

The making of an ecological trap:  
Are elephants attracted by  
deforested areas?



FONDATION  
FRANÇOIS  
SOMMER



***Hugo Valls-Fox, Alessandro Fusari, Jean-Baptiste Deffontaines,  
Carlos Lopes Pereira, José Dias, & Philippe Chardonnet***

# The deforestation paradox

## Negative impacts

- Habitat loss
- Disturbance

*Kinnaird et al. (2014). Conserv. Biol.*

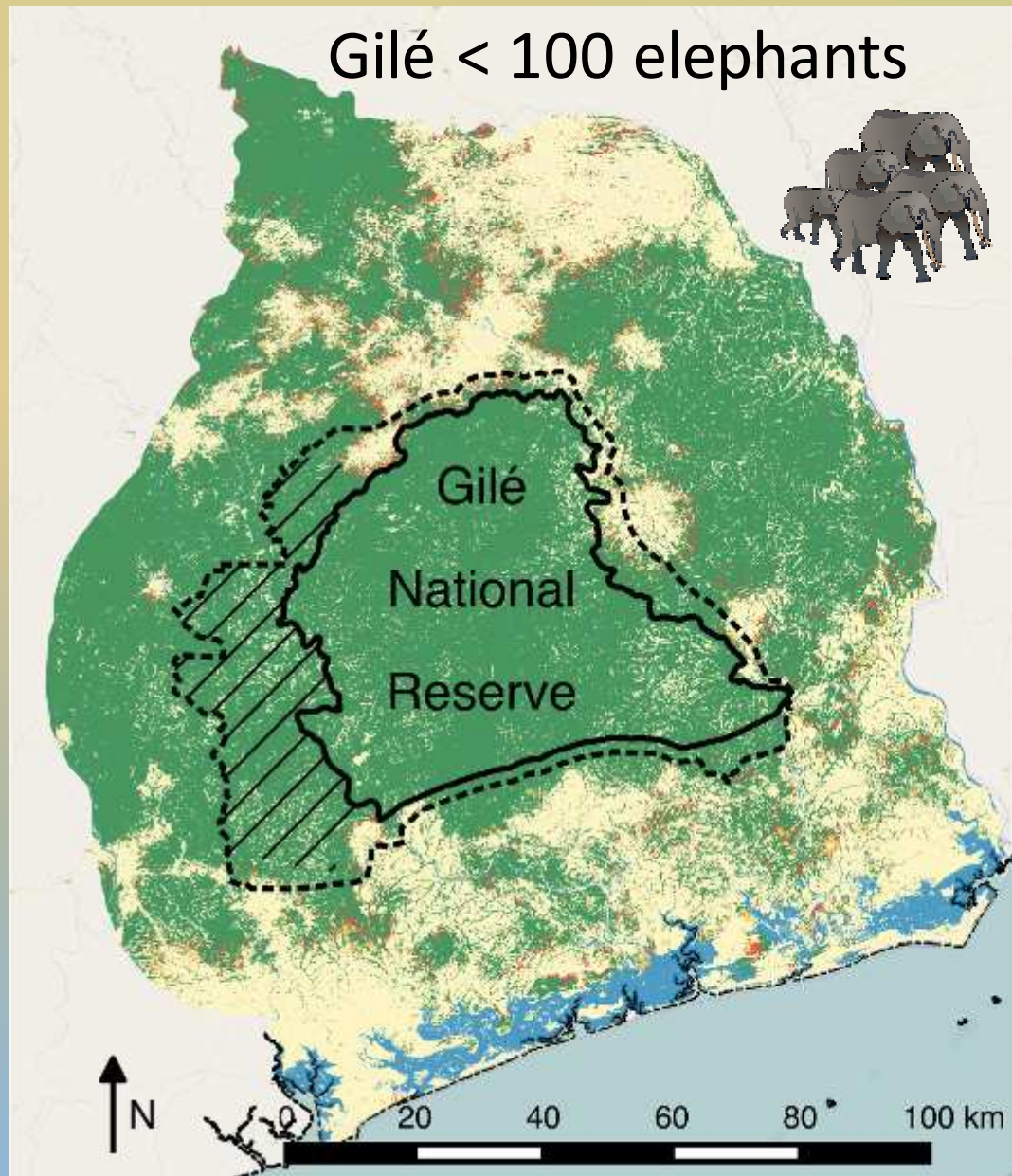
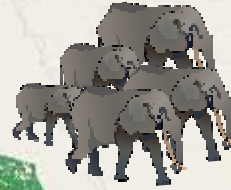


- Idiosyncratic response of large mammals to deforestation  
*Froese, et al. (2015). Trop. Ecol.*
- Elephants attracted by secondary regrowth or fields ?

➤ **Effect of deforestation on elephant habitat use ?**

# Study Area

Gilé < 100 elephants



Moz < 10 000 elephants



<i>Protected Area</i>	4 610 km <sup>2</sup>
□ Gilé National Reserve	2 872 km <sup>2</sup>
⊞ Buffer Zone	1 738 km <sup>2</sup>
▨ Coutada	978 km <sup>2</sup>

*Vegetation cover*

■ Miombo woodland
■ Deforestation between 2010 - 2013
■ Deforestation between 2005 - 2010
■ Non forest areas
■ Coastal wetlands and mangroves

# Deforestation around Gilé National Reserve



Miombo Forest

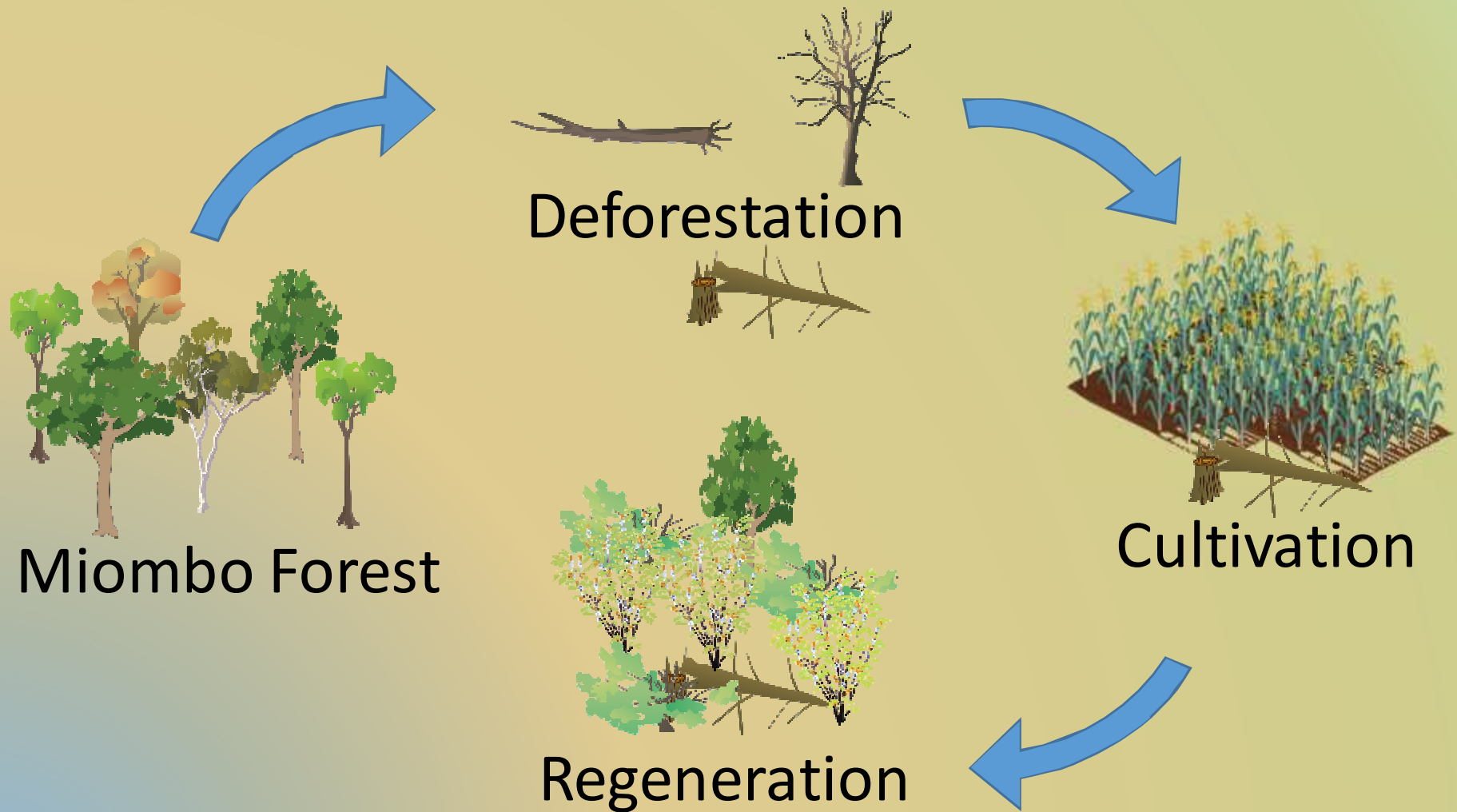
# Deforestation around Gilé National Reserve



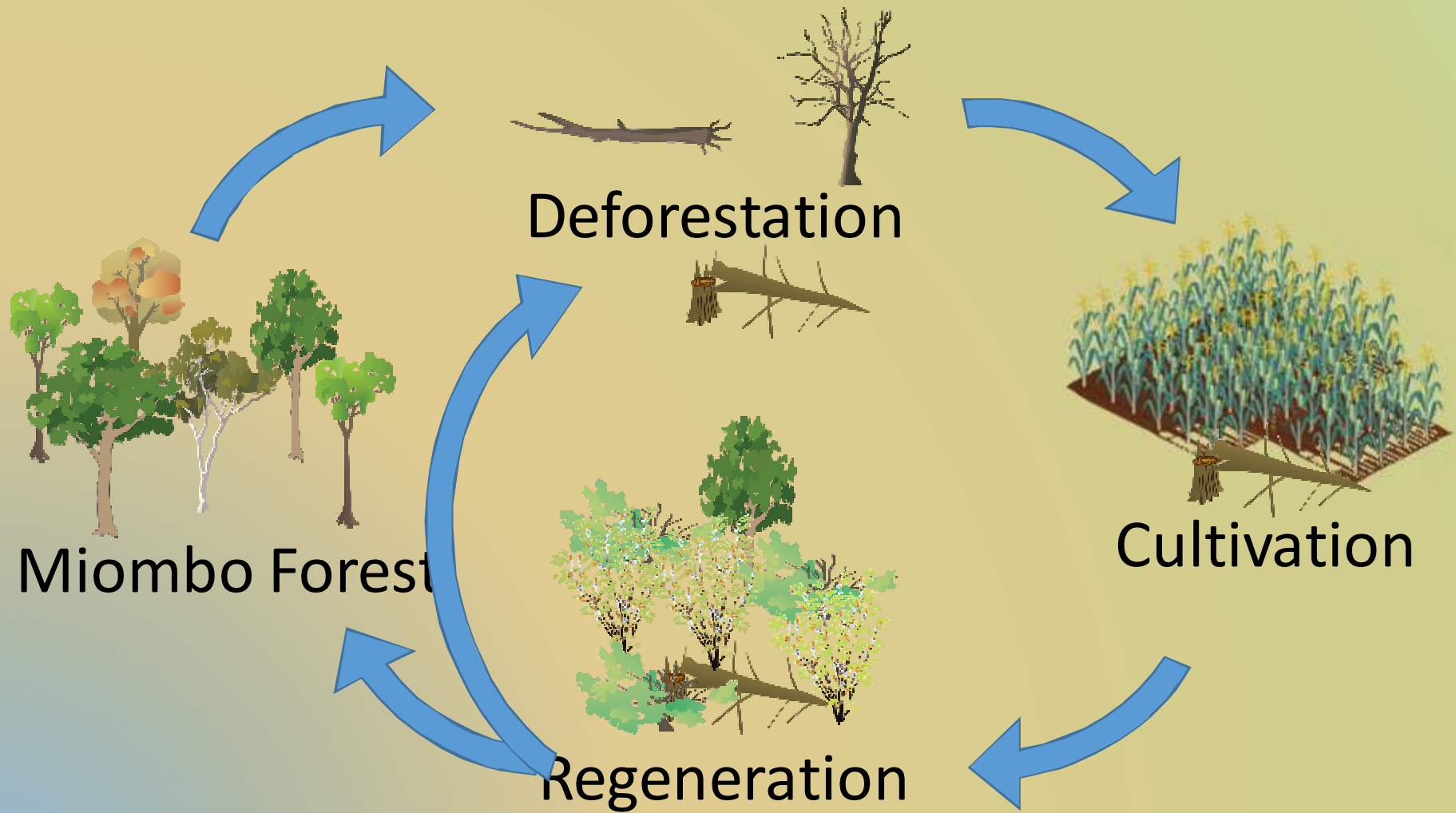
# Deforestation around Gilé National Reserve



# Deforestation around Gilé National Reserve



# Deforestation around Gilé National Reserve





## Method: GPS satellite collars

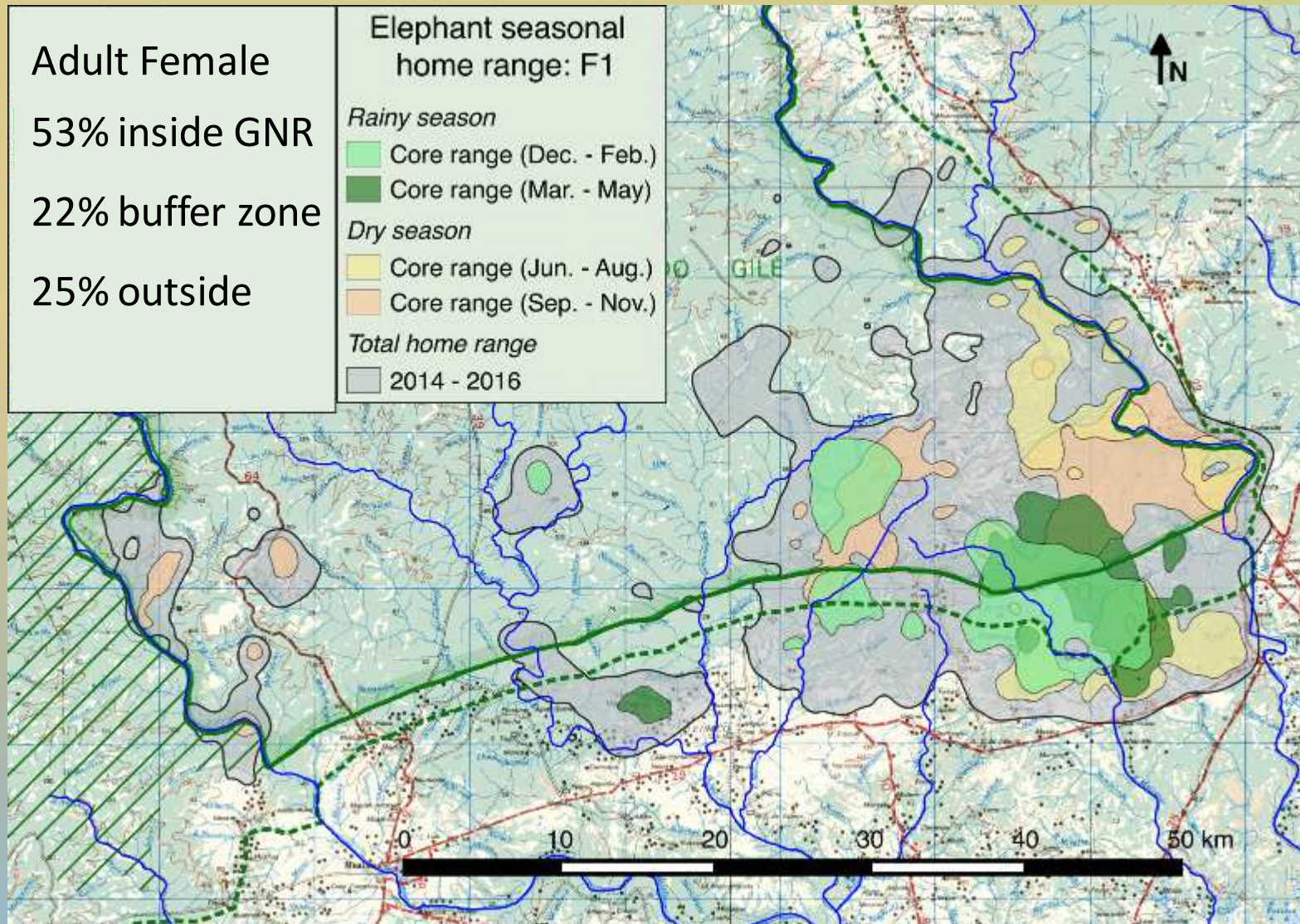


3 collars Oct. 2014 + 3 collars Jul. 2016

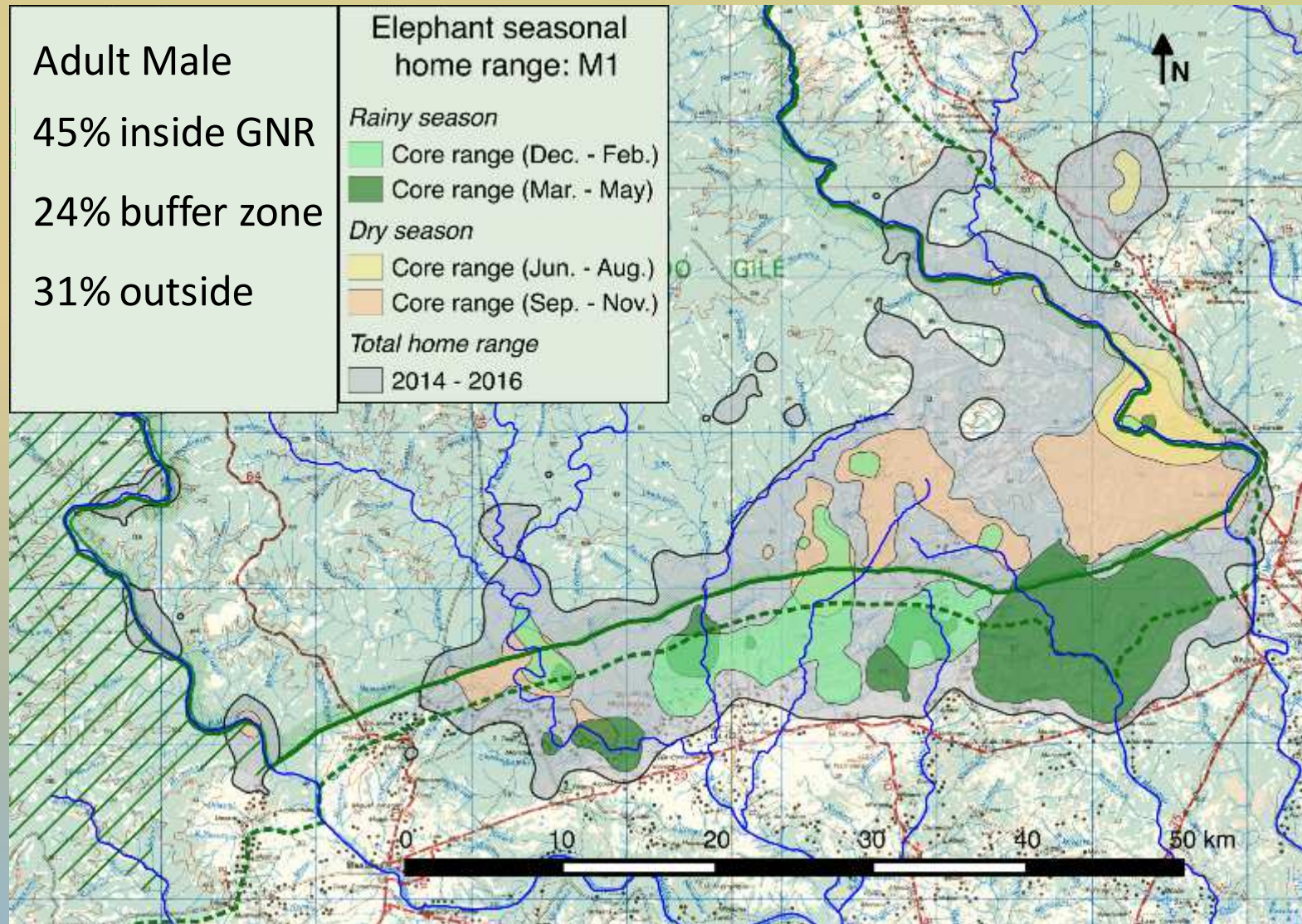
Elephant movement :

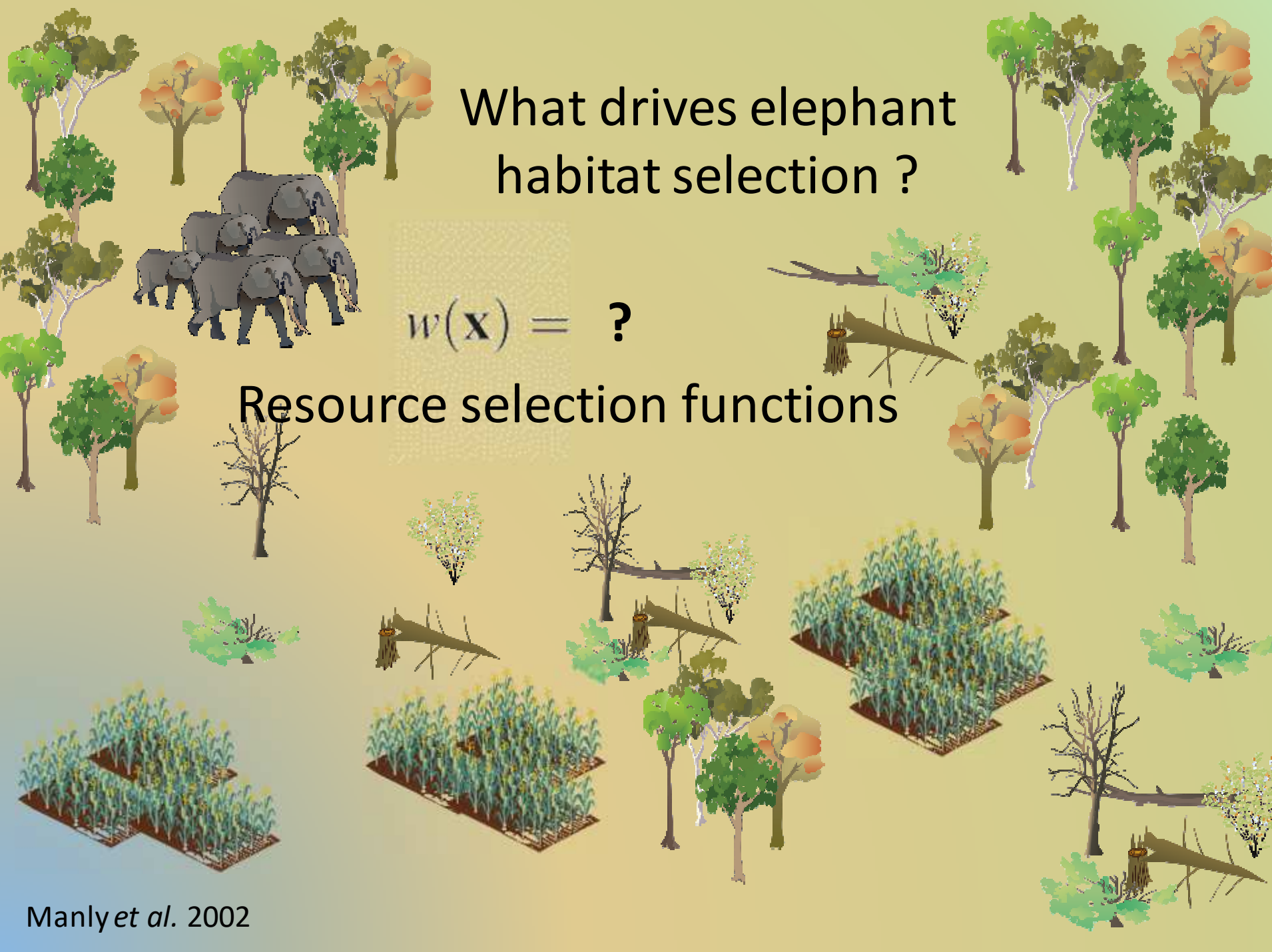
- Habitat use and habitat selection

# Elephant seasonal home-range



# Elephant seasonal home-range





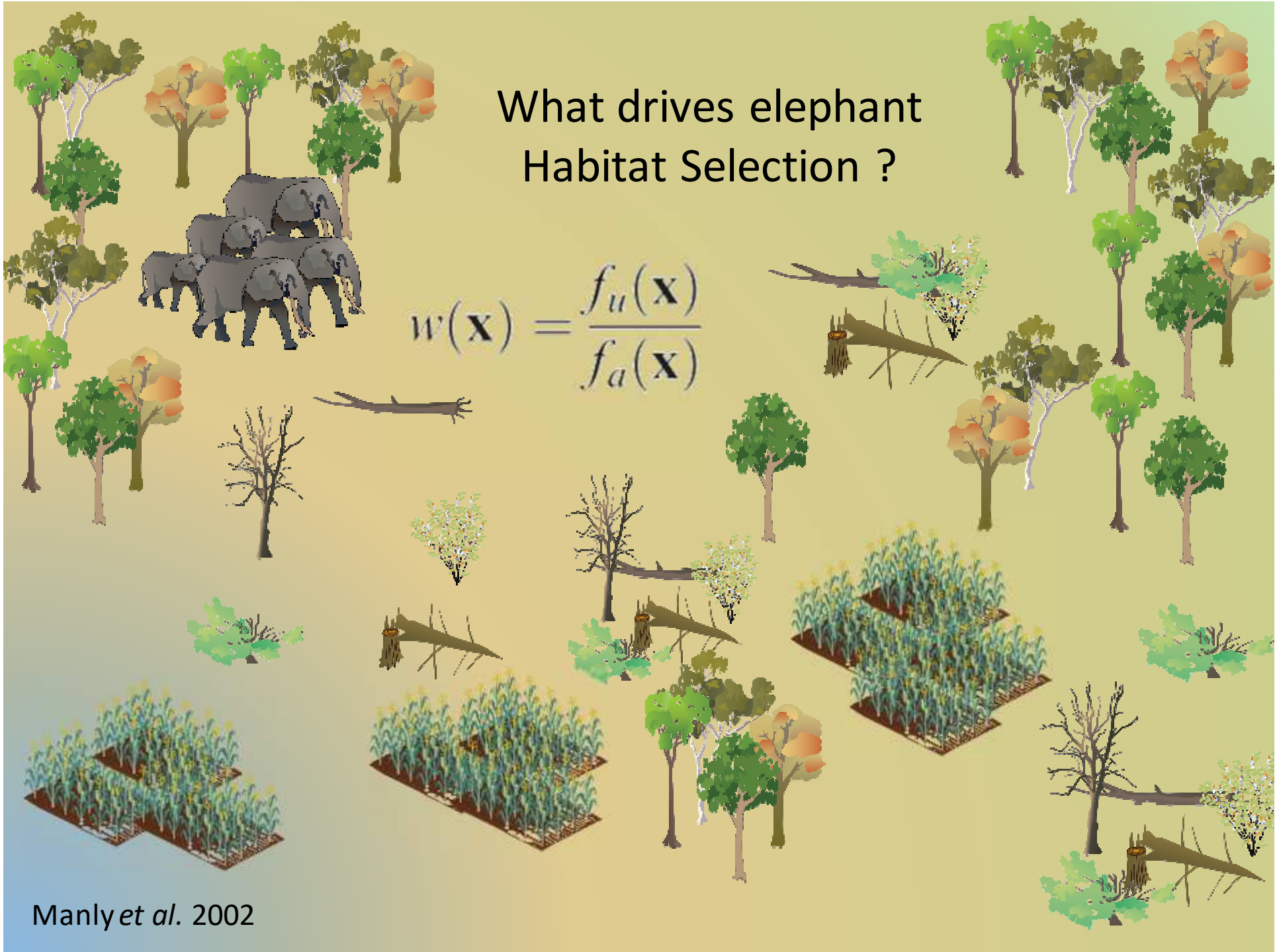
What drives elephant  
habitat selection ?

$$w(\mathbf{x}) = ?$$

Resource selection functions

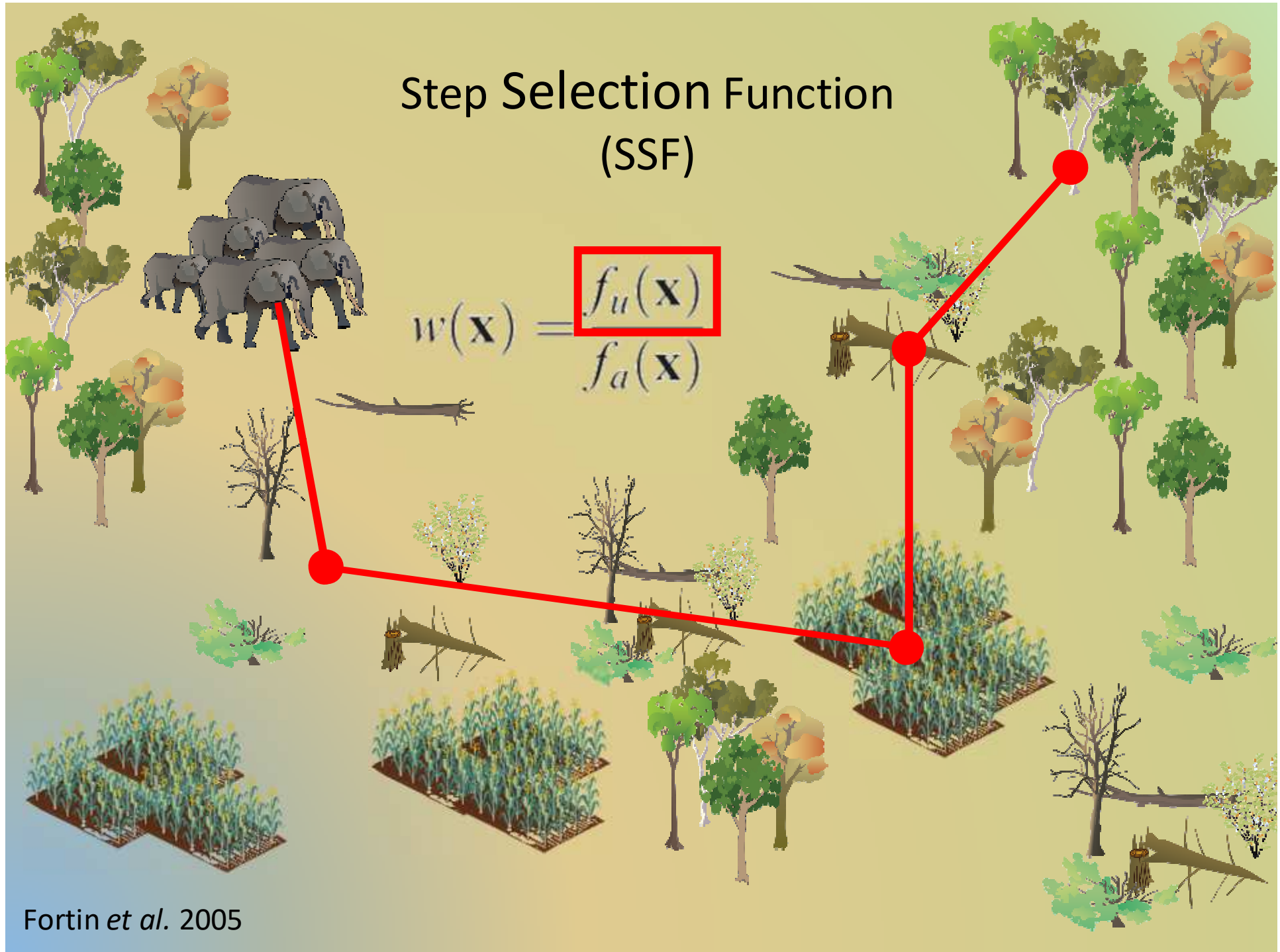
# What drives elephant Habitat Selection ?

$$w(\mathbf{X}) = \frac{f_u(\mathbf{X})}{f_a(\mathbf{X})}$$

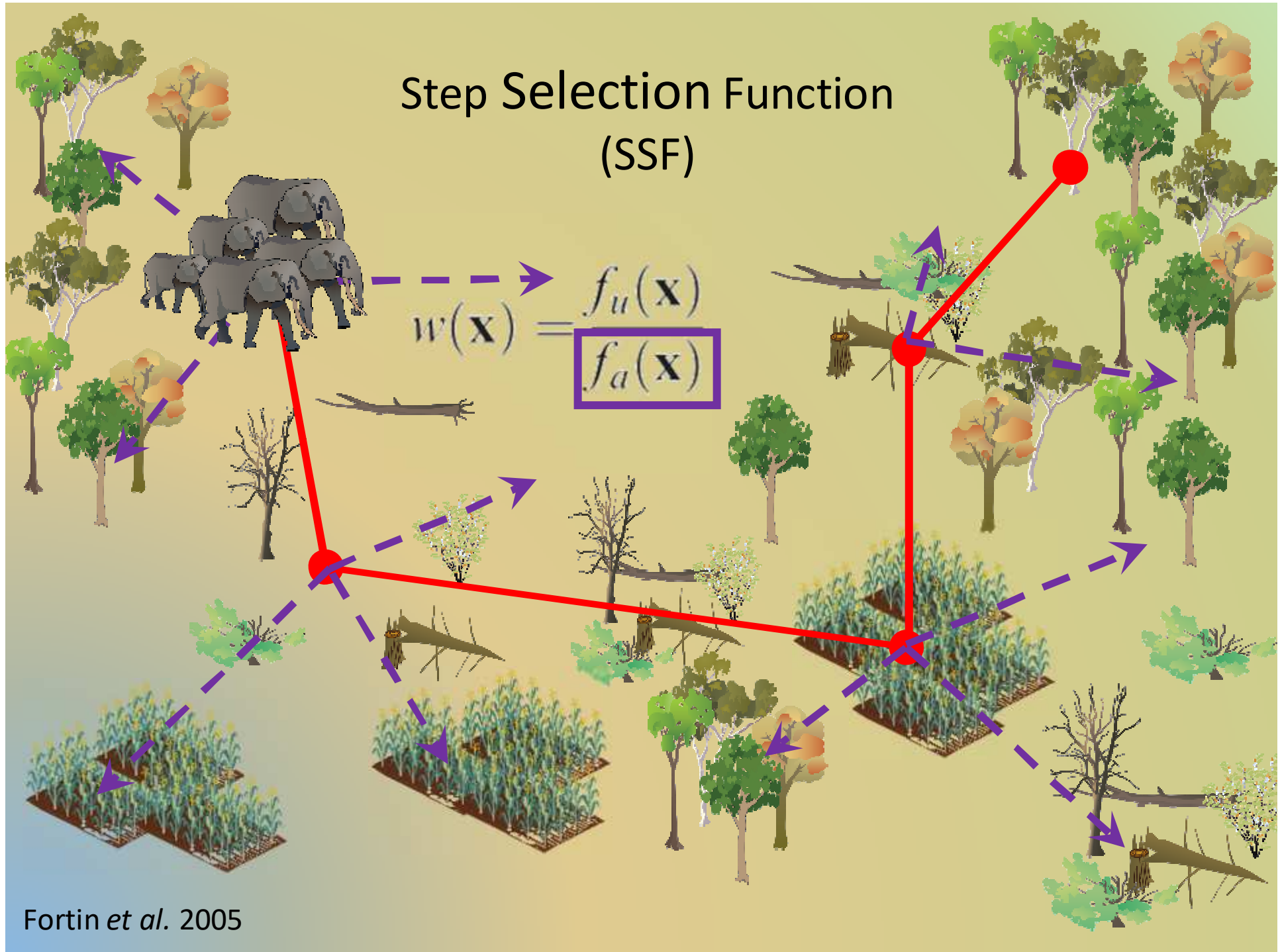


# Step Selection Function (SSF)

$$w(\mathbf{x}) = \frac{f_u(\mathbf{x})}{f_a(\mathbf{x})}$$



# Step Selection Function (SSF)



## Step Selection Function (SSF)

$$w(\mathbf{x}) = \frac{f_u(\mathbf{x})}{f_a(\mathbf{x})}$$

$$\hat{w}(\mathbf{x}) = \exp(\hat{\beta}_1 x_1 + \dots + \hat{\beta}_k x_k)$$

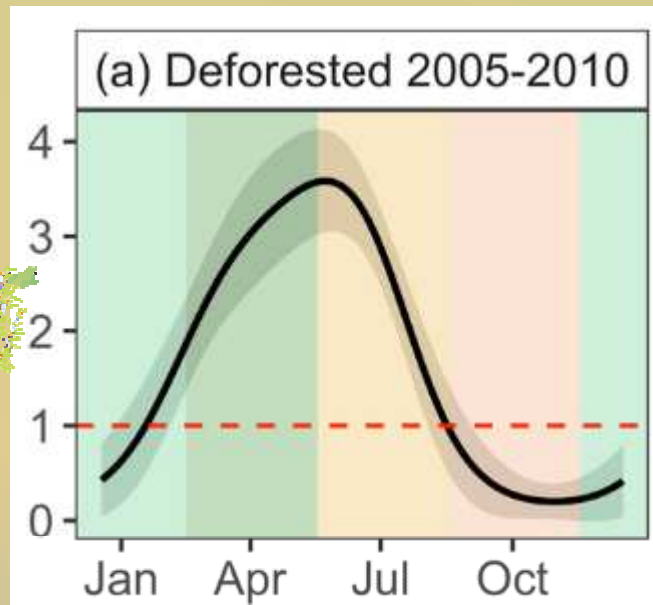
Landscape variables :

- *Vegetation*
- *Distance to water*
- ...

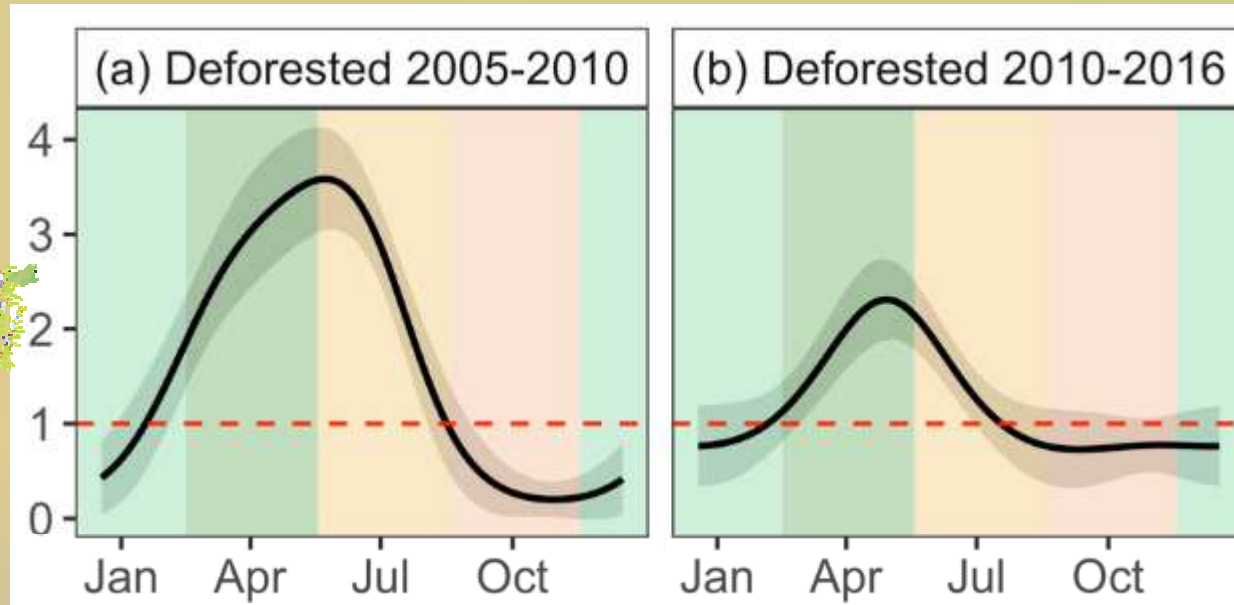




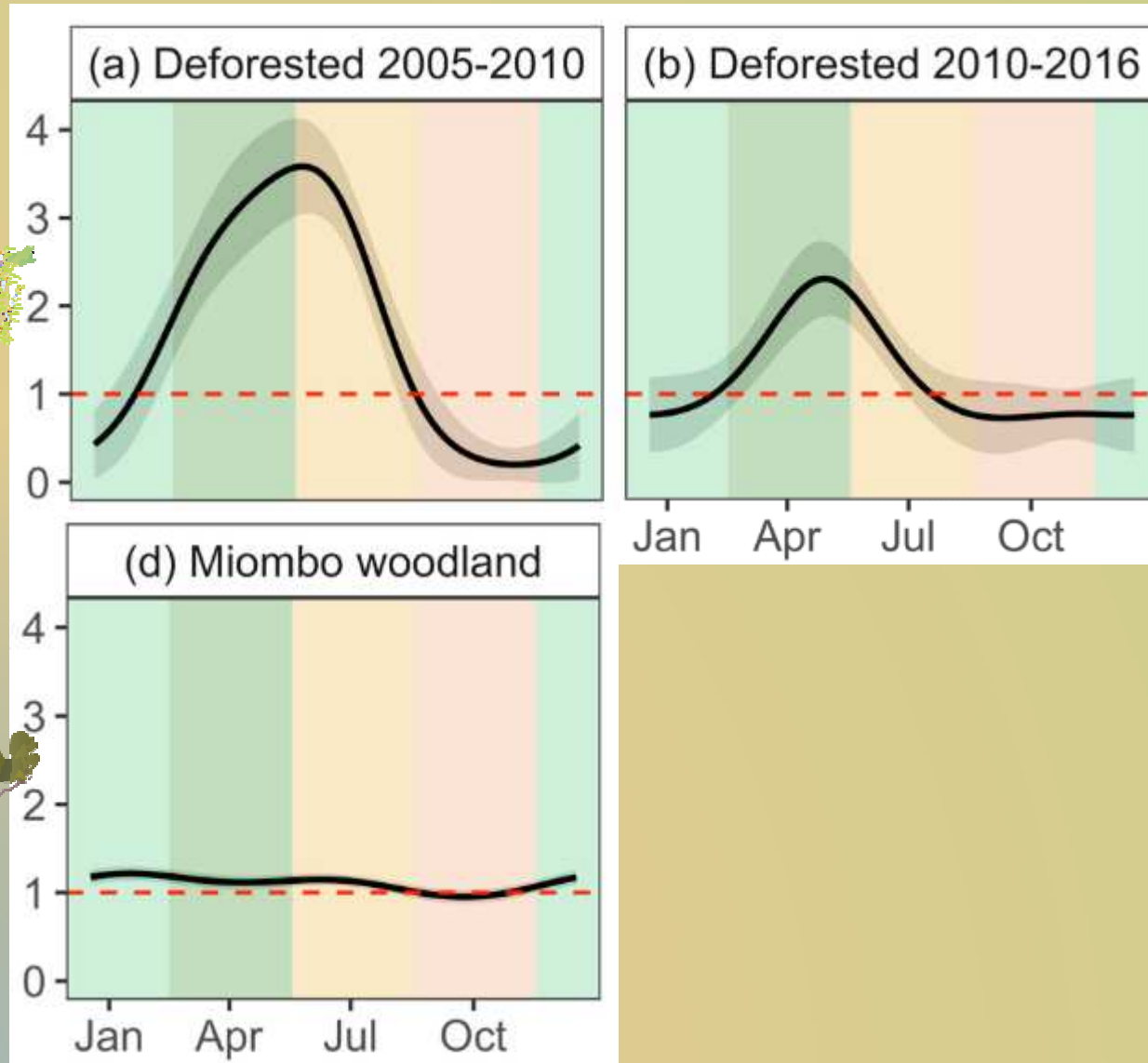
# Seasonal Patterns of habitat selection



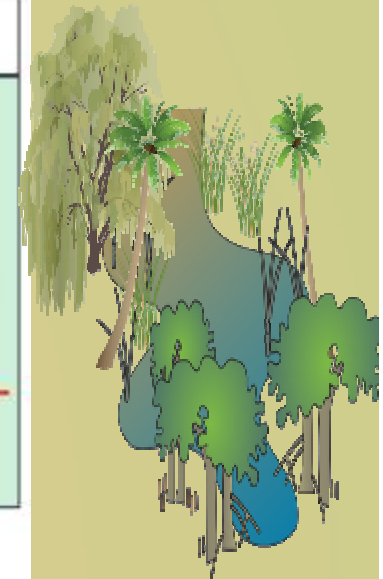
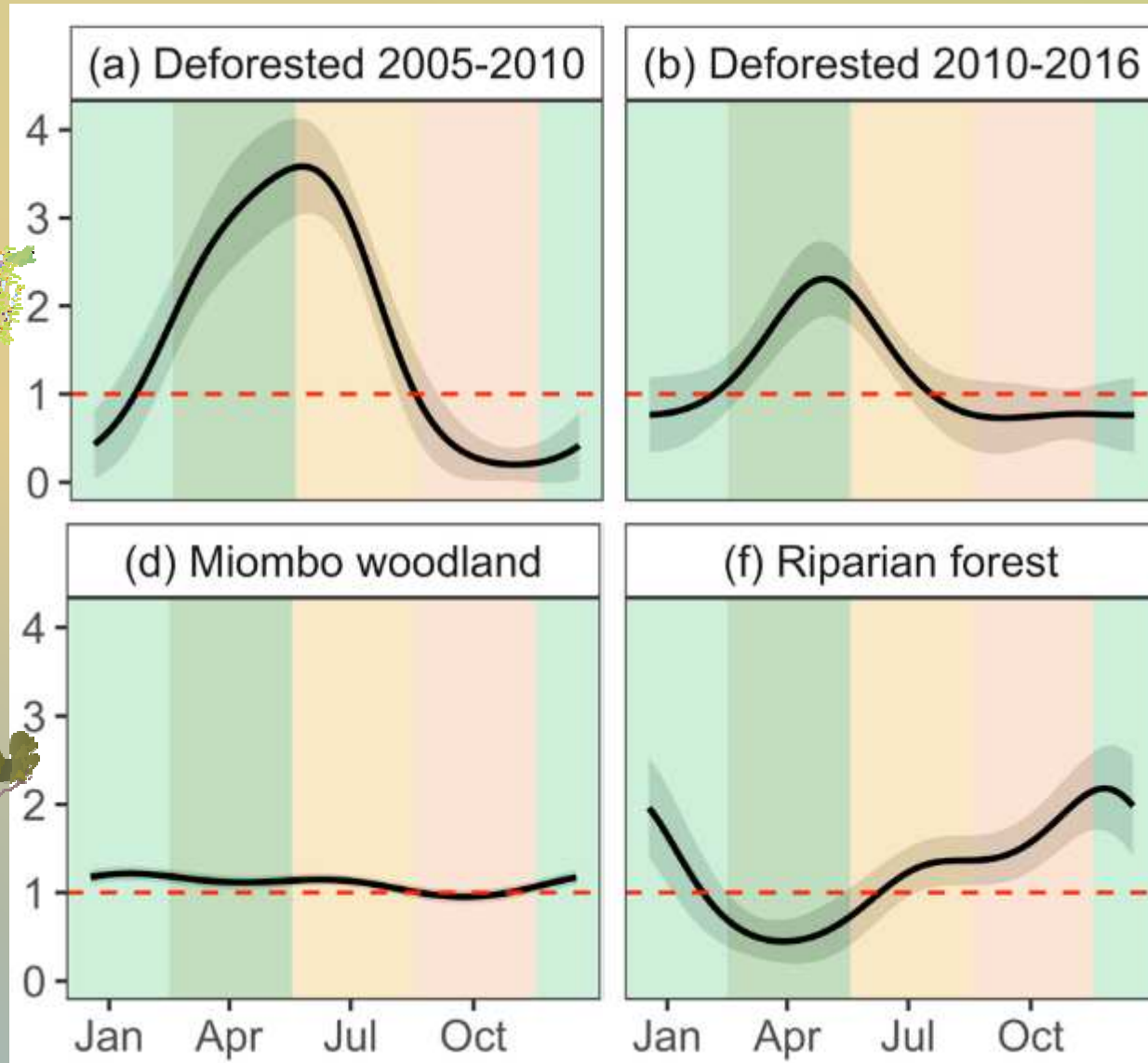
# Seasonal Patterns of habitat selection



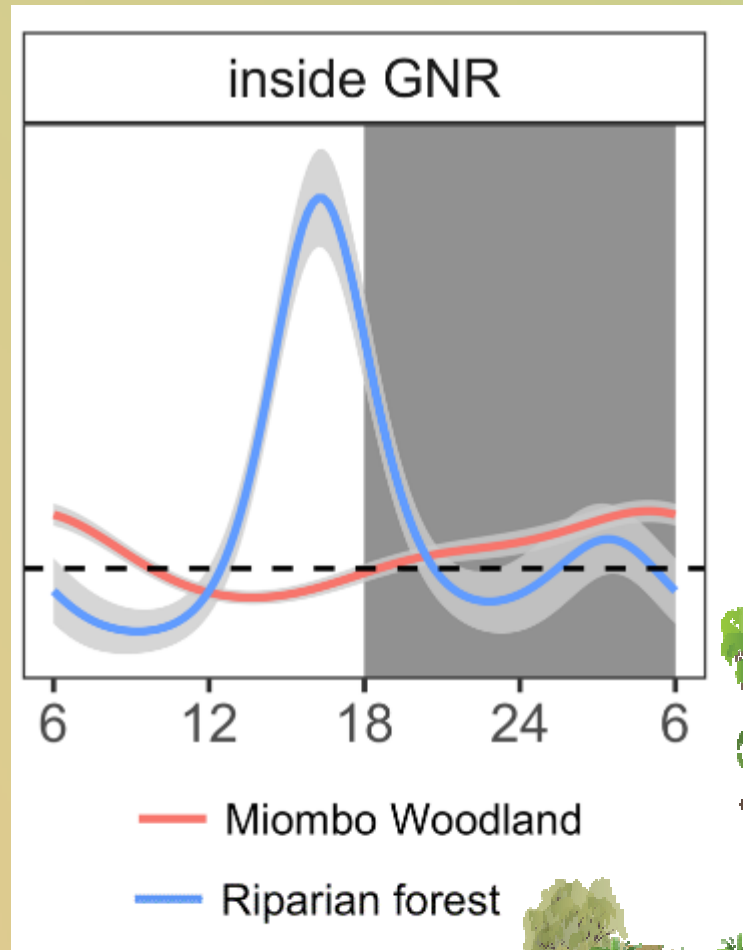
# Seasonal Patterns of habitat selection



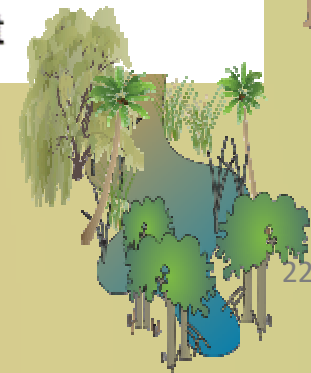
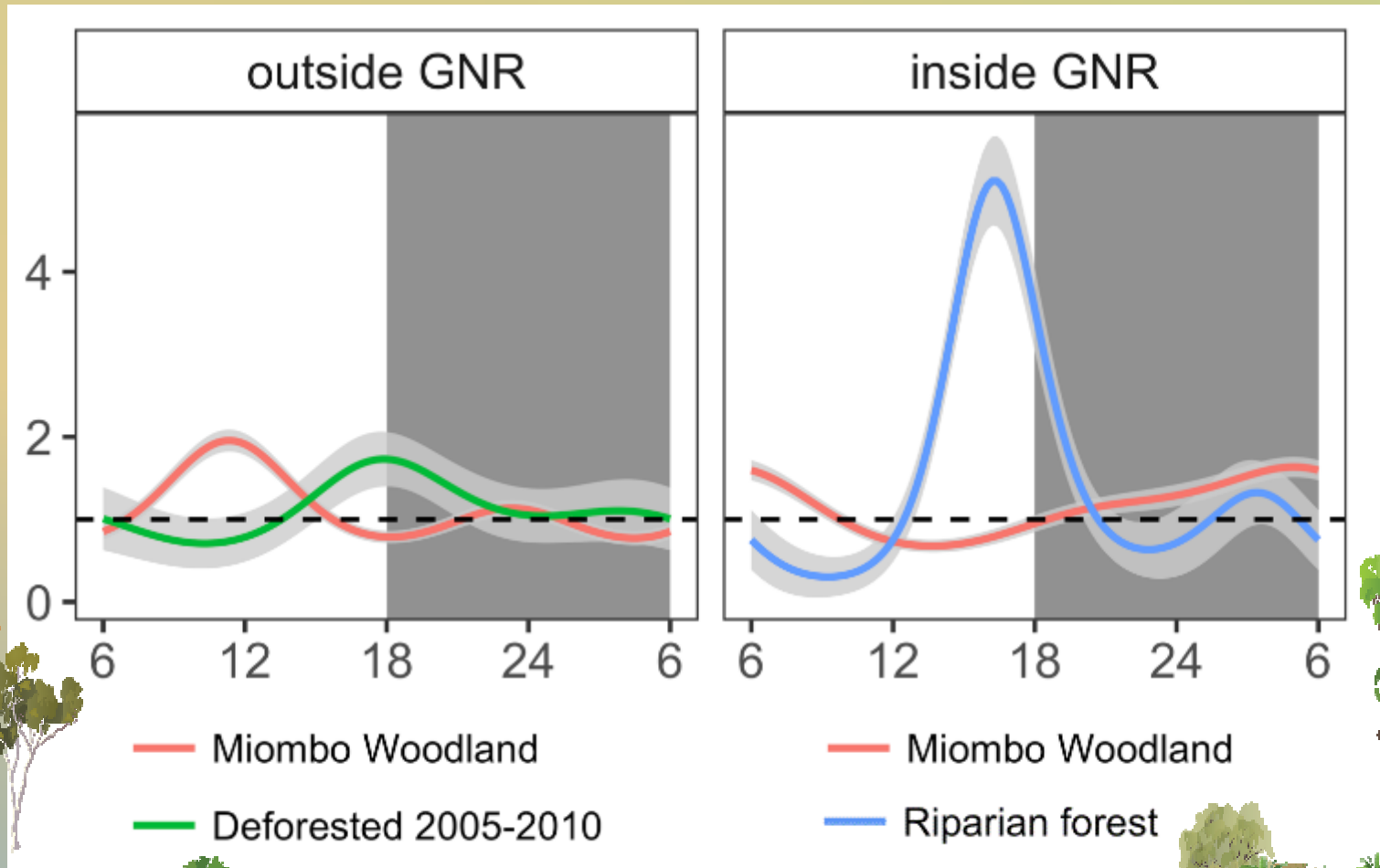
# Seasonal Patterns of habitat selection



# Daily patterns of Habitat selection



# Daily patterns of Habitat selection



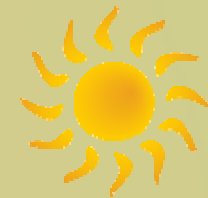
# Summary of results



Deforested 2005-2010  
Regeneration

Deforested 2010 -2016  
Cultivation

Miombo  
Forest



## Discussion: Logging for conservation ?

- Elephants attracted to periphery by:
  - **Regenerating forests**  
*Struhsaker et al. 1996* (Tropical rainforest)
  - **Fields** -> Human Elephant Conflict
- Elephant density too low to maintain disturbed areas : They need « browsing lawns ».



➤ How to conciliate coexistence with people and the maintenance of man-made secondary forests ?