Future Carbon Storage in Vegetation

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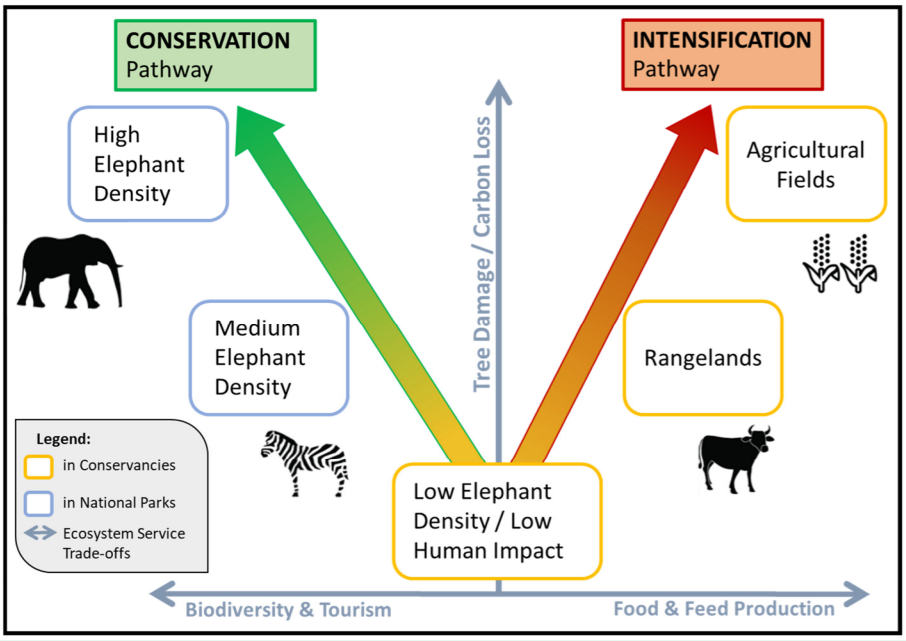
Introduction

Carbon Storage ...

- ... can be considered an **ecosystem service**
- ... has synergies & trade-offs with other ecosystem services
- ... could play an **economic role**, if carbon certificates were sold and people benefitted from conserving trees
- ... but rates of carbon gains & losses need to be **quantified**...
- ... and are influenced by **land-use changes** under different **future-making pathways**

Future-Making & Hypotheses

Two conflicting pathways of land-use change for future rural Africa (Conservation vs Agricultural Intensification) shape savanna ecosystems and ES provision:



Ecosystem Services (ESs) are "the contributions that ecosystems make to human well-being" (Schröter et al 2019). As some ESs strongly trade-off against each other, they can't be all maximized at the same time.

Important ESs from savanna ecosystems:

Ecosystem Goods:
- Firewood
- Building Material
- Food
- Forage
- Medicine

Other ESs:
- Carbon Storage
- Pest Control
- Soil Fertility
- Soil Erosion Control
- Cultural Values

Key Questions

- How much carbon is stored, and how much is lost along the conservation and intensification pathways (e.g. due to disturbances like fires, elephant damage, or human impact)?
- What are indirect effects of biodiversity on carbon storage?
- Which synergies between carbon storage and other ESs can be found and how could they be integrated?

Methods

- Basic tree measurements (height, canopy diameters, stem diameter at breast height) to feed allometric models **-> Tree biomass**
- Damage assessment on trees **-> Biomass loss to disturbance factors**
- Extrapolated per area **-> Carbon storage in vegetation**
- Complemented by other plant functional traits (e.g. leaf dry matter content, leaf N content, growth rates ...) **-> Plant functional strategies in relation to ecosystem functioning**

Analyses

- Land-use effects on Biodiversity – Ecosystem Function relationship (BEF)
- Land-use effects on Biodiversity – Ecosystem Service relationship (BES)
- Integration of all above mentioned **-> Effects of intensification and conservation on BEF and BES with special focus on carbon storage**

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