Ecosystem services of church forests and wetlands: supporting rural human well-being in Lake Tana Basin, Ethiopia

Department of Natural Resources, Faculty of Geo-Information and Earth Observation, University of Twente

Tegegne M. Sitotaw

Abstract

The Lake Tana Biosphere reserve (6,935 km^2) is the most economically, historically and environmentally important headwater catchment of the Upper Blue Nile River System. This landscape comprises of isolated patches of natural forest, wetlands, communal grasslands, agricultural lands and eucalyptus woodlots. This biosphere reserve is one of the 250 most important lake areas in the world for biodiversity that provides ecosystem services supporting human well-being. This study focuses on the ecologically important ecosystems of church forests and wetlands of the Lake Tana Biosphere reserve that provide multiple services to people. Most of the remaining patches of natural forests are found surrounding the churches and the wetlands are distributed around the periphery of Lake Tana and estuaries. Rapidly growing population, environmental and social changes adversely affect the characteristics of local ecosystems. Consequently, the widespread alteration and fragmentation of the natural land cover became the greatest threat to the ecosystems. Ecosystem fragmentation, overexploitation of natural resources, overgrazing, and alien species (*eucalyptus* and *water hyacinth*) lead to significant reduction of ecosystem conditions and loss of ecosystem services and affect human well-being. There is lack of information and methods on the links between ecosystem condition and flows of ecosystem services from isolated ecosystems in space and time. This study will address this gap in four steps. First, an assessment of ecosystem condition will be carried out by combining measures of condition indicators to understand the ecosystem's capacity to generate services. Remote sensing and ground-survey information will be used to assess the ecosystem conditions of church forests and wetlands. Six relevant ecosystems services such as raw materials (reeds), pasture for livestock grazing, climate regulation, pollination, erosion control and tourism will be assessed. Second, this study will explore the best way to define and assess the spillover effect of ecosystem service flows from the two conservation ecosystems to the adjacent areas. Third, spatiotemporal ecosystem condition changes for the last 40 years will be quantified and mapped to evaluate the protection and management effectiveness. And lastly, scenarios for policy and ecosystem condition changes for the next 30 years will be developed to model impact on ecosystem services. Spatial assessments of the supply of ecosystem services from current and future ecosystems are valuable for policy and decision-making processes regarding the conservation and use of natural resources.