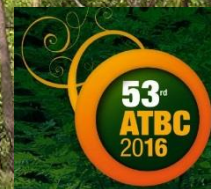


Impact of fire on resilience of tropical dry forests: miombo in Lubumbashi (Democratic Republic of Congo)



Gembloux Agro-Bio Tech
Université de Liège



Hick.A, Tooth M., Tshibungu A. and Mahy G.

University of Liege, Gembloux Agro-Bio Tech, Biodiversity and Landscape Unit

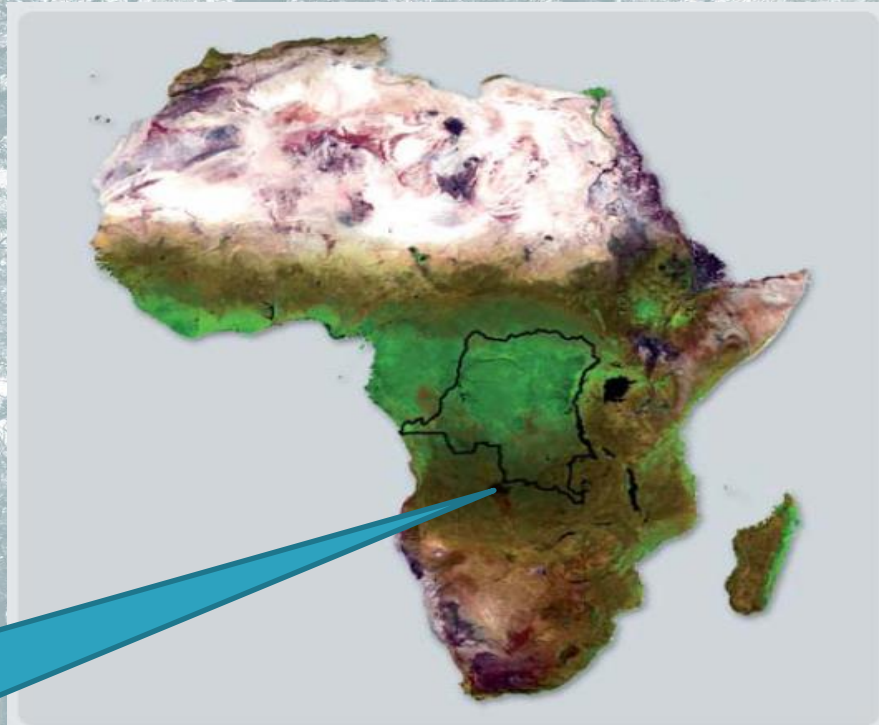
23/06/16

WHY DRY FOREST?





Dry forest account for 70-80% of forested area in Africa (2.7 million km²):



La RDC se situe au centre du massif forestier africain

- Wet forests ■
- Dry forests and savannas ■

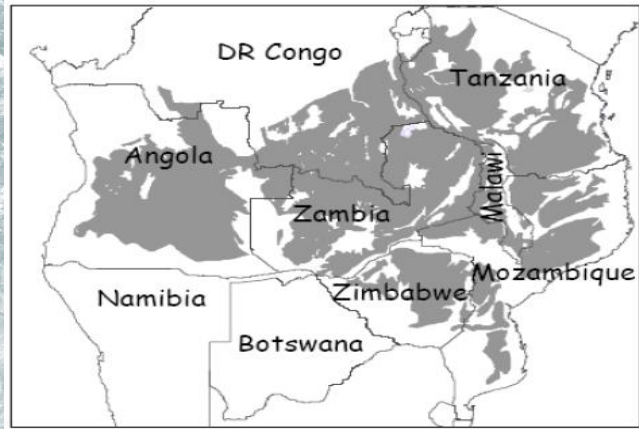
SOURCE: © 2007 UCL-GEOMATICS, COMPOSITION COLOREE SPOT VEGETATION

**Widespread in
frost-free
regions**

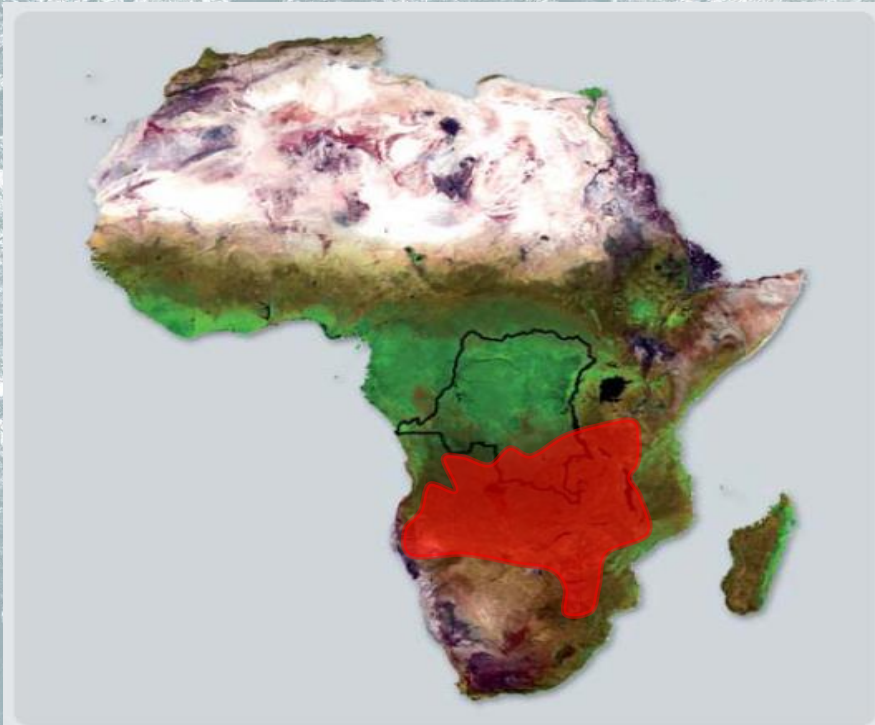
**Pronounced seasonality
in rainfall distribution**

**Several months of
severe drought**

In Centro-southern Africa miombo is widespread and covers 2.7 million km² spread over seven countries :



Miombo's distribution (White 1983)



La RDC se situe au centre du massif forestier africain

Wet forests ■
Dry forests and savannas ■

SOURCE: © 2007 UCL-GEOMATICS, COMPOSITION COLOREE SPOT VEGETATION

« *Brachystegia* – *Isoberlinia* – *Julbernardia* »



Brachystegia spiciformis



Brachystegia longifolia

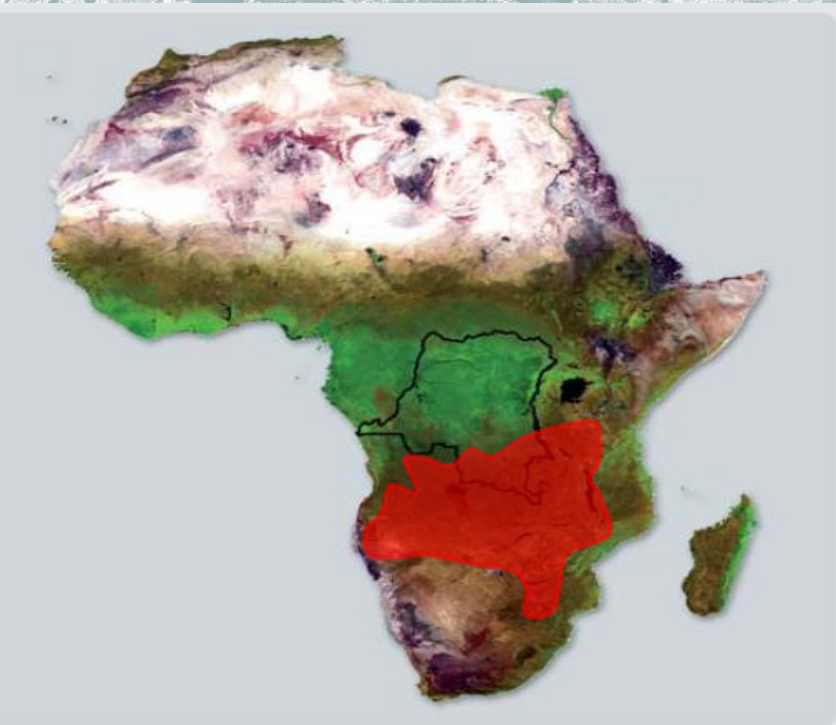
« *Brachystegia* – *Isoberlinia* – *Julbernardia* »



Julbernardia paniculata



Julbernardia globiflora



La RDC se situe au centre du massif forestier africain

- Wet forests ■
- Dry forests and savannas ■

SOURCE: © 2007 UCL-GEOMATICS, COMPOSITION COLOREE SPOT VEGETATION





Deciduous and/or semi-deciduous species

Biological activity synchronized with rainfall seasonality

Fruit maturation in rainy season

Few species have seed banks

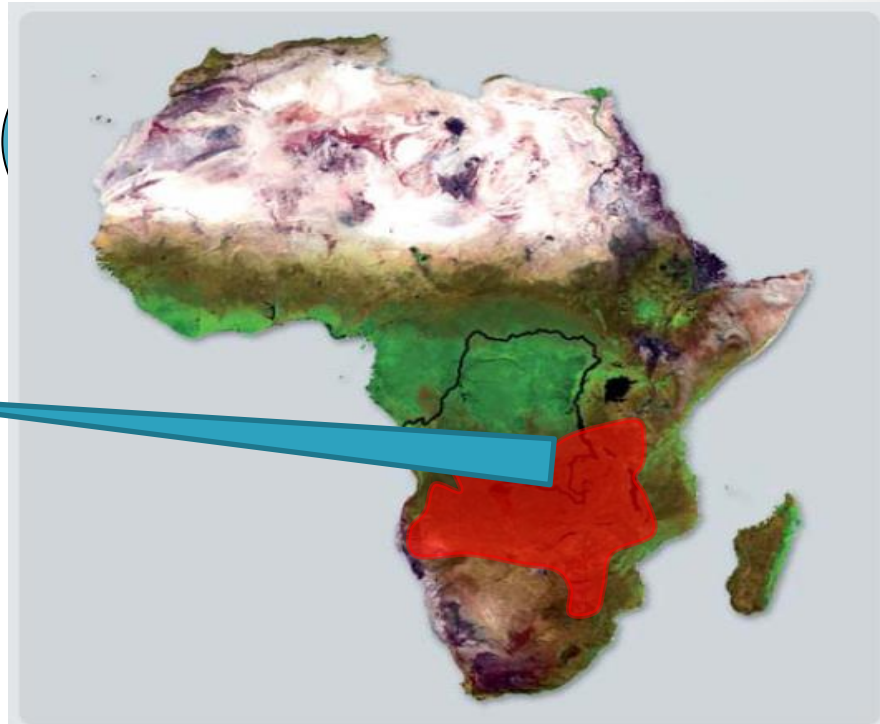
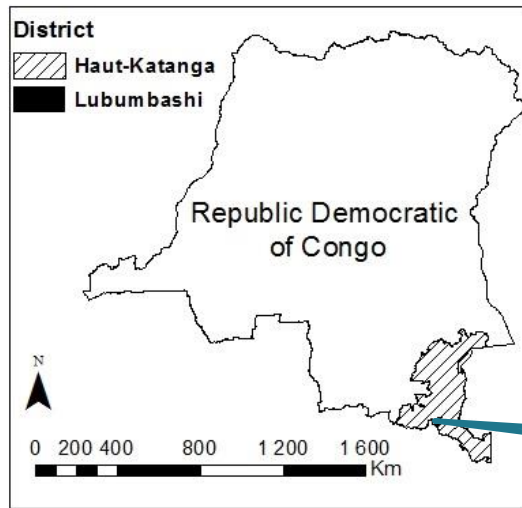
Seed germination are highly limited by moisture availability

Robust taproot

Sprouting capacity

CASE STUDY

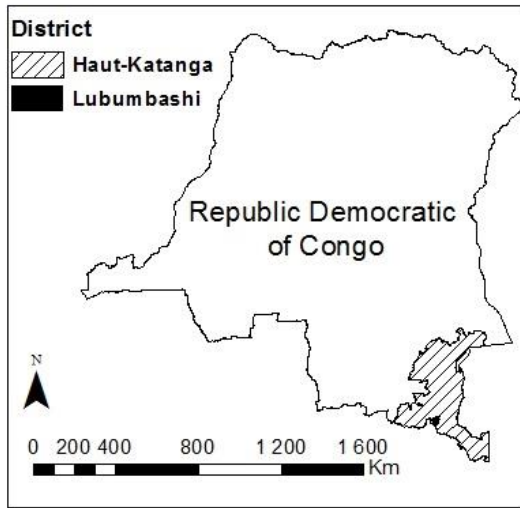




La RDC se situe au centre du massif forestier africain

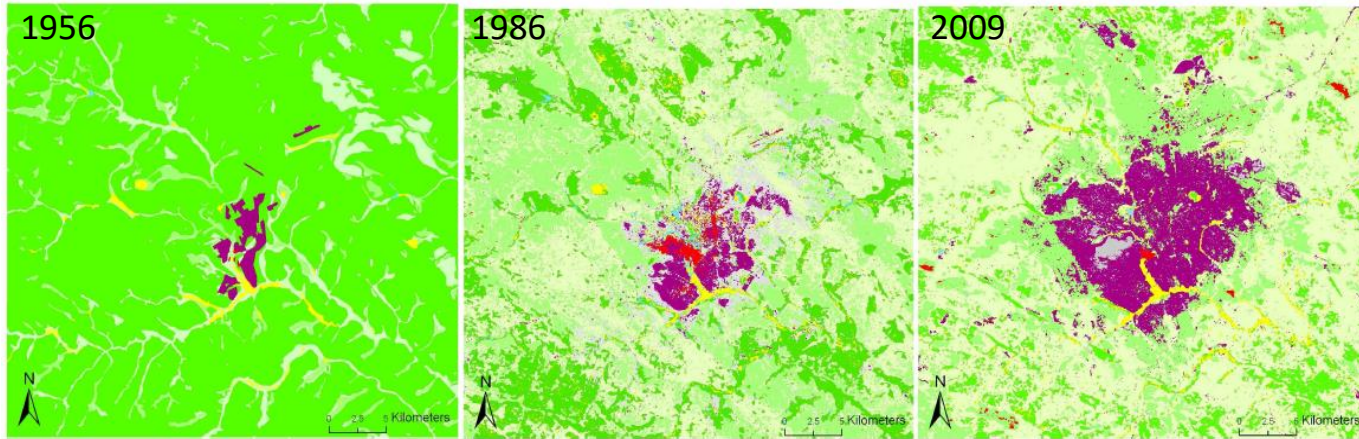
- Forêts denses humides ■
- Forêts sèches et savanes ■

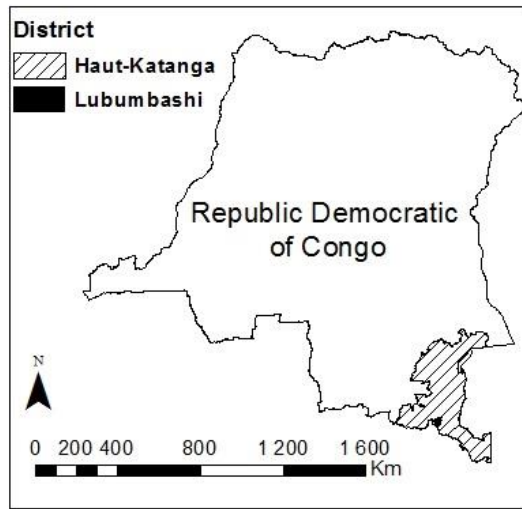
SOURCE: © 2007 UCL-GEOMATICS, COMPOSITION COLOREE SPOT VEGETATION



Urban population growth

Munyemba Kankumbi F. (2010)

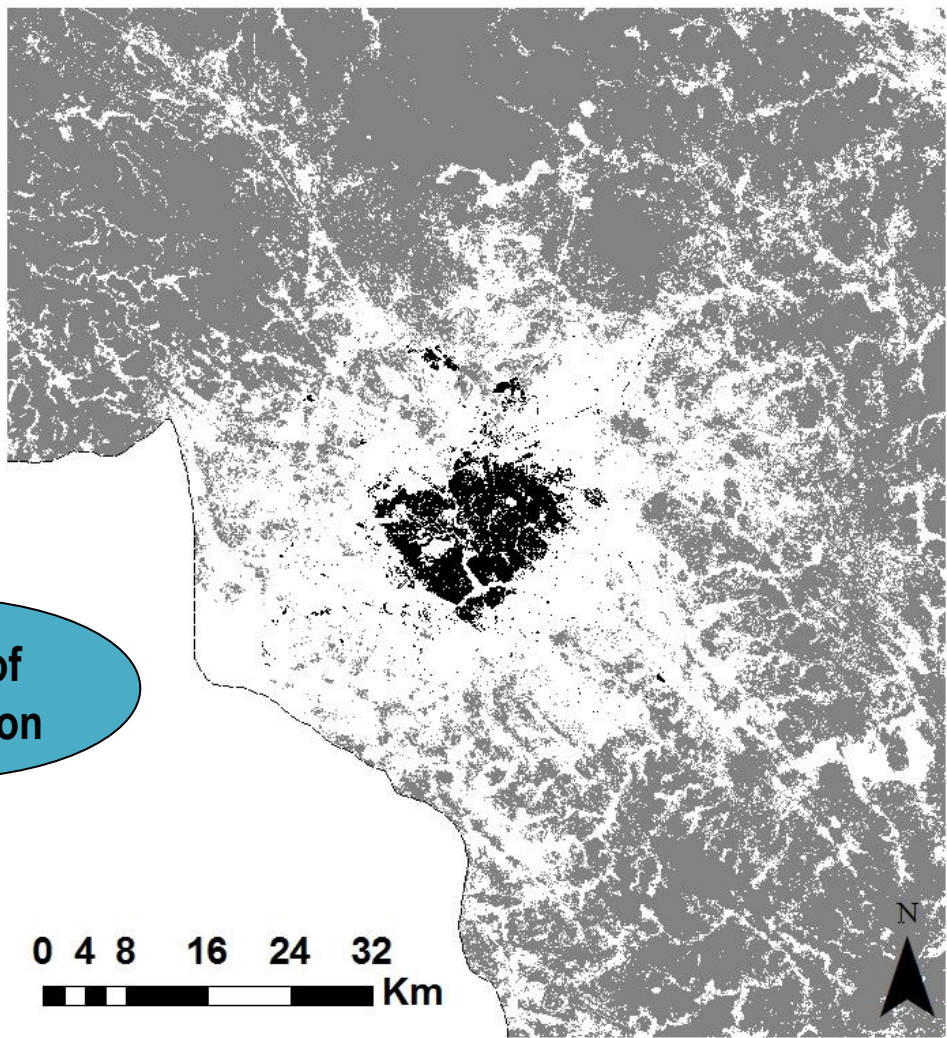
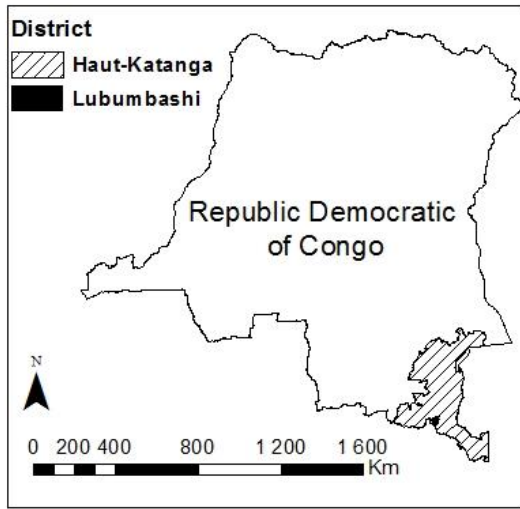




Urban
population
growth

Charcoal





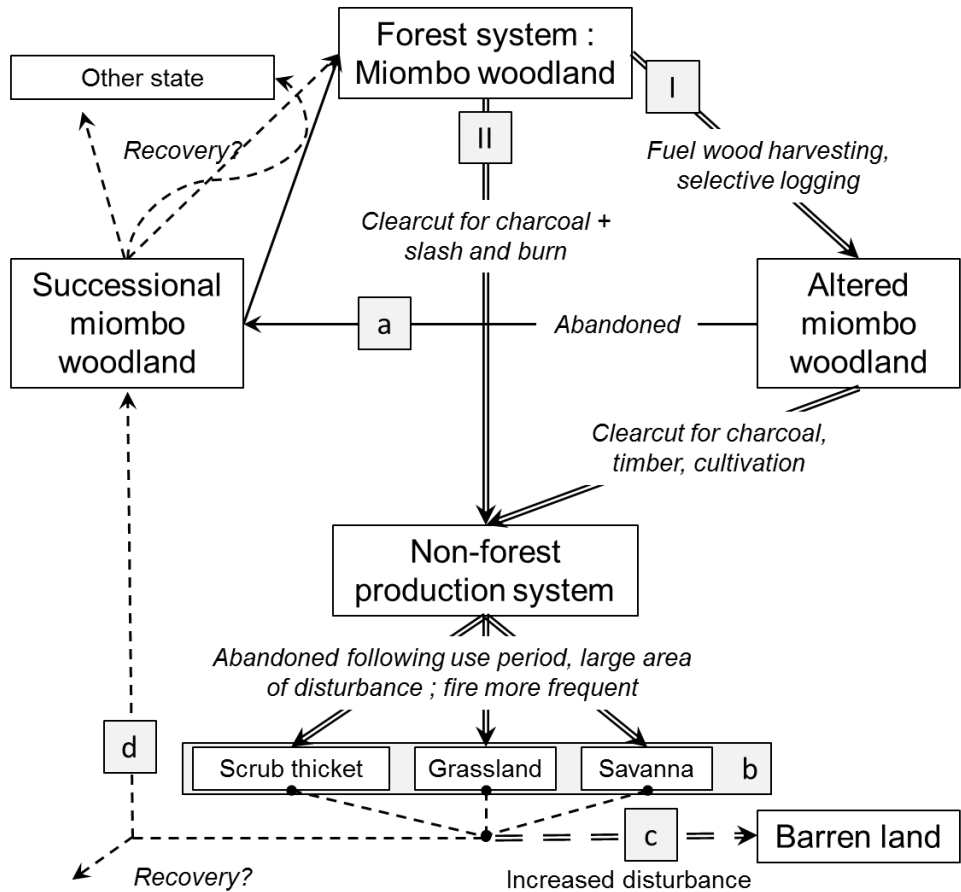
Deforestation

Mosaic of degradation

- Non-forest areas
- Woodlands forests
- Urban areas
- Limit of DRC

Forest degradation and recovery model adapted to Murphy and Lugo 1986

2 ways of forest degradation (I and II)

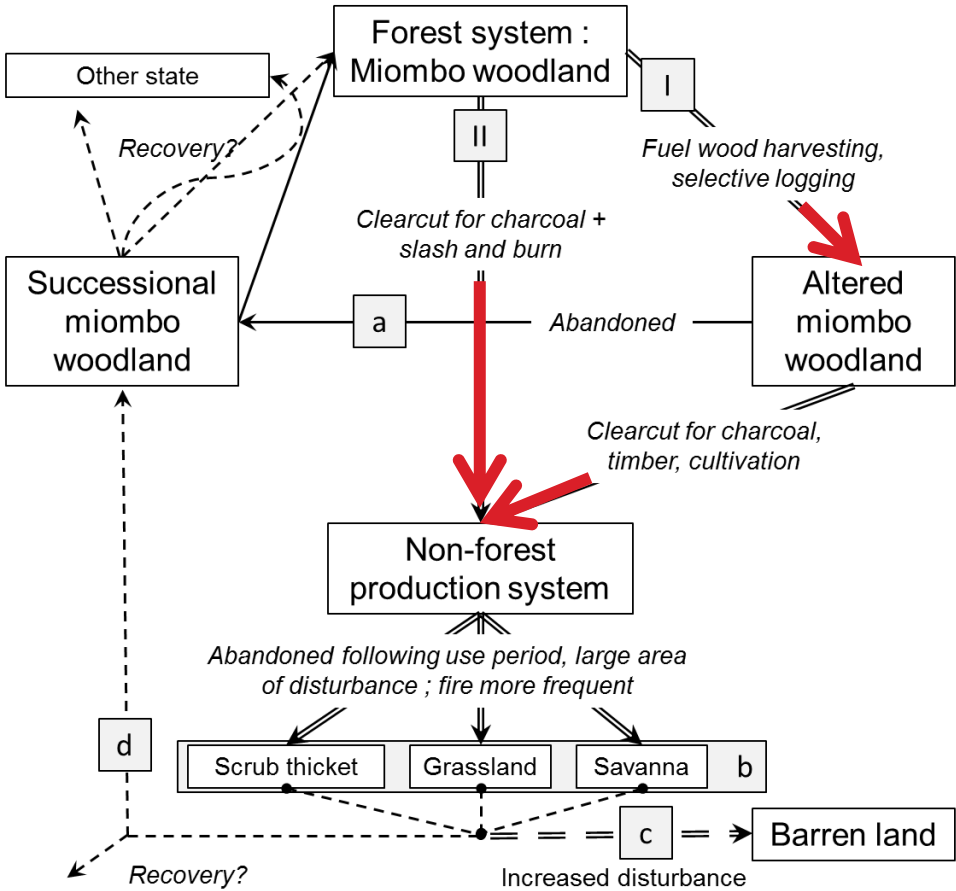


Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout



Forest degradation and recovery model adapted to Murphy and Lugo 1986

2 ways of forest degradation (I and II)

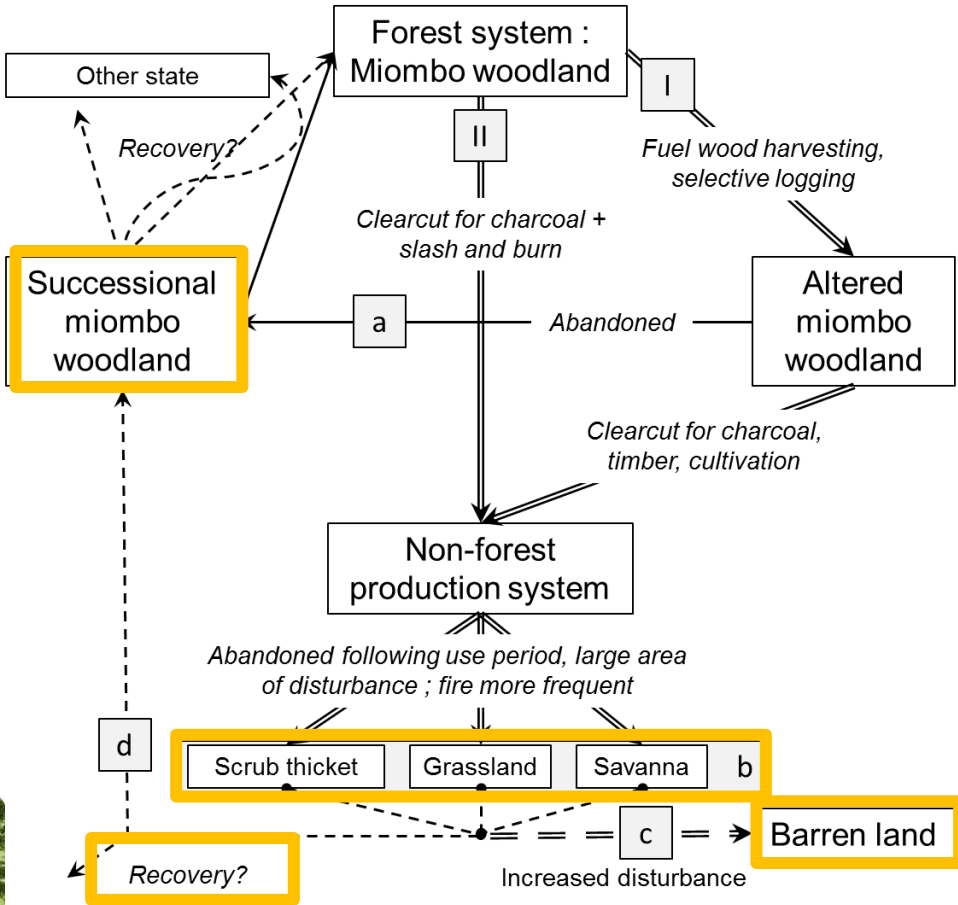


Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout



Forest degradation and recovery model adapted to Murphy and Lugo 1986

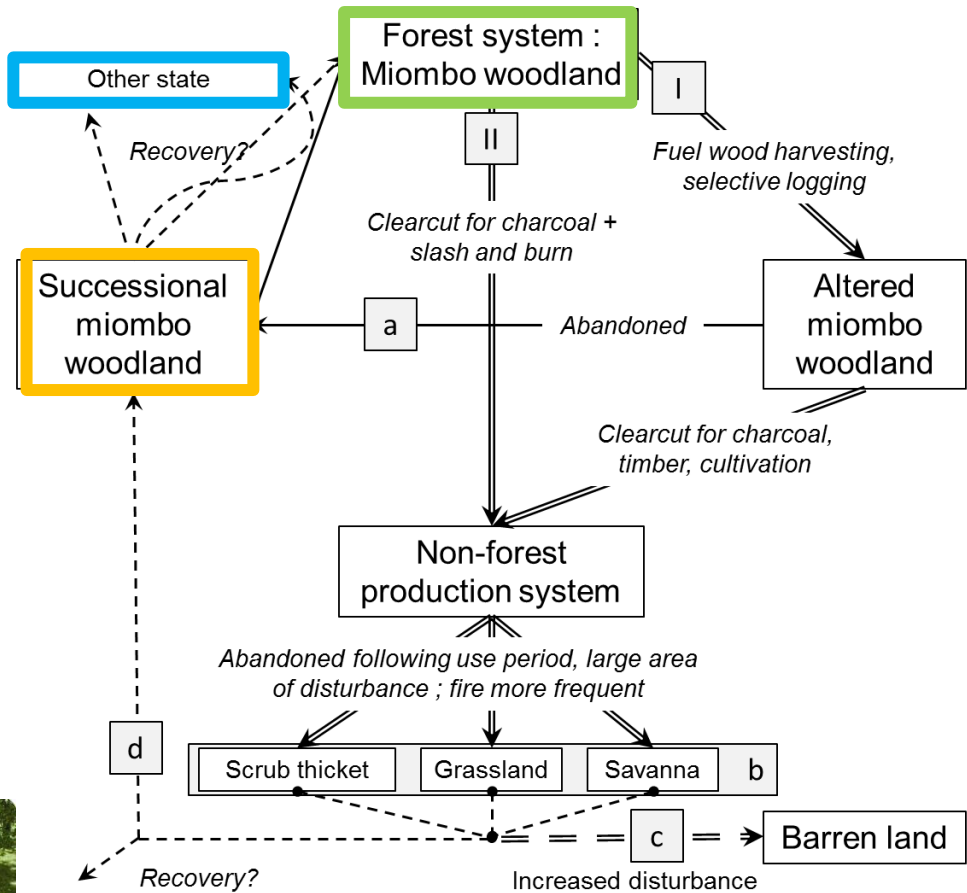
4 ways of potential trajectory (a, b, c and d)



Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout

Forest degradation and recovery model adapted to Murphy and Lugo 1986

4 ways of potential trajectory (a, b, c and d)



Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout

Disturbance

Mosaic of degradation

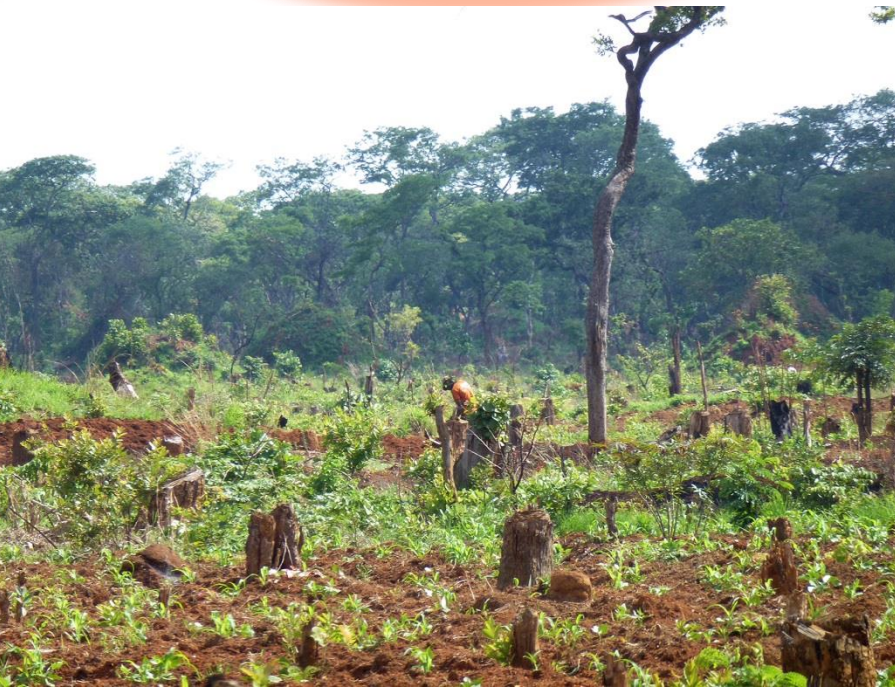




GENERAL CONCEPTS



Restoration



Understanding how communities are assembled after ecosystem disturbance can help to guide restoration

Resistance



Resistance is the ability of an ecosystem to respond to disturbances by resisting ecological changes (Holling 1973; Greipssoon 2011)

Resilience



Capacity of an ecosystem to return to a trajectory close to the original ecosystem after a disturbance (Horn 1974; White and Walker 1997)

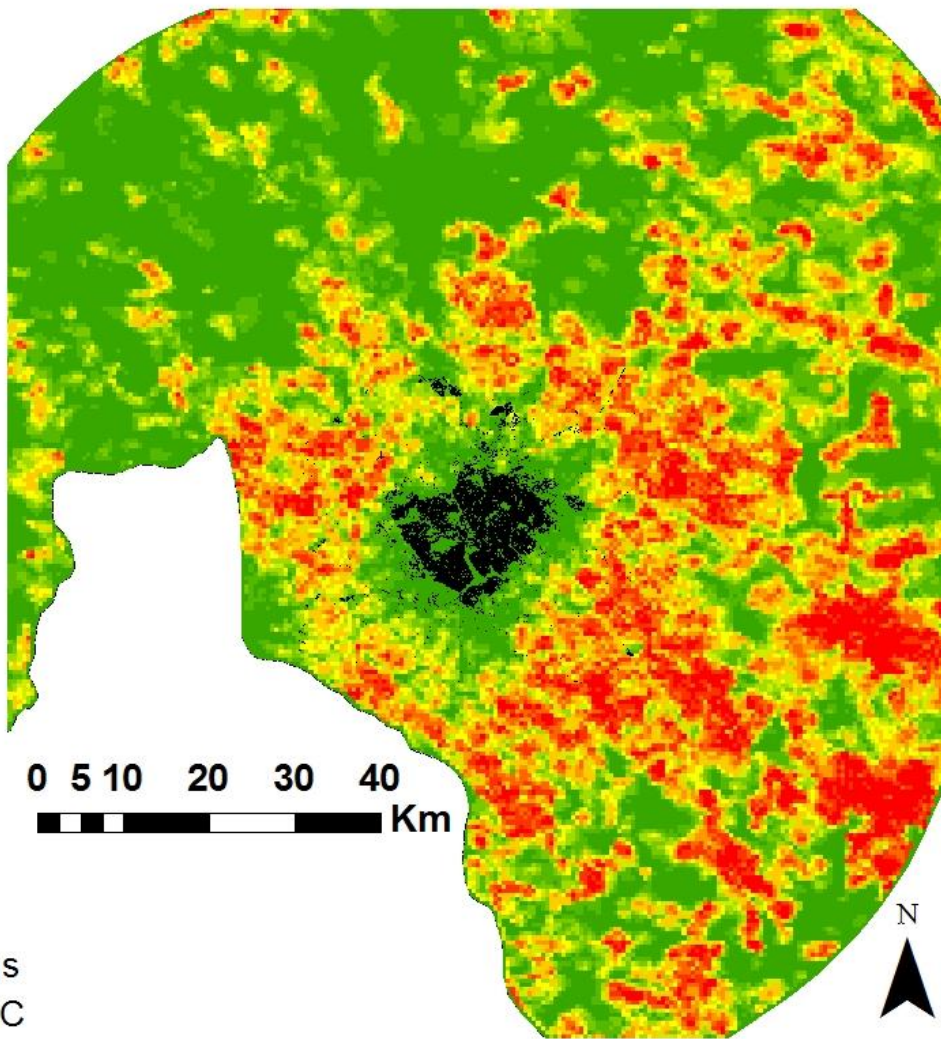
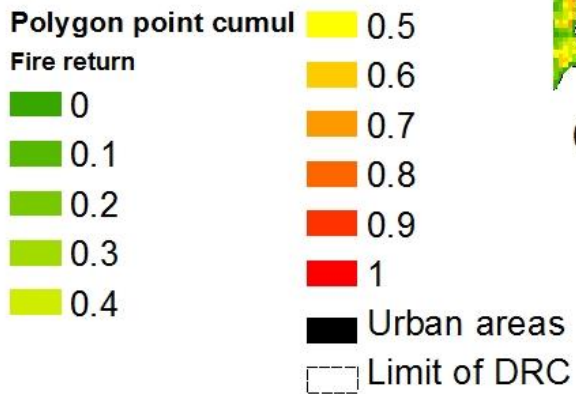
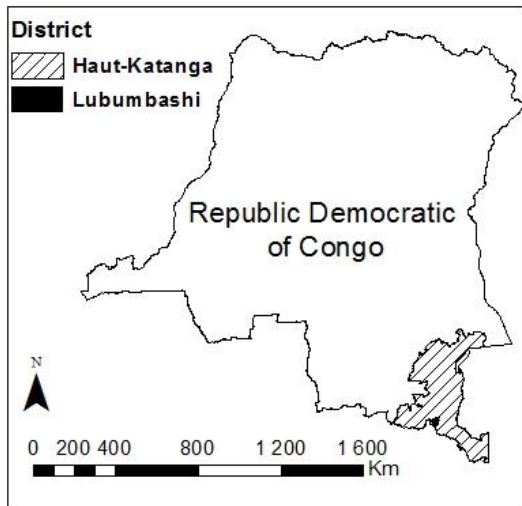
Resilience

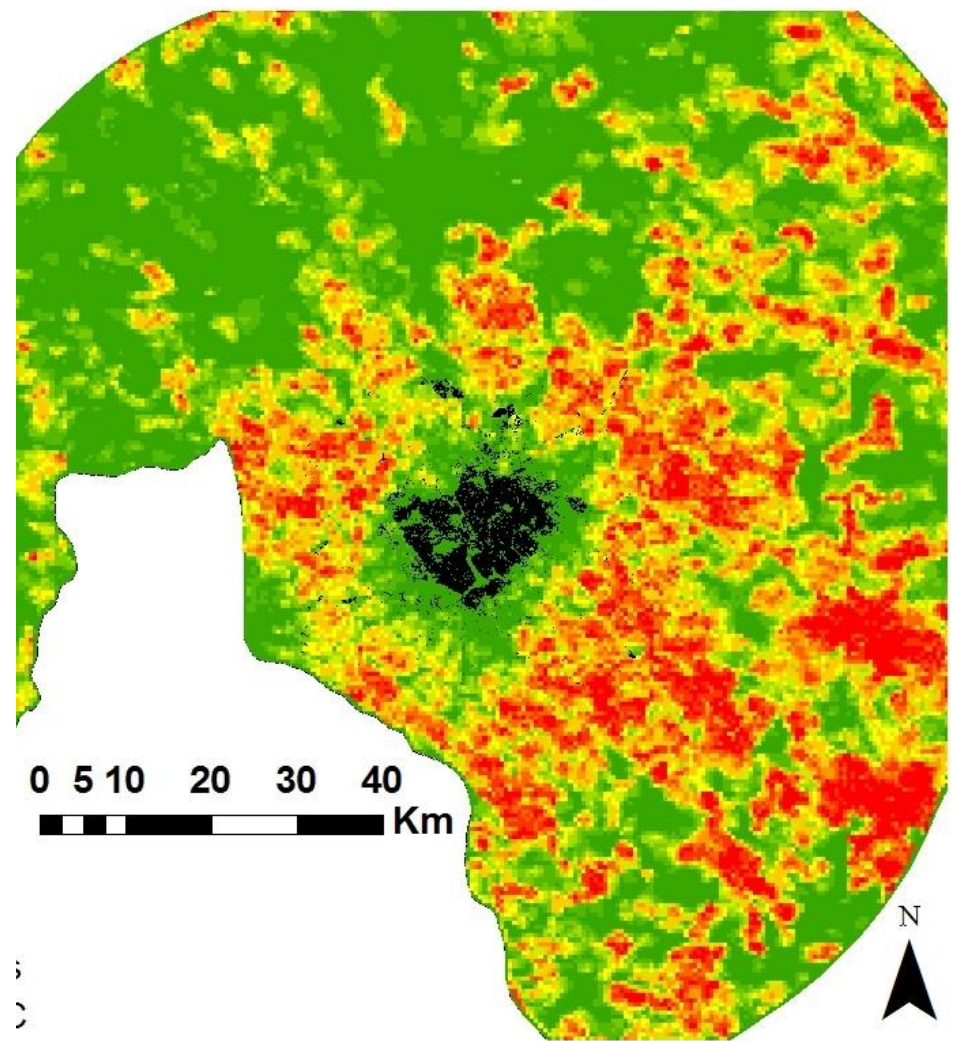
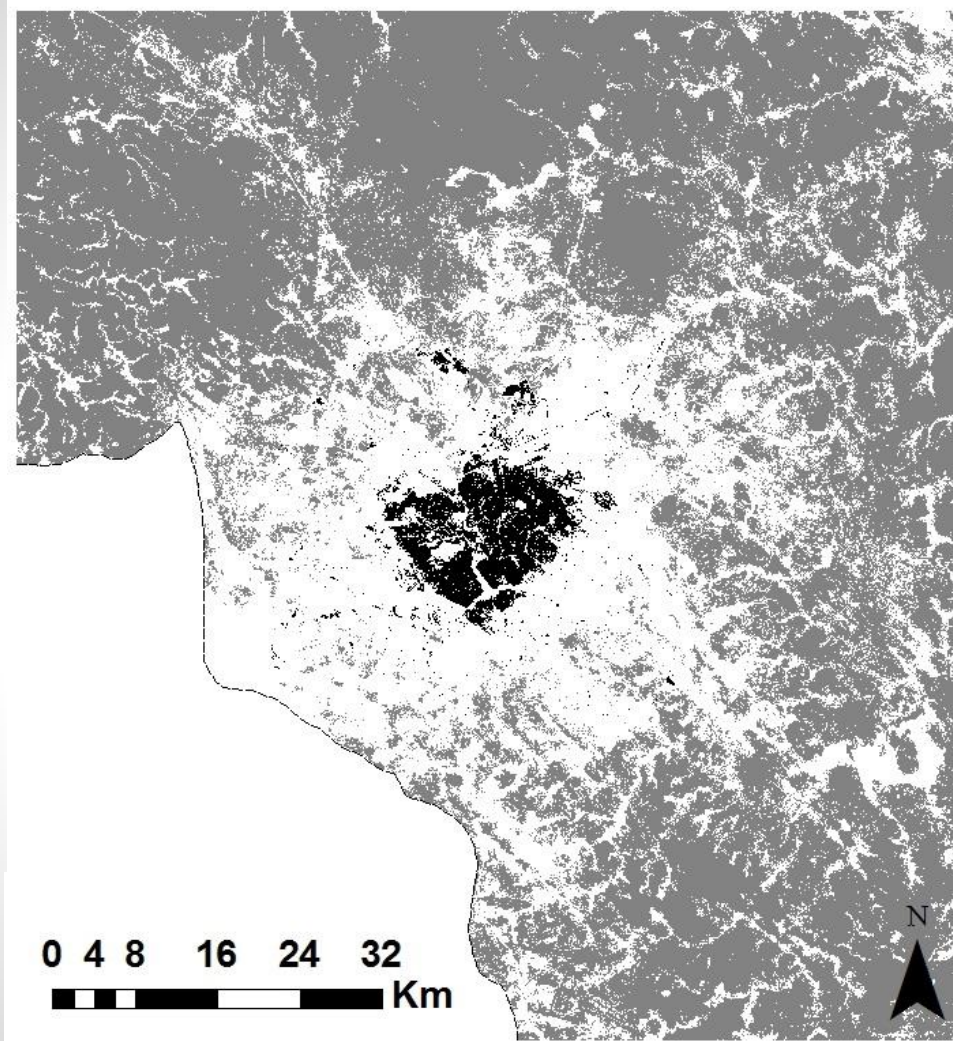
**Several
trajectories**

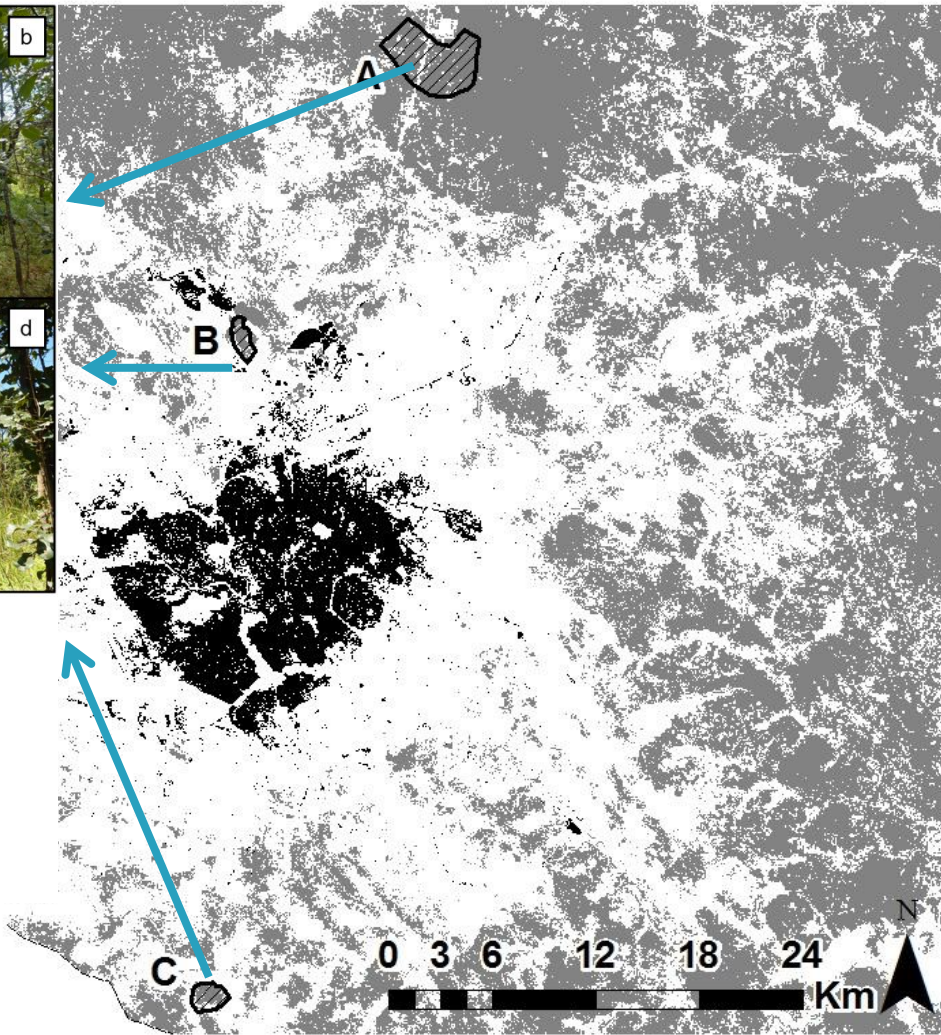


FOREST - MOSAIC OF DEGRADATION IN PERI-URBAN AREA



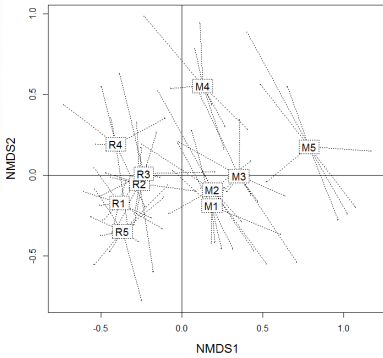
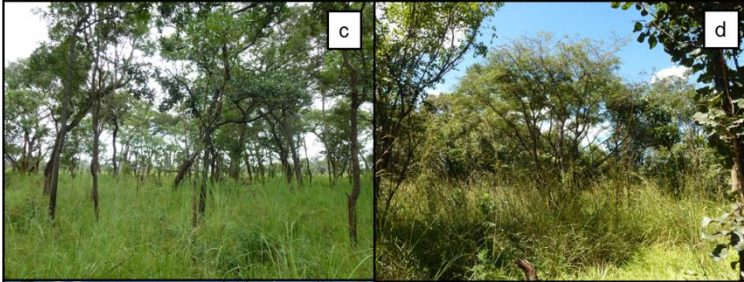
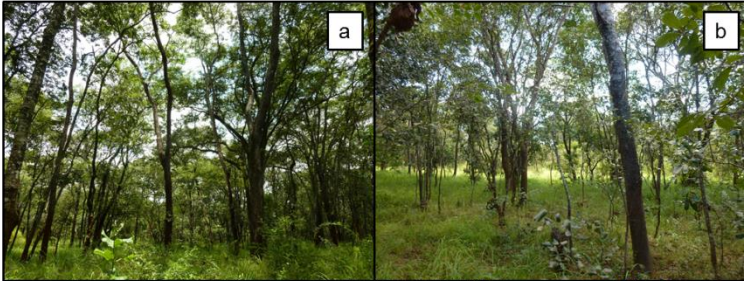




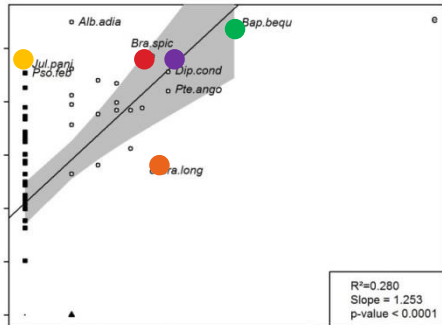
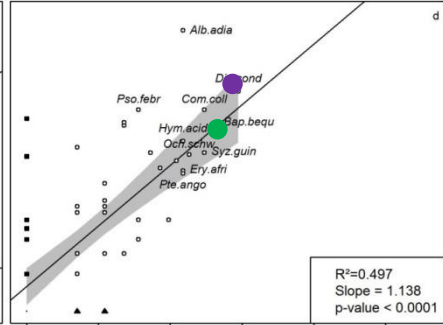
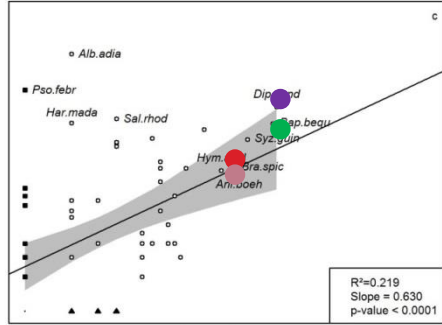
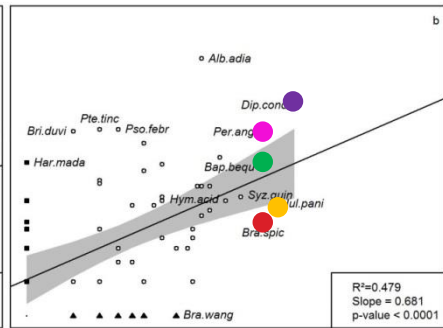
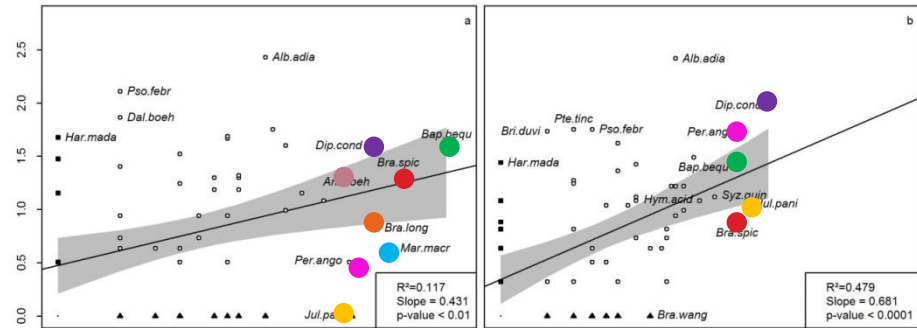


RESULTS

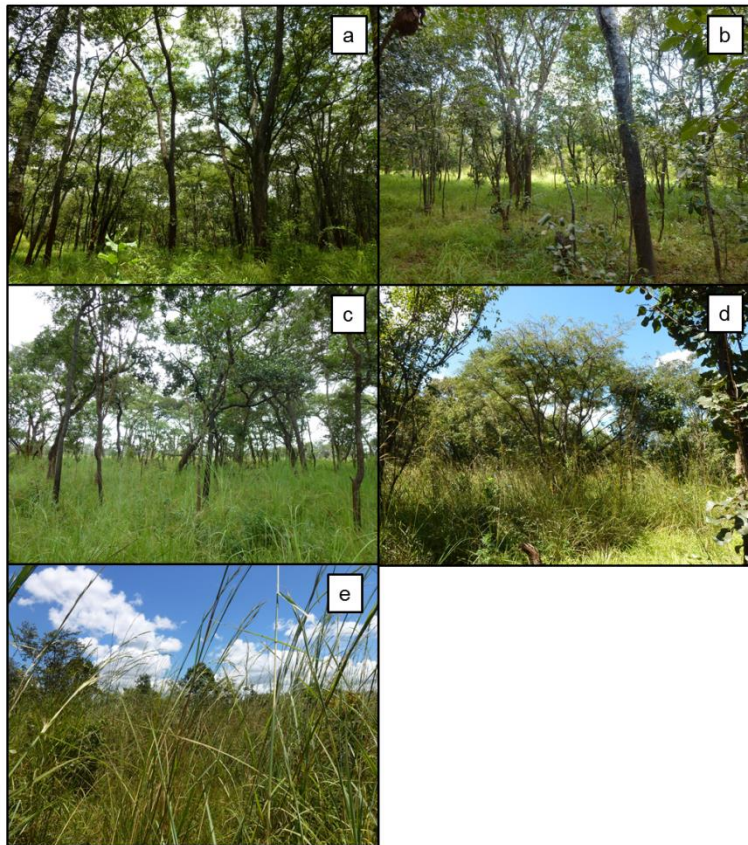




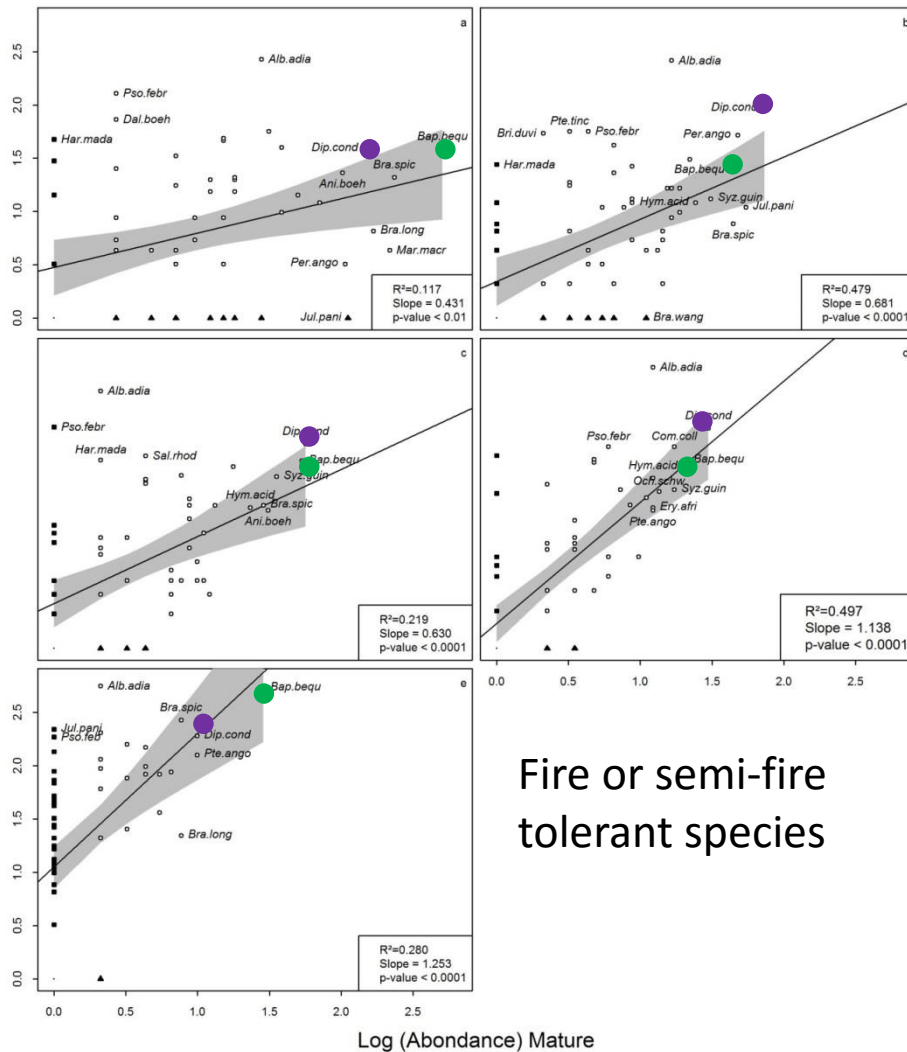
Log (Abundance) Regeneration



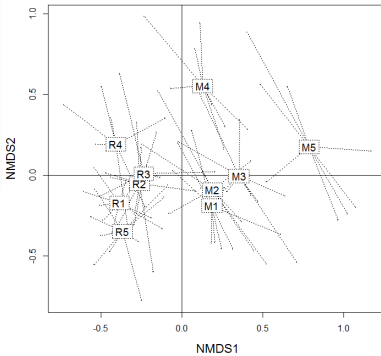
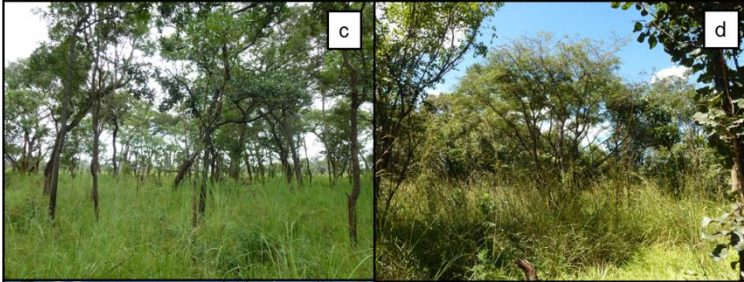
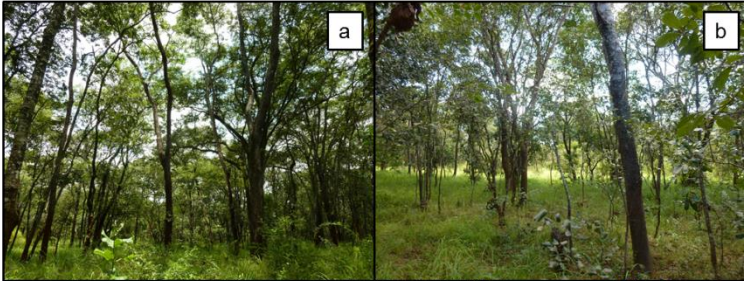
Log (Abundance) Mature



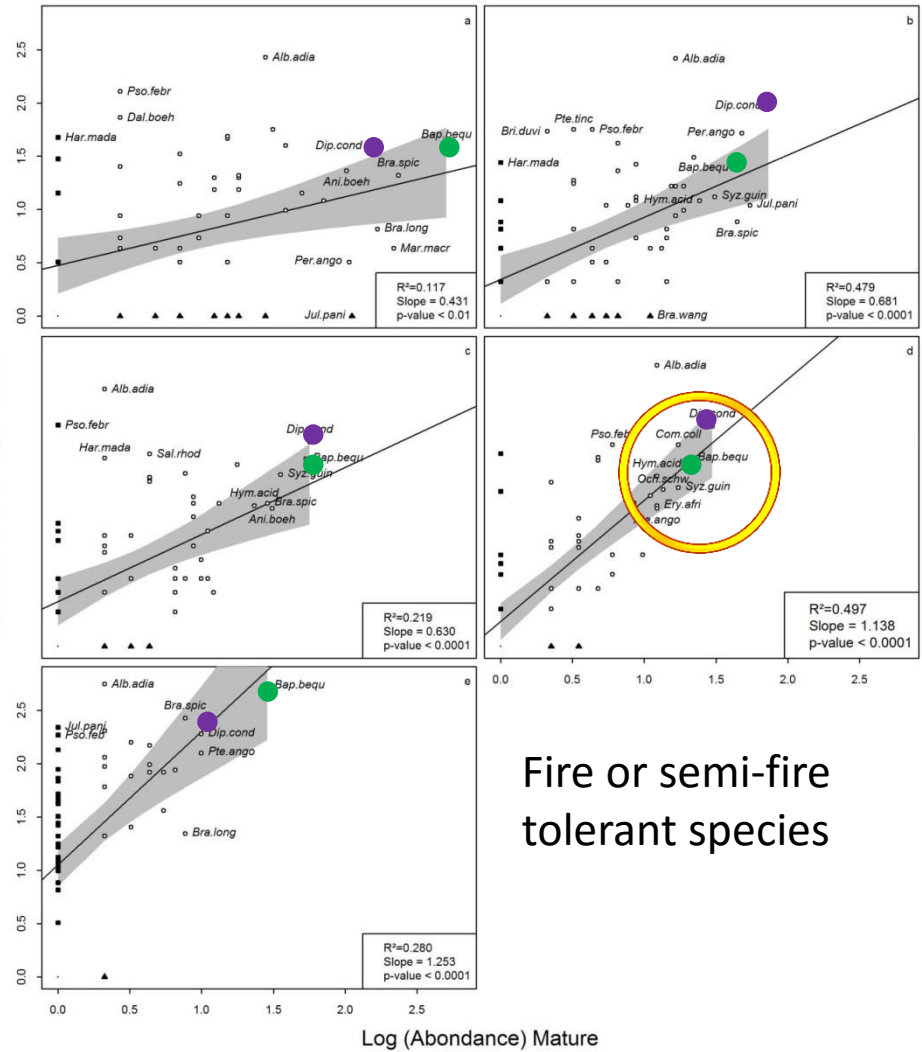
Log (Abundance) Regeneration



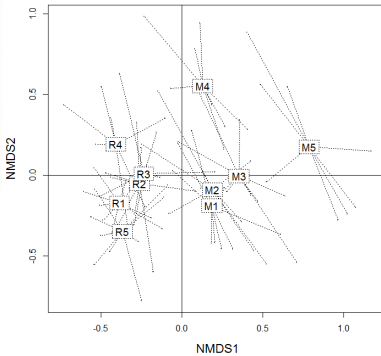
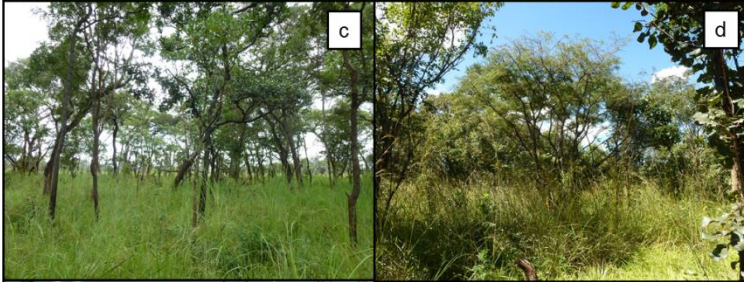
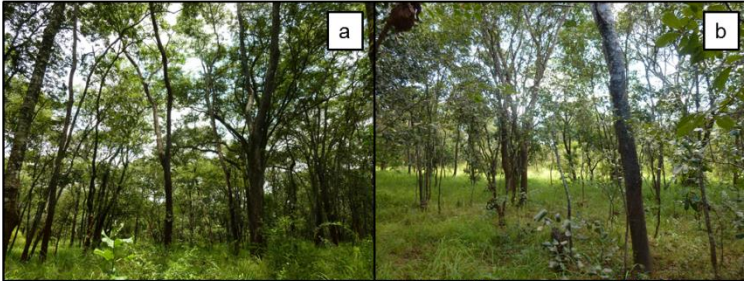
Fire or semi-fire tolerant species



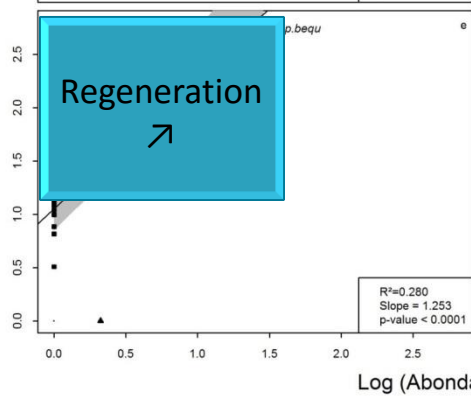
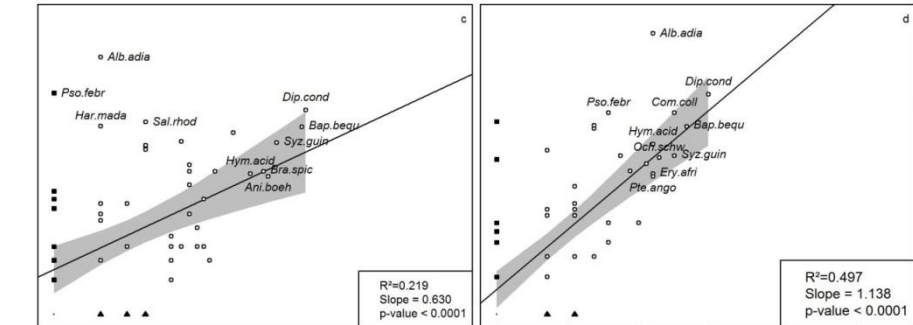
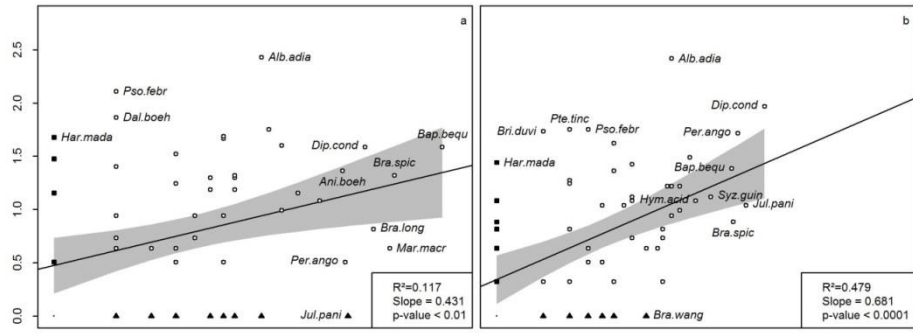
Log (Abundance) Regeneration



Fire or semi-fire tolerant species

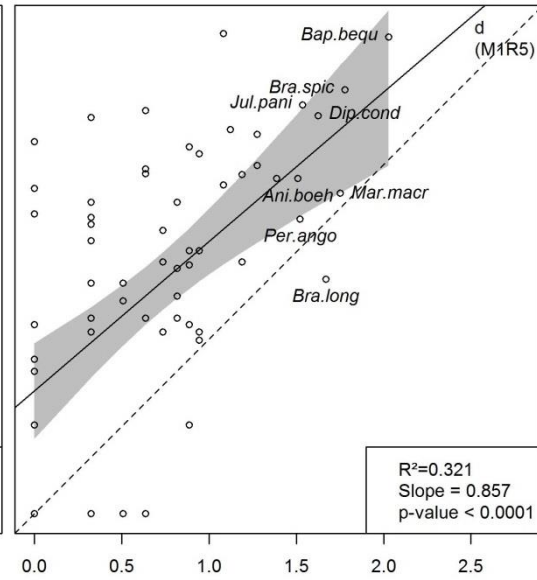
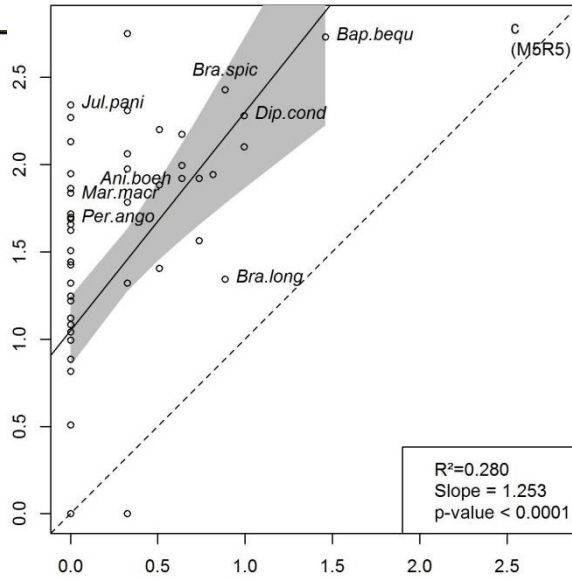


Log (Abundance) Regeneration



Fire or semi-fire tolerant species

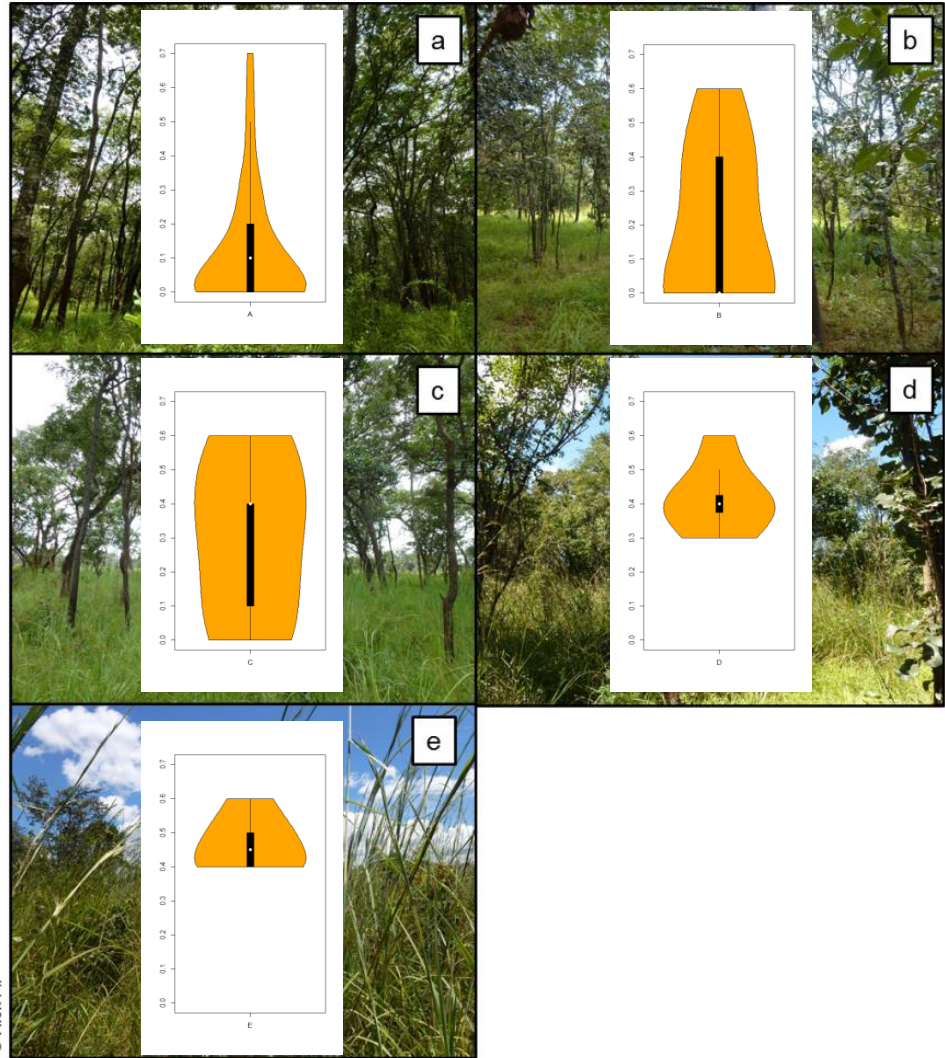
© Hick A.



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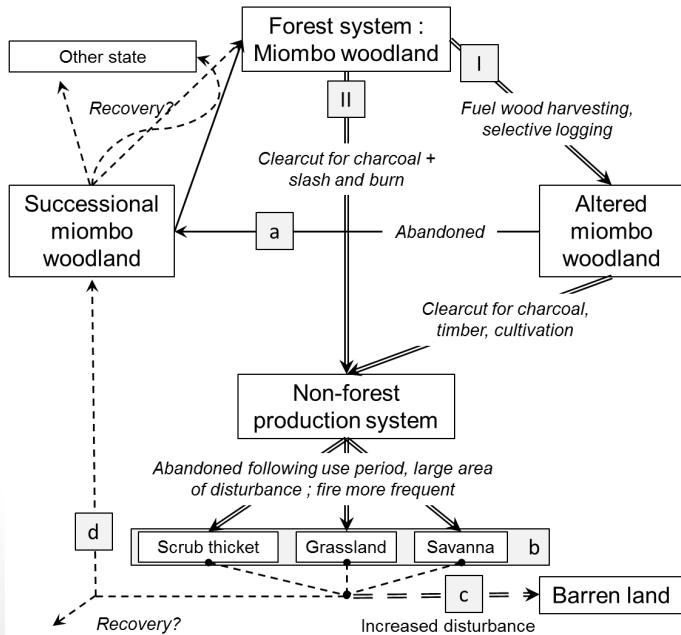
Fire recurrence



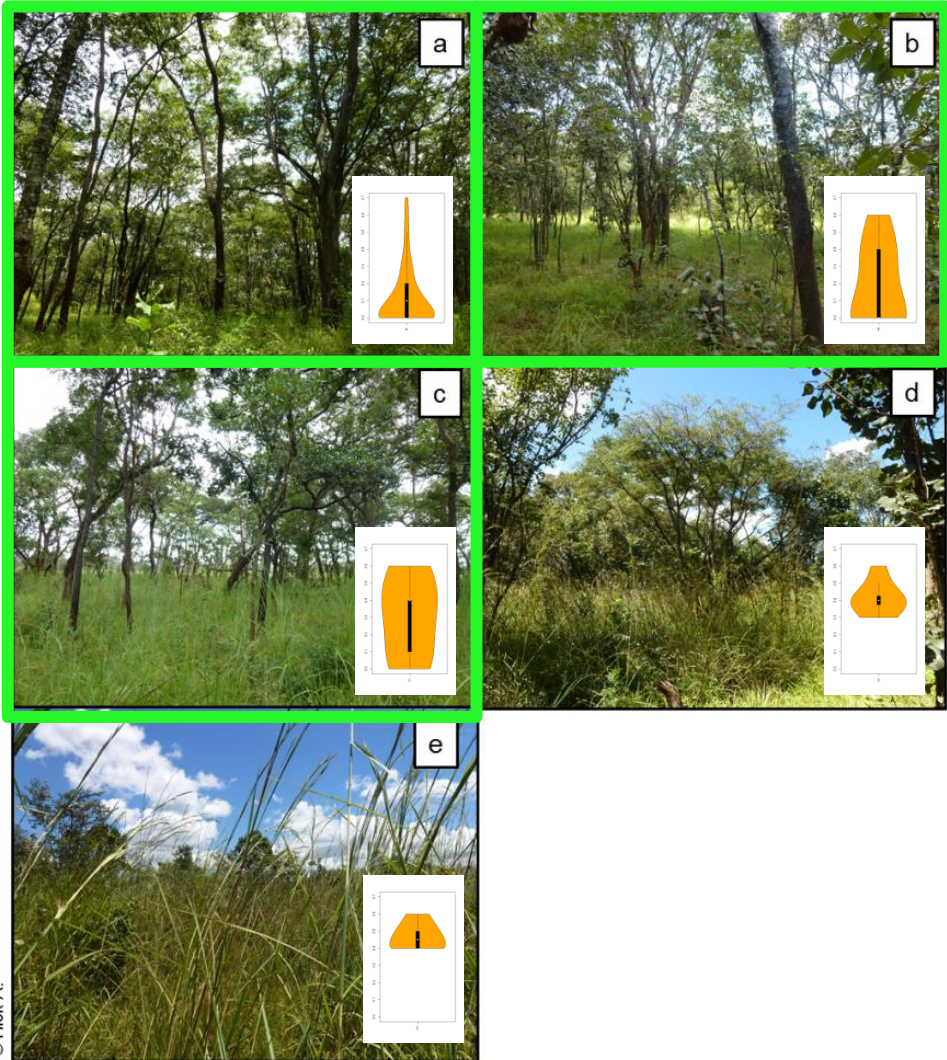
RESILIENCE
RESISTANCE



Resilience ↗ ↗

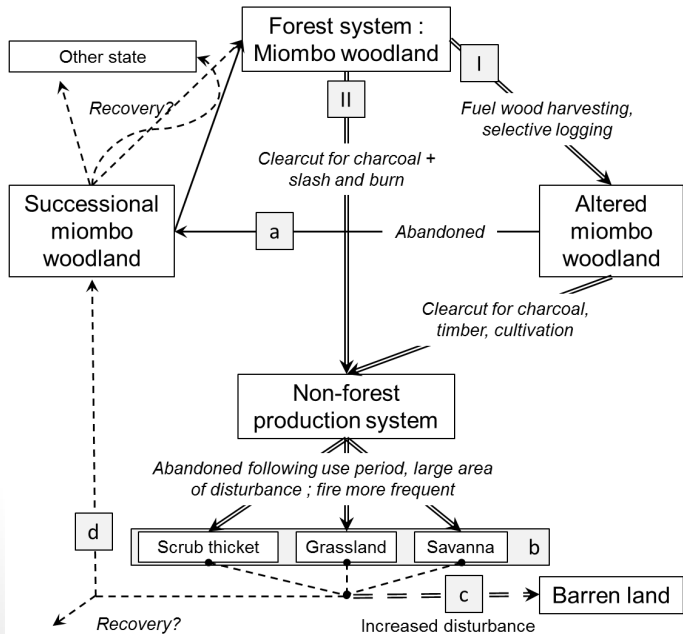


Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout



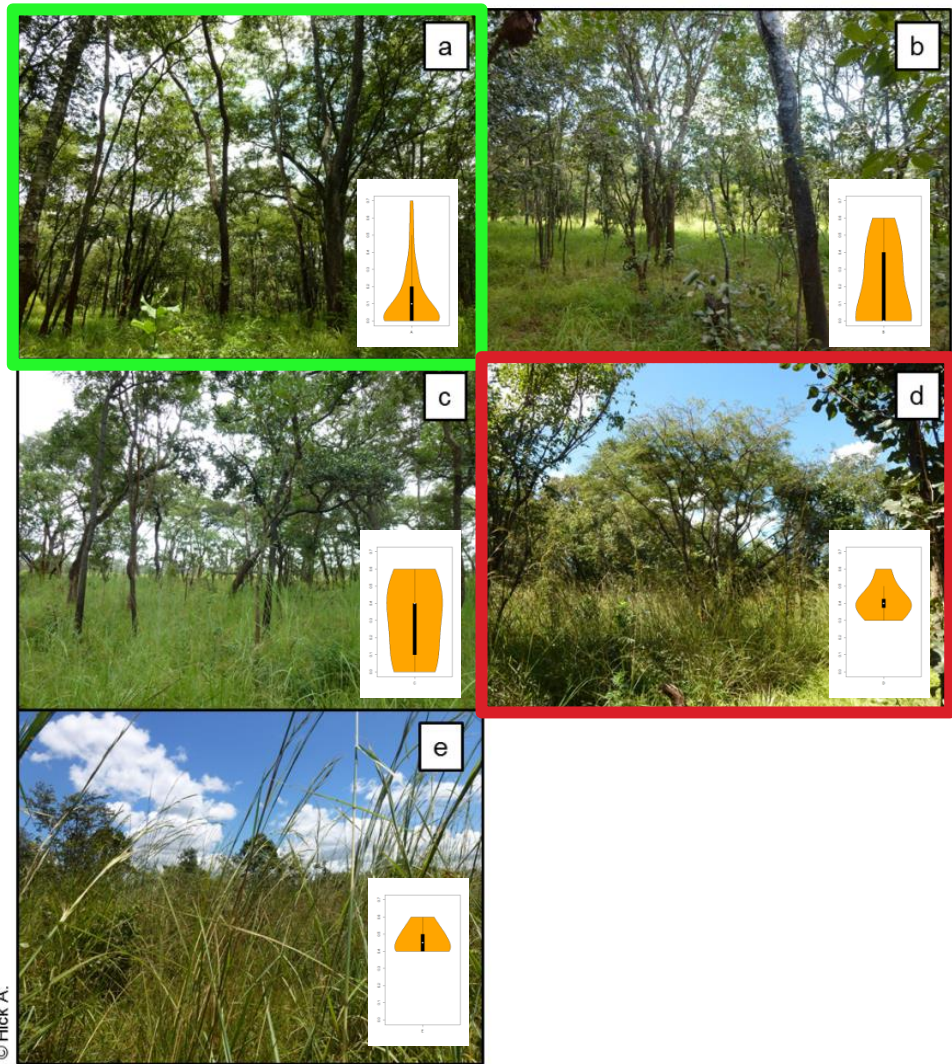
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Resilience ↘ Recovery? Trajectory ≠ ?

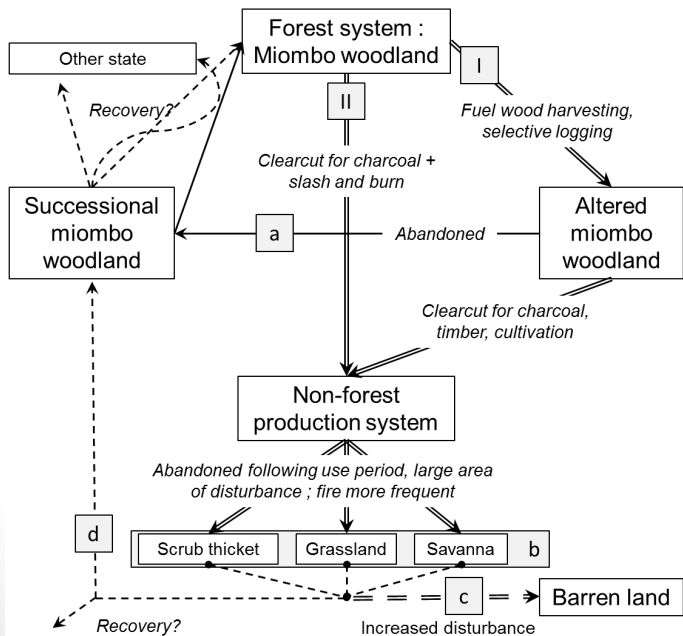


Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout

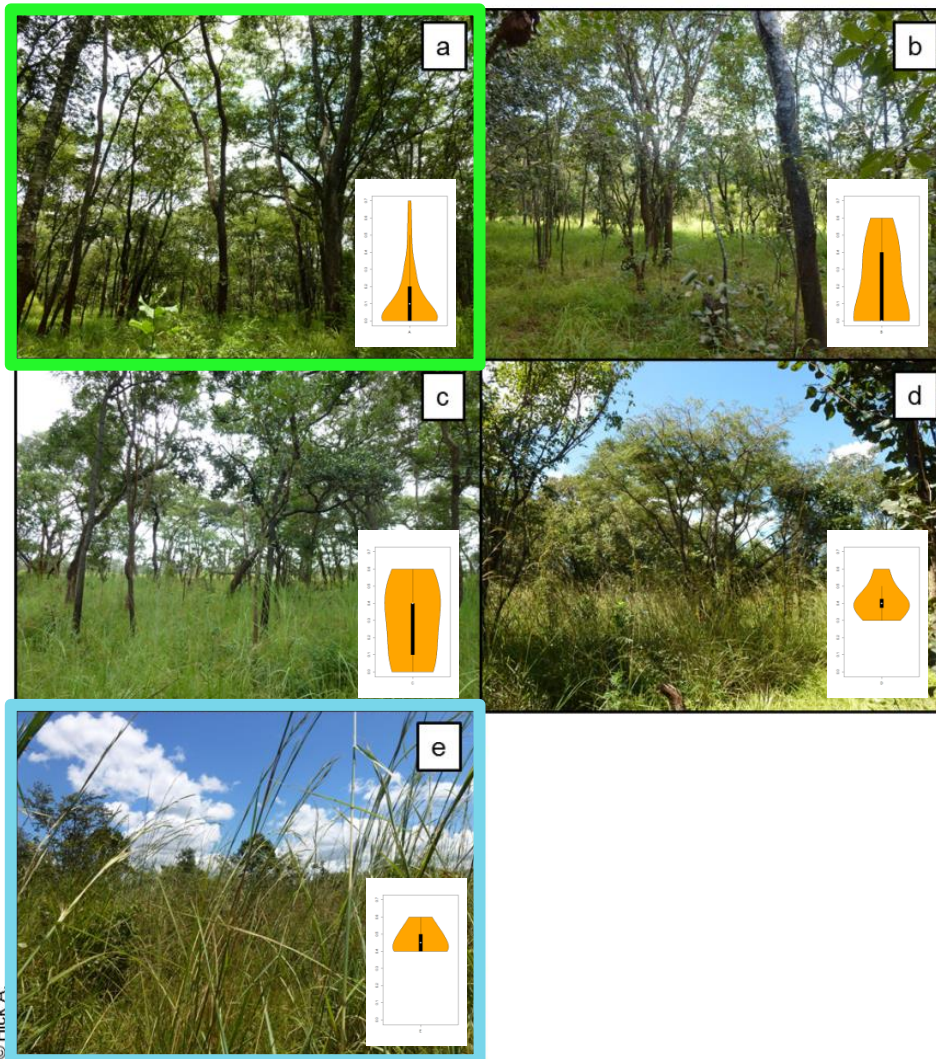
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Recovery? Trajectory ≠ ?



Recovery depending upon severity of soil degradation, fire frequency, availability of seed pools and ability to resprout



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A photograph of a dense forest with tall, leafy trees under a bright blue sky with scattered white clouds. A black horizontal banner is centered across the middle of the image, containing the word "Thanks" in white, sans-serif font. The foreground shows a mix of green grass and small plants.

Thanks