

# Pathways and Patterns



Science & Survival



# Trailblazing elephants and the key landscape features that shape connectivity in Southern Mozambique



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**In memory of Anka Bedetti: this is her research**



elephants  
**alive!**

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**Africa in the last 100 years:**



**The human population increased**

**47 mil. to 1.53 bil.**

**3155% increase**

**vs.**



**The elephant population decreased**

**10 mil. to 400 000**

**~ 97% decrease**

**elephants  
alive!**



Connectivity is key to long-term  
persistence



elephants  
**alive!**

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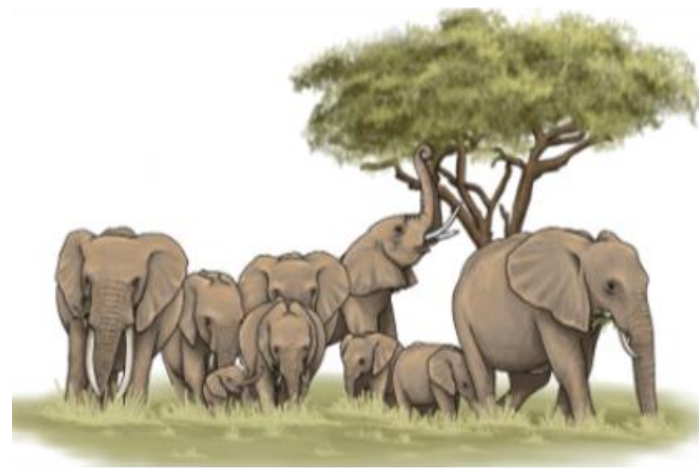
# Elephants are supreme ecosystem engineers

Disturbance



Knocking over trees & branch breakage

Browsing preference



Selection of tree and grass species

Nutrients

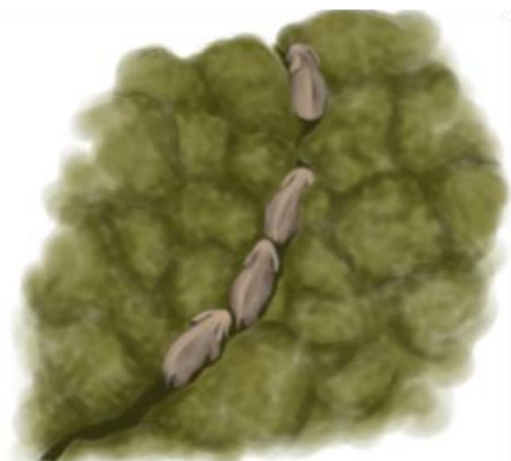


Dung, urine and carcasses

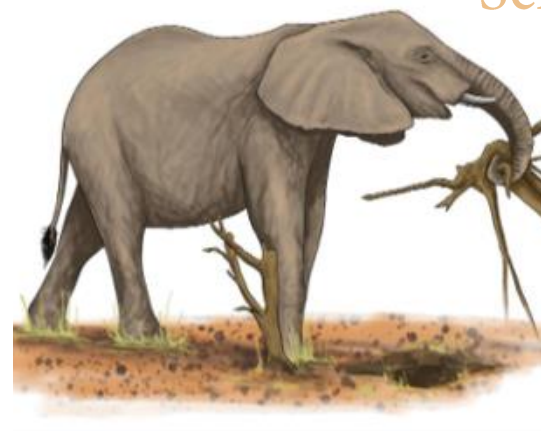
Seed dispersal



Seeds moved away from parent tree

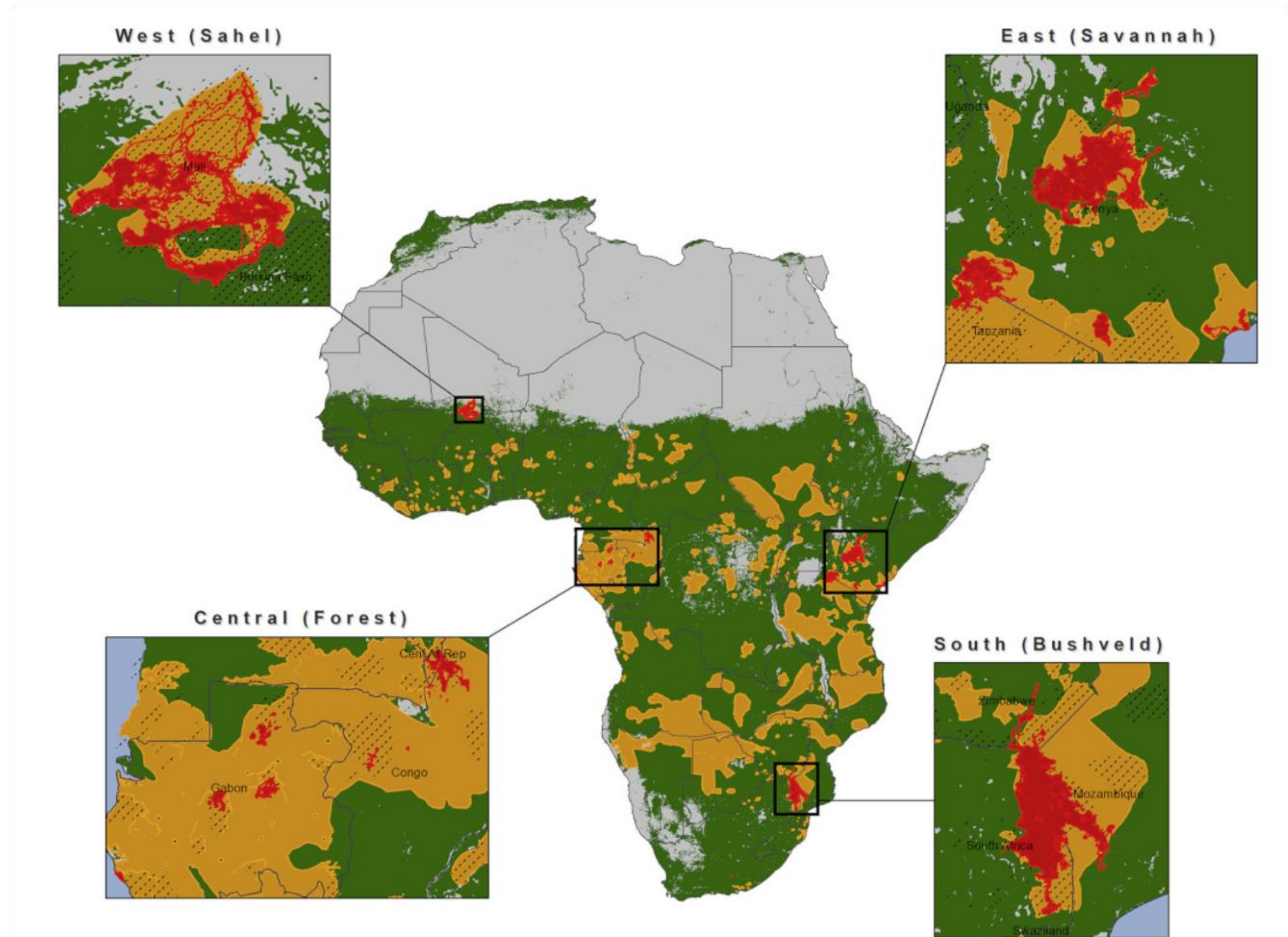


Trampling



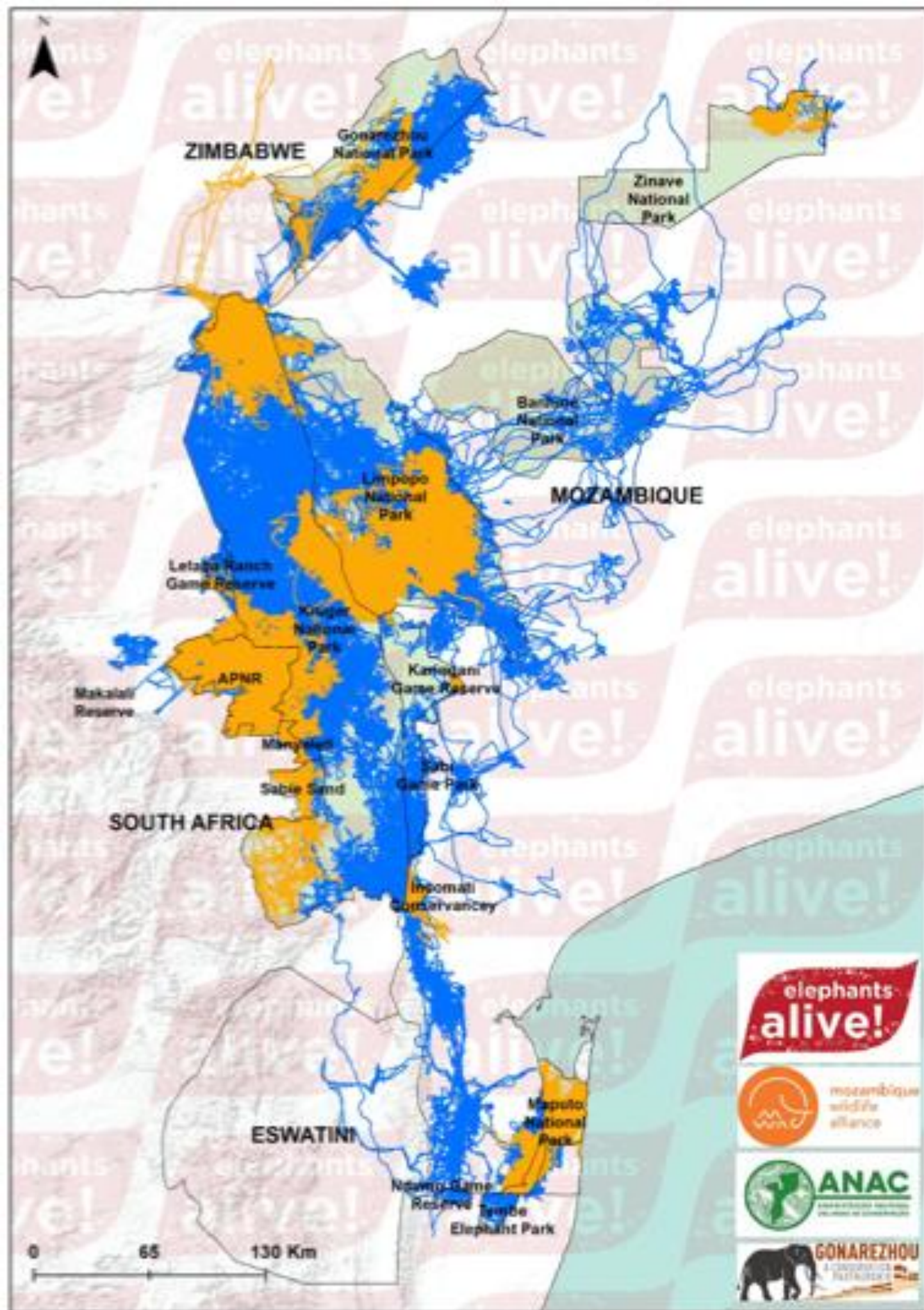
Bark stripping

**Elephants  
occupy only  
17% of their  
possible  
range**



# Objectives

1. Empirically quantify connectivity across Southern Mozambique using GPS tracking data on African savanna elephants.
2. To assess the landscape features (i.e. biotic or human-made) influencing connectivity.



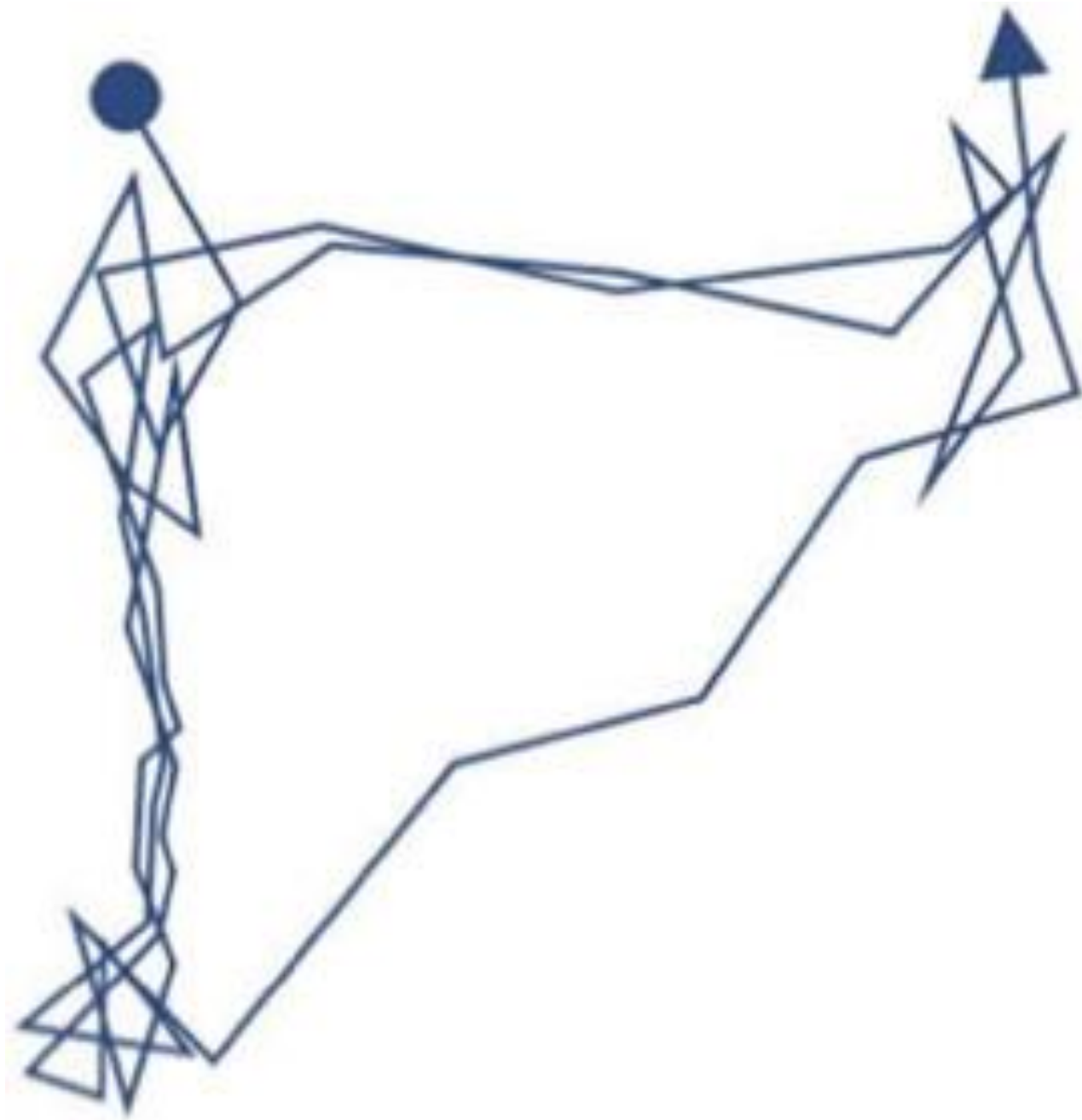


elephants  
**alive!**

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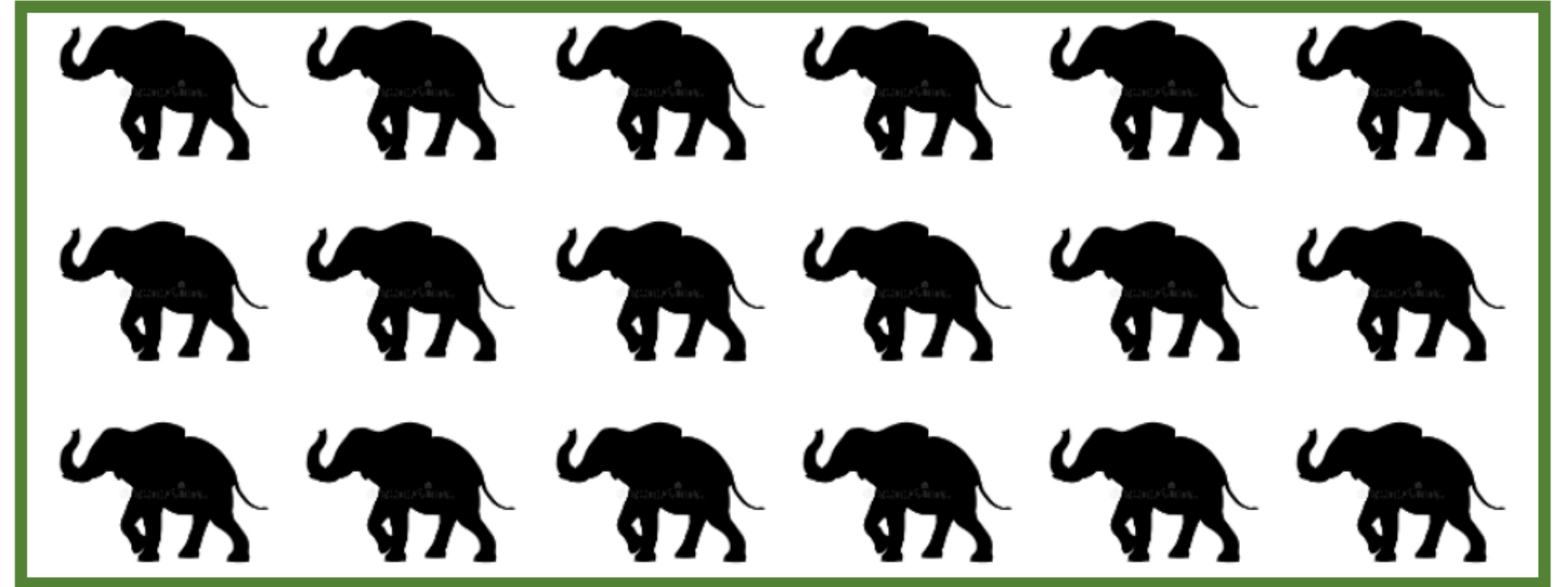
**What we did**

# Movement trajectories

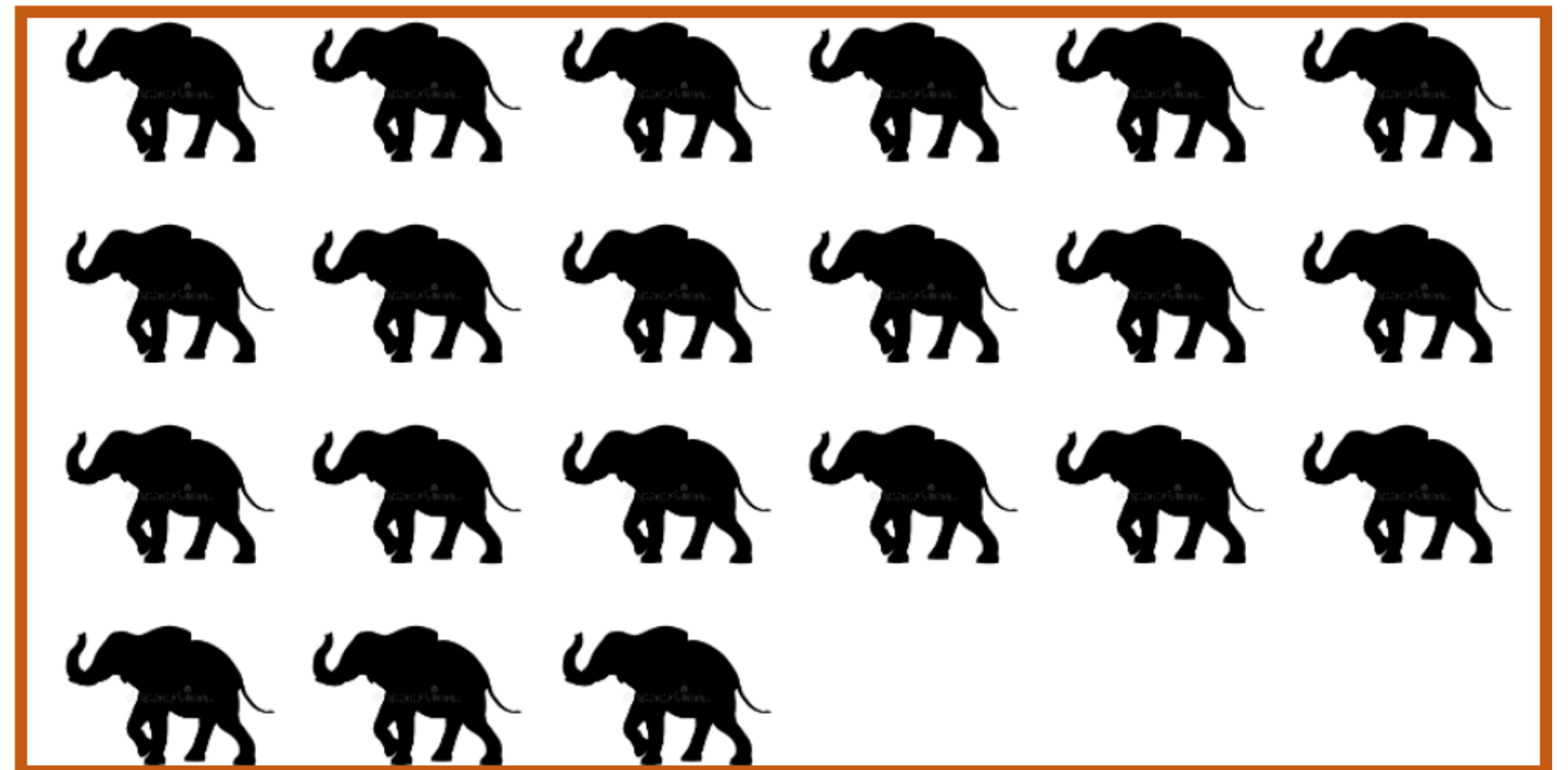


5 years: 2017 - 2022

Inside protected areas

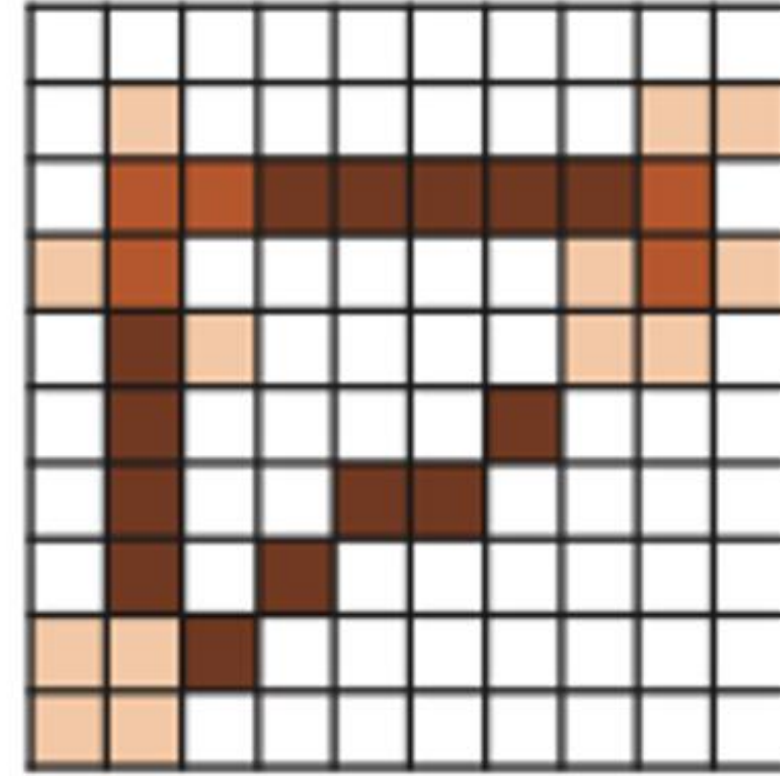
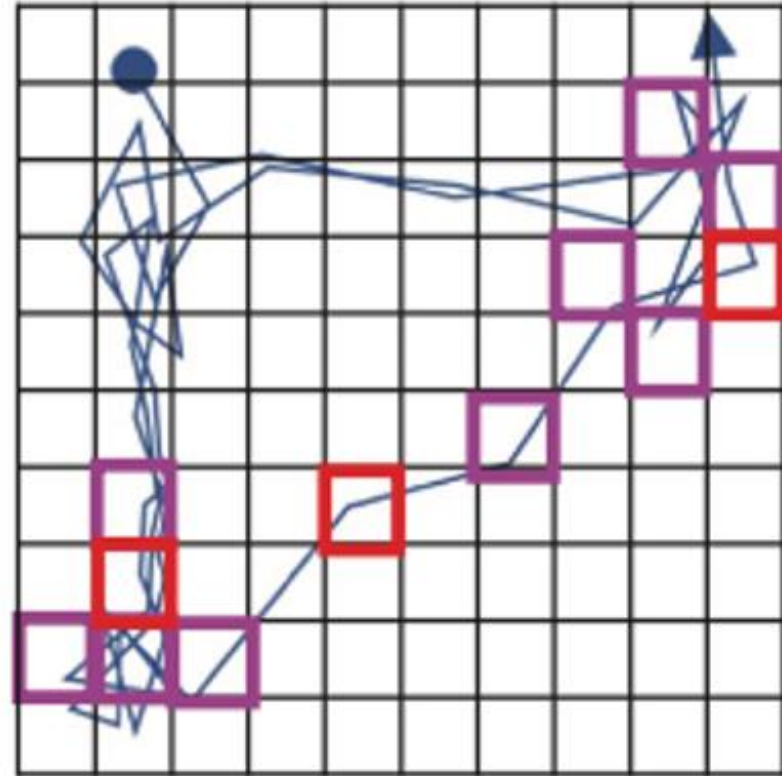
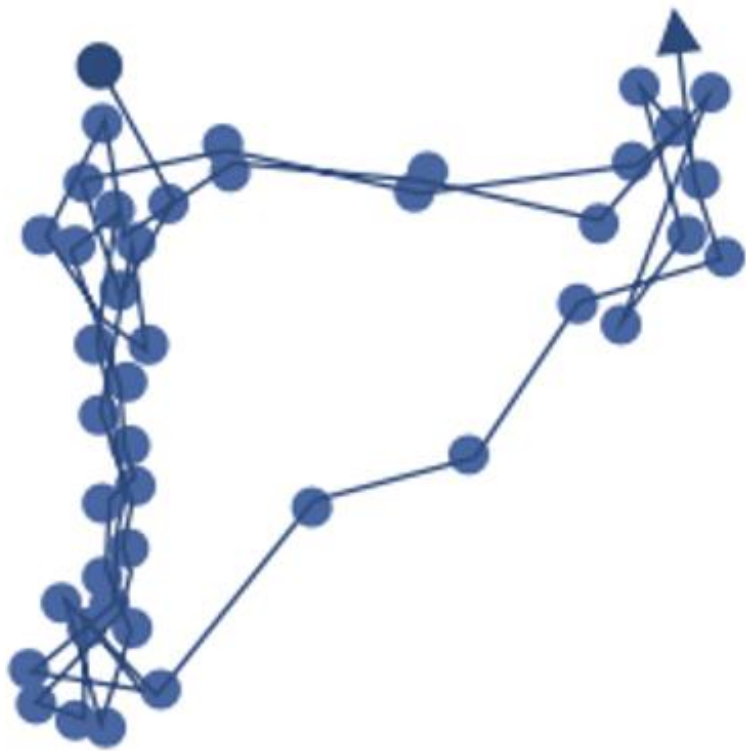


Outside protected areas



# Properties

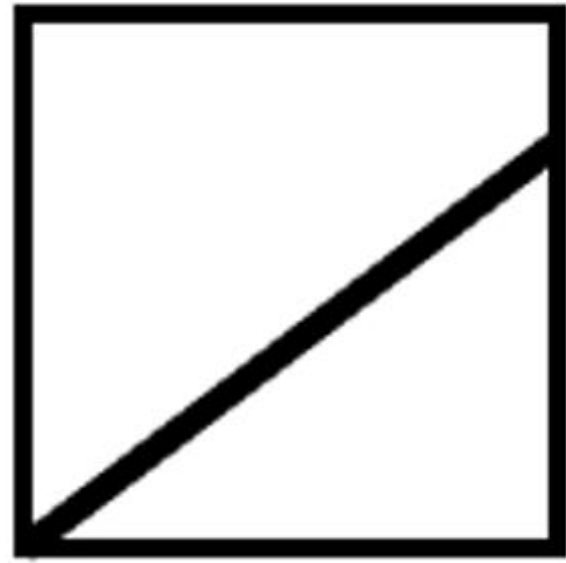
# Metric: Betweenness



Use, Structural and Movement properties



**NDVI**



**SLOPE**



**GHMI**

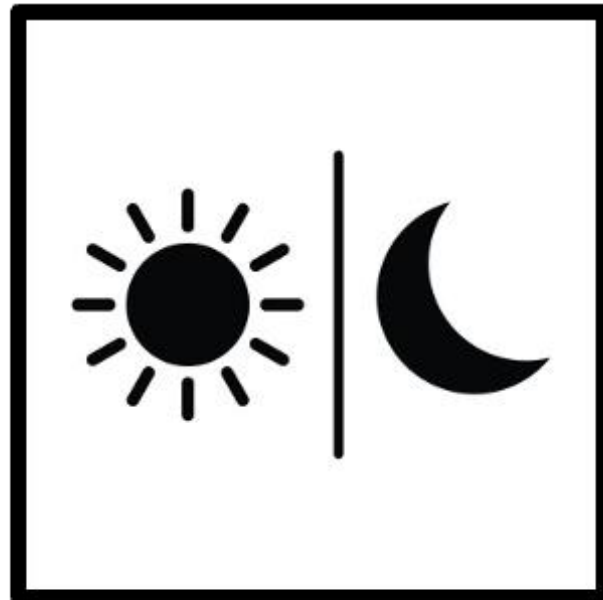


**PtGWS**

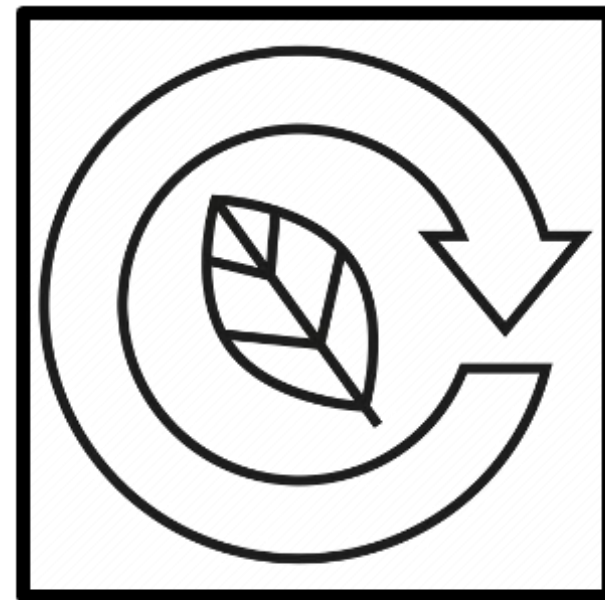


**TREE  
DENSITY**

**ENVIRONMENTAL PARAMETERS**



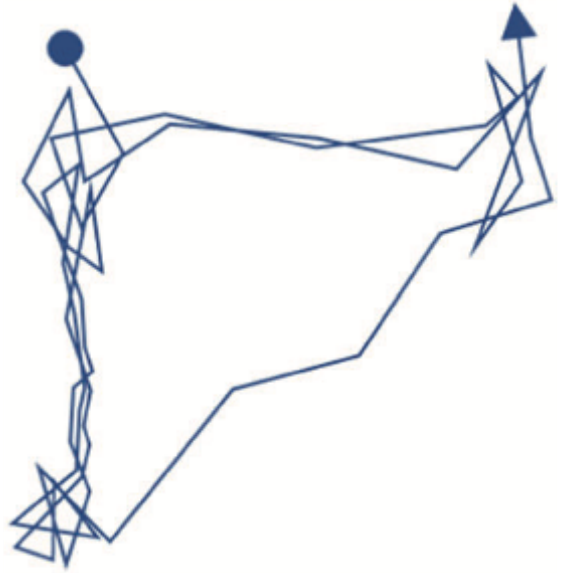
**DAY/ NIGHT**



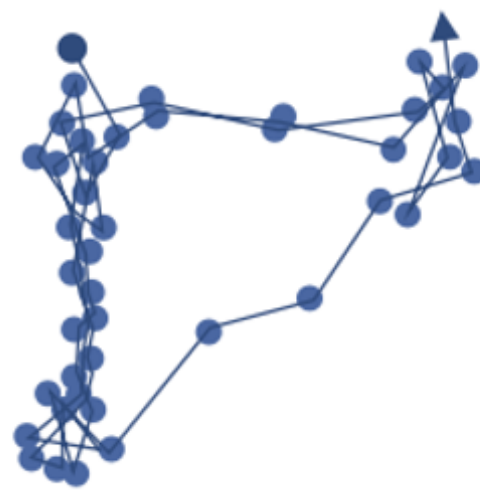
**IN/OUT**

**OTHER PARAMETERS**

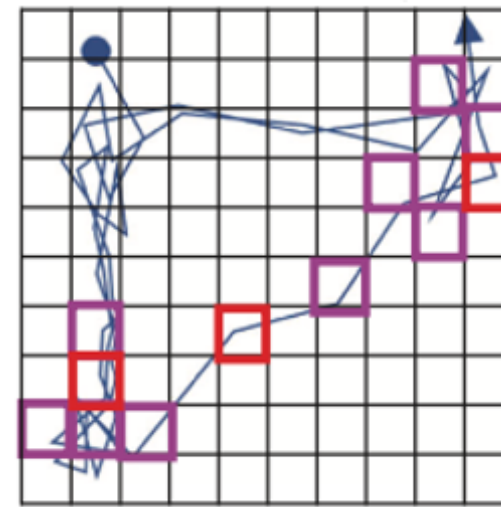
# MOVEMENT TRAJECTORIES



# PROPERTIES



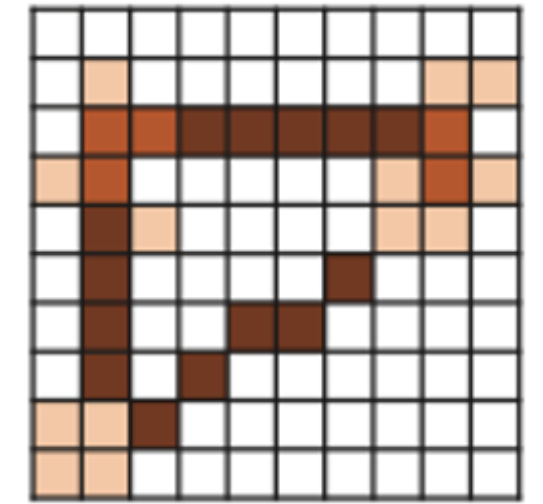
use



structural & movement

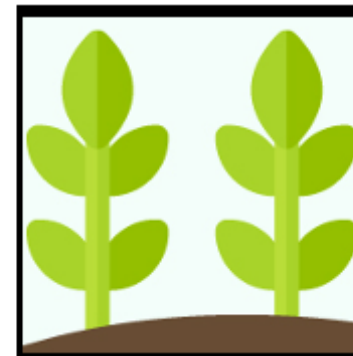


# METRIC: BETWEENNESS

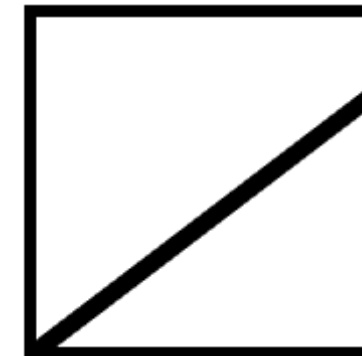


+ BAYESIAN MODEL

# ENVIRONMENTAL VARIABLES



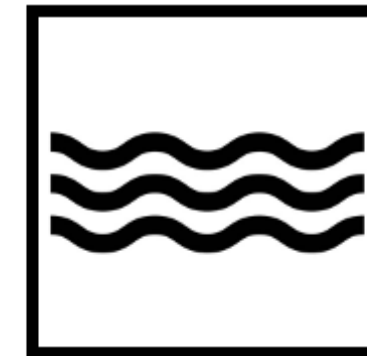
NDVI



SLOPE



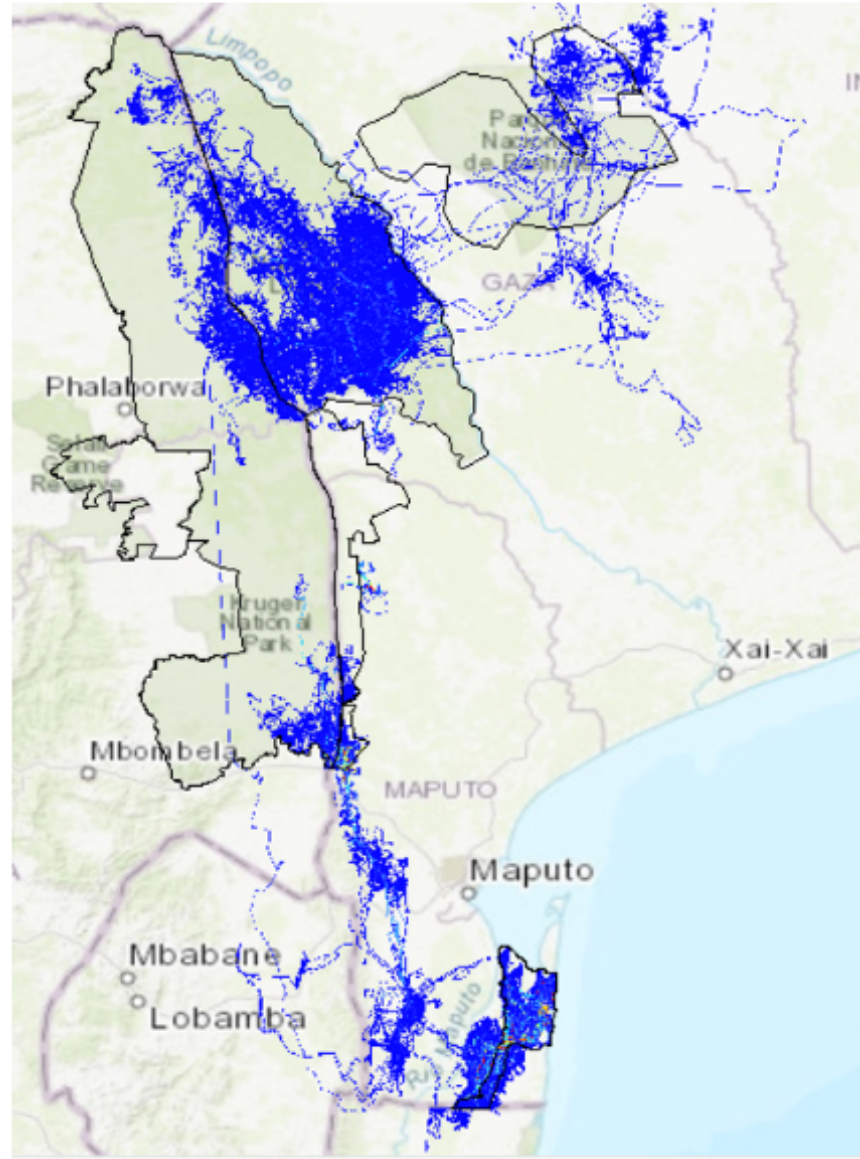
GHMI



PtGWS



TREE DENSITY



CORRIDOR IDENTIFICATION

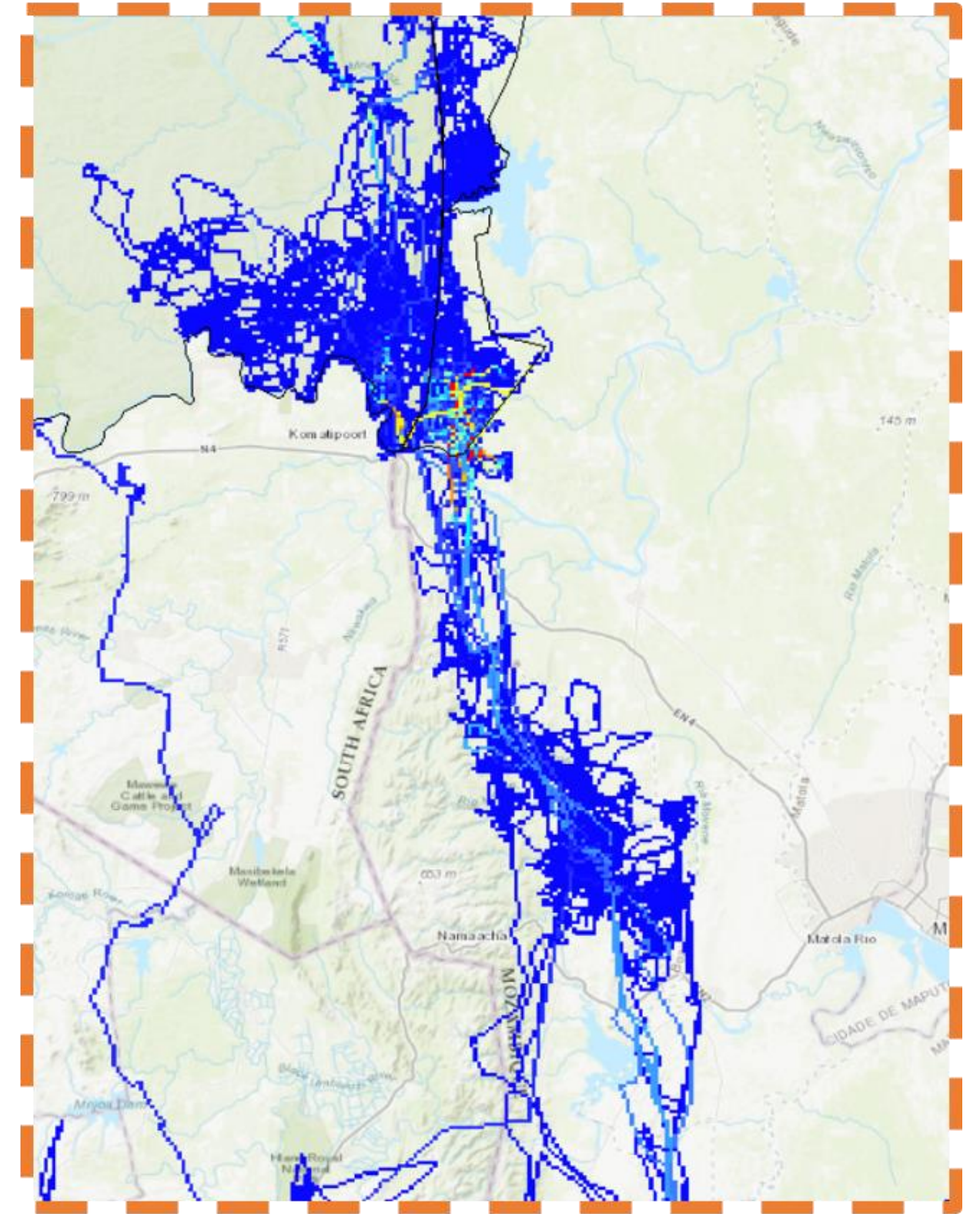
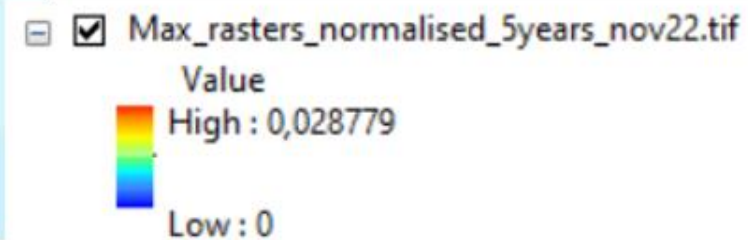
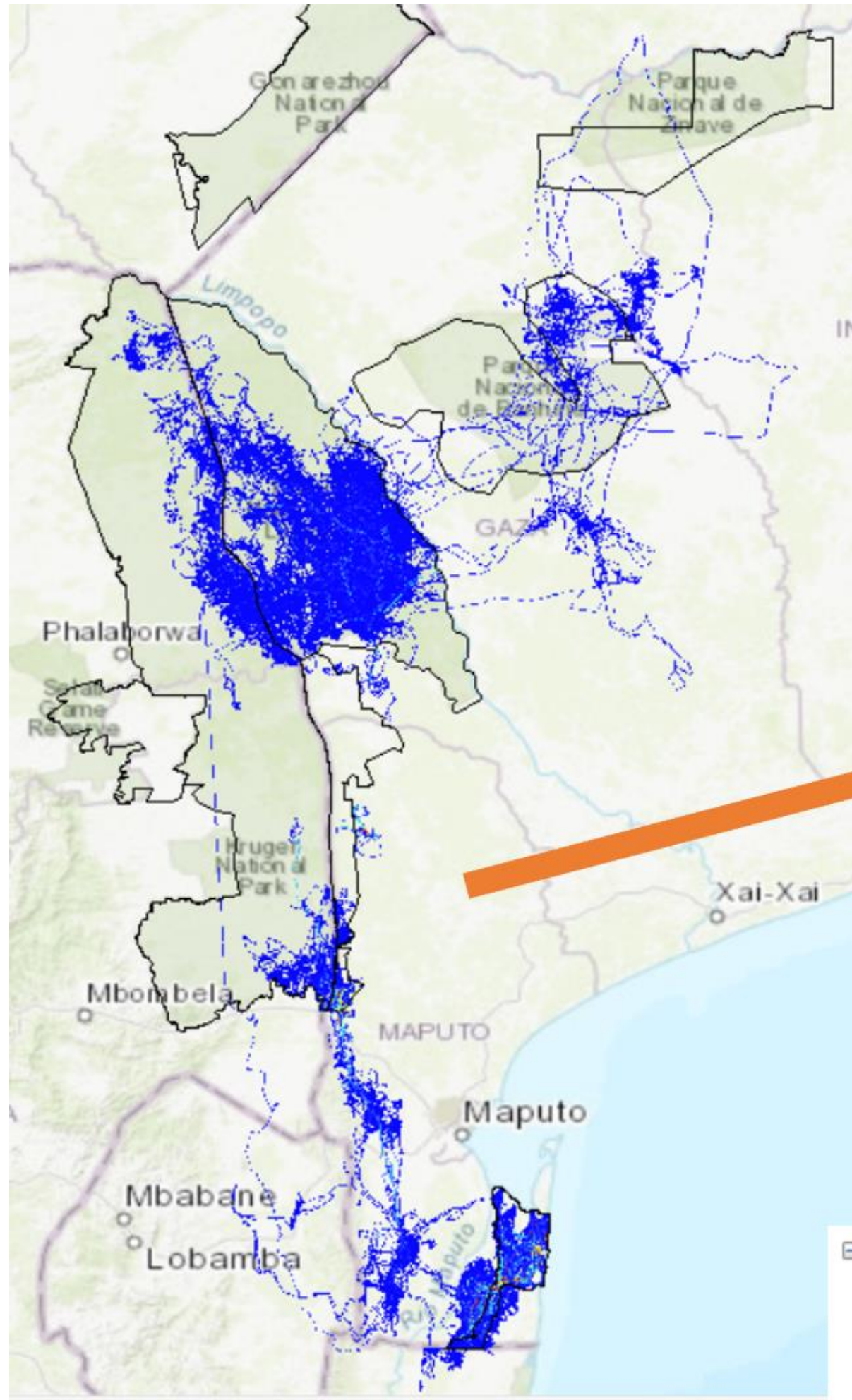




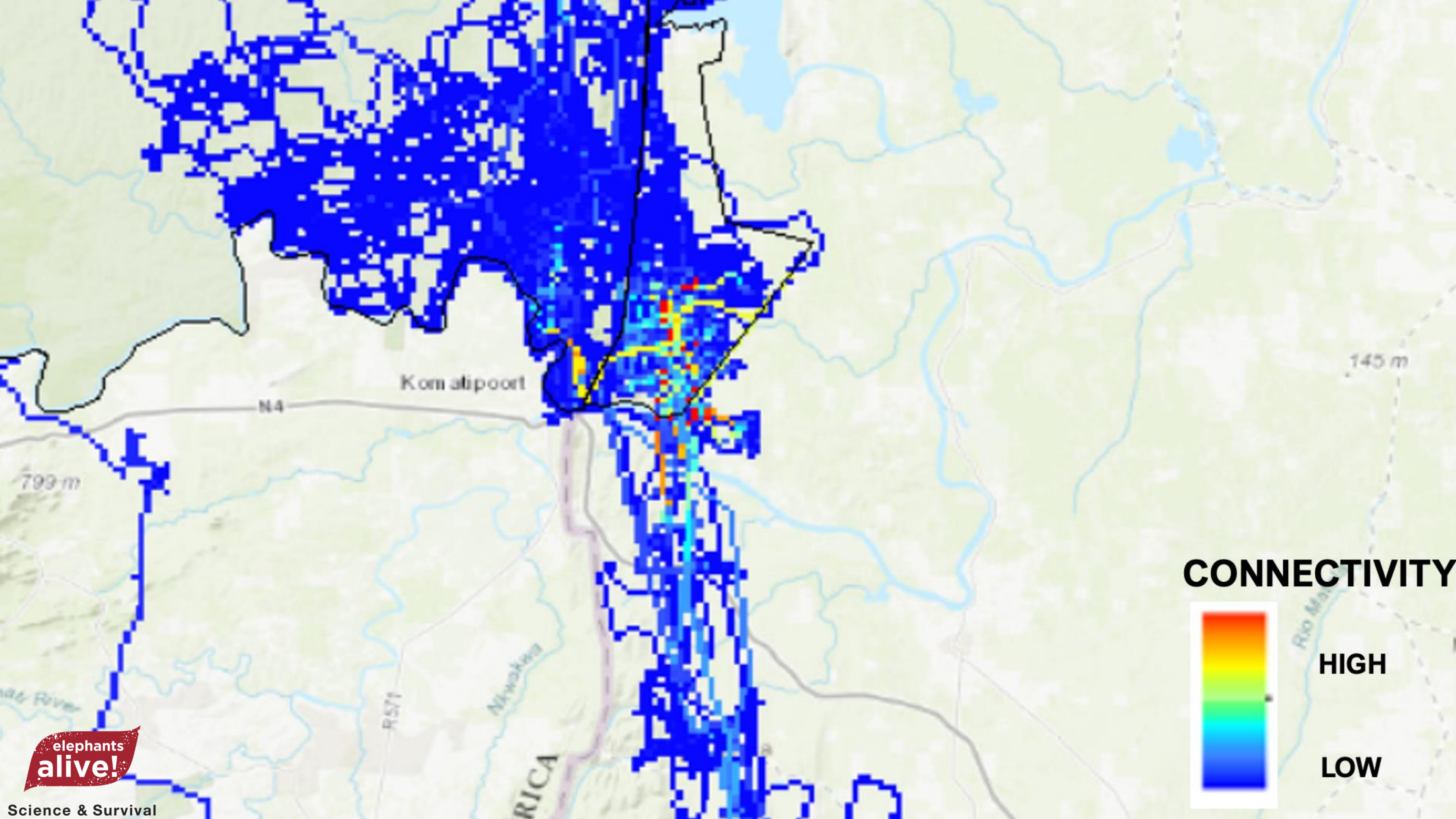
elephants  
**alive!**

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**Our findings**



CORRIDOR LINKING GREAT LIMPOPO & LEBOMBO  
 TRANSFRONTIER NATIONAL PARK  
 & 3 COUNTRIES (MOZAMBIQUE, SA & ESWATINI)



Kom atipoort

N4

799 m

145 m

### CONNECTIVITY



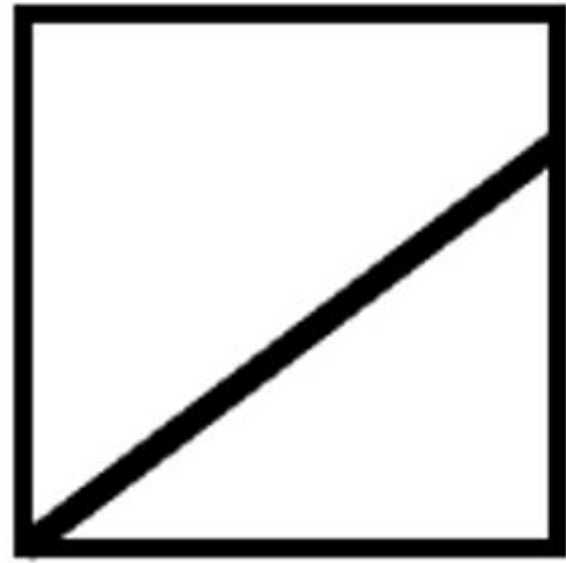
HIGH

LOW

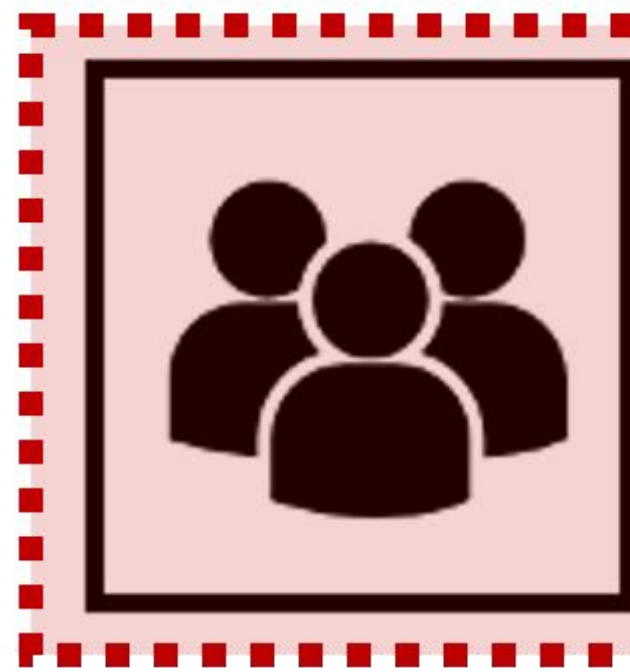
elephants  
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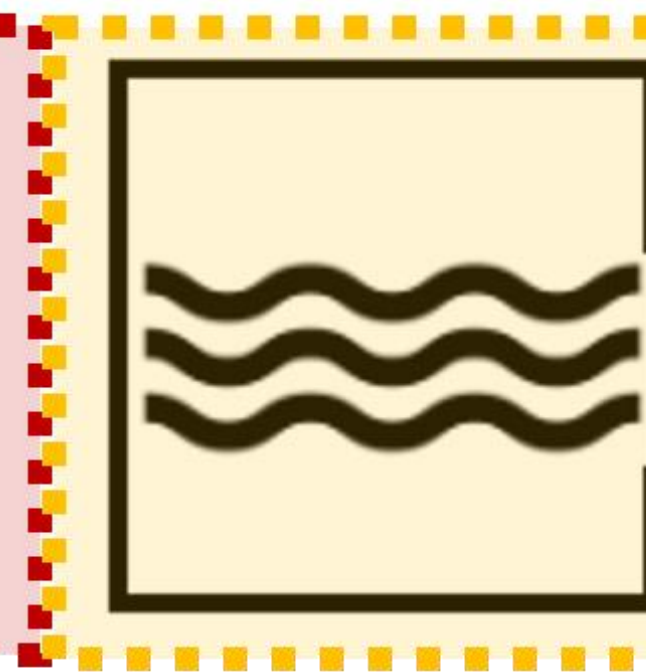
**NDVI**



**SLOPE**



**GHMI**

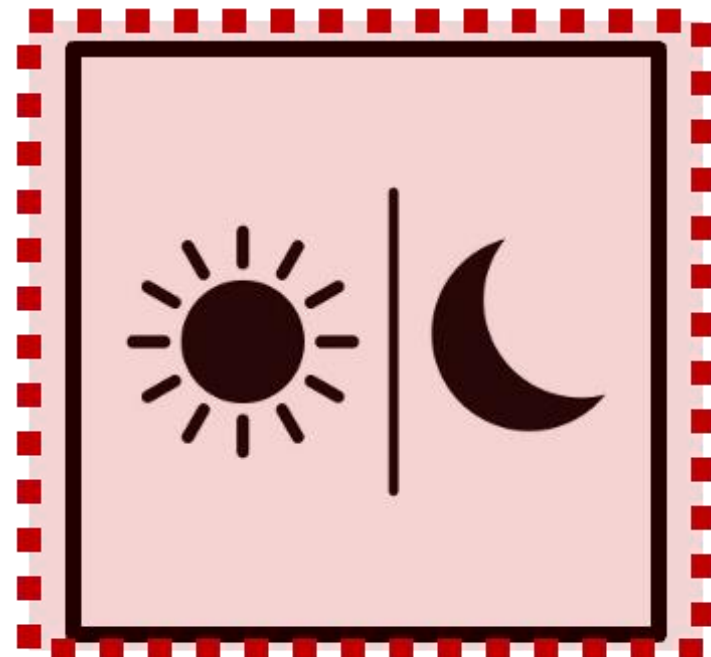


**PtGWS**

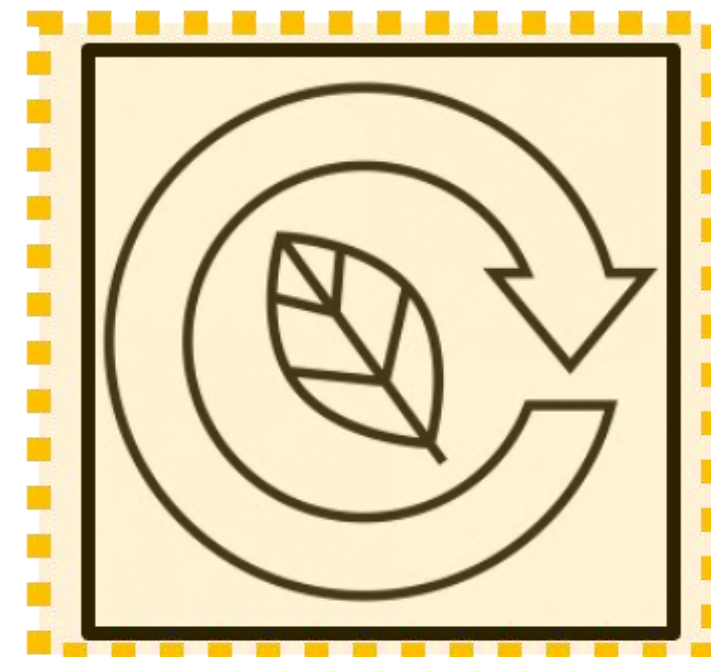


**TREE  
DENSITY**

**ENVIRONMENTAL PARAMETERS**



**DAY/ NIGHT**



**IN/OUT**

**OTHER PARAMETERS**



elephants  
**alive!**

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**Why it matters**

# Connectivity will help ensure the survival of savanna elephants



# Corridors act as conduits for seeds and nutrients

Nutrients

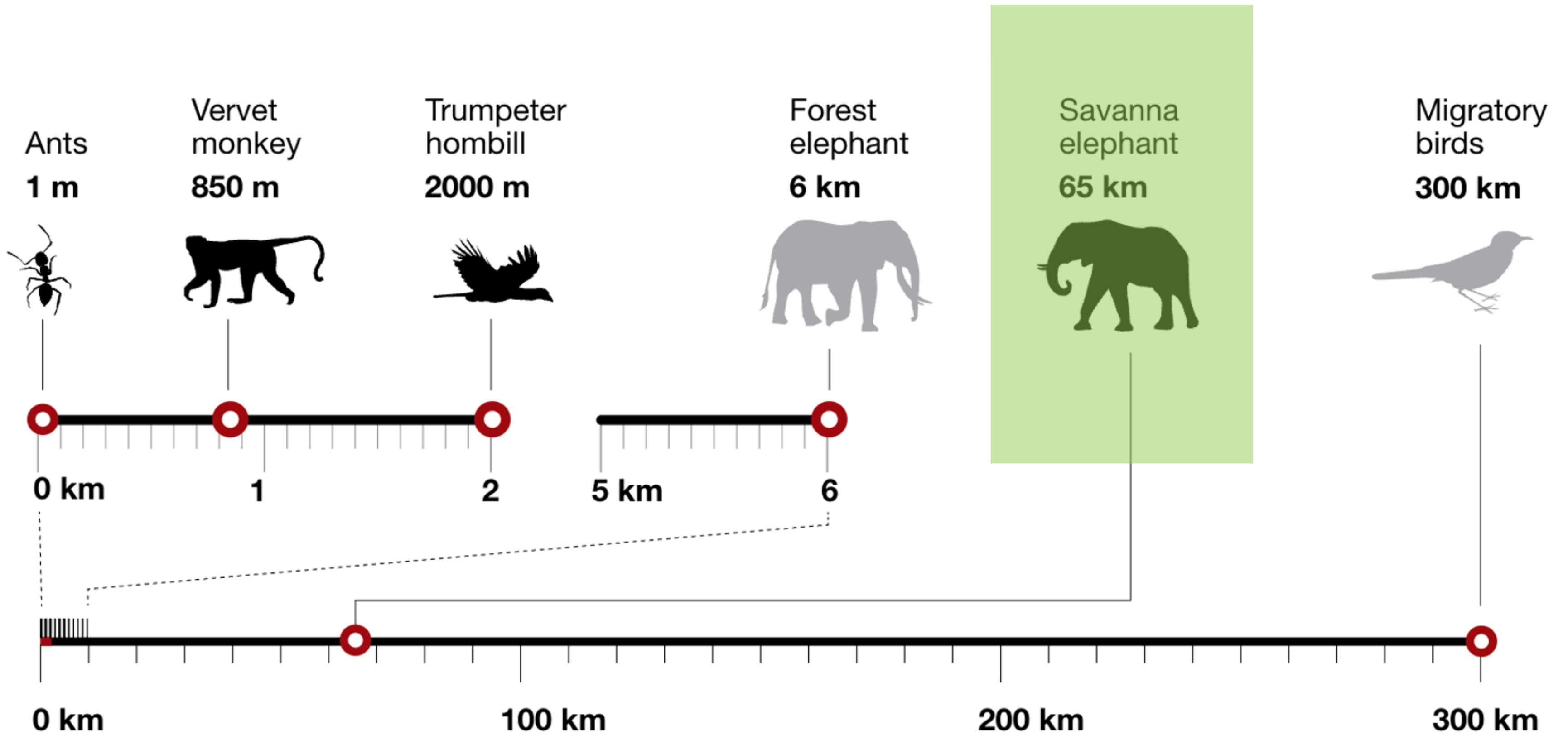


Dung, urine and carcasses

Seed  
dispersal



Seeds moved away from parent tree



(GRAPHIC) A. CUADRA AND G. GRULLÓN/SCIENCE; (DATA) K. BUNNEY



*Acacia/Vachellia erioloba*



*Schinziophyton rautanenii*



*Sclerocarya birrea*



3500 seeds/  /day

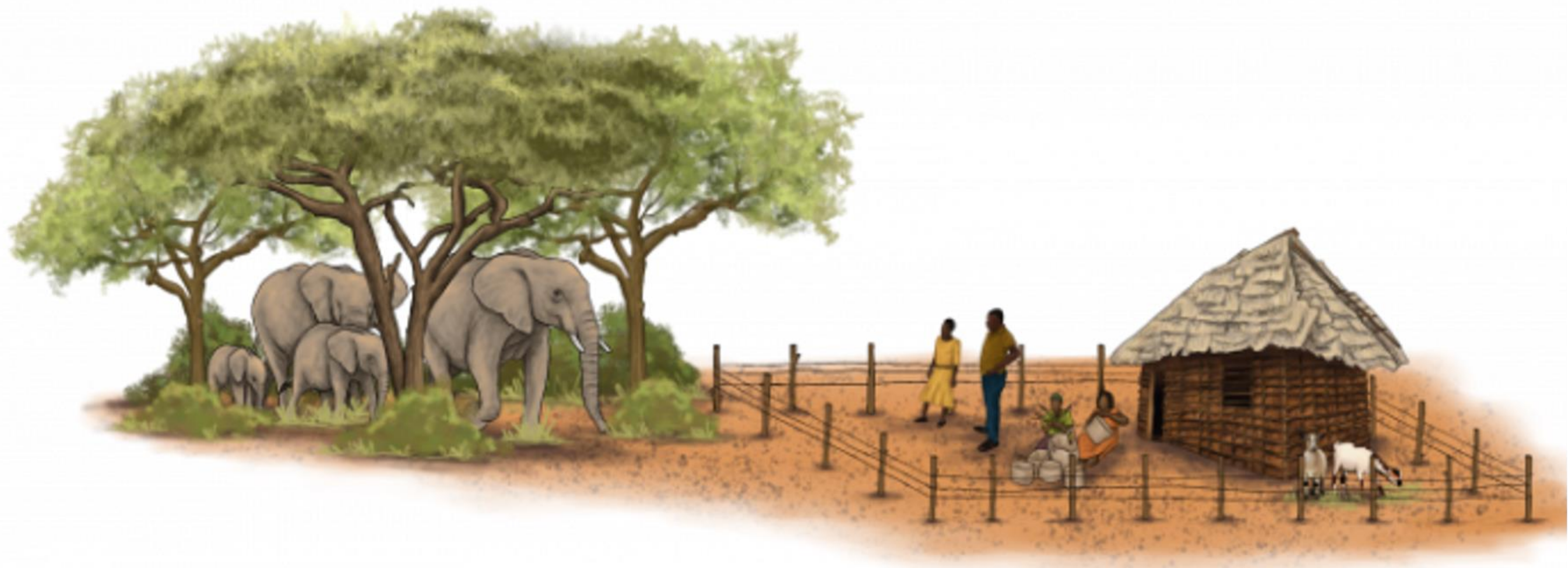



60 seeds/  /day



30 seeds/  /day

# Mapping and securing corridors will promote human-elephant coexistence





Wild Animal Corridor  
Drive carefully at night

elephants  
**alive!**

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**Thank you for listening**

