Reforestation success around Ranomafana National Park: survival and growth from 2007 to 2018

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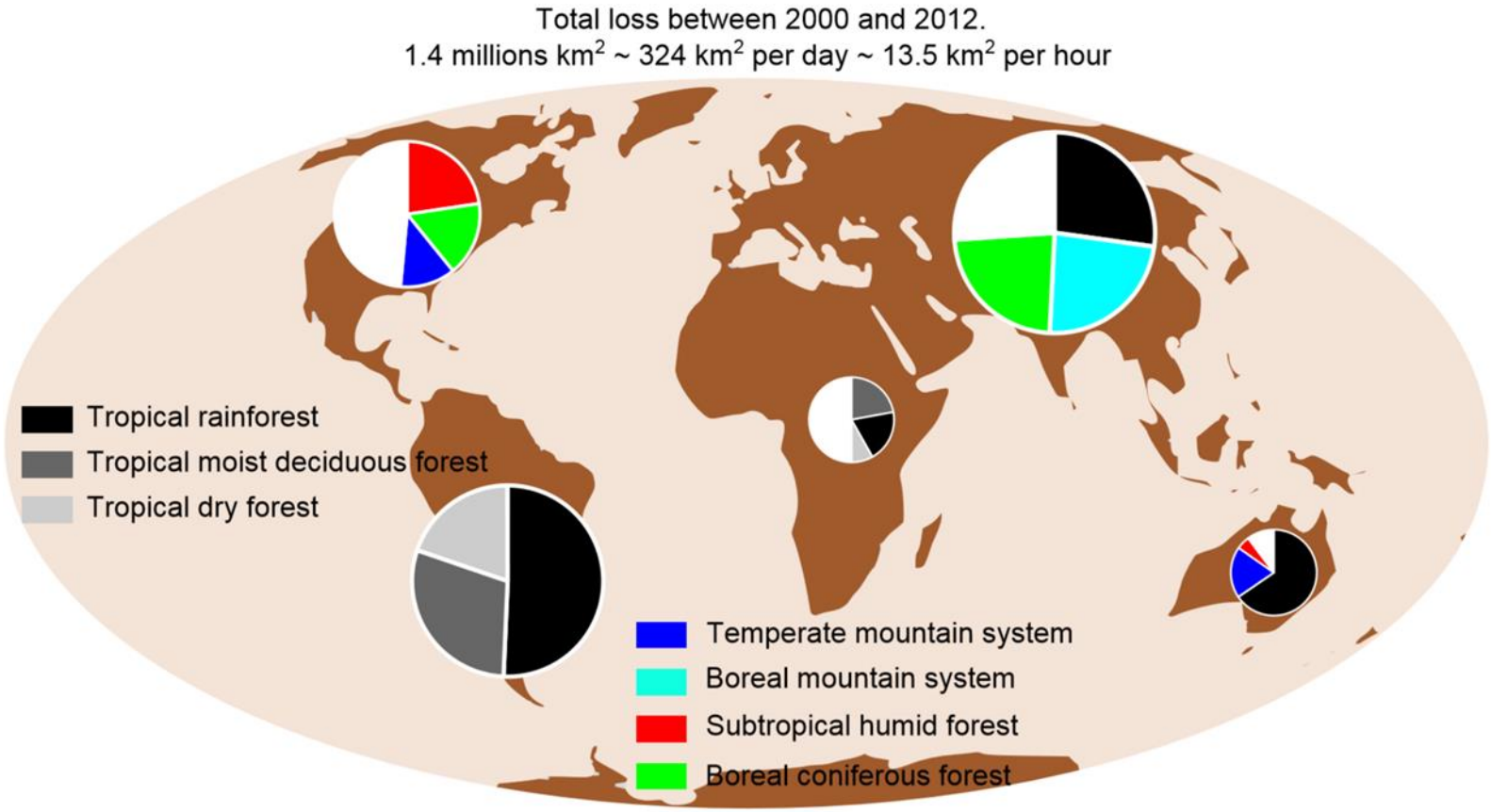
INTRODUCTION

- Deforestation is a worldwide problem
- Tropical forests are the most deforested



Ramiadantsoa 2015

INTRODUCTION

Madagascar:

- Natural forests: covers 8.9 million hectares or 15% of the national territory (2014)
- Annual deforestation rate: reach 1.1% (~100,000ha) per year (2010 - 2014)
- Malagasy government: planting of 60 million trees, in 200,000 ha.

Objectives

- How can we evaluate the success of these reforestation programs?
  - ✓Survival rate
  - ✓Growth rate
- What are the factors that influence these two variables?

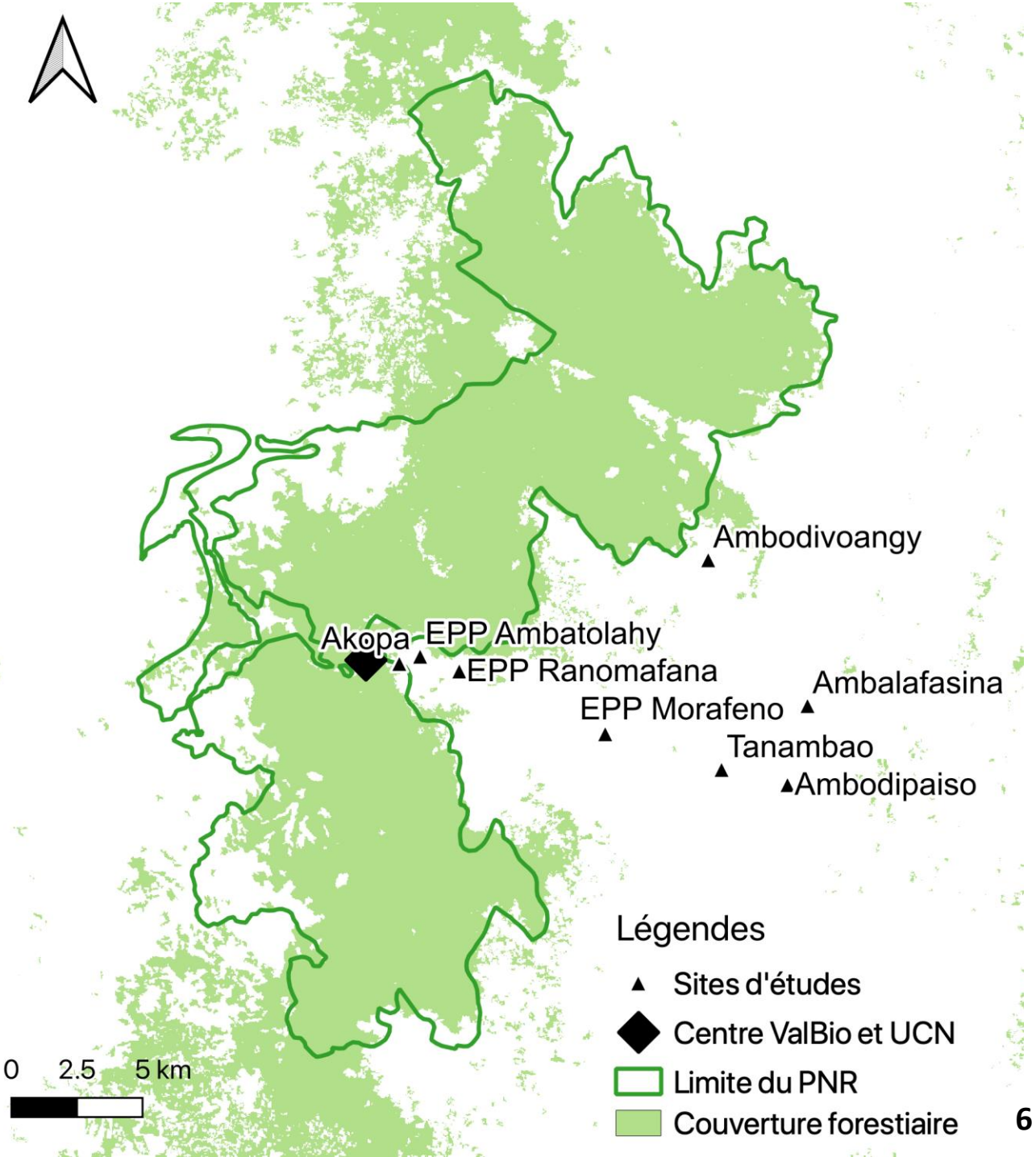
INTRODUCTION

CHOICE CRITERIA

- Target species:
  - Native tree in the park and endemic Ecological and social important
  - Most aboundant during inventory and planting record available
- 4 Species:
  - *Canarium madagascariensis* (Ramy)
  - *Bridelia tulasneana* (Harina)
  - *Protorhus Abrahamia* (Sandramy)
  - *Cryptocarya sp.* (Tavolo)

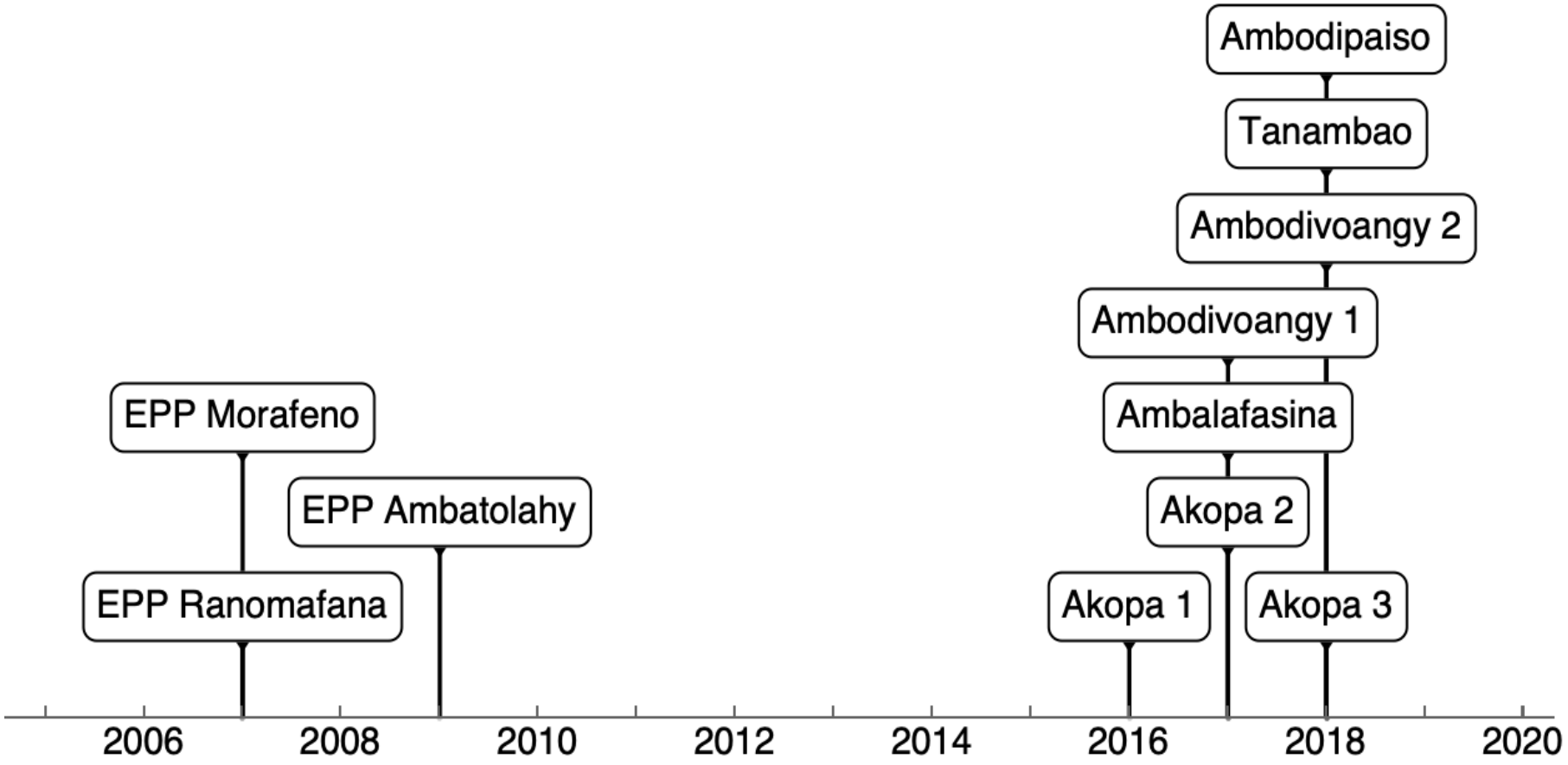
MATERIELS AND METHODE

- Ranomafana National Park (RNP)
  - area: 41 601 ha
  - Floristic diversity: more than 257 woody species
- Selected site: 8 among 32 reforestation sites around the Park



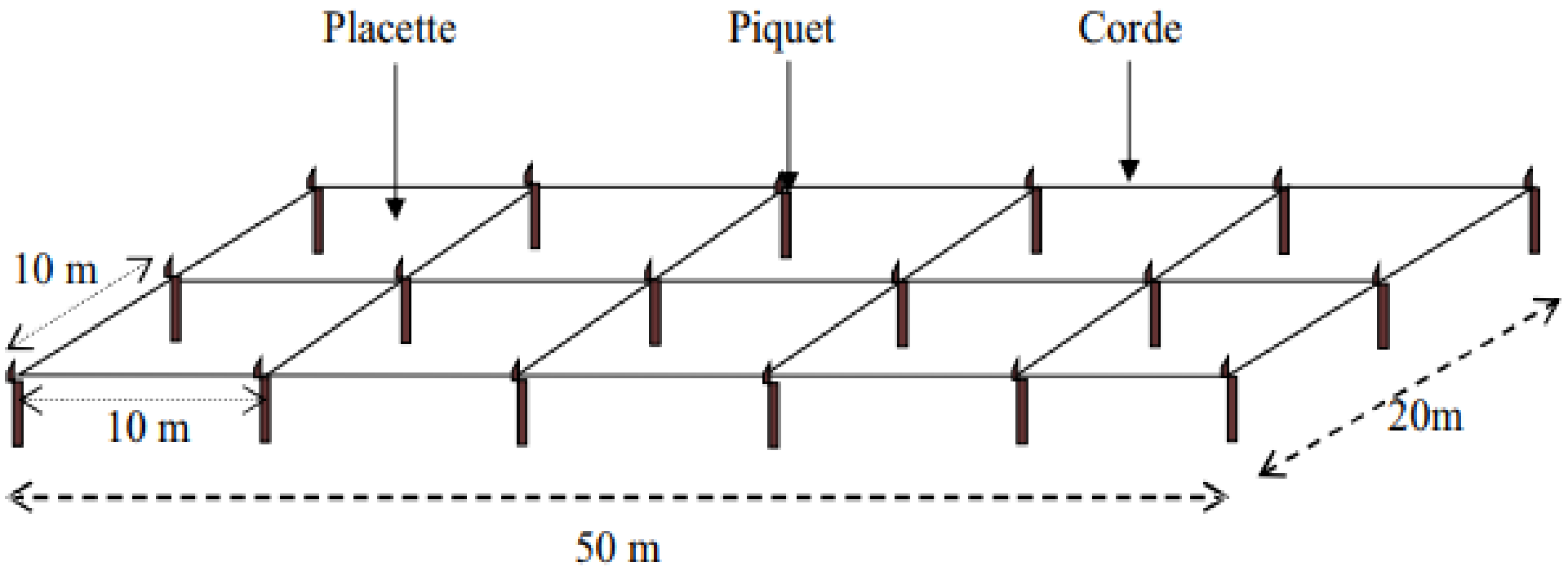
MATERIELS AND METHODE

Description of reforestation per sites



Reforestation program per site: various

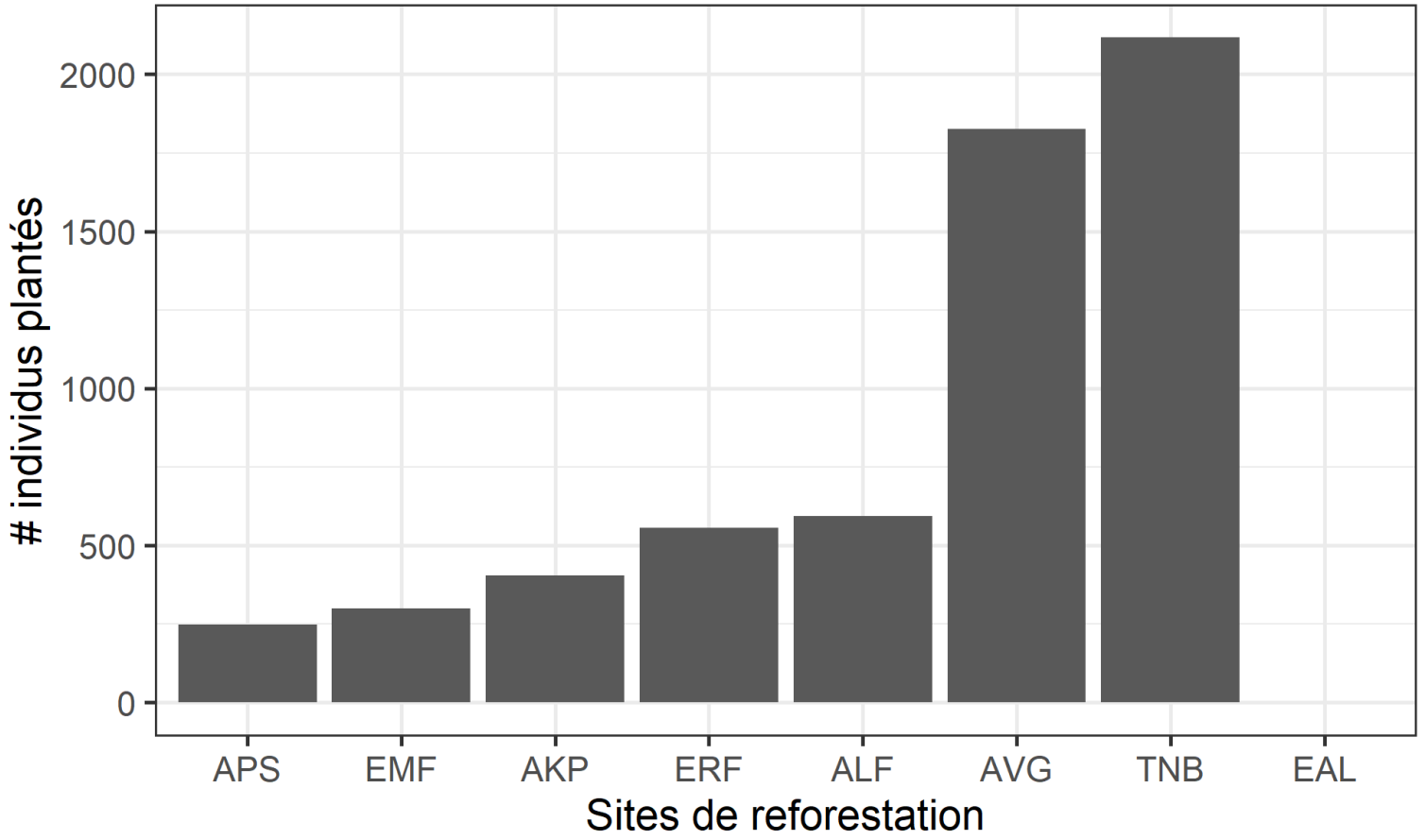
FLORISTIC INVENTORY



Plot Permanent de Suivi (PPS)

MATERIELS AND METHODE

Description of reforestation sites



Site code:

- AKP : Akopa
- AFS : Ambalafasina
- AVG : Ambodivoangy
- APS : Ambodipaiso
- EAL : EPP Ambatolahy
- EMF : EPP Morafeno
- ERF : EPP Ranomafana
- TNB : Tanambao
- « # » : Number.

Total planted individuals : 6045 → number and density different by site

e.g: Ambodipaiso = 248 ; Tanambao = 2118

ANALYSE 1

Biotic and abiotic comparison of sites

PCA:

- Biotic and Abiotic Variables
- Species present and missing per site

ANALYSE 2

Survival rate → $\mathbf{TS}\ (\%) = \frac{\boldsymbol{Number\ individuals\ inventoried}}{\boldsymbol{Nomber\ individuals\ planted}} \times \mathbf{100}$

- between sites (8 sites)
- between biotic and abiotic variables
- according to species and site (Tanambao and Ambodivoangy)
- Statistical test (???)

ANALYSE 3

Growth (biovolume) → $Biovolume = 0,53 \times Hight \times \frac{\pi}{4} \times Diametere^2$

- Species, site different same age
- Species, same site and same age
- Statistical test (???)

Linear regression (diameter and hight): species same age and same site →

$$\log(Hauteur) = \log(a) + z \log(Diametre)$$

RESULT 1

SITE COMPARISON

- Similarity of sites and environmental factors
- Difference between number and species
- Composition of the planted species

RESULT 2

SURVIVAL STUDY

- Survival rate per site
- Survival rate per species

RESULT 3

GROWTH STUDY

- Biovolume by site and year of plantation (4 species)
- Biovolume by species
- Biovolume by slope

RESULT 4

LINEAR REGRESSION

- Diameter and height relationship by species

DISCUSSION

- Survival per site
- Growth per age
- Survival and growth order
- Evaluation success of program

CONCLUSION

Evaluation of reforestation success: Survival and growth

- Focusing on the number of individuals planted is insufficient