between two grazing management regimes.

Keywords: Biodiversity, Functional diversity, Ecosystem functioning, Sustainable land management, Free grazing, Seasonal grazing