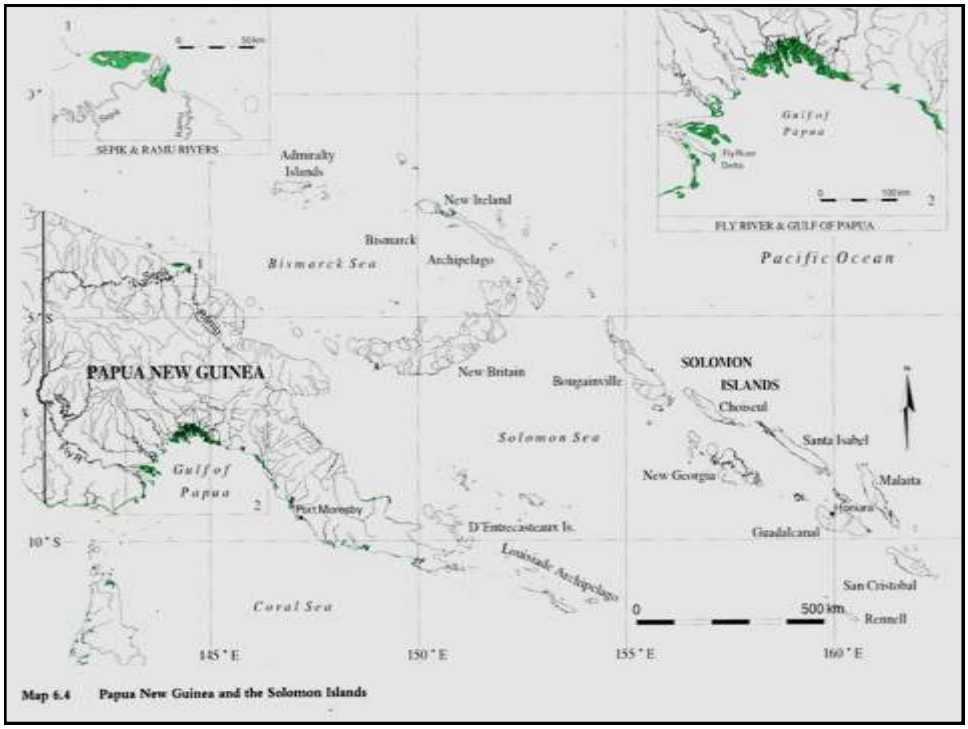
Factors controlling the survival of mangrove seedlings in reforested sites in Central Province, Papua New Guinea

Mazzella Maniwavie

University of Papua New Guinea

Introduction

- PNG home to 6-7% of world's biodiversity with many endemics
- 7 million people speaking > 800 languages
- Literacy rate 56%
- Indigenous people own 97% of land
- 80 % of population is rural and rely heavily on natural biological resources for livelihoods
- 410, 00 ha of mangrove forest



Map 6.4 Papua New Guinea and the Solomon Islands

Introduction

- Mitigation of harmful effects of deforestation and negative climate change effects
- In Pacific Islands: sustain fisheries, livelihoods and give coastal protection
- PNG Govt. supports reforestation as the least costly option to mitigate and adapt to coastal flooding
- In Central province: restore forests heavily degraded by human settlement and collection of firewood.

Introduction

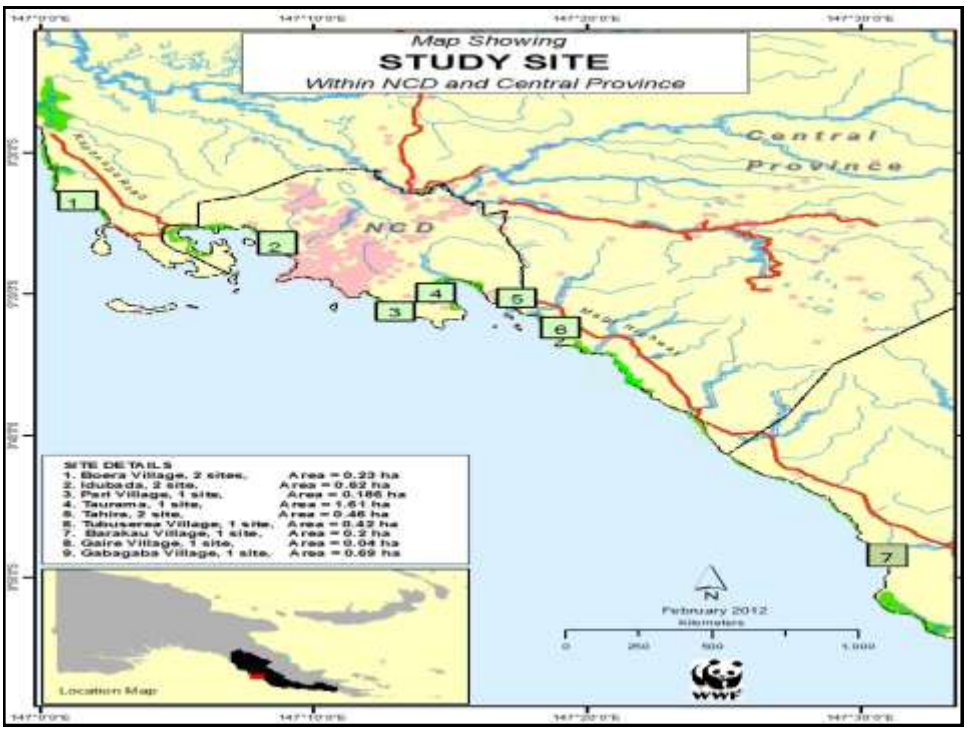
- >15,000 mangroves planted since 2005
- *Rhizophora* and *Bruguiera species*
- Replanting efforts have been mixed including sometimes 100% plant mortality
- No scientific analysis of the success and failure of mangrove replanting in PNG

Research Aim:

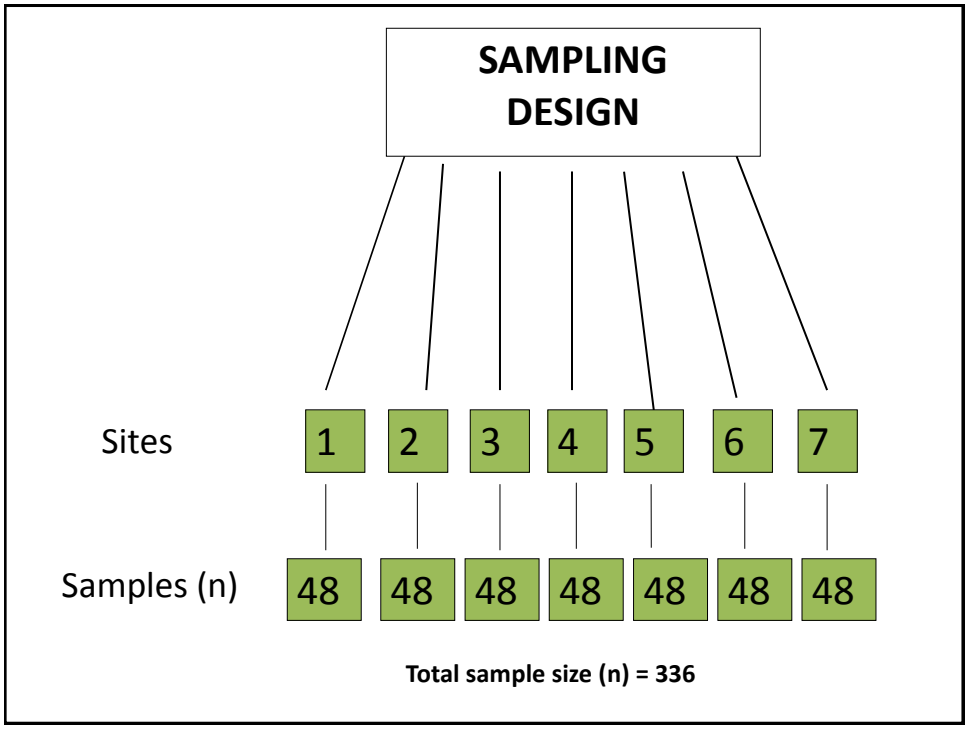
Help community-based mangrove rehabilitation projects through a predictive model

Research Question

What are the critical environmental factors for mangrove survival?



Methodology



Data Analysis

- Multiple Logistic Regression (0=dead, 1=alive)
- Plant survival was analyzed against a suite of potentially important environmental variables
- Variables: Soil salinity, pH, redox potential, particle size, protection index and Disturbance
- Model inference (using AICc) was used to determine the best model
- 51 Models were constructed and tested
- From the top model the importance of the environmental variables could be assessed

Results

Top Model

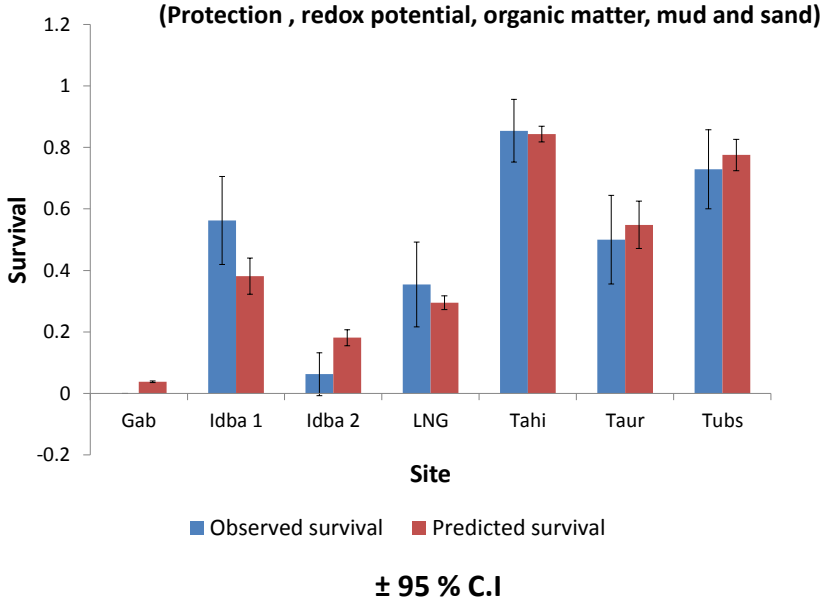
- The top model had **71%** support
- Most critical environmental variables:

  - Protection , redox potential, organic matter, mud and sand

- Strong and (significant) interactions:
  - organic matter * mud
  - redox potential*organic matter*mud

Top Model

(Protection , redox potential, organic matter, mud and sand)

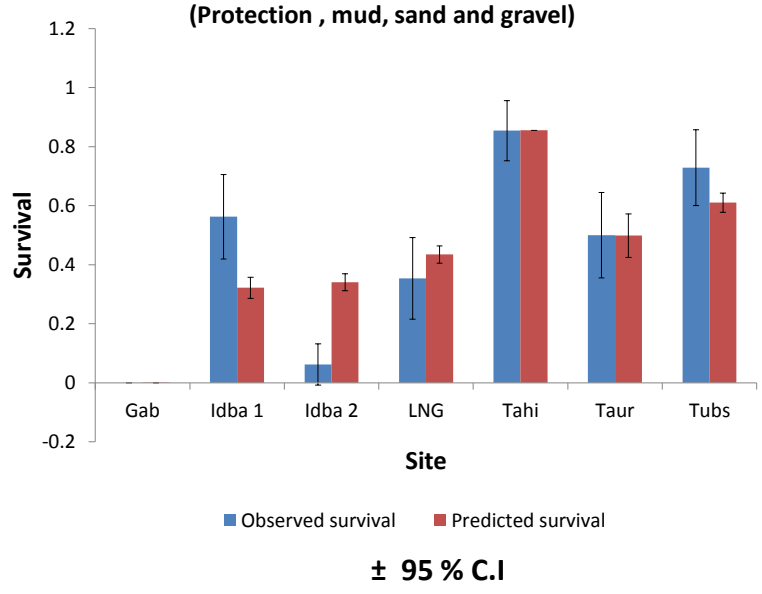


± 95 % C.I

Community Model

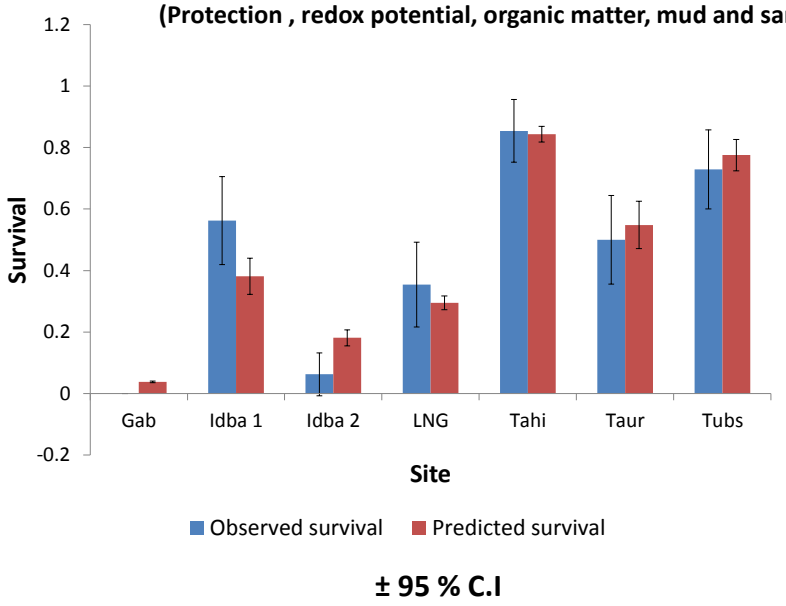
- Local communities can't measure redox potential
- Most critical environmental variables:
  - protection , sand, mud and gravel
- Model was ranked 20th/ 51 on AICc
- No significant interactions
- Not a great model
- But explains survival data fairly well

Community Model



Top Model

(Protection , redox potential, organic matter, mud and sand)



± 95 % C.I

Discussion

Conclusion

- Top model is very good predictive tool for estimating mangrove survival
- For community-based projects, the community model (no redox potential) is fairly good..
- …and could form the basis of visual site selection

Implications of this study

- Use Predictive models to assess potential replanting sites for optimal conditions before replanting
- Assist PNG Govt. through the Office of Climate Change to achieve its initiative “Millions of Mangrove” as a means to combat coastal flooding
- Create a proper PNG manual on replanting techniques integrating the predictive tool

Acknowledgements

Supervisors : Nathan Whitmore
Dr. Augustine Mungkaje

Field Assistants: Peter Robui
Wilson Yipma

Funded by:

WILDLIFE CONSERVATION SOCIETY