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Agricultural development, biodiversity and ecosystem services in the Lake Victoria Basin

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Competition for land is increasing as a consequence of the demands for food and commodities and for conserving biodiversity and ecosystem services. Land conversion, in particular forest loss and degradation, continues to lead to a loss of biodiversity and trade-offs among ecosystem services, with mostly negative outcomes for local livelihoods. Decision makers need to understand such trade-offs in order to better balance different demands on land and resources. Therefore, there is an urgent need for spatially-explicit information on the effects of different trajectories of human-induced landscape change on biodiversity and ecosystem services.

In this study we developed a novel framework to evaluate priority areas for action to support conservation and development, and applied it to the Lake Victoria basin (LVB) in East Africa, covering parts of five countries. It includes spatially-explicit consideration of the drivers of land use change, including population change, trends in commodity markets and agricultural production. Regionally specific scenarios up to 2050 developed in consultation with local stakeholders and quantified with a global economic model (IMPACT) were used as inputs into a land-use change model to project plausible futures of landscape change due to likely changes in these drivers. Model runs were implemented for different forest protection levels based on current and future assumptions about protected areas and their effectiveness. Modelled land use/cover scenarios were then used to assess the potential future impacts on biodiversity and ecosystem services in the landscape.

Our results show that depending on protected area coverage and effectiveness, the impacts on forest conservation at the national scale vary, with forest loss actually increasing in some of the LVB countries when protected area coverage was set at its highest. Furthermore, our results highlight areas within the LVB with the highest and lowest potential impacts on biodiversity and ecosystem services under future scenarios of land use change and different forest protection levels. Such results can support decision makers in (a) assessing and visualising where pressure on biodiversity and ecosystem services is likely to be highest, (b) assessing potential trade-offs and (c) making more informed choices balancing conservation and development needs.