Using camtraps to asses the effect of land-use on scavenger communities in the brazilian Cerrado

Mellina Sidous, Erich Fisher (Universidade Federal do Mato Grosso Do Sul, Sarah Cubaynes (CEFE), Marion Valeix (CEFE), Hervé Fritz (REHAB) et Pierre Cyril Renaud (CASEST)
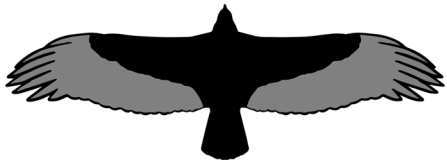
Scavenging is omnipresent among vertebrates

- Energy-rich resource
- Require few energy to be assimilated

Carcass

Obligate scavengers

Scavenging is omnipresent among vertebrates

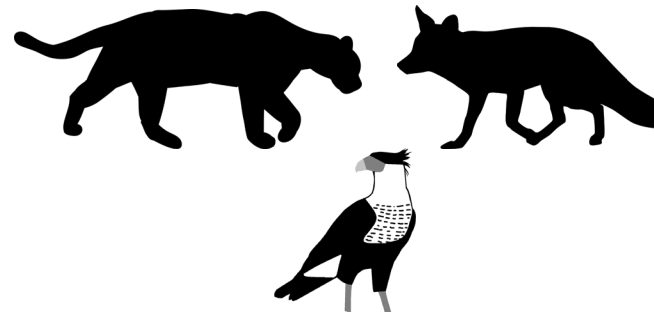- Energy-rich resource
- Require few energy to be assimilated

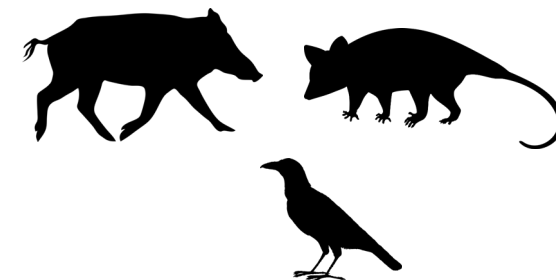**Carcass**

Obligate scavengers

Facultative scavengers

carnivorous

omnivorous

Scavenging is omnipresent among vertebrates
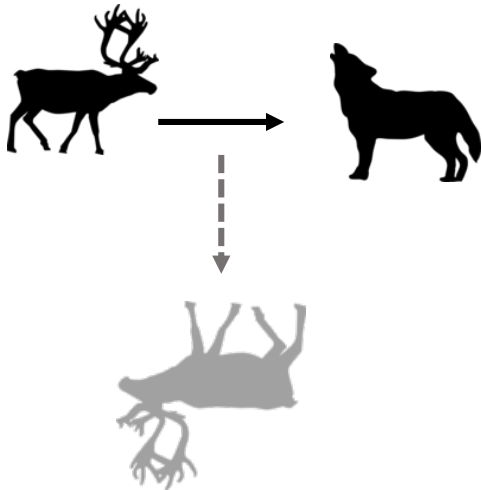## ↳ Thus key to understand communities functioning

New interactions

Canis lupus   *Gulo gulo*

Mattisson et al. 2011, *J.Mammal* ; Van Dijk et al. 2008, *J. Anim. Ecol.*

Scavenging is omnipresent among vertebrates
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New interactions

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Mattisson et al. 2011, *J.Mammal* ; Van Dijk et al. 2008, *J. Anim. Ecol.*
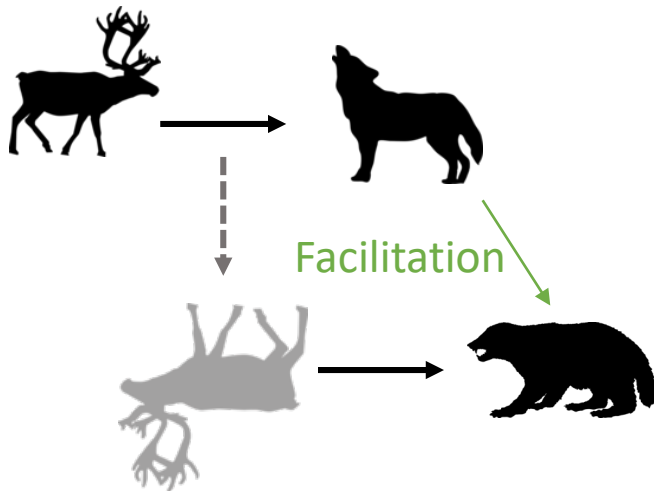
Scavenging is omnipresent among vertebrates
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Facilitation Intra-guild predation

Mattisson et al. 2011, *J.Mammal* ; Van Dijk et al. 2008, *J. Anim. Ecol.*
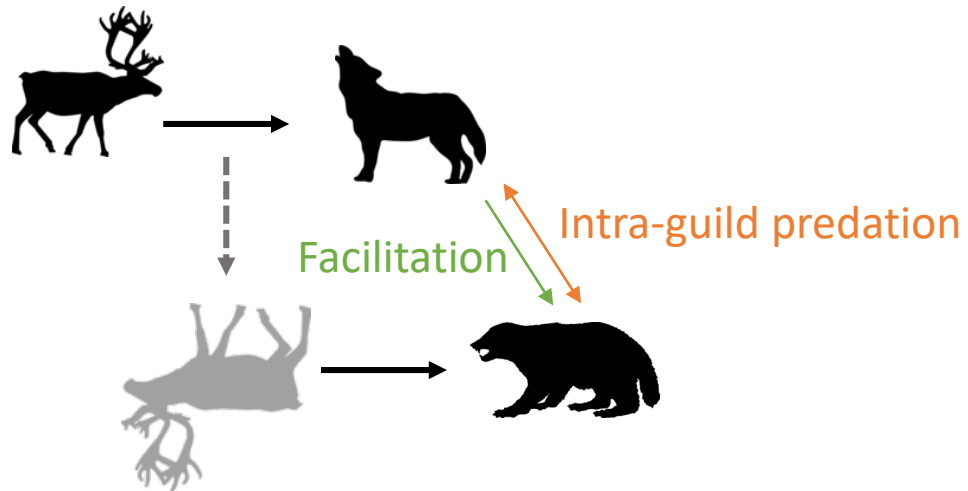
Scavenging is omnipresent among vertebrates
↳ Thus key to understand communities functioning

New interactions

Canis lupus   *Gulo gulo*
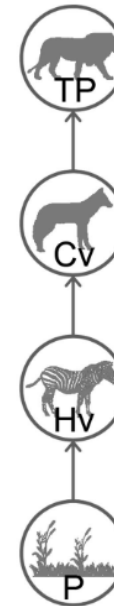
Facilitation
Intra-guild predation

Increases the number of links in food webs

TP
Cv
Hv
P

→ Biomass flux from resources to consumers
⋯⋯▶ State shift to detritus
- - -▶ State shift to carrion
→ Scavenging

Mattisson et al. 2011, *J.Mammal* ; Van Dijk et al. 2008, *J. Anim. Ecol.*

Moleon et al. 2014, *Biol Rev Camb Philos Soc*

Scavenging is omnipresent among vertebrates
↳ Thus key to understand communities functioning

New interactions

Canis lupus   *Gulo gulo*

Facilitation

Intra-guild predation

Increases the number of links in food webs

scavenging

Community stability

Biomass flux from resources to consumers
State shift to detritus
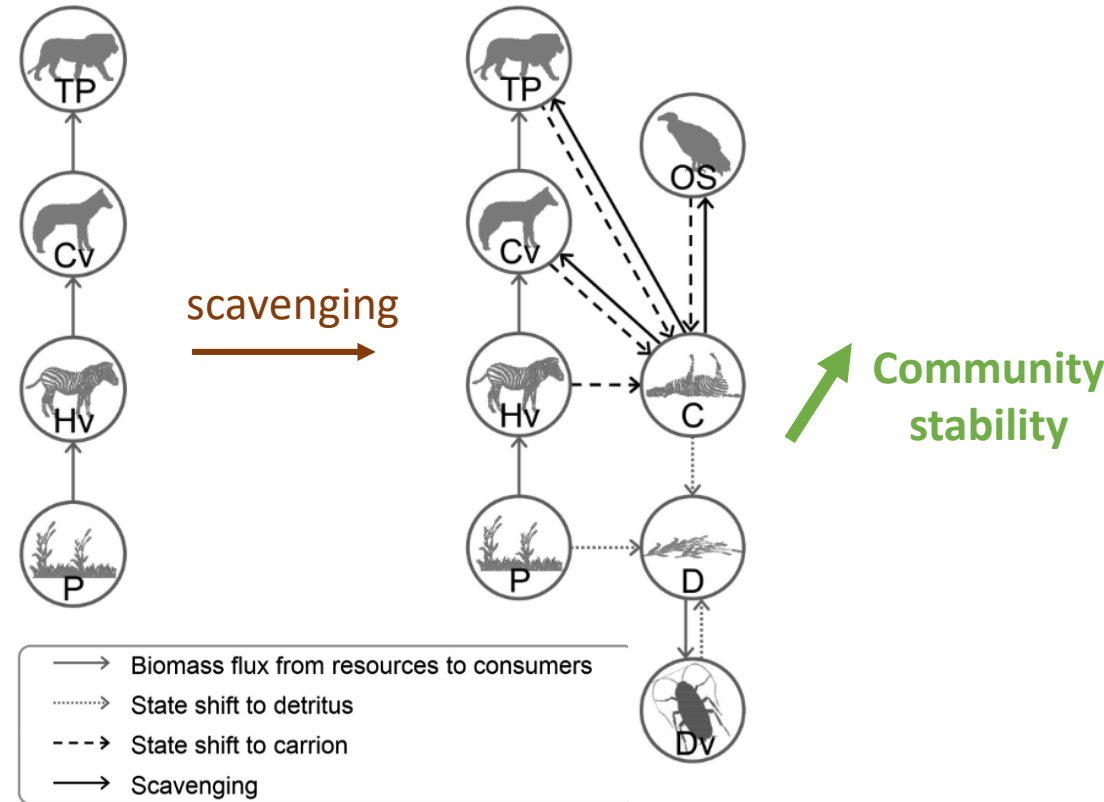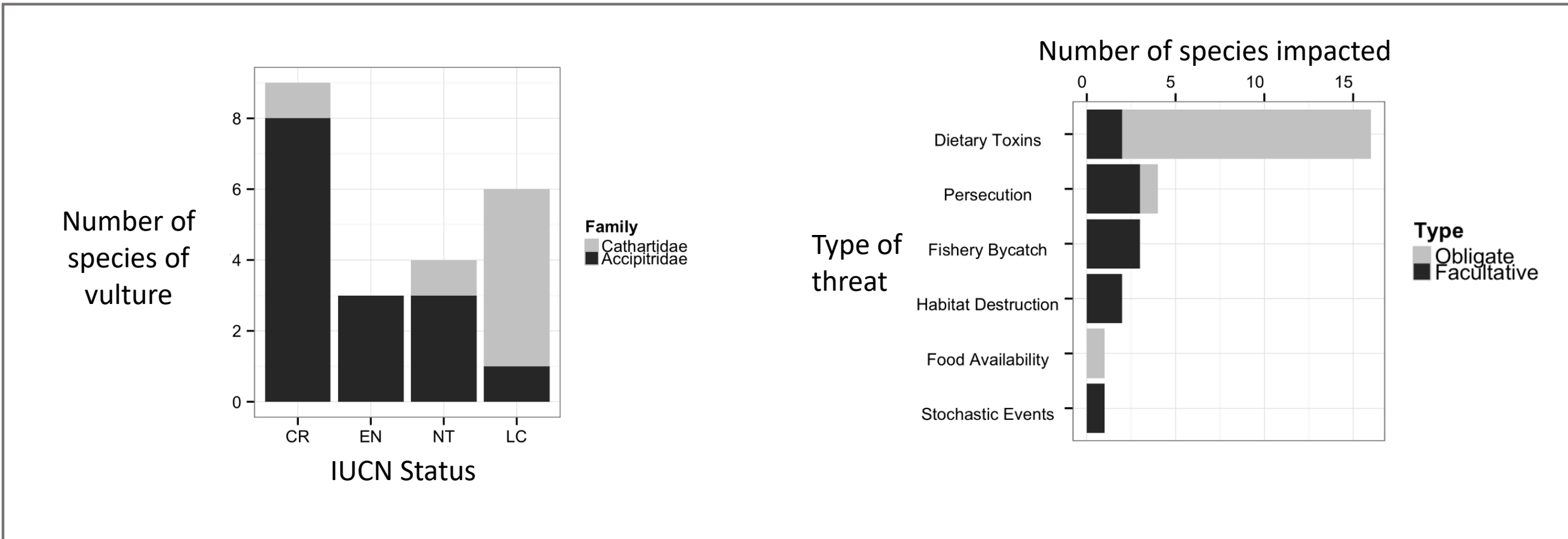State shift to carrion
Scavenging

Mattisson et al. 2011, *J.Mammal* ; Van Dijk et al. 2008, *J. Anim. Ecol.*

Moleon et al. 2014, *Biol Rev Camb Philos Soc*

Scavenging communities are influenced by anthropogenic activities

➡️ Scavenger species are threatened by human activities

Number of species of vulture — IUCN Status (CR, EN, NT, LC)

Family: Cathartidae, Accipitridae

Type of threat: Dietary Toxins, Persecution, Fishery Bycatch, Habitat Destruction, Food Availability, Stochastic Events — Number of species impacted

Type: Obligate, Facultative

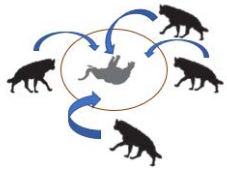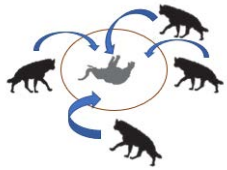# Scavenging communities are influenced by anthropogenic activities

➡️ Scavenger species are threatened by human activities

➡️ Human activities can influence natural scavenging processes

---

Examples

Change in the spatial repartition of resources

Roadkills

© Sonia Metzger

Scavenging communities are influenced by anthropogenic activities

➡️ Scavenger species are threatened by human activities

➡️ Human activities can influence natural scavenging processes

Examples

Roadkills

Game hunting

Change in the spatial repartition of resources

© Sonia Metzger

© FieldsportsChannel.tv,

Change in the temporal repartition of resources

Scavenging communities are influenced by anthropogenic activities

➡️ Scavenger species are threatened by human activities

➡️ Human activities can influence natural scavenging processes

Examples

Roadkills   **Game hunting**

Change in the spatial repartition of resources

© Sonia Metzger

© FieldsportsChannel.tv
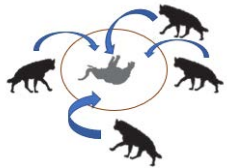
Change in the temporal repartition of resources
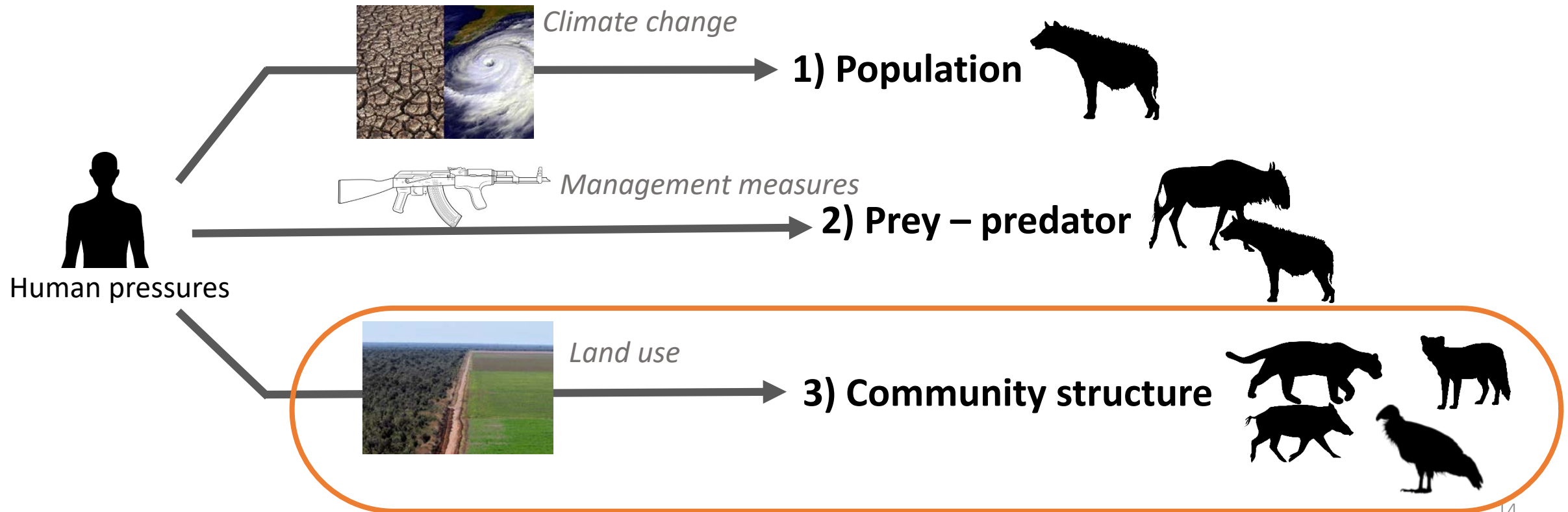
Change in the abundance of resources for scavengers

My PhD

Effect of anthropogenic pressures on scavengers, their community and the structure of scavenger communities
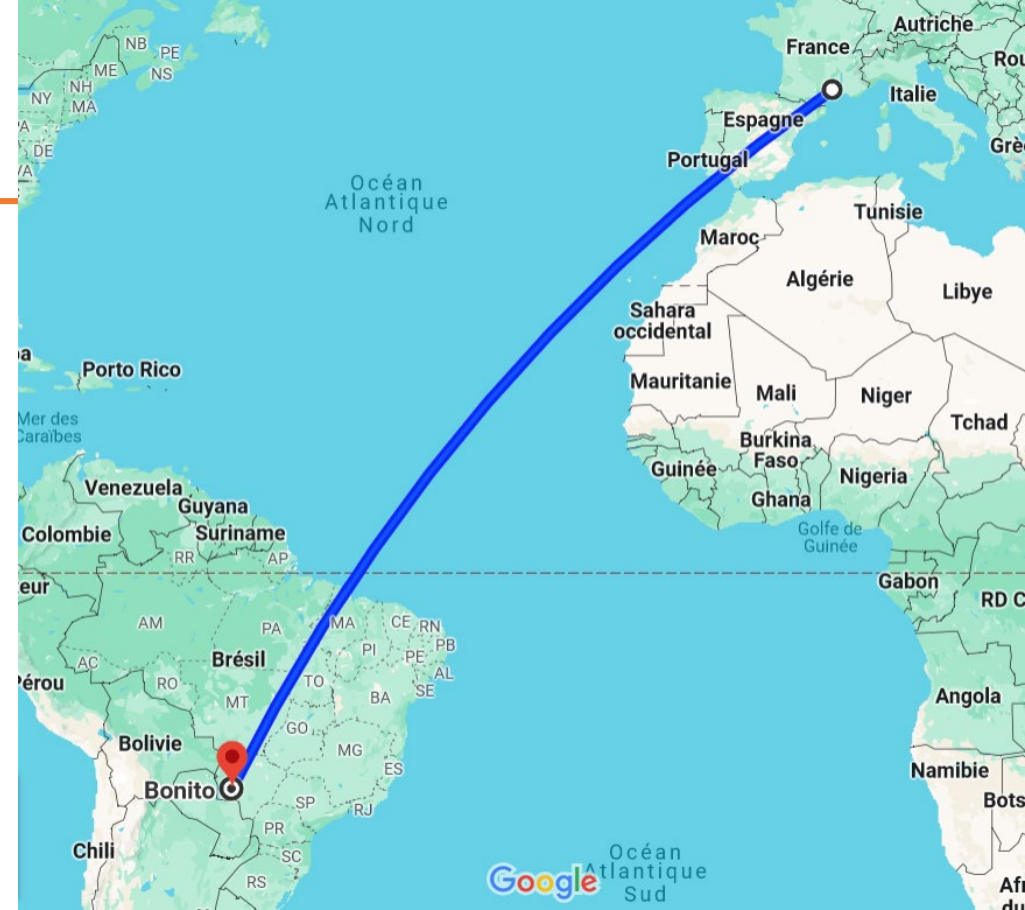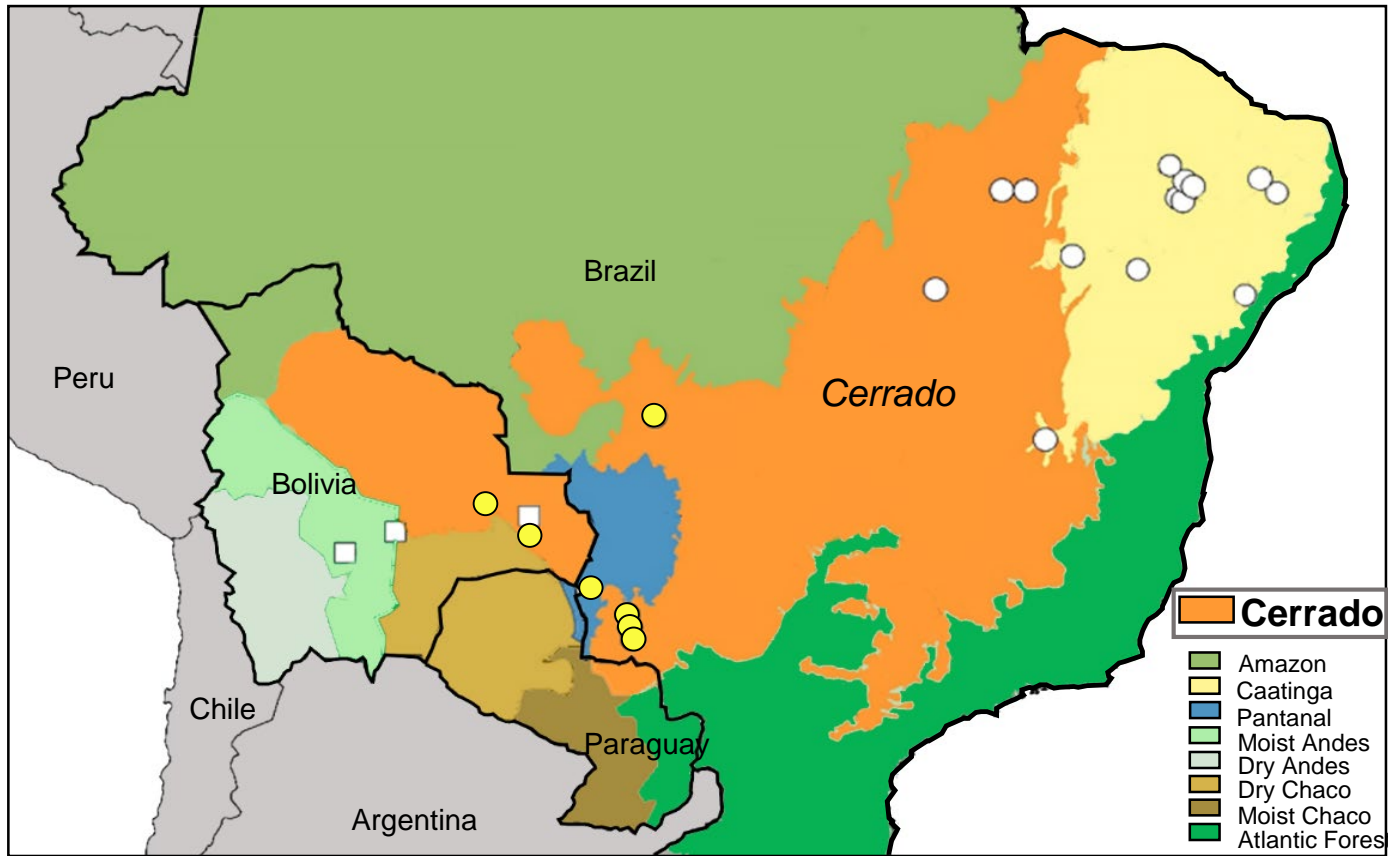
Climate change

1) Population
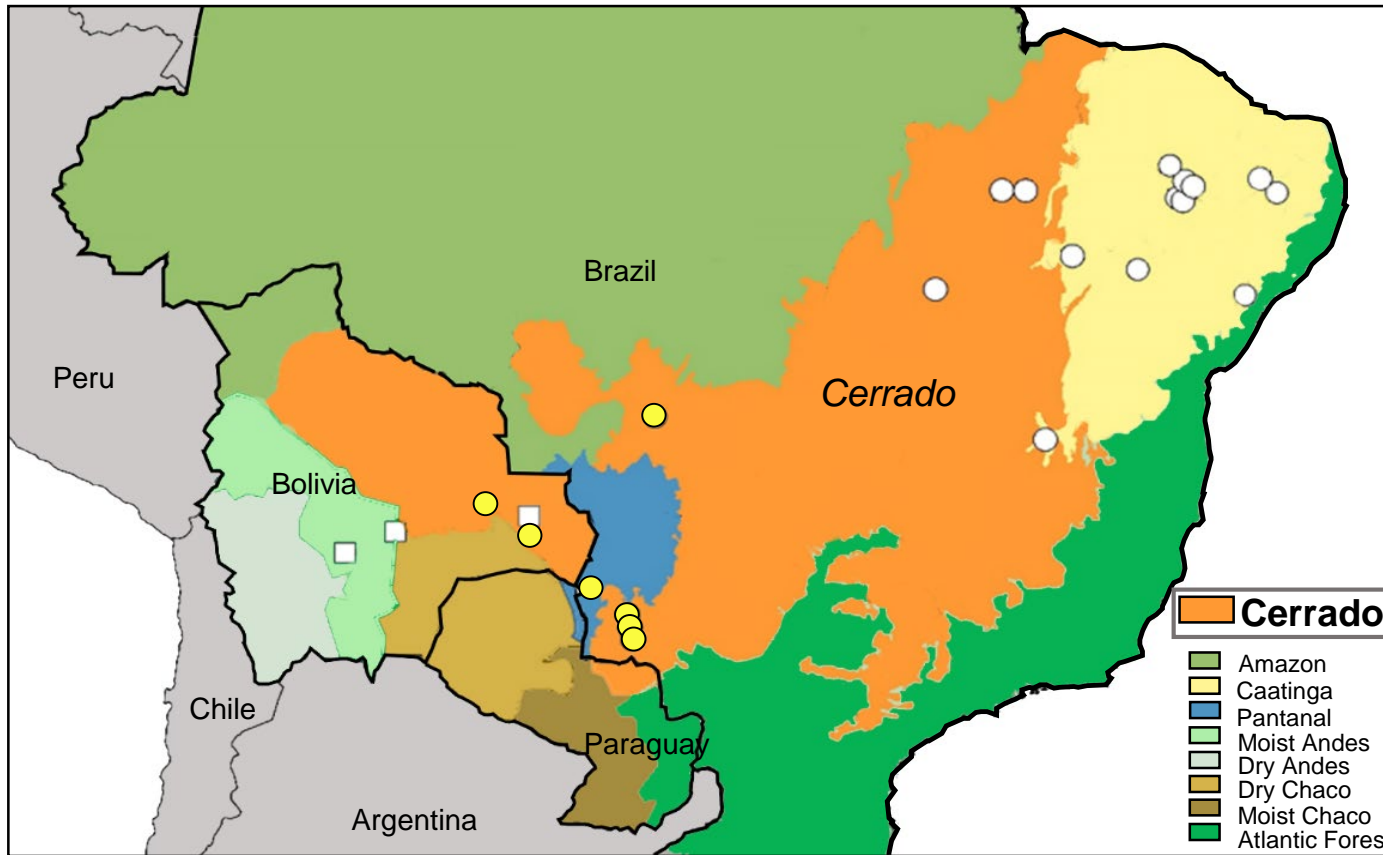
Management measures

2) Prey – predator

Human pressures

Land use

3) Community structure

My PhD

Effect of anthropogenic pressures on scavengers, their community and the structure of scavenger communities

Climate change

1) Population

Management measures

2) Prey – predator

Human pressures

Land use
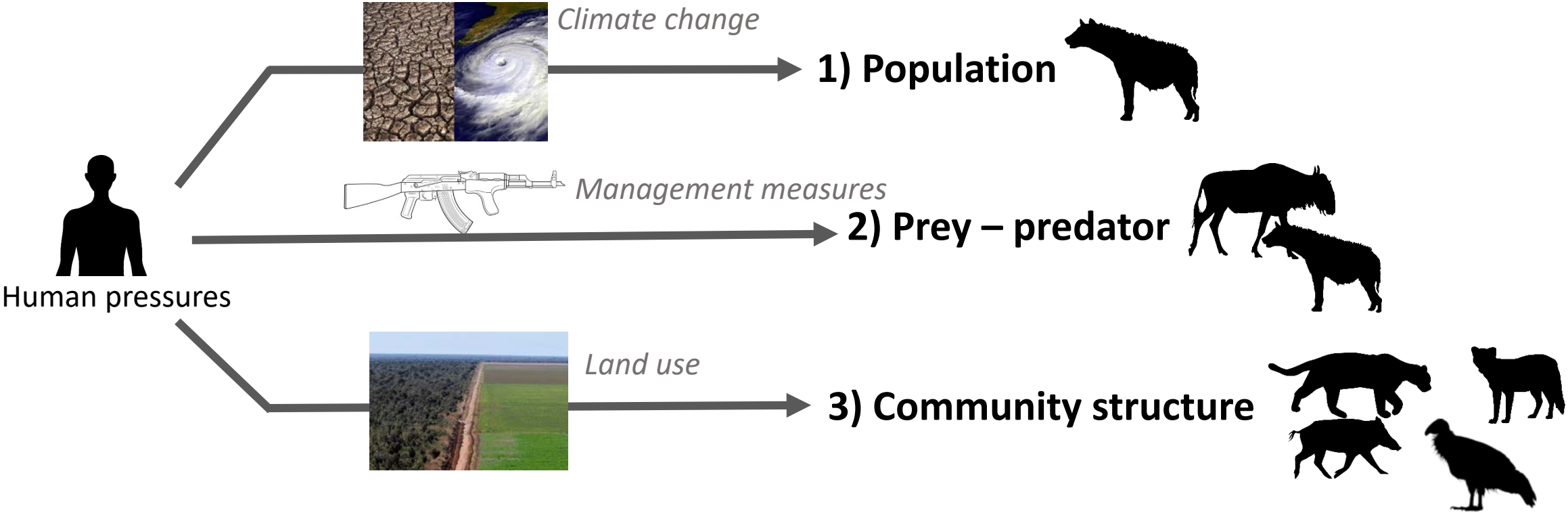
3) Community structure

Let's go to Brazilian Cerrado

Brazilian Cerrado

➡ Biodiversity hotspot

- *4800 endemic species of plant and vertebrate*
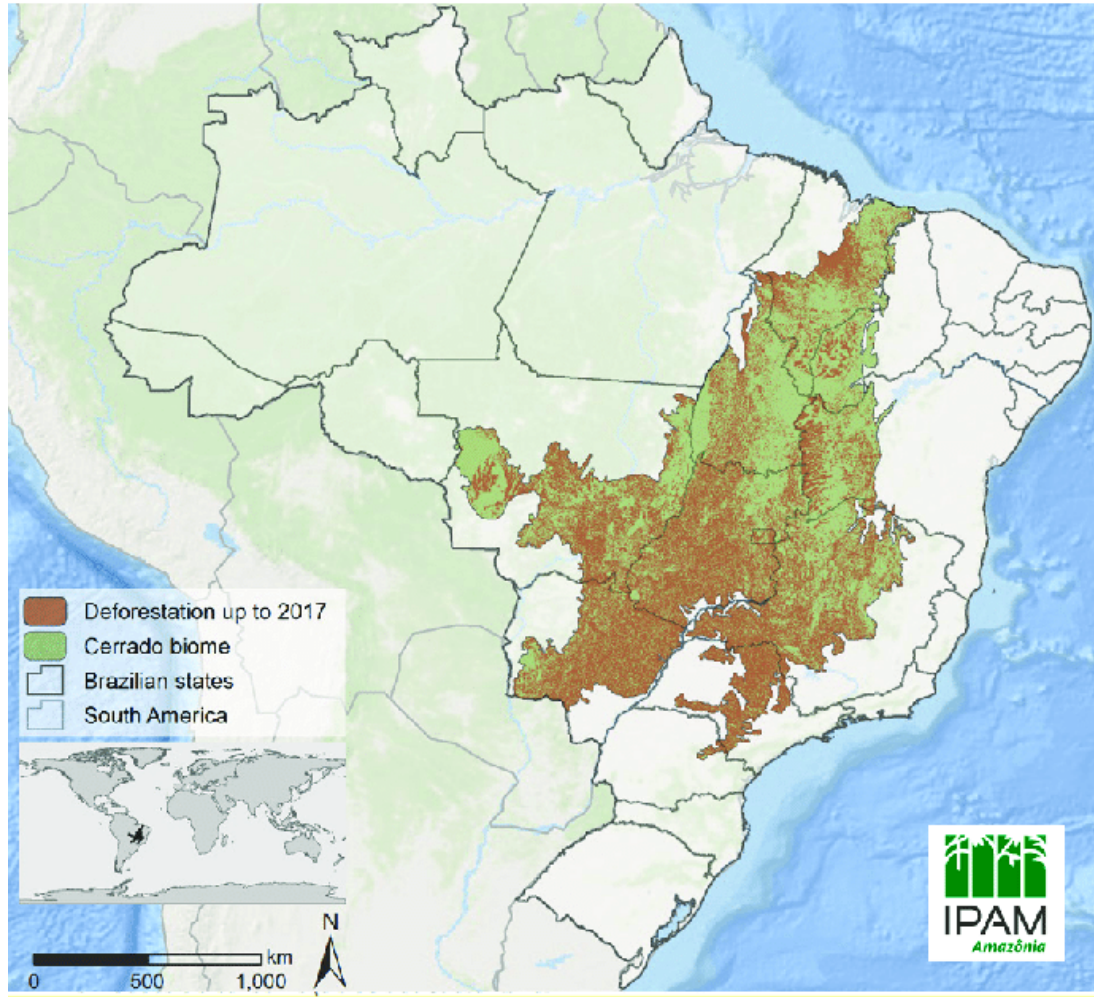

Syngonanthus nitens   *Amphisbaena alba*   *Scinax canastrensis*
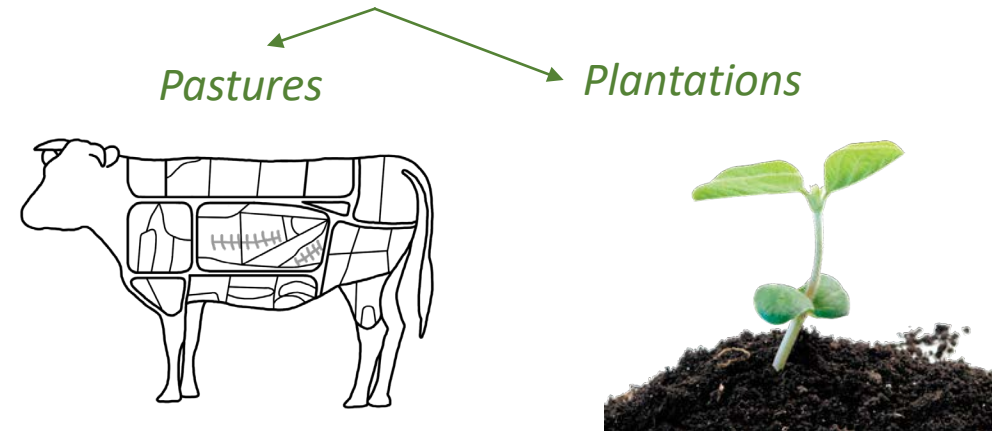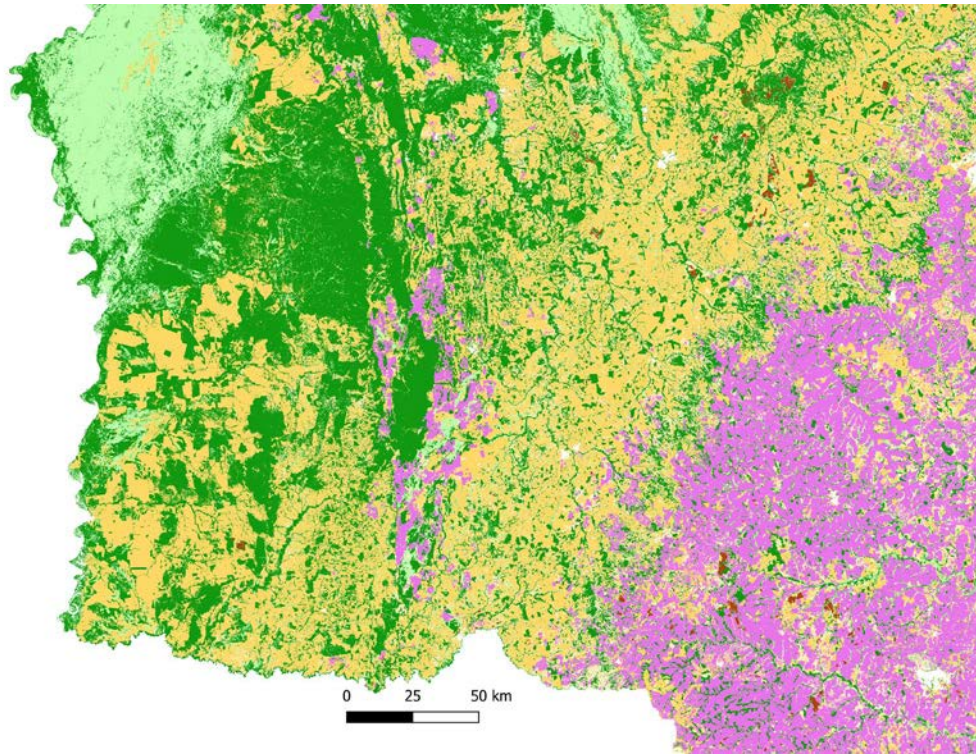
- *5% of earth's species*

Brazilian Cerrado

Deforestation up to 2017
Cerrado biome
Brazilian states
South America

➡ Heavily deforest

- Lost at least 46% of its surface

- Less than 20% undisturbed

- Mainly for agriculture

Pastures   *Plantations*

Russo Lopes et al. (2018). Cerrado: The Brazilian savanna's contribution to GHG emissions and to climate solutions.

Strassburg et al. 2017, *Nat Ecol Evol* ; Marris 2005, *Nature*

Brazilian Cerrado

Legend:
- ✓ ■ Floresta
- ✓ ■ Formação Natural não Florestal
- ✓ ■ Agropecuária
  - ✓ ■ Pastagem
  - ✓ ■ Agricultura
  - ✓ ■ Floresta Plantada
  - ✓ ■ Mosaico de Agricultura e Pastagem

0 25 50 km

➡ **Heavily deforest**

- Lost at least 46% of its surface

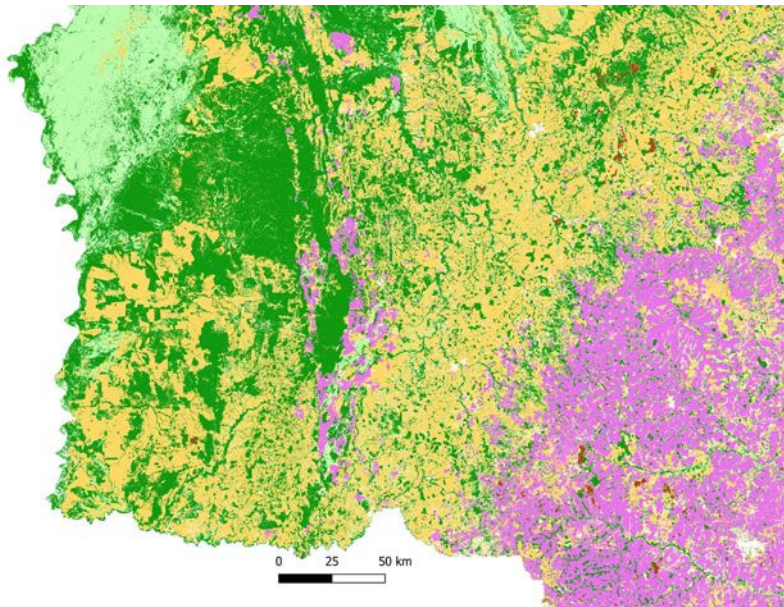- Less than 20% undisturbed

- Mainly for agriculture

➡ **Brazil Forest Code**

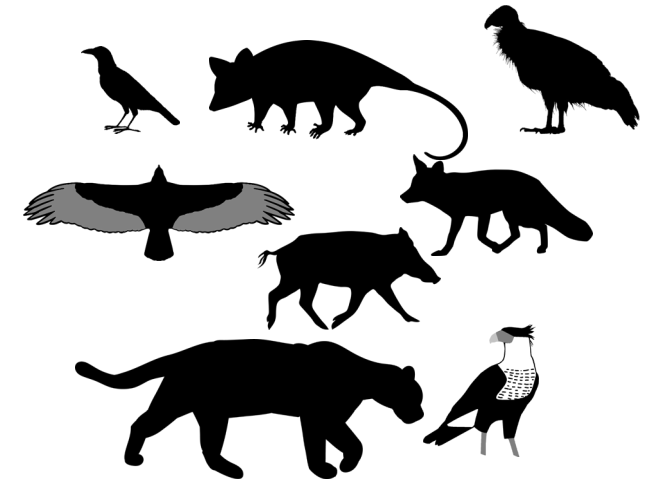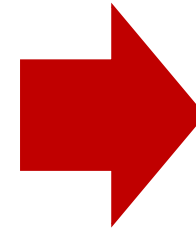- Private owners must leave at least 20% of their land in their natural state

« Mosaic »

Reconstructing Three Decades of Land Use and Land Cover Changes in Brazilian Biomes with Landsat Archive and Earth Engine – Remote Sensing, Volume 12, Issue 17, 10.3390/rs12172735

18

Strassburg et al. 2017, *Nat Ecol Evol* ; Marris 2005, *Nature*
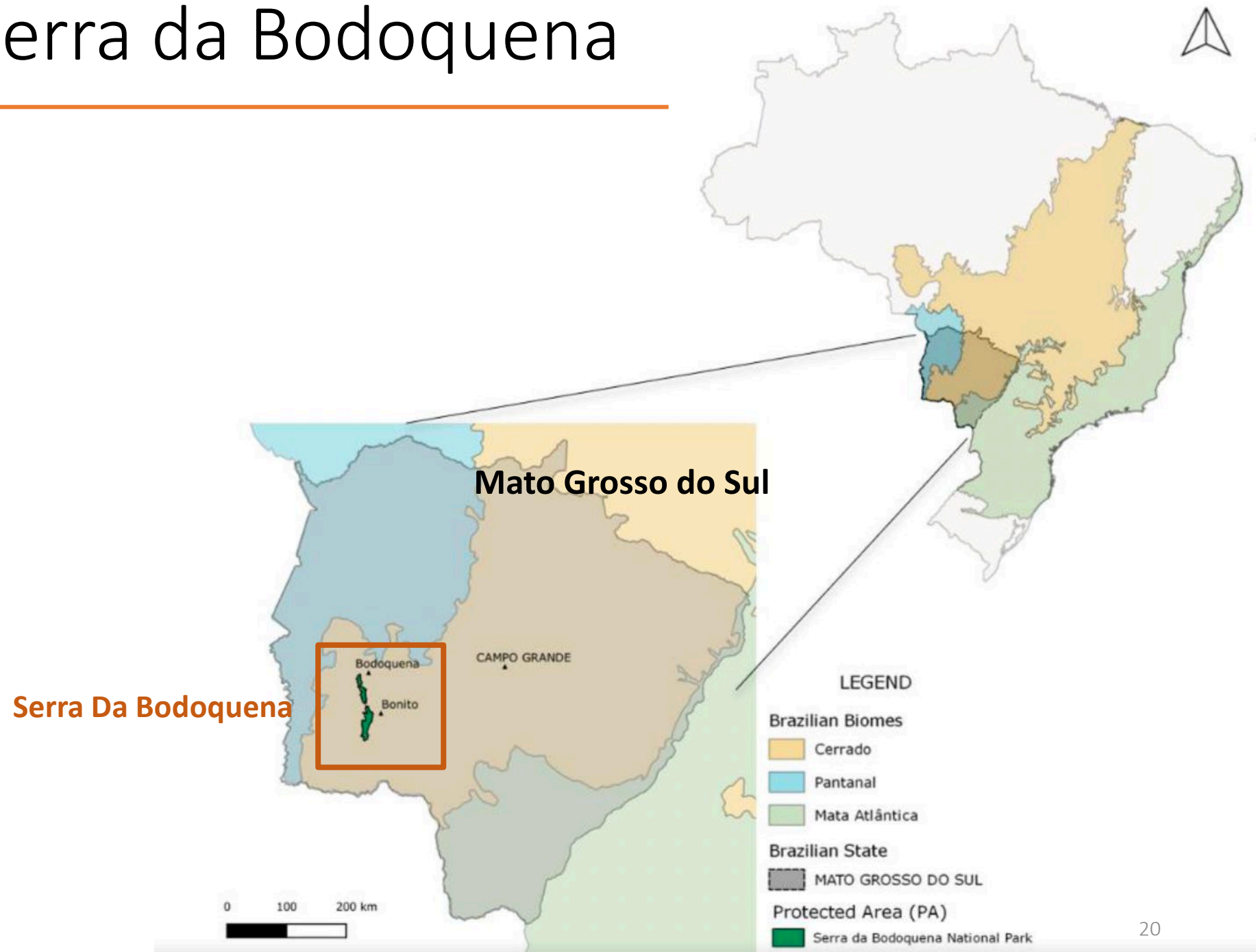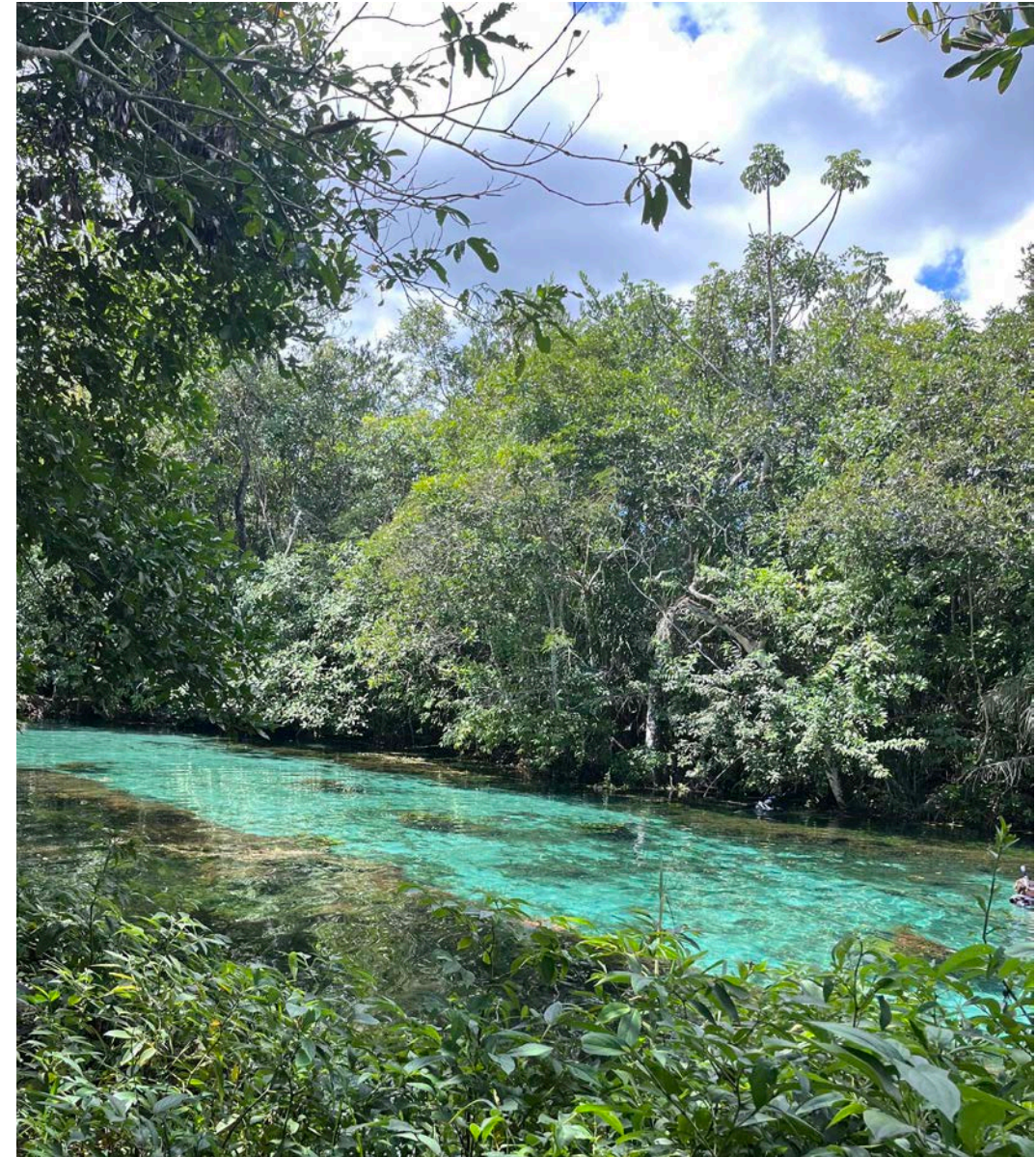
Problematic

What is the effect of land use on scavenger communities in the Cerrado ?

| ▶ ✓ ■ Floresta |
| ▶ ✓ ■ Formação Natural não Florestal |
| ▼ ✓ ■ Agropecuária |
| ✓ ■ Pastagem |
| ▶ ✓ ■ Agricultura |
| ✓ ■ Floresta Plantada |
| ✓ ■ Mosaico de Agricultura e Pastagem |

Souza at. al. (2020) –*Reconstructing Three Decades of Land Use and Land Cover Changes in Brazilian Biomes with Landsat Archive and Earth Engine* – Remote Sensing, Volume 12, Issue 17, 10.3390/rs12172735

Case Study : Serra da Bodoquena

Mato Grosso do Sul

Serra Da Bodoquena

Bodoquena

Bonito

CAMPO GRANDE

LEGEND

Brazilian Biomes

Cerrado

Pantanal

Mata Atlântica

Brazilian State

MATO GROSSO DO SUL

Protected Area (PA)

Serra da Bodoquena National Park

0   100   200 km

Case Study : Serra da Bodoquena

- Famous for its cristal clear rivers
  Touristic area

# Case Study : Serra da Bodoquena

Famous for its cristal clear rivers

>Touristic area

Principal activity is agriculture

Legend:
- Floresta
- Formação Natural não Florestal
- Agropecuária
  - Pastagem
  - Agricultura
  - Floresta Plantada
  - Mosaico de Agricultura e Pastagem

0   25   50 km
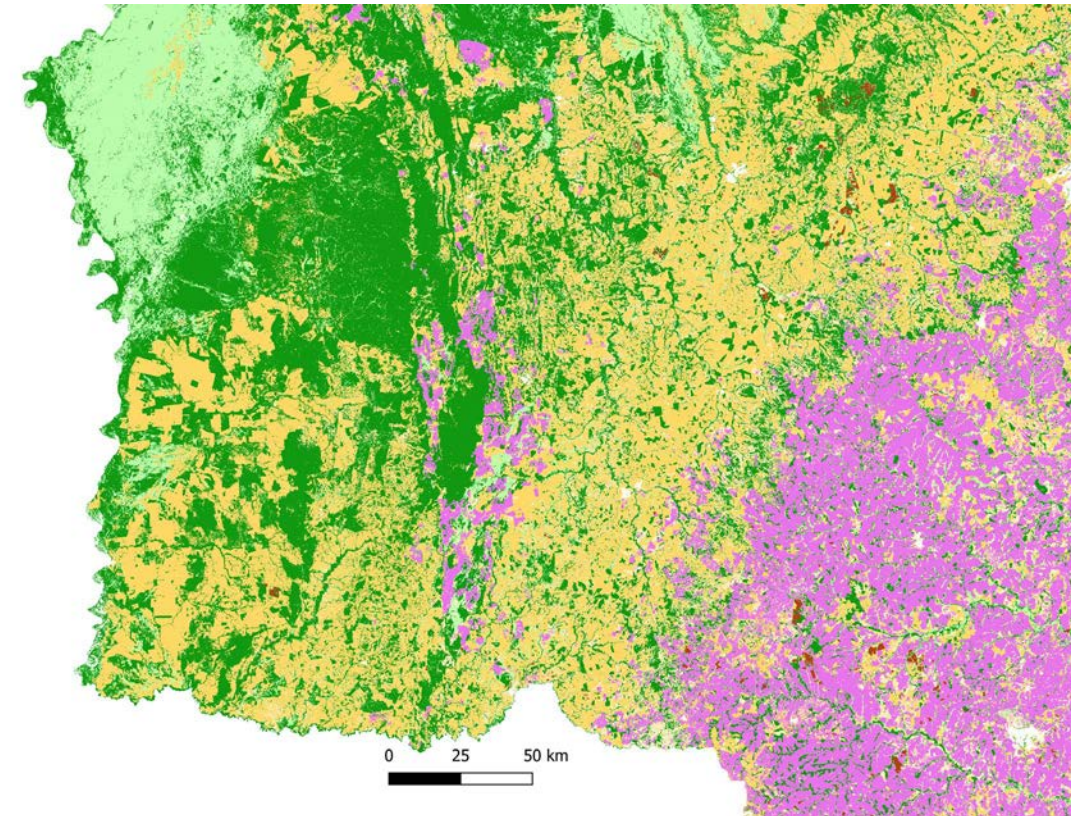
Principal activity in the region is agriculture

- ▸ ✓ 🟩 Floresta
- ▸ ✓ 🟩 Formação Natural não Florestal
- ▾ ✓ 🟨 Agropecuária
  - ✓ 🟧 Pastagem
  - ▸ ✓ 🟪 Agricultura
  - ✓ 🟫 Floresta Plantada
  - ✓ 🟨 Mosaico de Agricultura e Pastagem

0   25   50 km
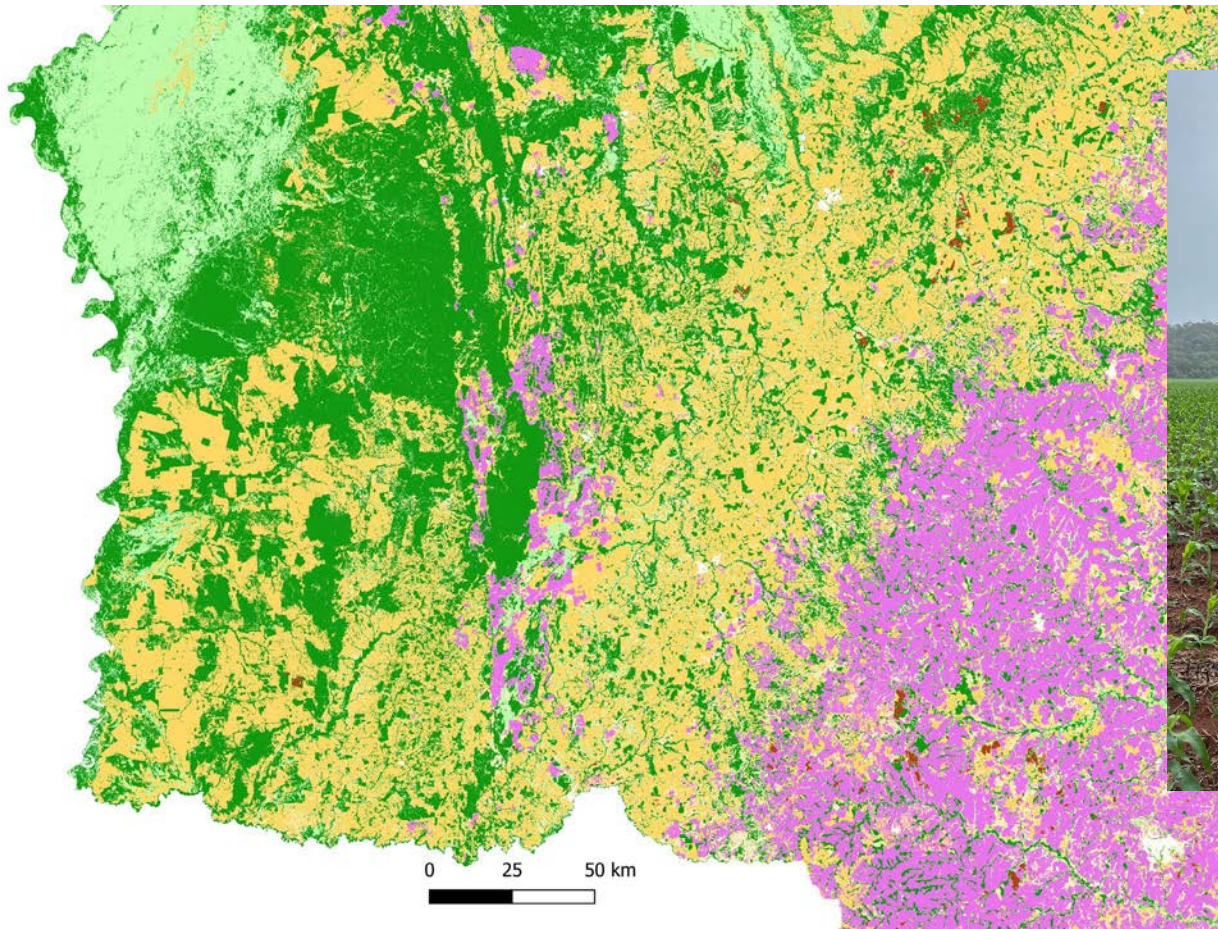
Question

What are the effect of this land use on the community of vertebrate scavengers present in the Bodoquena Plateau ?

18 sites part of a Long Term Ecological Research Program (LTER)
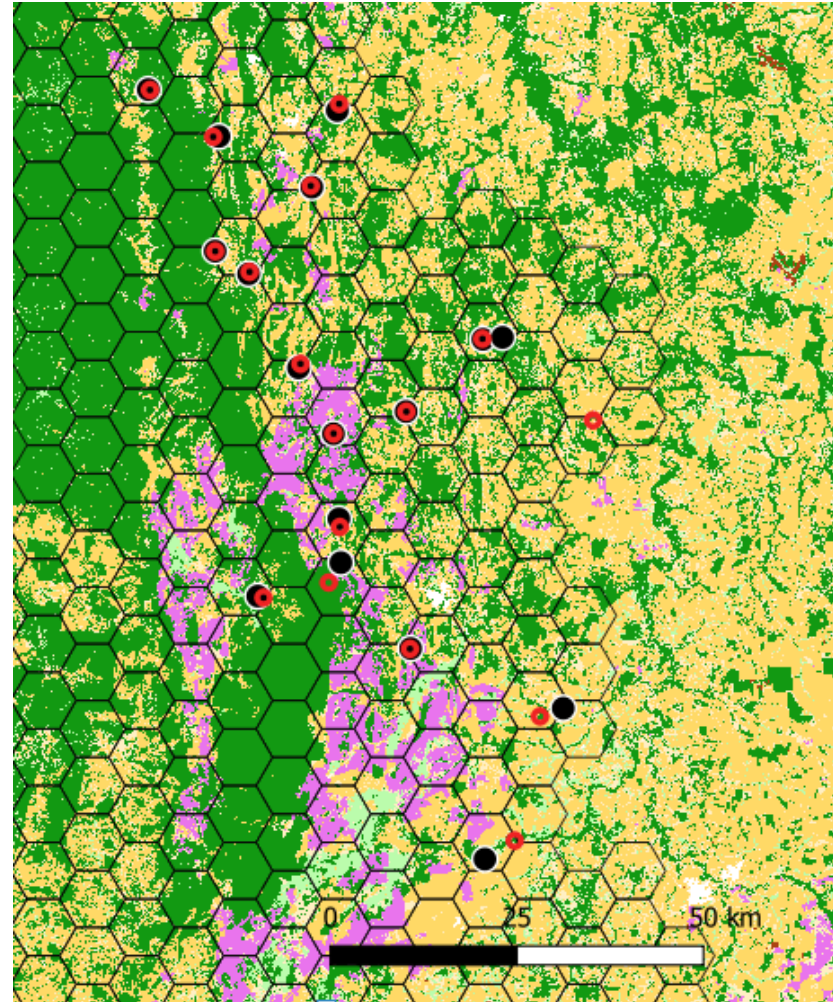
Protocol : Cam-traps in front if meat baits to identify the scavenger species present in each site

0.5m

3m

Meat bait of about 3kg

5 Days

Two temporal repetitions of the protocol
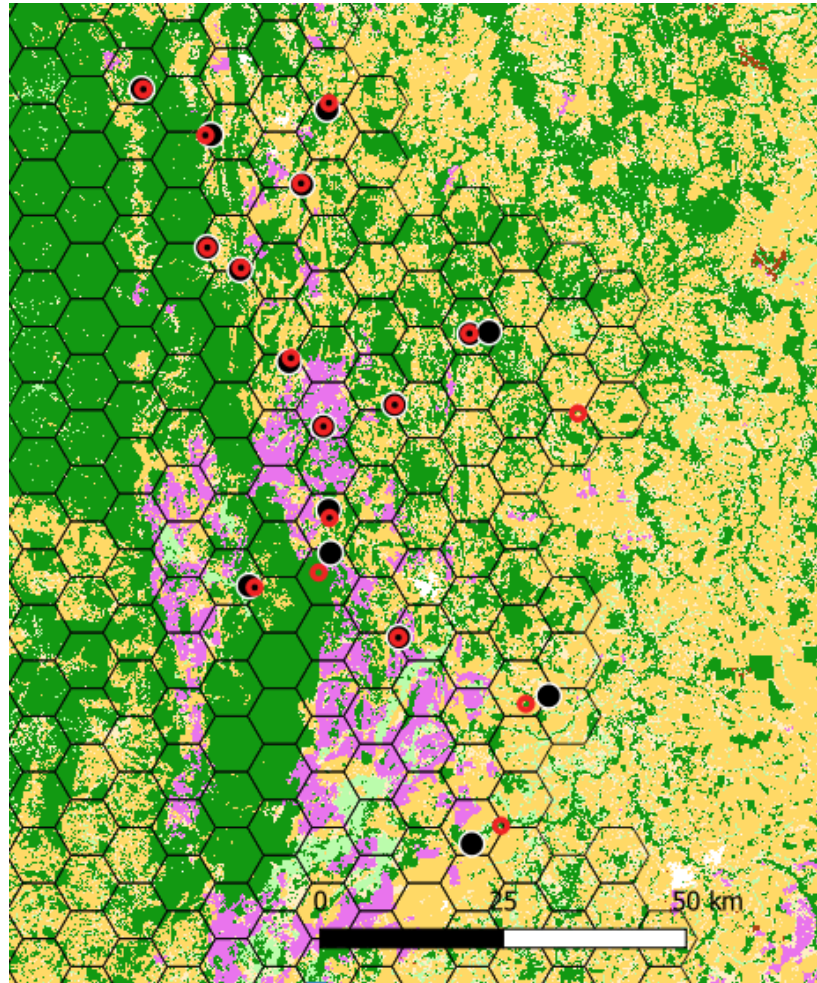
3 sub samples on each site

○ Data in 2019

● Data in 2023

(Renault, 2019)
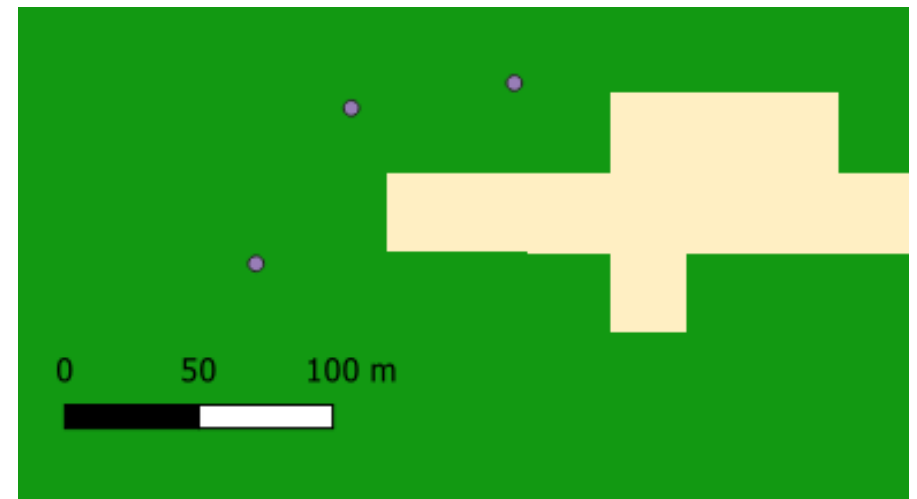
Detection of the four species of vulture of the area

Coragyps atratus   *Cathartes aura*

Sarcoramphus papa

Cathartes burrovianus

28

Birds

Aramides cajanea

Momotus momota

Cyanocorax cyanomelas

Cyanocorax chrysops

Birds of prey

Micrastur semitorquatus

Carcacara plancus

Buteogallus urubitinga

Domestic animals

Felis catus

Canis lupus familiaris

Carnivores

Puma concolor

Leopardus pardalis

Herpailurus yagouaroundi

Omnivores

Sus scrofa

Tayassu pecari

Pecari tajacu

Euphractus sexcinctus

Sapajus cay

Procyon cancrivorus

Nasua nasua

Didelphis albiventris

Cerdocyon thous

Dasypus novemcinctus

Eira barbara

Two species that were not expected to be scavenger seem to have enjoyed our baits

Tapirus terrestris

Dasyrprocta azarae

Some non scavenger species

Sorting of species considered as scavenger

- Ayline Baygin and Jessica Frisetti, L2 Université Franche-Comté

- Marc Nassivera, L3 ENS-PSL

Sorting of species considered as scavenger
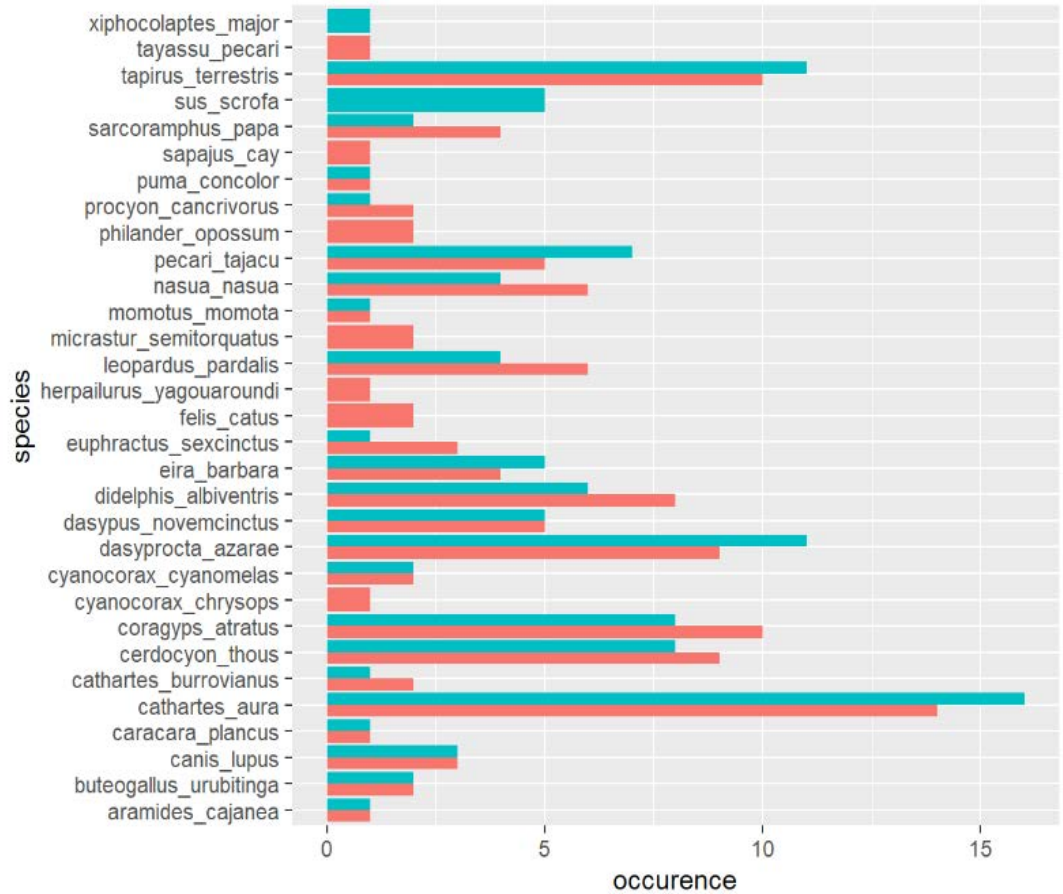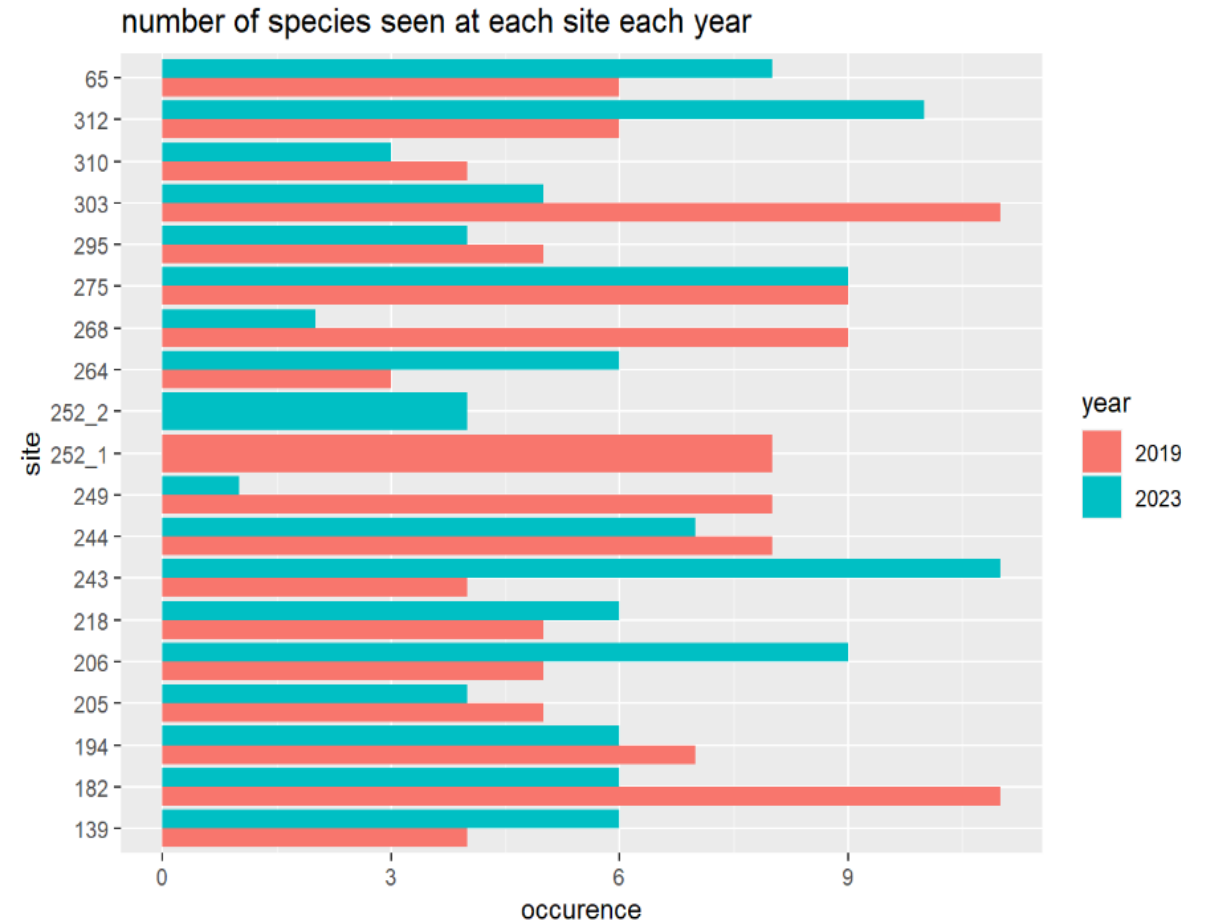
Analyses
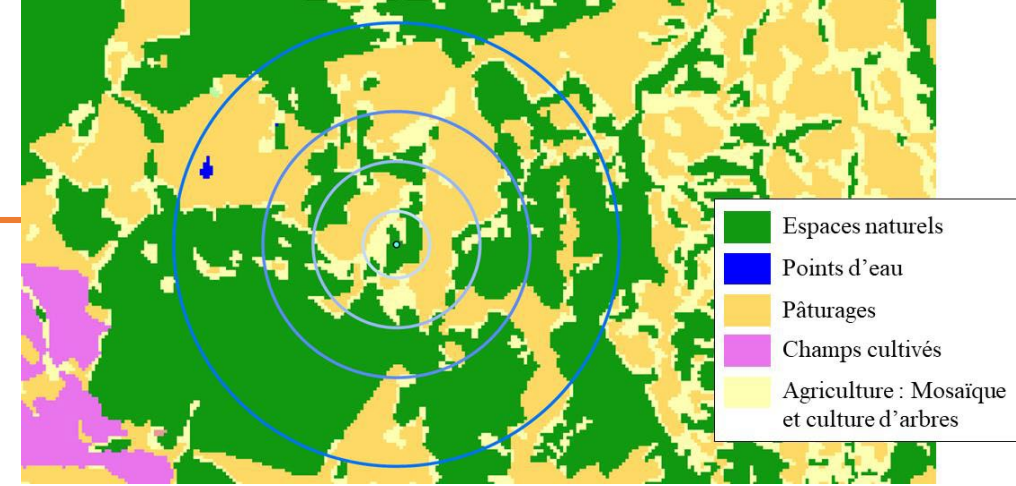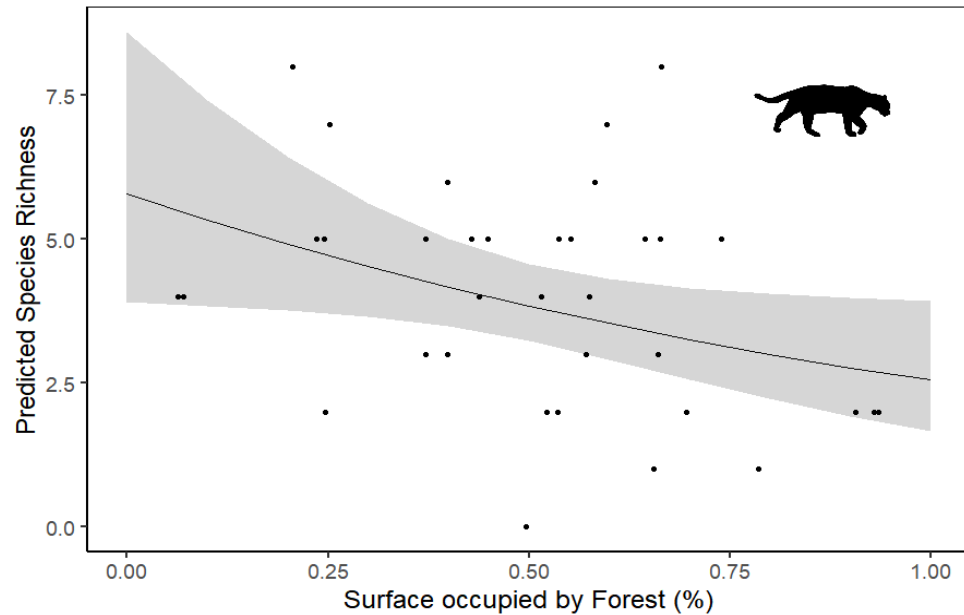
« Mapbiomas Brasil | Estatísticas ». https://mapbiomas.org/estatisticas.

A) Species richness

Env variables

Using QGIS and MapBiomass (collection 7.1) :

Extraction of environmental variable at different buffer sizes

- ❖ *Forest ratio*

- ❖ *Pasture (in unforested area) ratio*

- ❖ *Edge length*

- ❖ *Number of forest patches*

Analyses

A) Species richness

B) Species composition

Analyses

A) Species richness

B) Species composition

C) Functional analyses
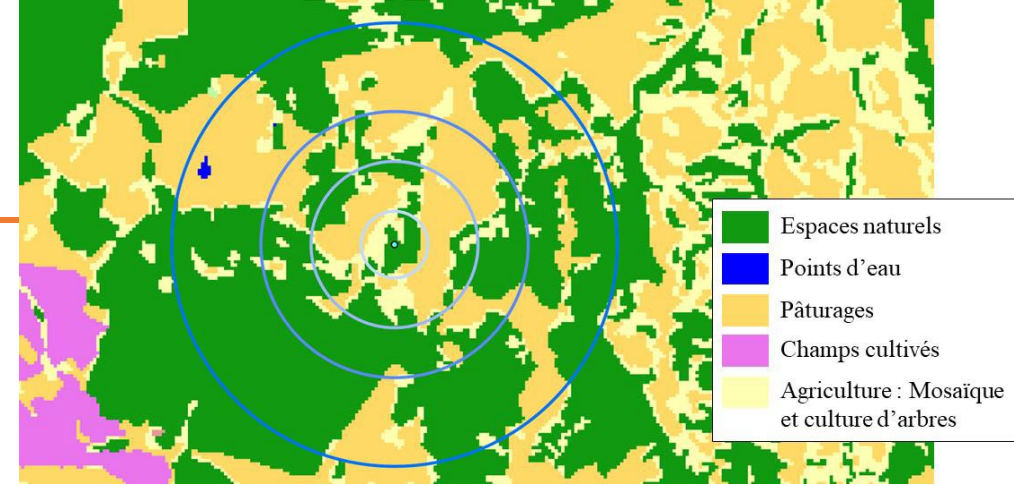
Functional Richness

2019

2023

Analyses

Légende:
- Espaces naturels
- Points d'eau
- Pâturages
- Champs cultivés
- Agriculture : Mosaïque et culture d'arbres

A) Species richness

B) Species composition

C) Functional analyses

D) Consumption of bait

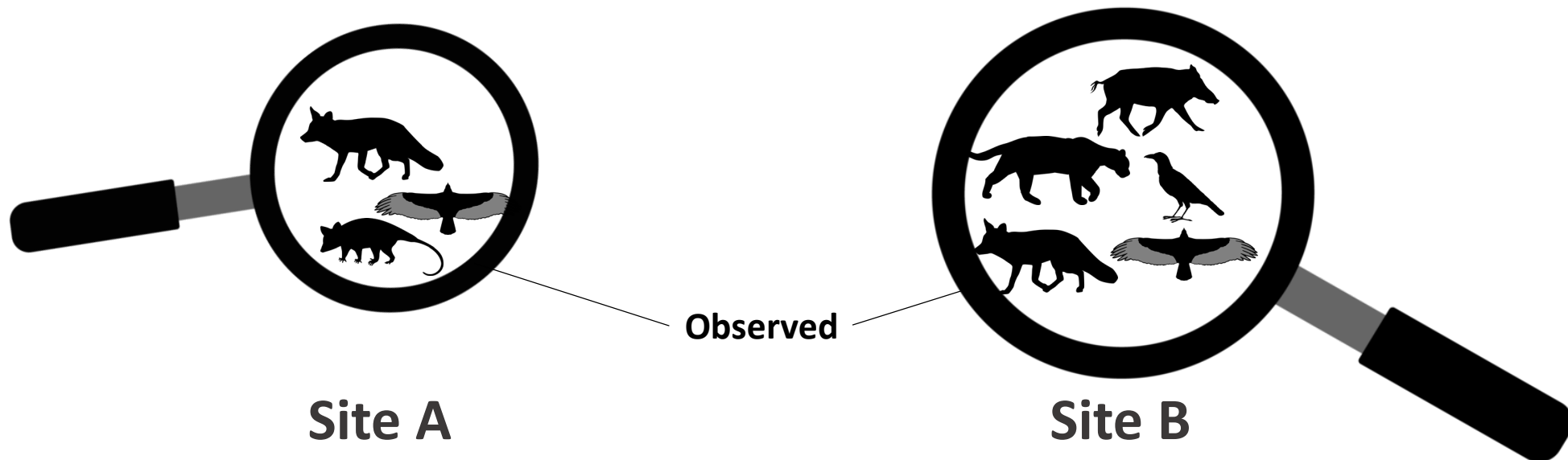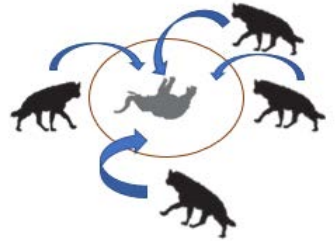**= Information about community structure and scavenging process**
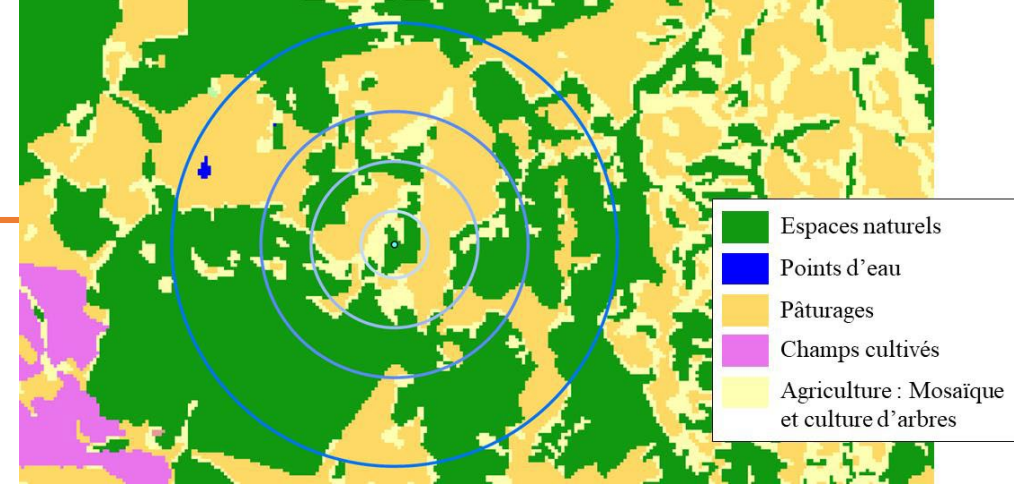
Limits of the protocol

➤ **Detection is not considered**

Scavenger species should be attracted to the bait more likely to be detected

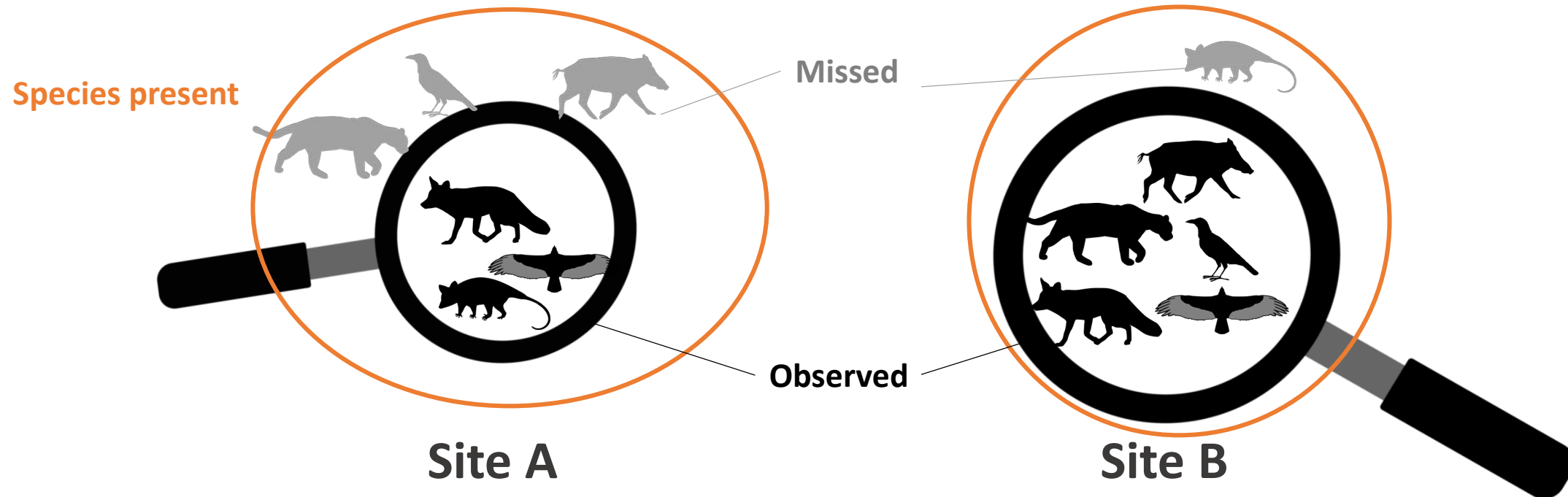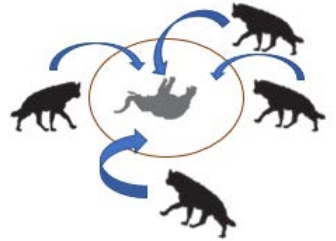But some species that are present on sites may still have been missed

Observed

Site A

Site B

Limits of the protocol

➤ **Detection is not considered**

Scavenger species should be attracted to the bait more likely to be detected

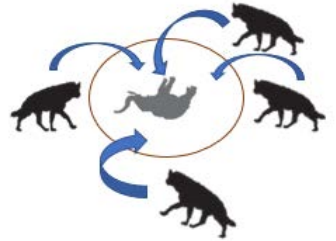But some species that are present on sites may still have been missed

Species present

Missed

Observed

Site A

Site B

Limits of the protocol

➢ **Detection is not considered**

Scavenger species should be attracted to the bait more likely to be detected

But some species that are present on sites may still have been missed
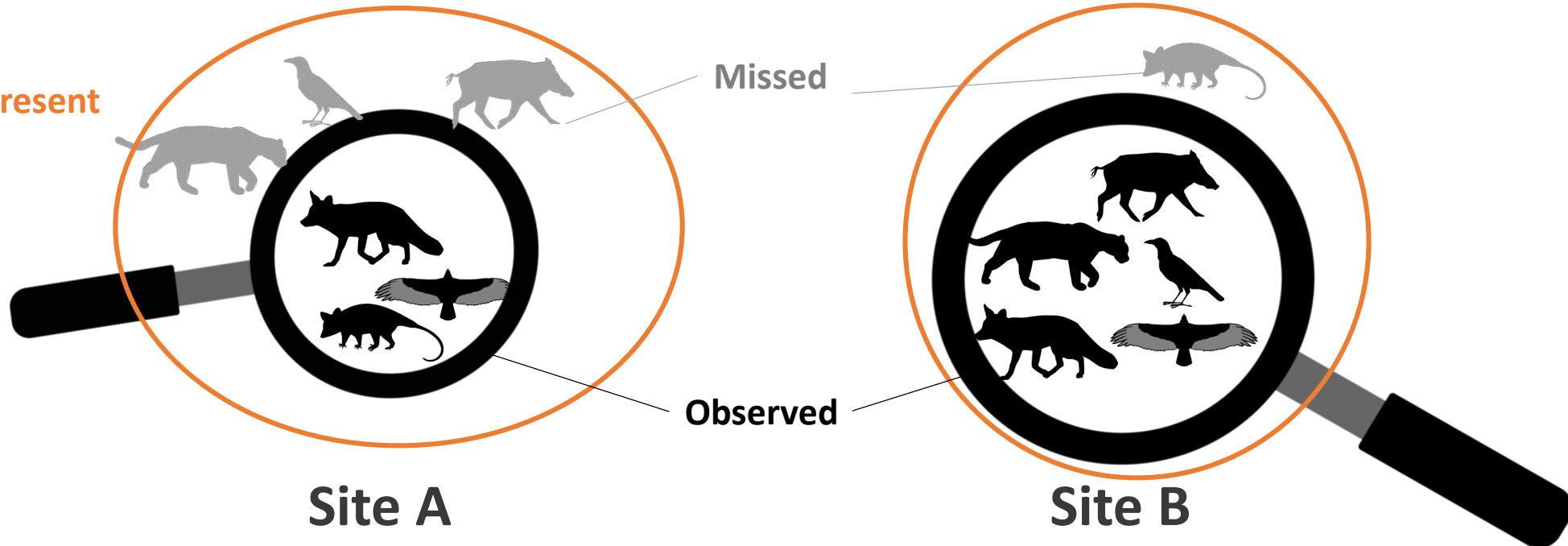
Forest cover = 30%

Forest cover = 70%

Species present

Missed

Observed

Site A

Site B

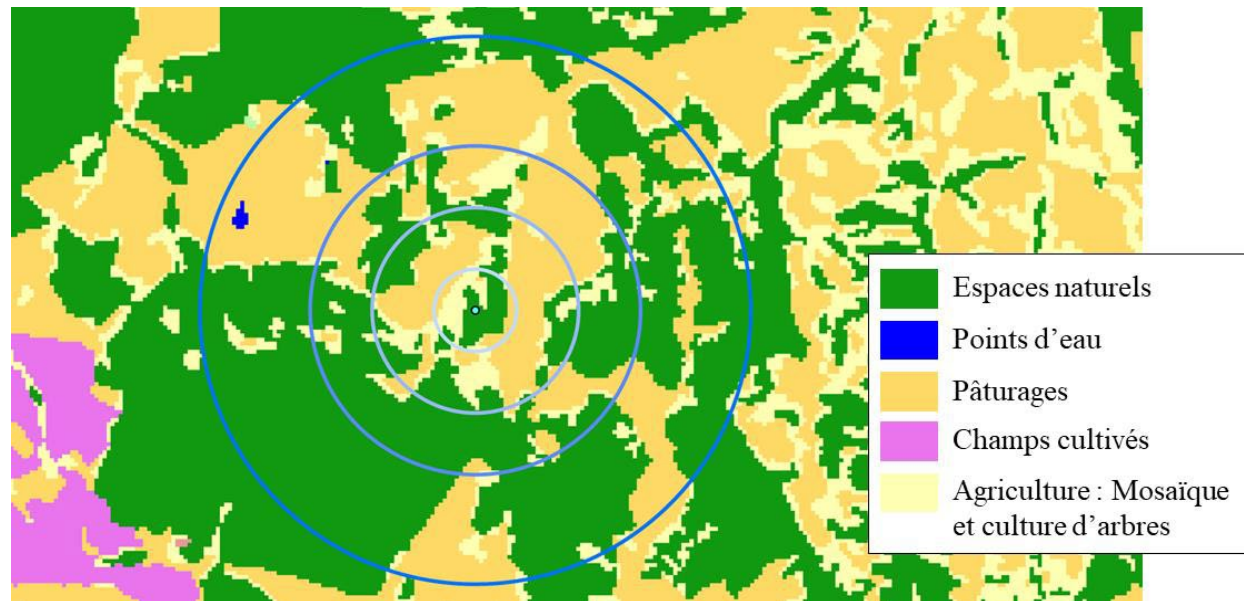# Limits of the protocol

➢ **Detection is not considered**

➢ **Some important choice**

Location of baits : near edges ? In the forest ?

Legend:
- Espaces naturels
- Points d'eau
- Pâturages
- Champs cultivés
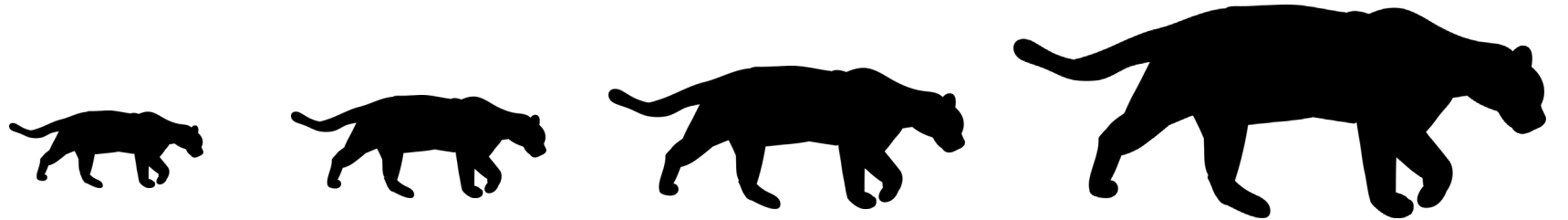- Agriculture : Mosaïque et culture d'arbres

Limits of the protocol

➢ **Detection is not considered**

➢ **Some important choice**

Location of baits : near edges ? In the forest ?

Size of the bait

Limits of the protocol

➤ **Detection is not considered**

➤ **Some important choice**

Location of baits : near edges ? In the forest ?

Size of the bait

Duration of experiment

5 Days

Limits of the protocol

➢ **Detection is not considered**

➢ **Some important choice**

➢ **Cannot use abundance**

    Species very hard to indentify

    Few photo per individual

Limits of the protocol

➢ **Detection is not considered**

➢ **Some important choice**

➢ **Cannot use abundance**

       Species very hard to indentify

       Few photo per individual

Interactions at kills

Interactions at kills

Merci !