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AGRICULTURAL DEVELOPMENT, BIODIVERSITY AND ECOSYSTEM SERVICES IN THE LAKE VICTORIA BASIN

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Introduction

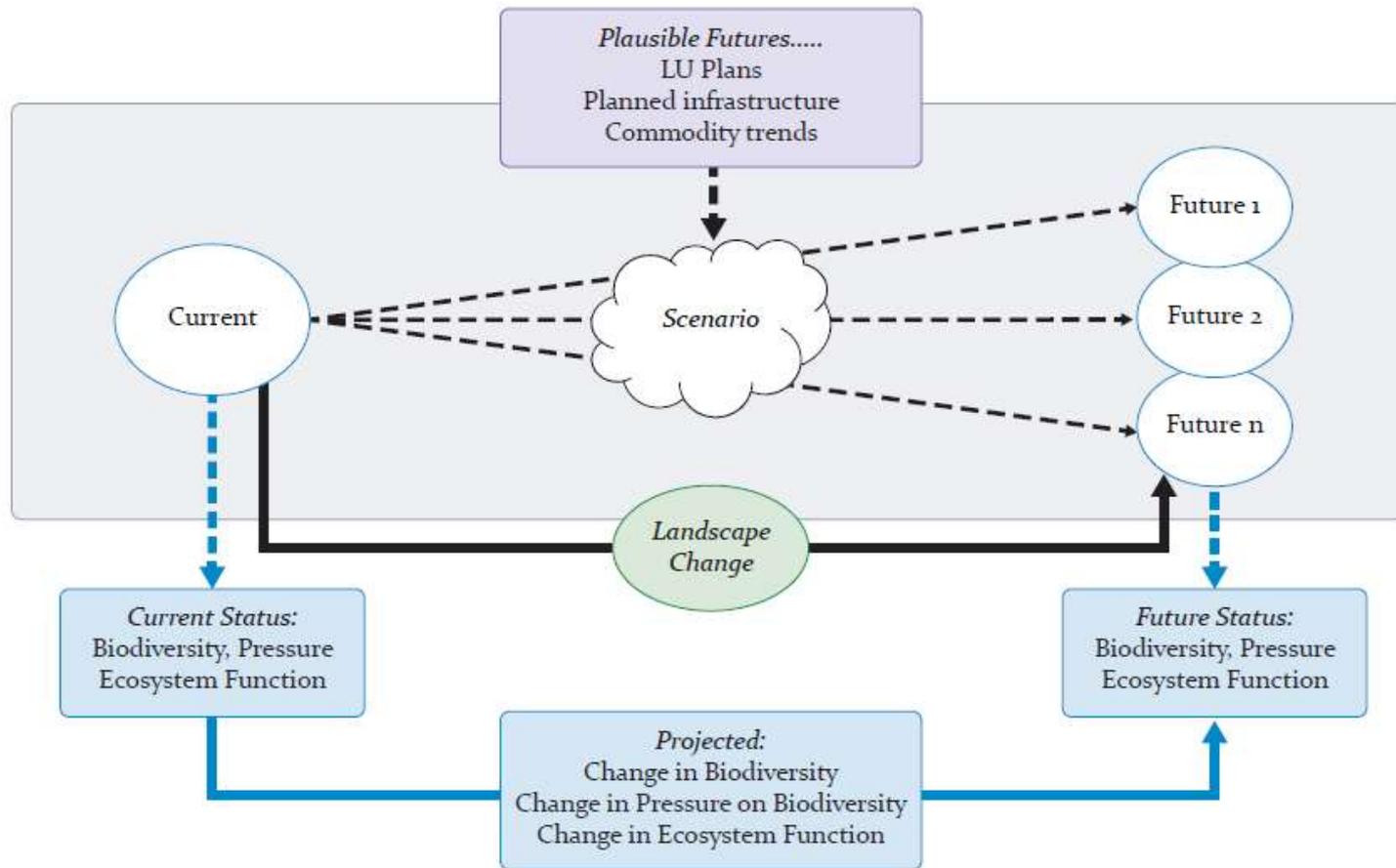
Context

- Lake Victoria Basin (LVB) covers parts of five countries
- LVB declared "area of common economic interest" and "regional economic growth zone" by the EAC
- Agriculture main economic sector in the region
- 25% of Key Biodiversity Areas and ecosystem services under threat from deforestation, overexploitation and poor land use practices



Legend
■ The Lake Victoria Basin
□ countries
■ Lake Victoria

Conceptual framework

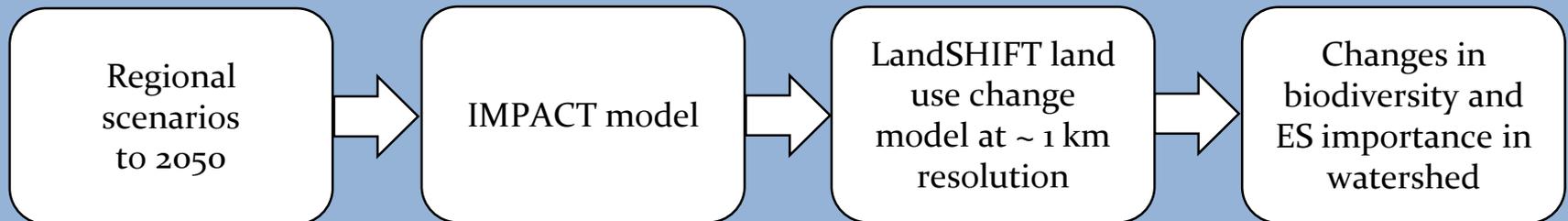


Scenarios and modelling change

Method and data

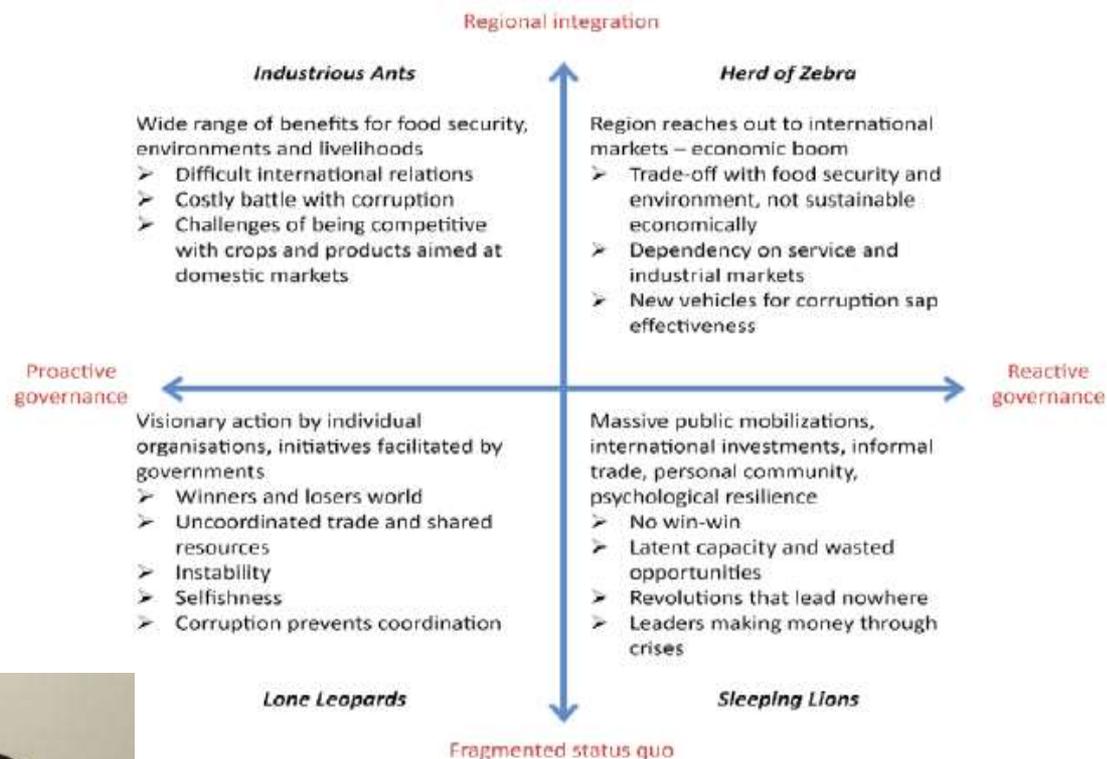
- Current and future land cover simulated using LandSHIFT land use change model (Schaldach et al., 2006)
- Initial land cover based on GLC2000 (Bartholome and Belward, 2005)
- Regionally developed scenarios, quantified by IMPACT model (Rosegrant et al., 2011)
- Biodiversity importance based on IUCN species ranges, habitat affiliation (IUCN, 2015) and modelled land cover
- Ecosystem services importance based on landscape functions approach (Kienast et al., 2009)
- Analysis carried out at watershed scale

Analysis flow chart



Socio-economic scenarios

- 4 regional stakeholder developed scenarios
- Developed in collaboration with CGIAR-CCAFS



Participants of the East African Scenarios workshop 2013.
Image: CCAFS



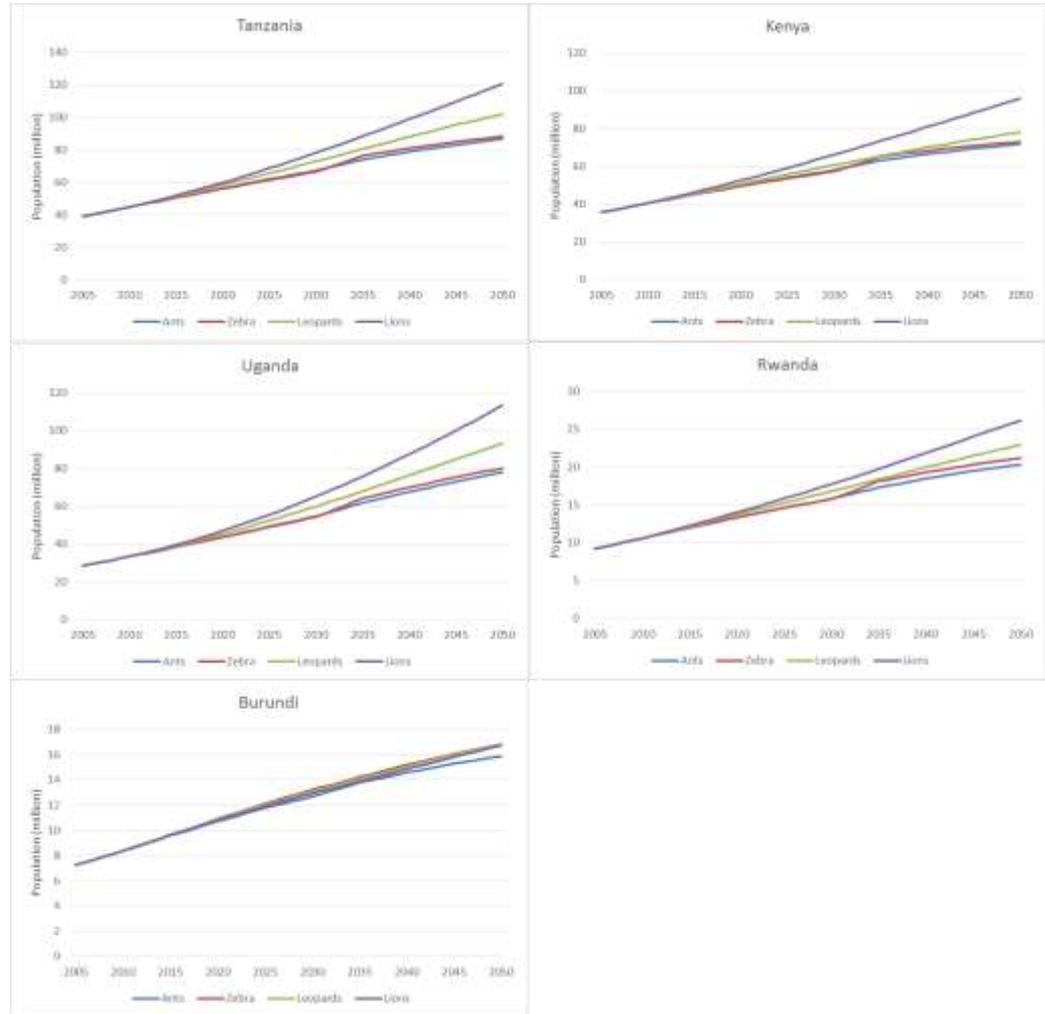
RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



Quantifying the scenarios

Population changes

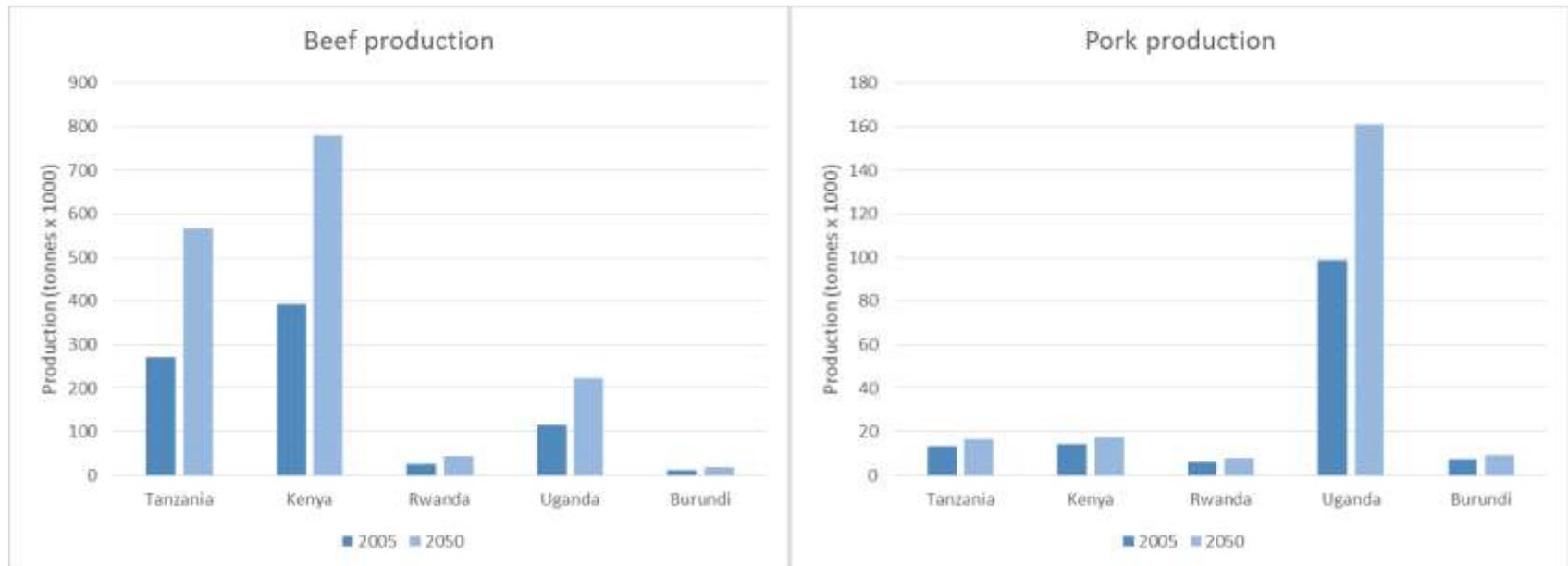
- Population for all countries set to nearly double by 2050
- Only Burundi showing slowing trend towards end of scenario period
- Large differences between scenarios



Quantifying the scenarios

Dietary changes

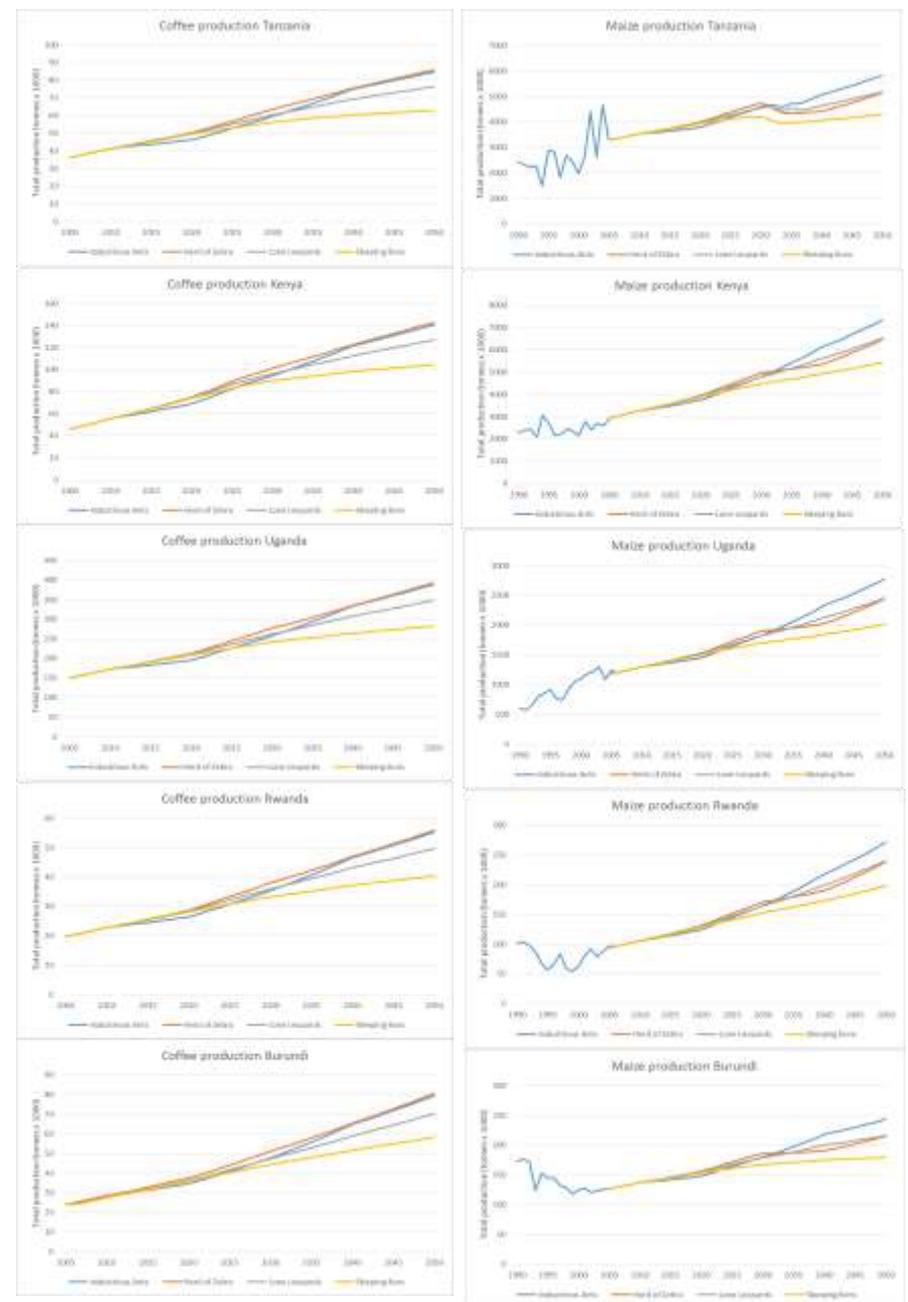
- Projected nearly doubling of meat production in some countries will require increase in grazing land



Quantifying the scenarios

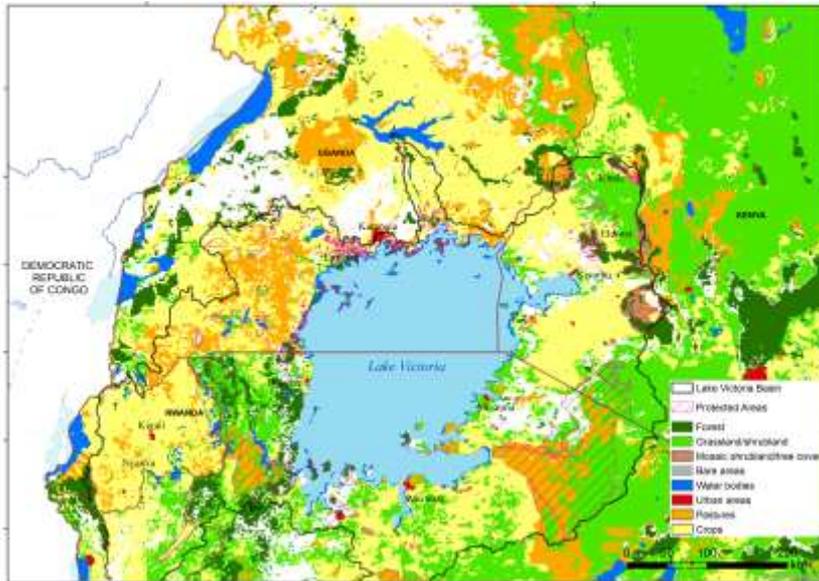
Crop production

- Different scenarios have different trajectories for crop production
- Scenarios include a large drought event around ca 2020
- For some crops projection range not larger than recent inter-annual variability
- Climate change in some cases increases crop production

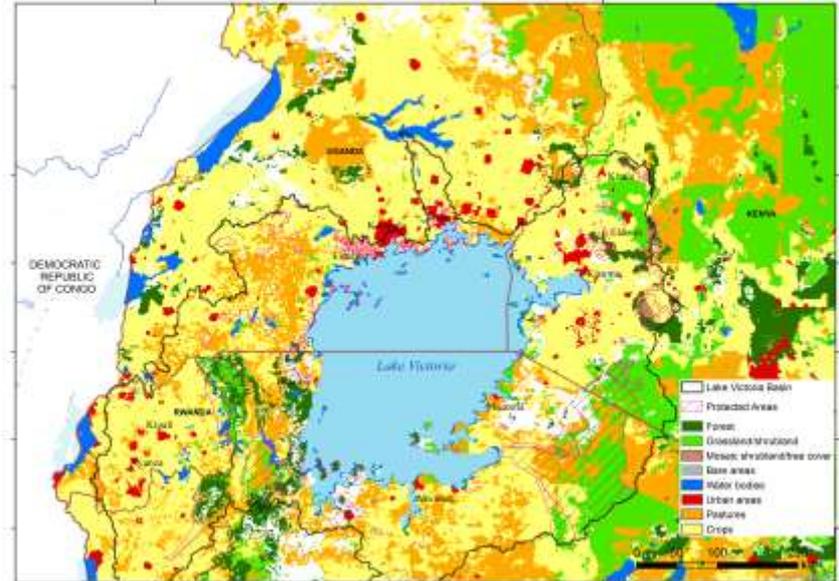


Results

Projected land use changes



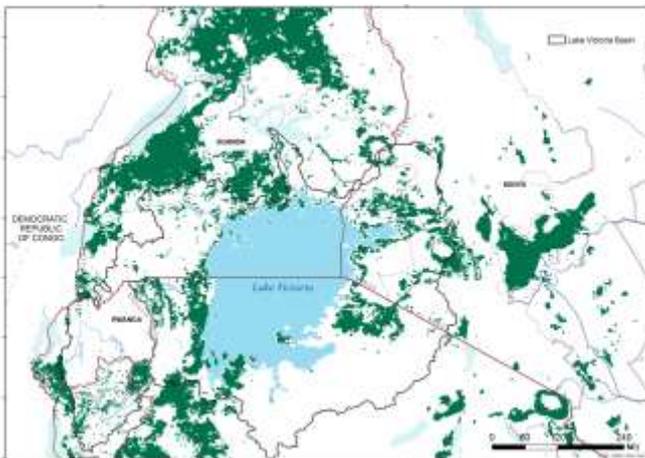
Baseline (2005)



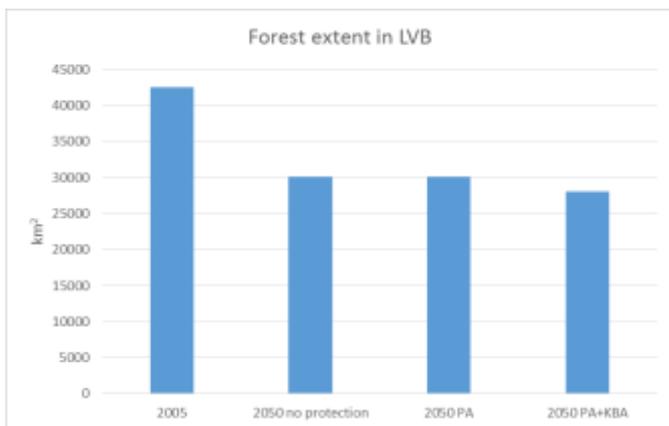
Projected 2050 Sleeping Lions scenario

Results

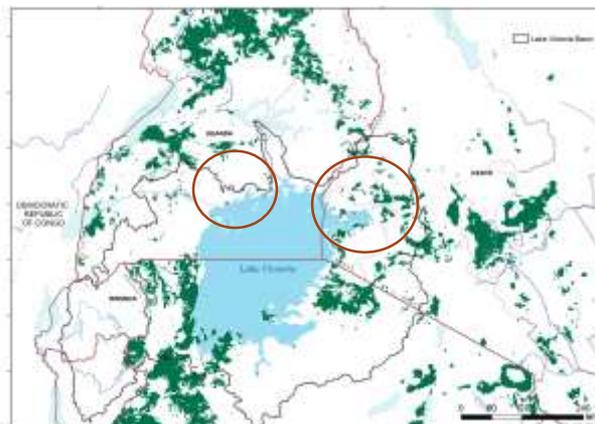
Projected forest loss



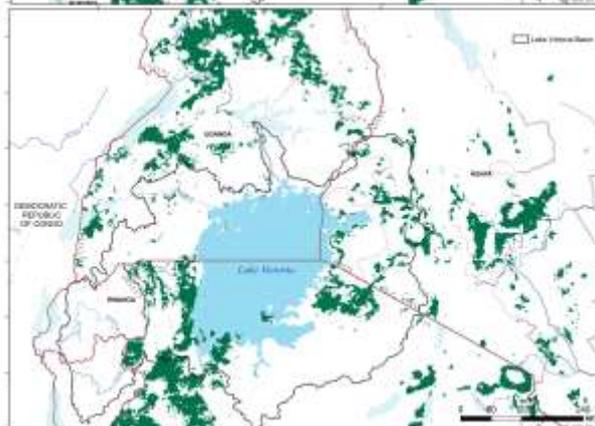
Baseline forest cover



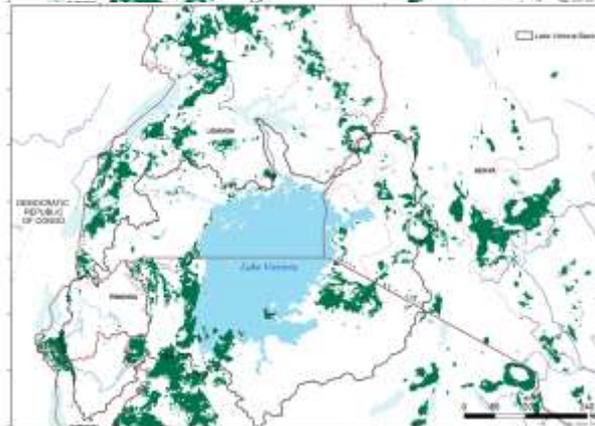
No protection



PAs protected

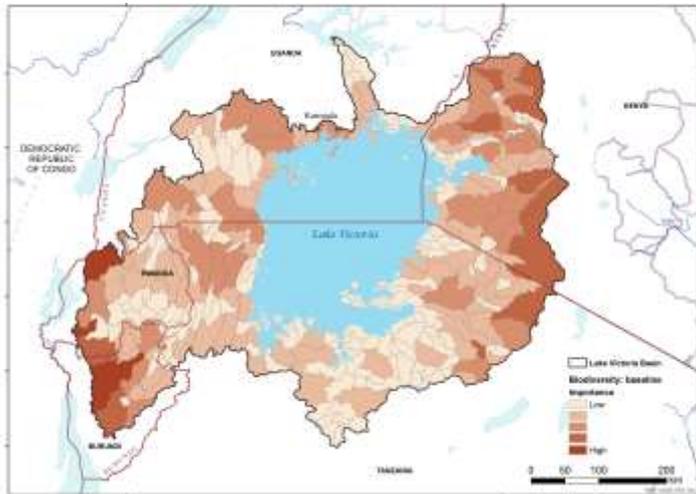


KBAs and PAs protected



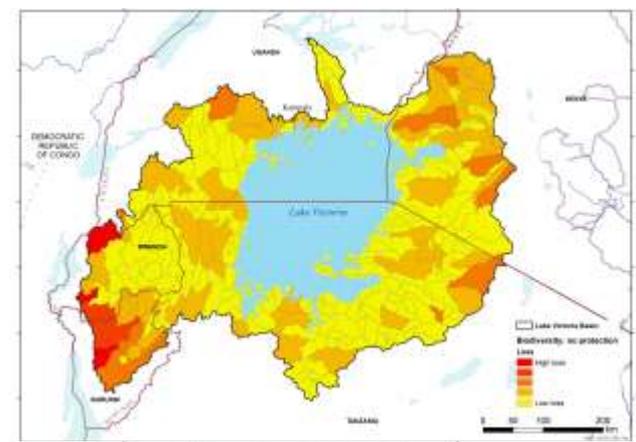
Results

Impacts on biodiversity

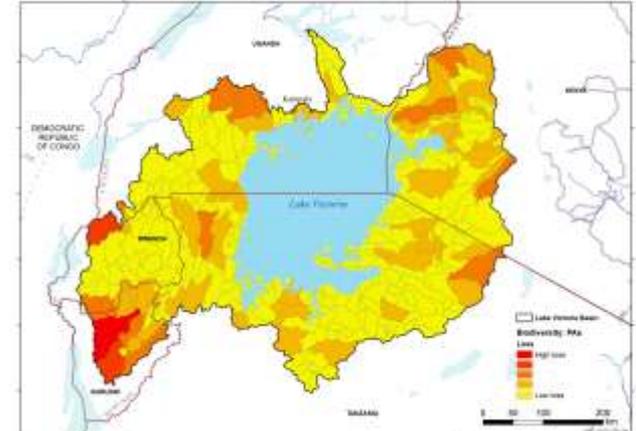


Baseline biodiversity importance

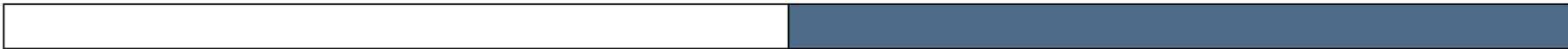
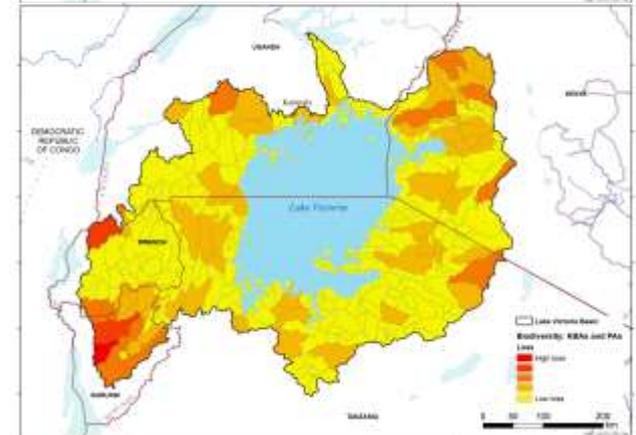
No protection



PAs protected



KBAs and PAs protected

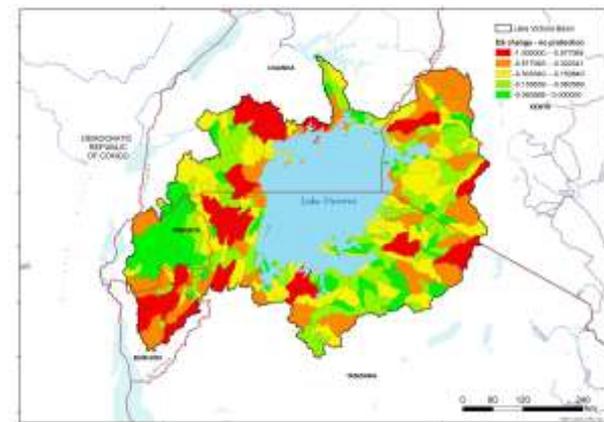


Results

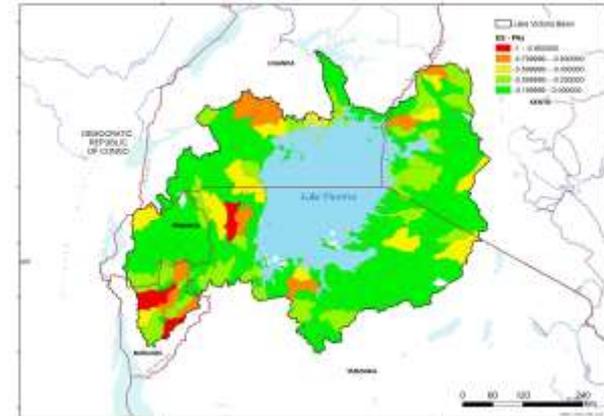
Impacts on ecosystem services

- Commodity provision, wild provision and regulating services.
- Forest loss has greatest impact on wild provision and regulating services.

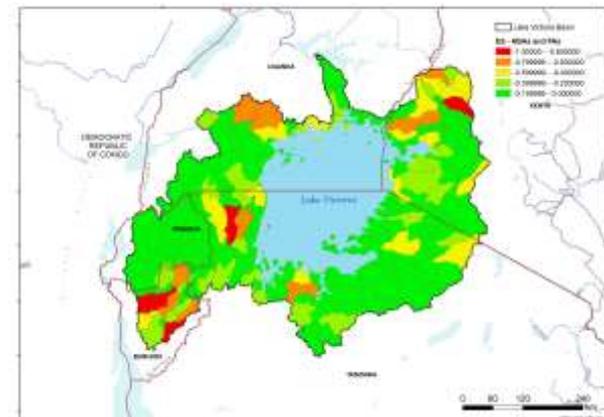
No protection



PAs protected



KBAs and PAs protected

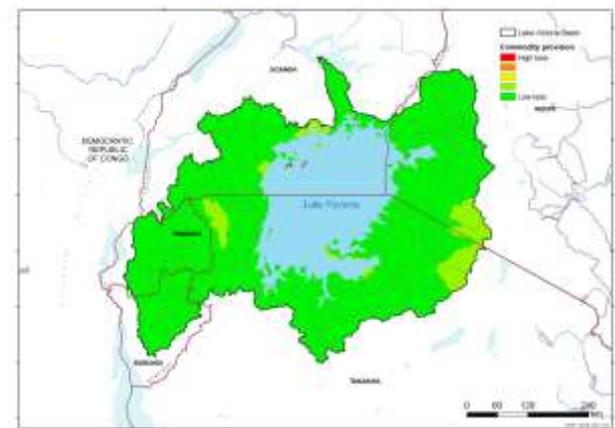


Results

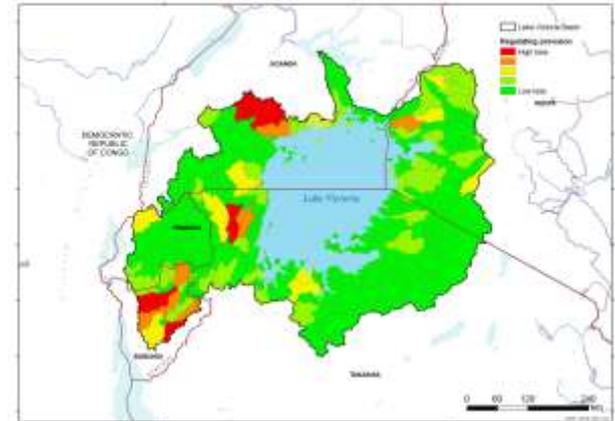
Impacts on ecosystem services

- Trade-offs in ecosystem services
- Commodity provision unaffected or increases but regulating and wild provision decreases

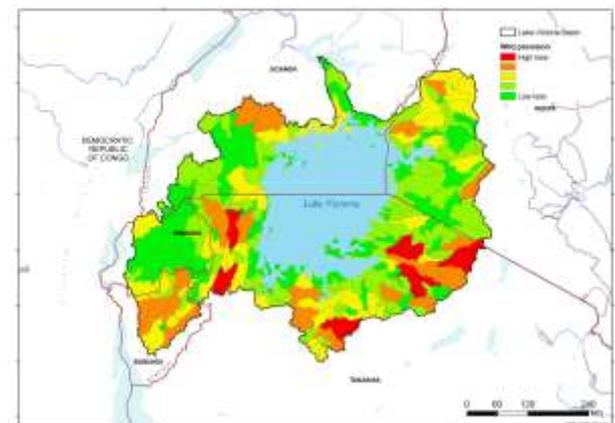
Commodity provision



Regulating provision

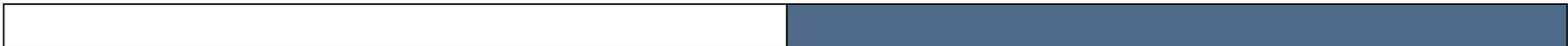


Wild provision



Conclusions

- Novel framework that can be implemented at different scales and for different regions that can help in prioritising conservation or other actions
- Different socio-economic scenarios result in only small differences in agricultural development and thus impacts on biodiversity and ES at the watershed scale.
- Protecting areas can lead to more forest loss as more forest is lost outside their boundaries if land use change drivers remain the same.
- Without protection, biodiversity losses are higher. Increasing protection (e.g. KBAs) results in even lower losses
- Without protection, the bundle of ecosystem services (wild, regulating and provisioning) loses more than with protection.
- Spatial assessment of different ecosystem services allows for analysis of trade-offs





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