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# Agricultural development and biodiversity in the Great Lakes of Africa

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## Abstract

Competition for land is increasing as a consequence of the demands for food and commodities and for conserving biodiversity and ecosystem services. Land conversion and the intensification of current agricultural systems continues to lead to a loss of biodiversity and trade-offs among ecosystem functions. Stakeholders need to understand these trade-offs in order to better balance different demands on land and resources. There is an urgent need for spatially-explicit information and analyses on the effects of different trajectories of human-induced landscape change on biodiversity and ecosystem services.

This paper presents a novel framework that can be implemented at multiple scales to evaluate priorities for conservation. This includes spatially-explicit consideration of the drivers of land use change, including population change, trends in commodity markets and agricultural production. Scenarios applied in a land-use change model were used to project plausible futures of landscape change due to likely changes in these drivers. Modelled land use/cover scenarios were then used to assess the potential future status of biodiversity, the impacts on biodiversity and on ecosystem functions in the landscape. The magnitude of projected changes in biodiversity and ecosystem functions can subsequently inform the prioritisation of conservation actions.

The framework has been applied in the Great Lakes region of Africa using regionally specific scenarios developed in consultation with local stakeholders. The potential impacts and variability of predicted land use change, were assessed for (a) biodiversity, a metric based on the distribution of suitable habitat for species in the region, and (b) the (change in) potential of a watershed to provide ecosystem functions.

Results highlight the watersheds with the highest and lowest potential impacts on biodiversity and ecosystem functions under future scenarios of land use change. Analyses at multiple scales, under different scenarios, enables the influence of scale on decision making outcomes to be assessed. Such results aim to support decision makers in (a) assessing and visualising likely future impacts on biodiversity and ecosystem functions, (b) assess trade-offs and (c) make more informed choices balancing conservation and development needs.

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