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Using dynamic vegetation models for climate change assessments and decision support in savanna rangelands

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People involved (alphabetic order)

Claire Davis-Reddy, Francois Engelbrecht, Barend Erasmus, Camille Gaillard, Thomas Hickler, Steven Higgins, Liam Langan, Anja Linstädter, Carola Martens, Guy Midgley, Glenn Moncrieff, Edwin Mudongo, Mirjam Pfeiffer, Jan Ruppert, Simon Scheiter, Judith Schulte, Wayne Twine

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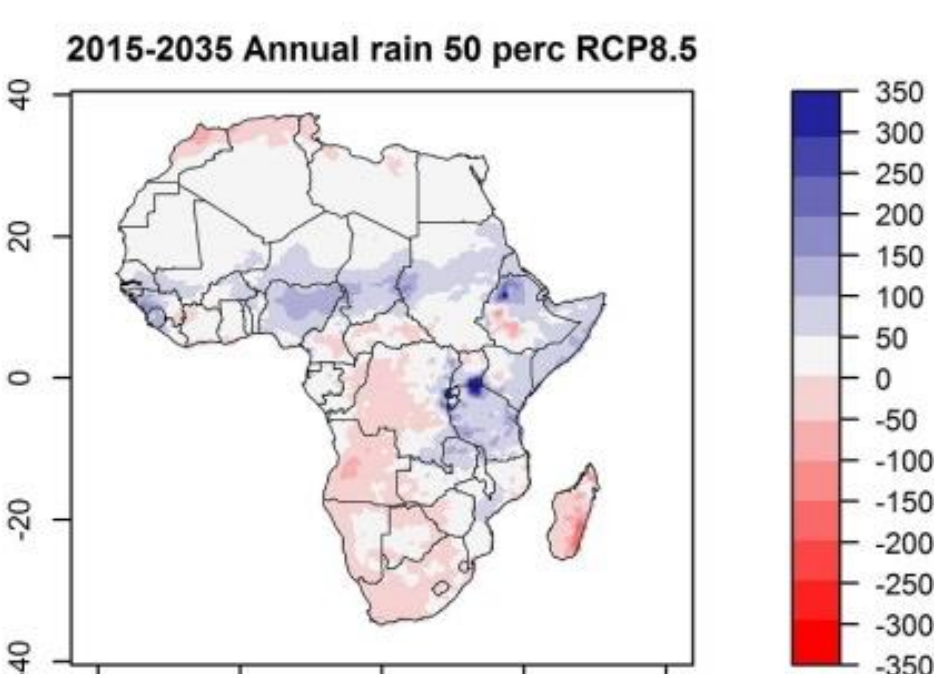
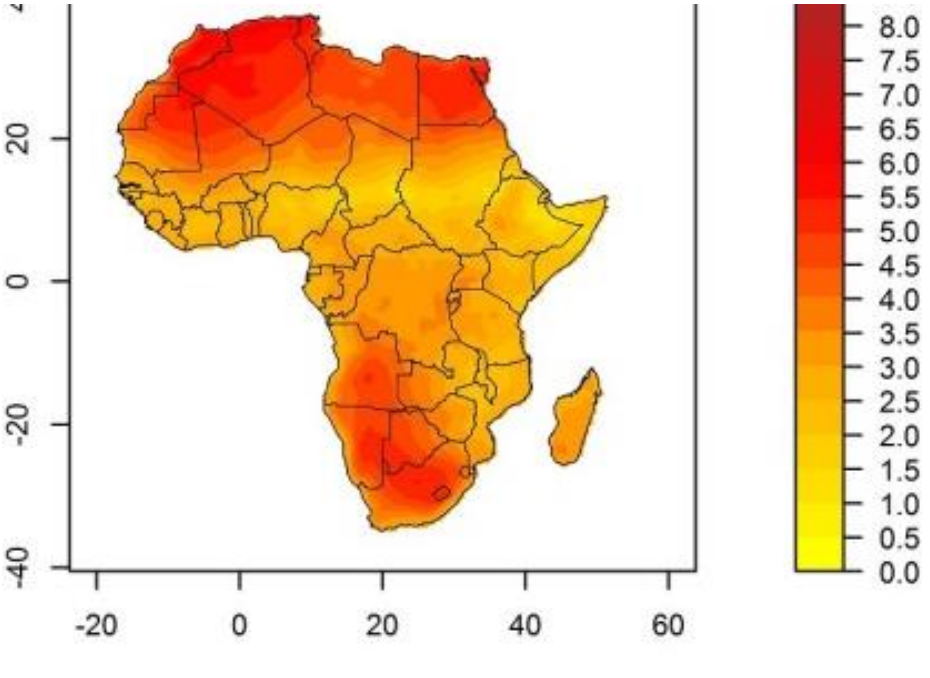
Climate change projected until 2100

Annual rainfall change until 2080-2100 (mm)



Annual temperature change until 2080-2100 (°C)

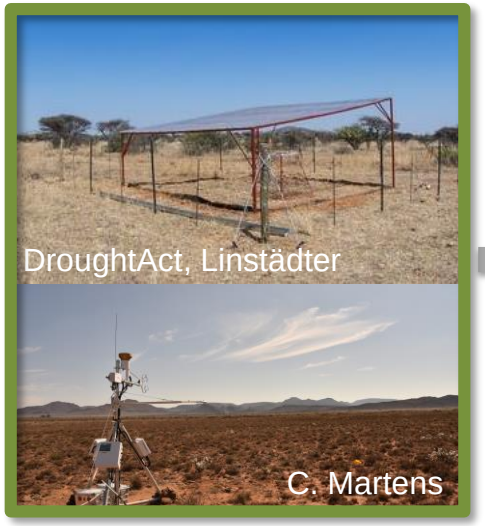


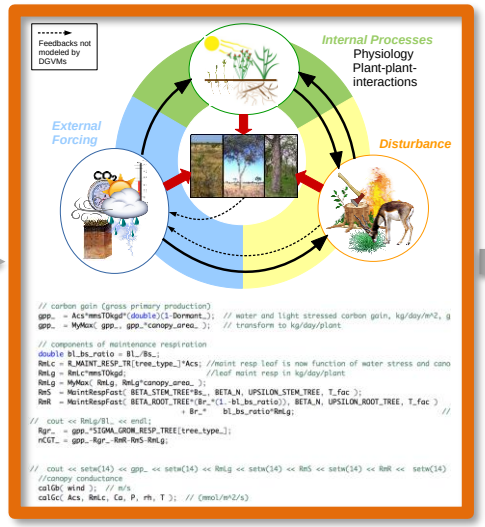
Climate model simulations for business as usual scenario (RCP 8.5)

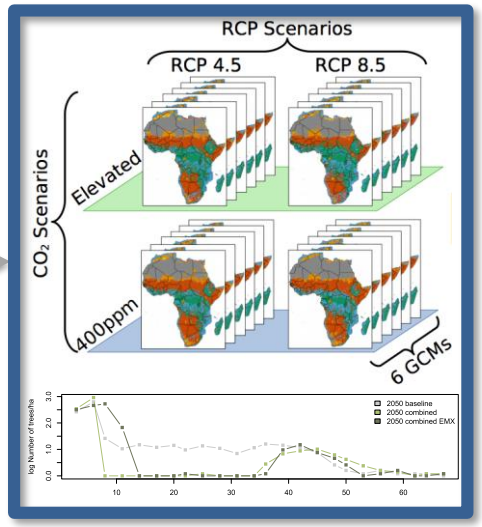
Engelbrecht et al.; Davis and Vincent (2017).

Questions

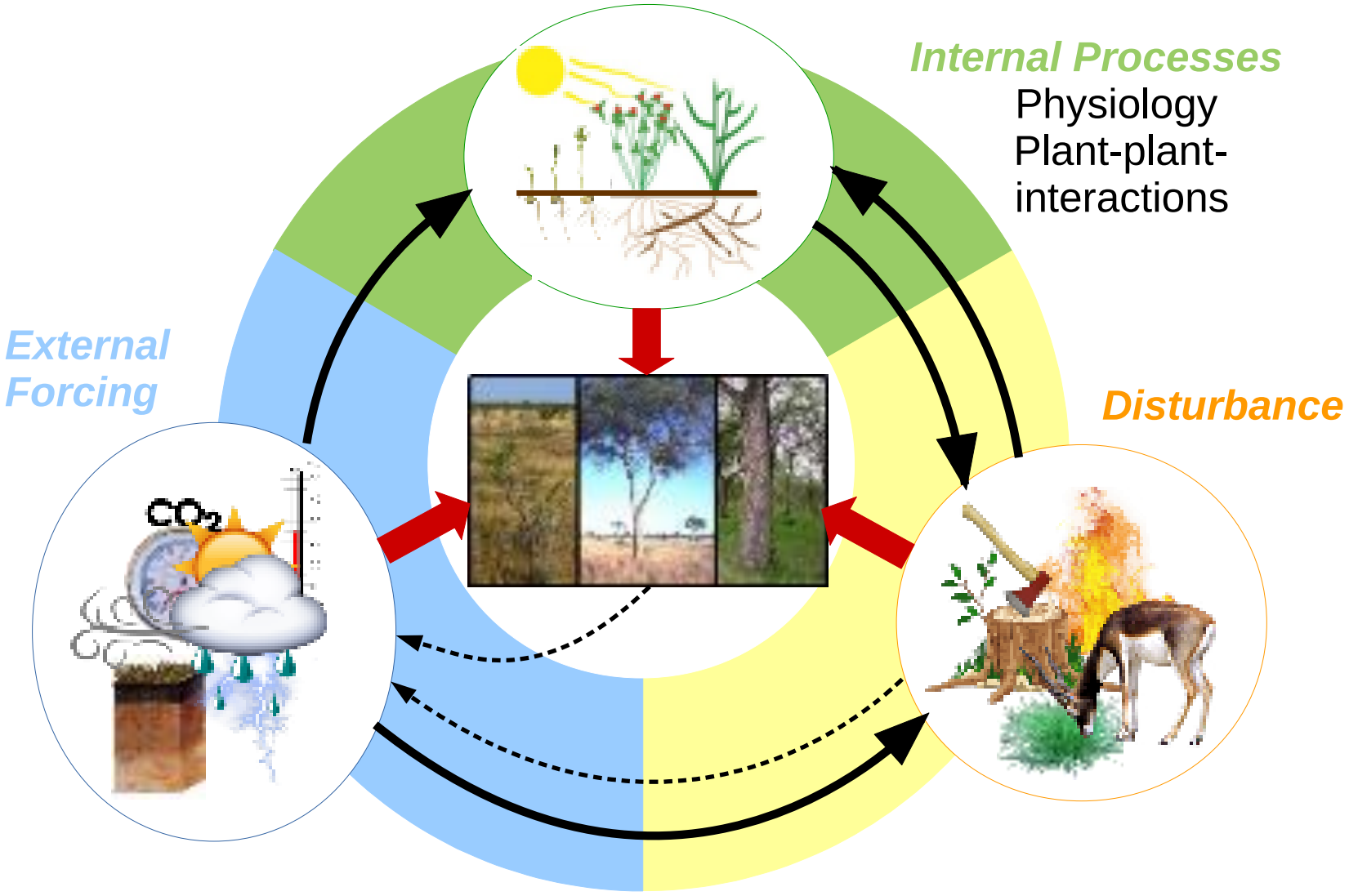
- How does vegetation change under future climate change?
- How does land-use interact with climate change impacts?
- How can we develop sustainable land-use practice?



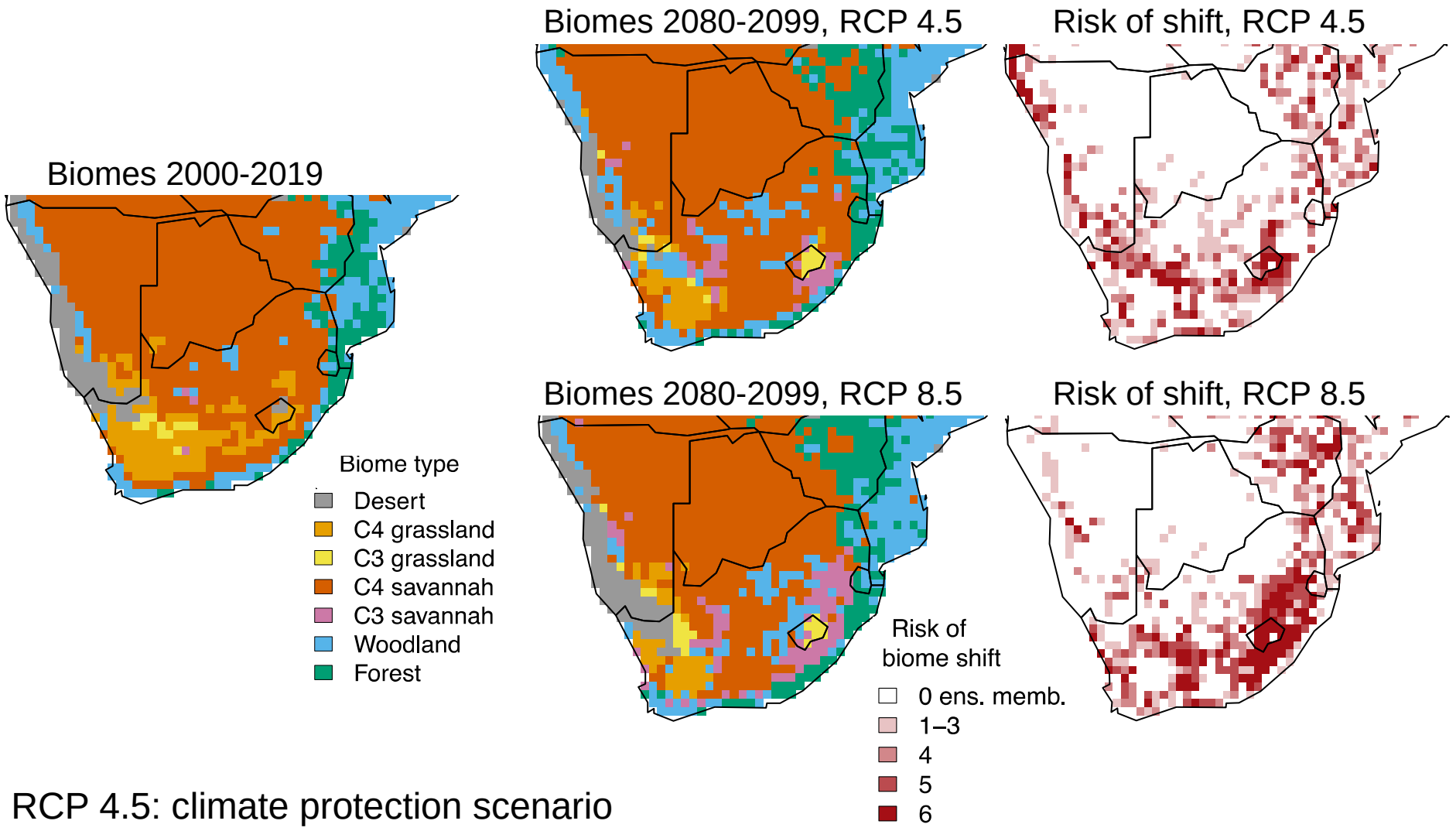




We develop Dynamic Vegetation Models



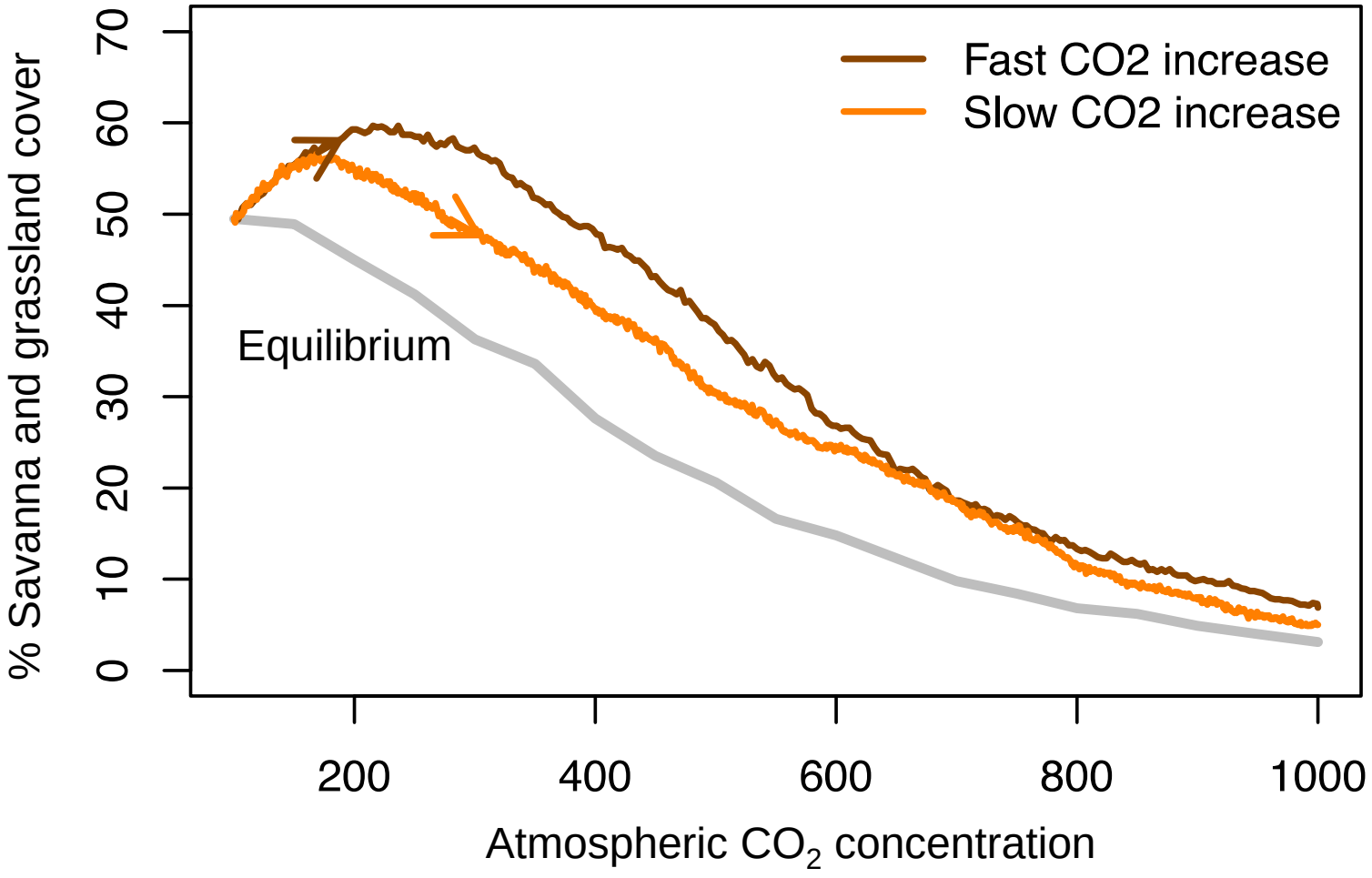
Savannas are at high risk of woody encroachment



RCP 4.5: climate protection scenario
RCP 8.5: business as usual scenario

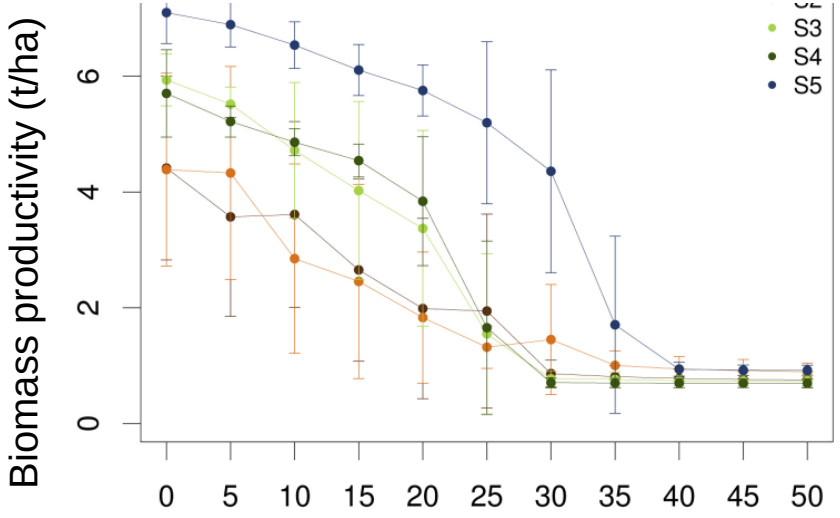
Martens et al. (in prep)

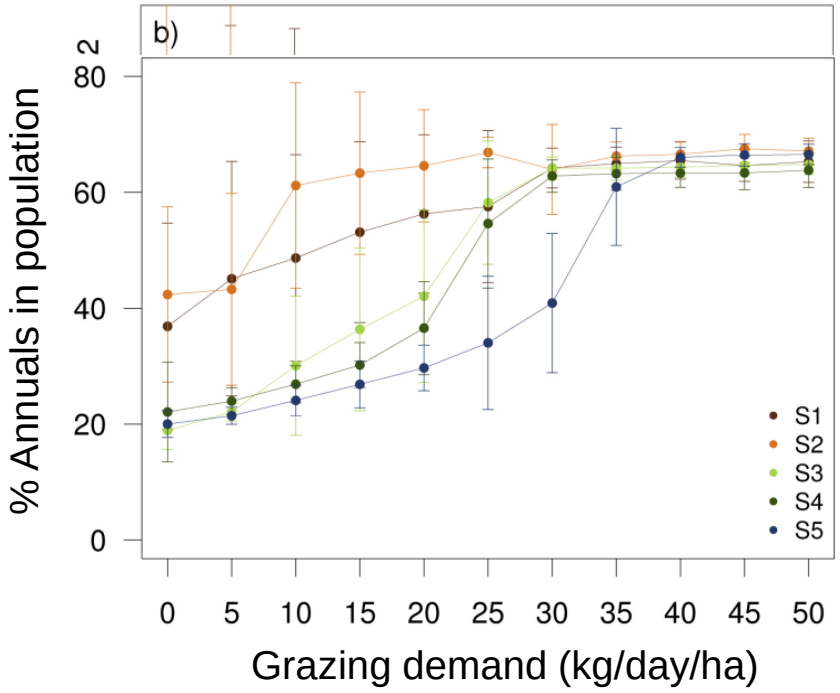
Vegetation change lags behind climate change and should be considered in management decisions

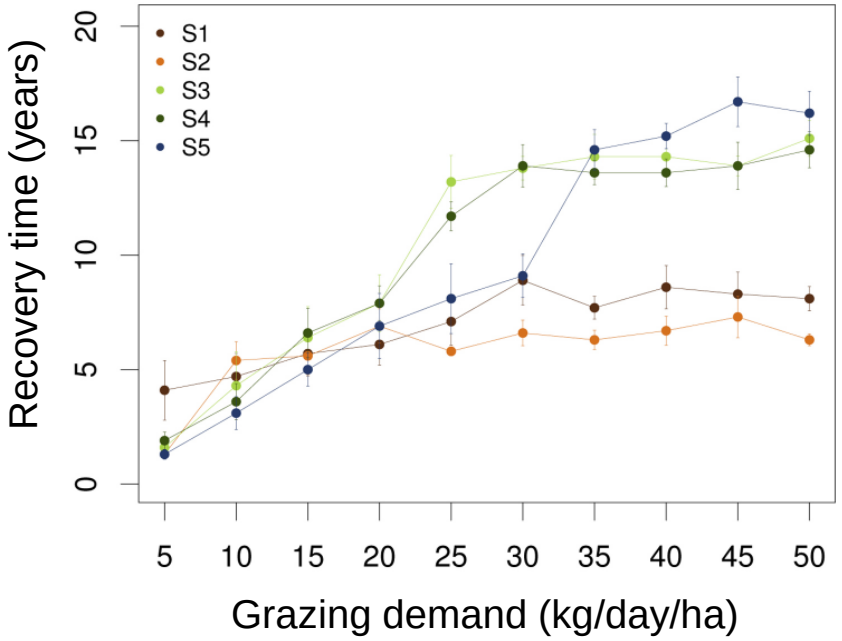


Scheiter et al. (unpublished)

Perennial grasses ensure grazing potential

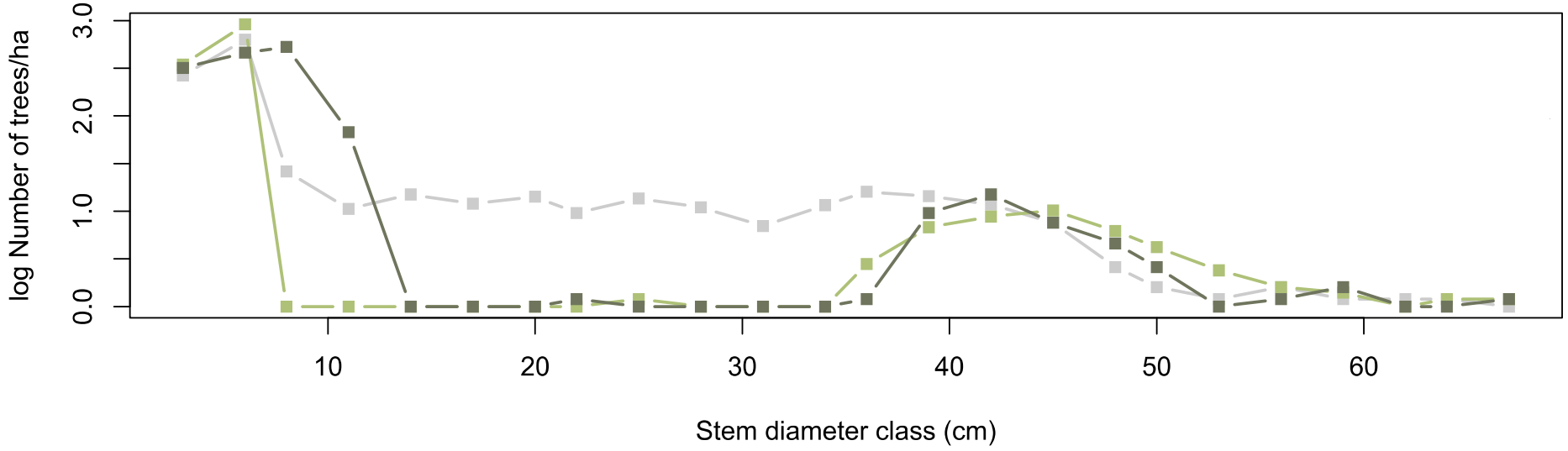






Pfeiffer et al. (2019) Ecological Modeling

Fuelwood harvesting modifies tree structure; recovery is possible after land-use change but slow



2050 baseline, no management

2050 fuelwood harvesting and livestock

2050 fuelwood harvesting reduced after 2019

Scheiter et al. (2019) Ecological Economics

Take home messages

- Open ecosystems (grasslands and savannas) are highly susceptible to climate change
- Vegetation change lags behind climate change and land-use change
- Lags need consideration in management policies
- Perennial grasses ensure grazing potential of savanna rangelands
- Recovery of vegetation after land-use change is possible but slow
- Dynamic vegetation models are powerful tools to inform decision making for climate adaptation and mitigation

Thank you for your attention.

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