Refaunation as a tool to restore lost ecological interactions in Atlantic Forest

“An empty forest is a doomed forest”  
Peres (1992)

“A forest without animals is like a stage without actors”  
Galetti (2016)
Defaunation (Galetti et al. 2006)

Bello et al. 2015
“Our work as conservation biologists is to reconstruct ecosystems”

Carl Jones (2018)
Proposal

Defaunated community  After Refaunation

Modified from Bello et al. 2015
Refaunation (Oliveira-Santos & Fernandez 2011)

• Restoration of entire faunas, not the reintroduction of a single species, but the reintroduction of groups of species in ecosystems where they were recently extirpated

• Similar to “Trophic Rewilding”

• Different from Rewilding in Donlan et al. (2005)
Refaunation

• Most reintroductions do not work
  • Absence of knowledge of the original cause of extinction
  • Problem of pathogens
  • The problem of readaptation to wildlife

• Refaunation needs to be done through successive reintroductions

• Refaunation has the assembly rule question
  • In which order species must enter?
Assembly rule (Galetti et al. 2017)

- Focus in **ecological processes**
- First, **generalist** species of **lower trophic levels**
- After – focus in **specialists** and **higher trophic levels**
Proposal

• Goal
  • Refaunation as a tool to restore lost ecological interactions

• Challenges
  • Discover where and why each species is missing
  • Reintroduce several species
  • Evaluate each reintroduction success
  • Measure the restoration of ecological interactions in each reintroduction
Discovering the extent of defaunation (Macedo, 2017)

• Mapping the extension of extinctions of medium and large-sized mammals in Atlantic Forest

• Mammals lost in average 88% (± S.E. 9.6) of its historical distribution in Atlantic Forest

• No resident populations in RJ
  • Tapirs
  • Jaguars
Priority areas

• Number of missing species

Fernandez et al. 2017
REFAUNA network – integrating efforts

A REDE

Diante da escassez de informações e conhecimento base sobre reintrodução no Brasil e do quadro atual da biodiversidade na Mata Atlântica, a Rede Refauna tem o objetivo de interligar as informações sobre os agentes conservacionistas, as instituições fontes de animais (zoológicos, criadouros e Cetas) e as unidades de conservação ideais para projetos de reintrodução.

AGENTES laboratórios, universidades e organizações
FONTES zoológicos, criadouros e Cetas
UNIDADES DE CONSERVAÇÃO
ESPECIES FOCO

ONDE ESTAMOS AJUDANDO
Tijuca National Park

• ~4000 ha
• Urban defaunated area inside Rio de Janeiro city
• Deforested for coffee and sugar cane plantation and charcoal
• The area was subject to reintroduction in the 70’s – Channel Billed Toucan
Agouti reintroduction

• Medium-sized scatter-hording rodent
• Captured in semi-captive populations
• Urban park in Rio de Janeiro city center
  • Around 600-800 animals in 15 ha.
  • Quarantine in RioZoo
  • Health and pathogens tests
  • Radiotransmitters
  • Transferred to pre-release pen in PNT
Agouti reintroduction

- Between 2010 and 14
  - 31 agoutis reintroduced
- Population fluctuating between 30-40 individuals (Kenup et al. 2017) in 150 ha.
- Nowadays, there is no need of reinforcement
Agouti reintroduction

• Agoutis interacted with 27 plant species
  • Study with the palm *Astrocaryum aculeatissimum*

![Graph showing the proportion of seeds with and without agoutis for different seed states: Buried, Moved, and Preyed.](image)

Source: Zucaratto 2013
Howler reintroduction

- Extinct in PNT since 1850’s
  - Last register – Charles Darwin
  - Folivore-frugivore
- Animals must have been born in RJ state
- Quarantine in Centro de Primatologia
  - Health and pathogen tests
- Transfer to pre-release pen in PNT
Howler reintroduction

- Started in 2015
  - First group – 4 animals
  - Total 6 animals reintroduced
  - 2 removed due interactions with humans
  - 1 is dead

- Now
  - 3 animals with known destination
  - One born in Tijuca - Tupi

- Need of new translocations
Howler reintroduction

- Howlers interacted with 60 plant species
- 21 dung-beetle species associated with their feces
- Most dung-beetles are tunnelers
- Several plant species hadn’t dispersers
- Can contribute with carbon fixing

Source: Genes et al. 2018
Main constraints

• Delay in obtaining environmental licenses
  • The problem of being a baseline in reintroduction studies in Brazil
  • Help to set requirements for Reintroduction Projects

• Scarcity of source populations
  • In special with Howlers – the sub-species problem
  • But also with one single source of agoutis

• Difficulties regarding quarantine and monitoring of animals
Next steps

• More species?
  • Iguana
  • Yellow-footed tortoise
  • Blue and yellow Macaw
  • Evaluating the best management practices for each reintroduced species to develop protocols
Conclusions

• Refaunation is promising
  • Low-cost (Fernandez et al. 2017)
  • Effective in restoring ecological processes
Acknowledgments