Agricultural development, biodiversity and ecosystem functions
A case study in the Lake Victoria Basin

Aims:
- Explore future projected impacts on biodiversity and ecosystem functions from land use change under plausible socioeconomic scenarios
- Identify current and potential future areas of focus to inform activities of conservation and other stakeholders in relation to potential impacts of major commodity markets on biodiversity and ecosystem functions.

Introduction
Land conversion and intensification of existing agricultural systems seem unavoidable and likely to result in loss of biodiversity and ecosystem functions. There is an urgent need to understand trade-offs between land uses, and to provide such information to stakeholders.

Method
- Analysis at watershed scale in the Lake Victoria Basin.
- Four socio-economic scenarios developed in a regional workshop.
- Current and future land use (Fig. 2) based on LandSHIFT model (Shaldach, et al., 2011) at 5km resolution.
- Biodiversity importance and biodiversity change based on IUCN species ranges and habitat affiliations linked to modelled land use (IUCN, 2016).
- Ecosystem function provision based on established links to land use (Kienast et al., 2009).
- Results shown are for ‘Herd of Zebra’ scenario only.

Analytical Framework
This study uses a novel analytical framework combining future scenarios with land use modelling, to evaluate spatially explicit priorities for conservation or other actions, in order to balance demands on land.

Results
- Results showing biodiversity importance (Fig. 3) and biodiversity loss (Fig. 4), based on birds, amphibians and mammals.
- Ecosystem function provision (Fig. 5) and change in ecosystem function provision (Fig. 6) based on commodity provision, wild provision and regulating services.

Biodiversity
- High biodiversity importance is characterised by:
  - High number of endemic or restricted range species
  - Diversity of land cover/use types
- High ecosystem function provision (2005) is characterised by:
  - High biodiversity importance

Ecosystem Function Provision
- High ecosystem function loss (2005-2050) is characterised by:
  - High biodiversity in baseline (2005)
  - Expansion of agricultural land (arable and grazing) in the watershed (2005-2050)

Web based tool
A web based tool was developed to visualise results for different scenarios. See: http://macarthur.unep-wcmc.org

Conclusions
- A novel approach to assess trade-offs between agricultural development and biodiversity in the future.
- High resolution land use change model driven by regionally developed scenarios and spatially explicit information on multiple values of biodiversity.
- Analytical framework highlights areas of interest and potential future pressures to be used by donors and other stakeholders to focus conservation or other activities.

References

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