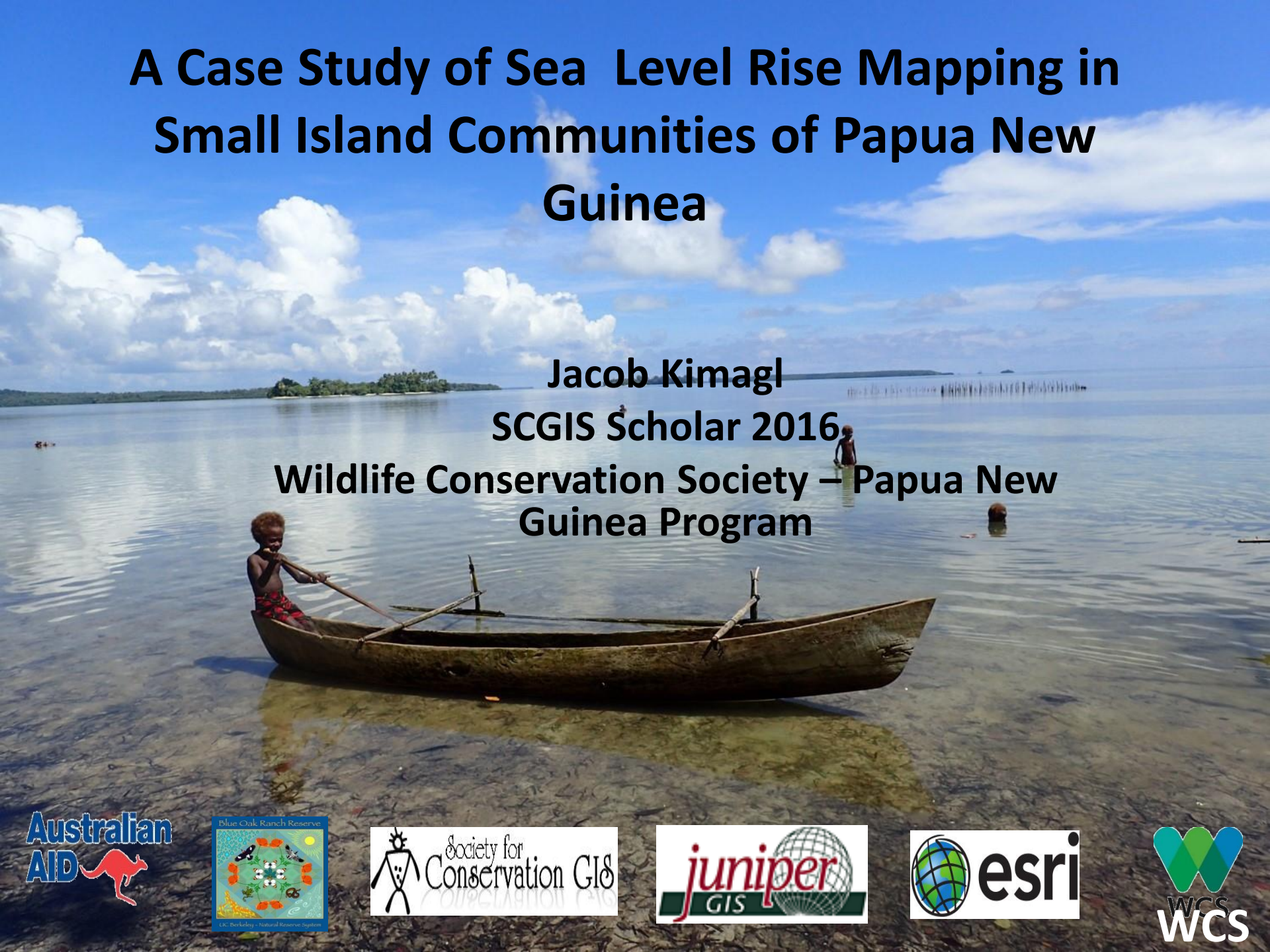
A Case Study of Sea Level Rise Mapping in Small Island Communities of Papua New Guinea

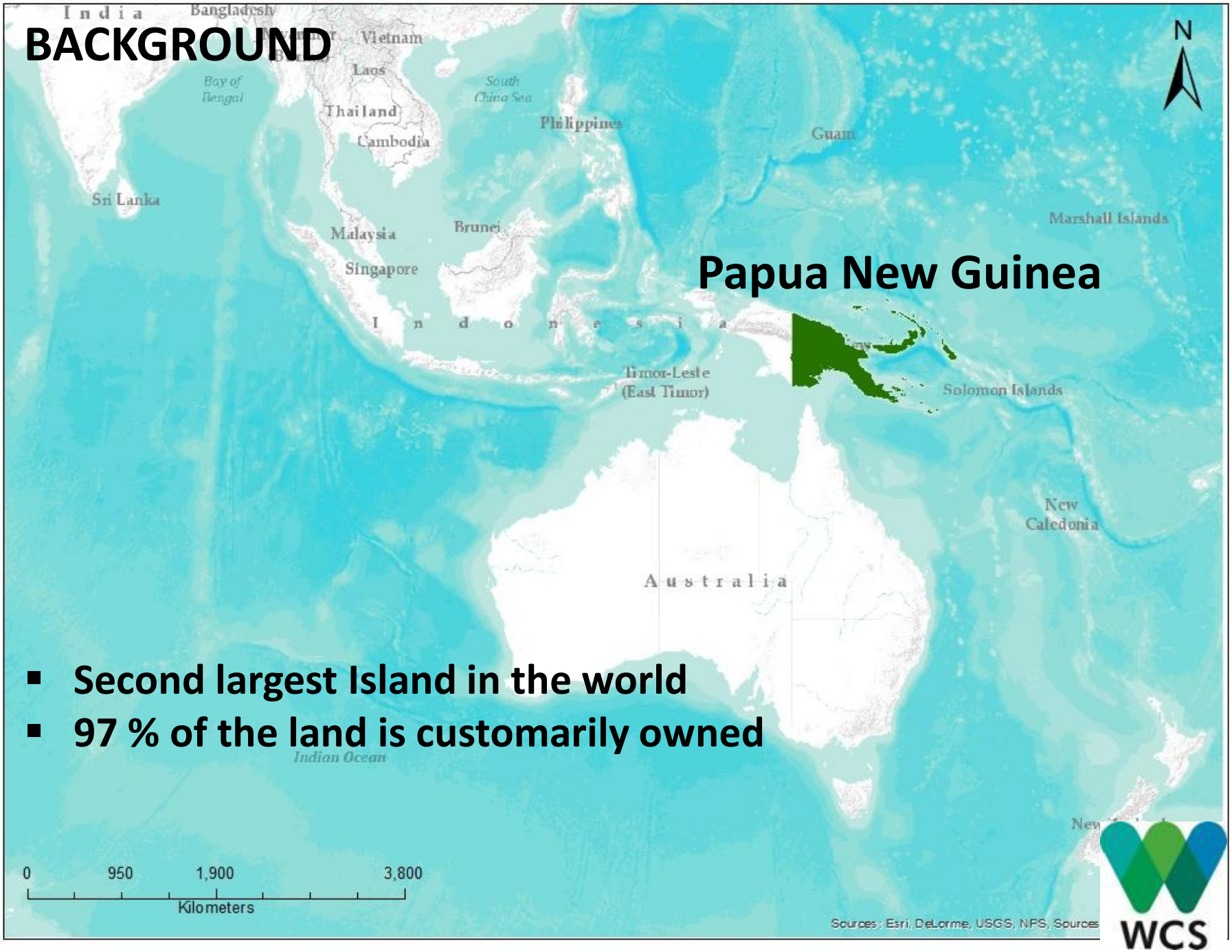


Jacob Kimagl

SCGIS Scholar 2016

Wildlife Conservation Society – Papua New Guinea Program

BACKGROUND



- **Second largest Island in the world**
- **97 % of the land is customarily owned**

Cultural diversity in PNG

- Most culturally diverse country on earth
- 815+ languages





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520 species of land birds

80% endemic

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310+ spp of frogs
95% endemic
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350+ species of reptiles

80% endemic

340+ spp mammals

80% endemic

PNG coast & reefs

	Area (Km^2)	Species
Coral reefs	**14,500**	
(hard corals)		514 (65% global)
(reef fish)		860 (30% global)
Coastline	17,000 km	
Mangroves	5400	44

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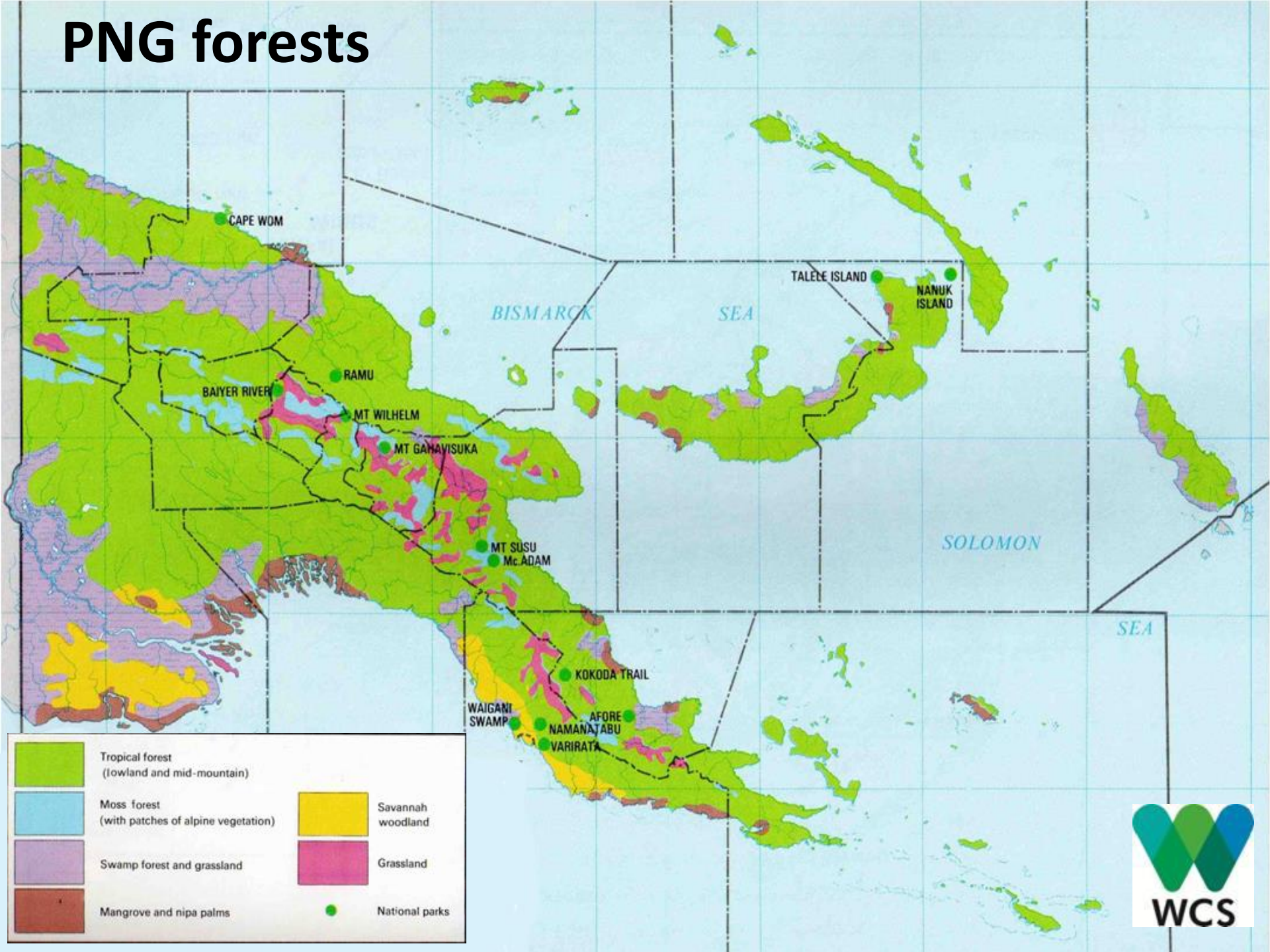
PNG forests


CAPE WOM
RAMU
BAIYER RIVER
MT WILHELM
MT GAHAVISUKA
MT SUSU
Mc.ADAM
KOKODA TRAIL
WAIGANI SWAMP
AFORE
NAMANATABU
VARIRATA
TALELE ISLAND
NANUK ISLAND
BISMARCK SEA
SOLOMON SEA
Tropical forest (lowland and mid-mountain)
Moss forest (with patches of alpine vegetation)
Swamp forest and grassland
Mangrove and nipa palms
Savannah woodland
Grassland
National parks
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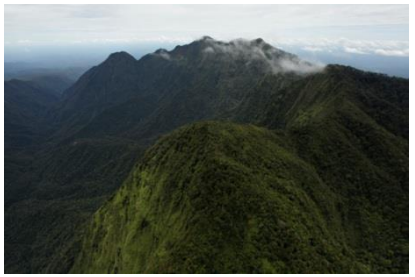
PNG has diverse sea and landscapes

From coral reefs to large intact forests



From alpine to lowland

From wide rivers to narrow fiords

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PNG has diverse sea and landscapes

From highlands to islands

From karst to volcanoes

From braided rivers to boulders streams

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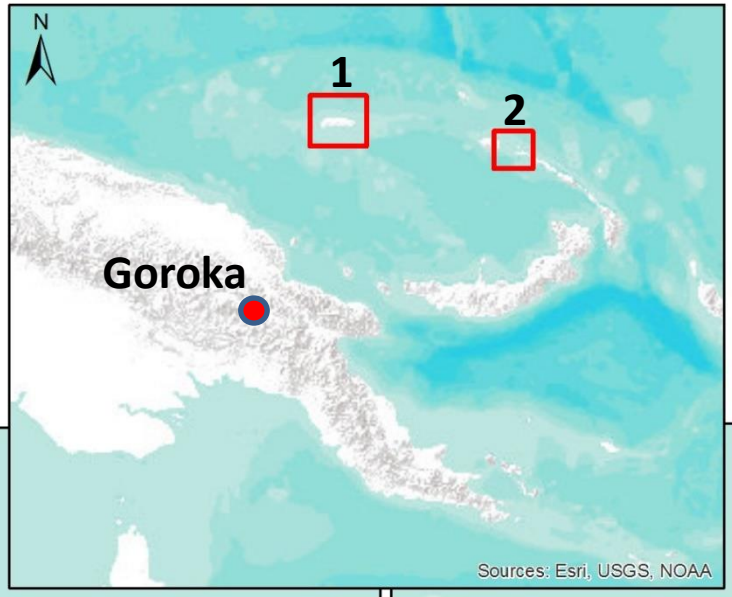
The overall vision for Papua New Guinea

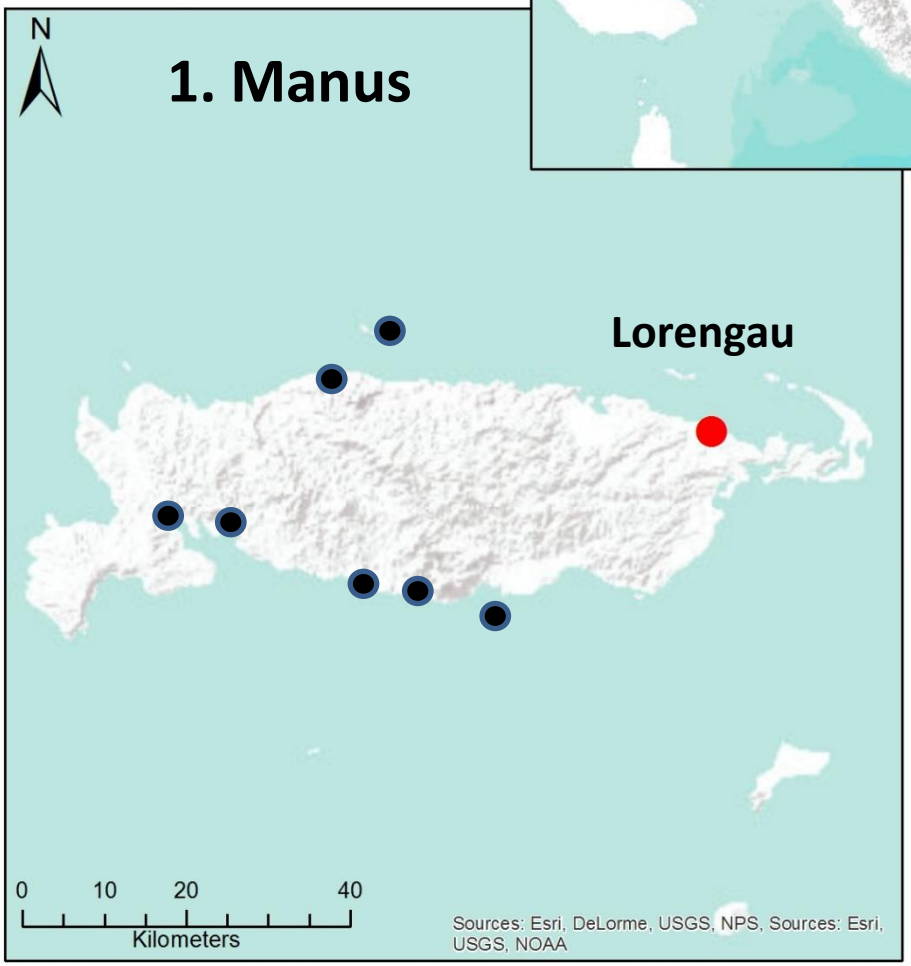
'Gutpela sindaun, gutpela solwara gutpela bus,

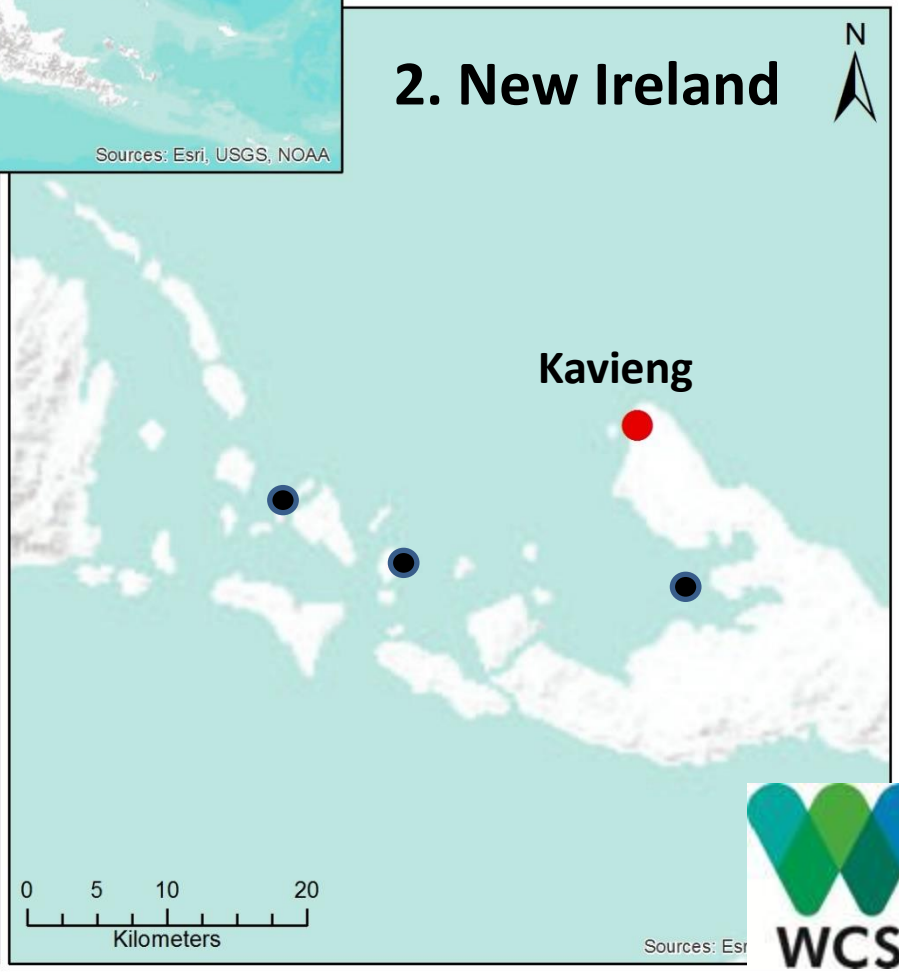
(Empowered people with healthy forests and seas)

STUDY SITES

Locality of our Study Sites







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INTRODUCTION

- Atolls are threatened in the face of changing climate
- Locals have limited knowledge in this technological changing world
- Empower local participation in accurately mapping their island topography
- Develop fine scaled sea level rise maps for locals interpretation & planning

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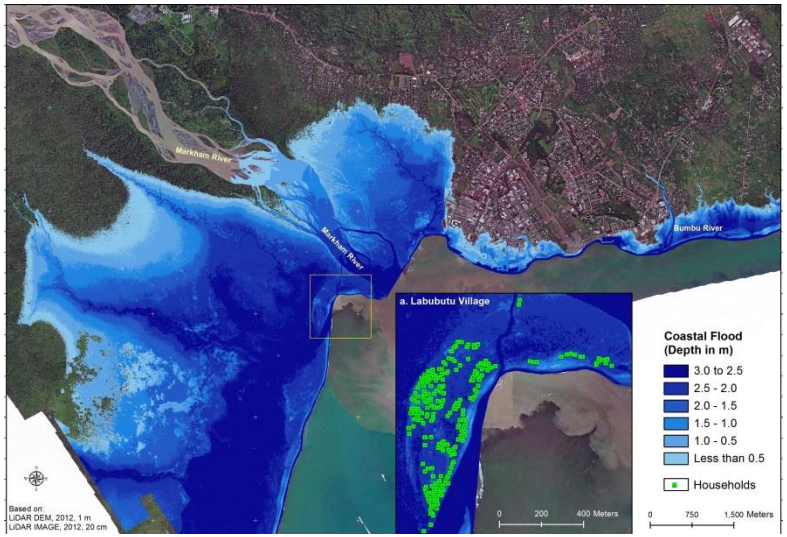
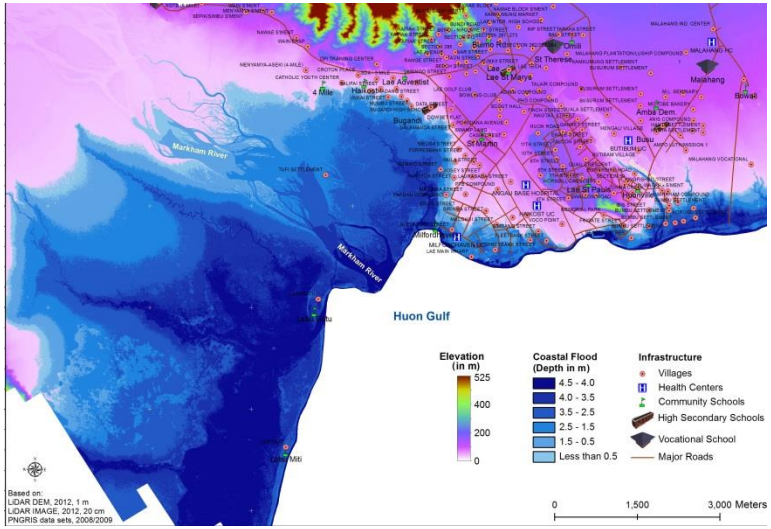
INTRODUCTION

- Sea level rise mapping is convenient, cheap and easy to learn method
- Limited access to high elevation data and expert knowledge to develop inundation models





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OBJECTIVES

- Empower local participation and capacity through the exercise
- Tool for awareness and local planning for small island communities

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METHODS

SLR Projections (IPCC)

50 cm rise by 2050

100 cm rise by 2100

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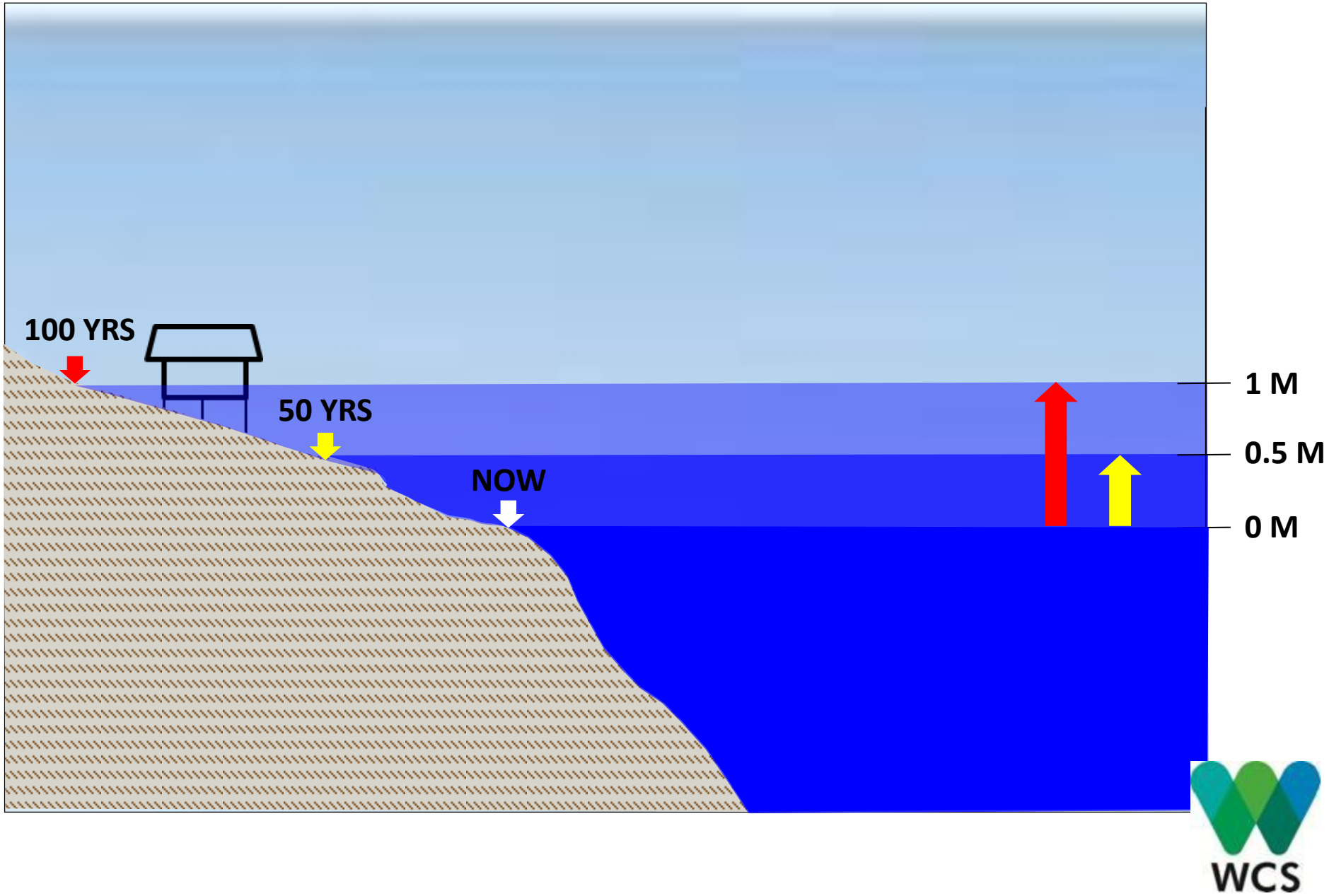
100 YRS
50 YRS
NOW
1 M
0.5 M
0 M
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Determining Reference points

- HAT = Highest Astronomical Tide (Usually in December/January)
- Also known as Current High Water Mark / Reference point

How to determine HAT

- Observation of coastal profile (sediments/rubble berm/vegetation)
- Local knowledge

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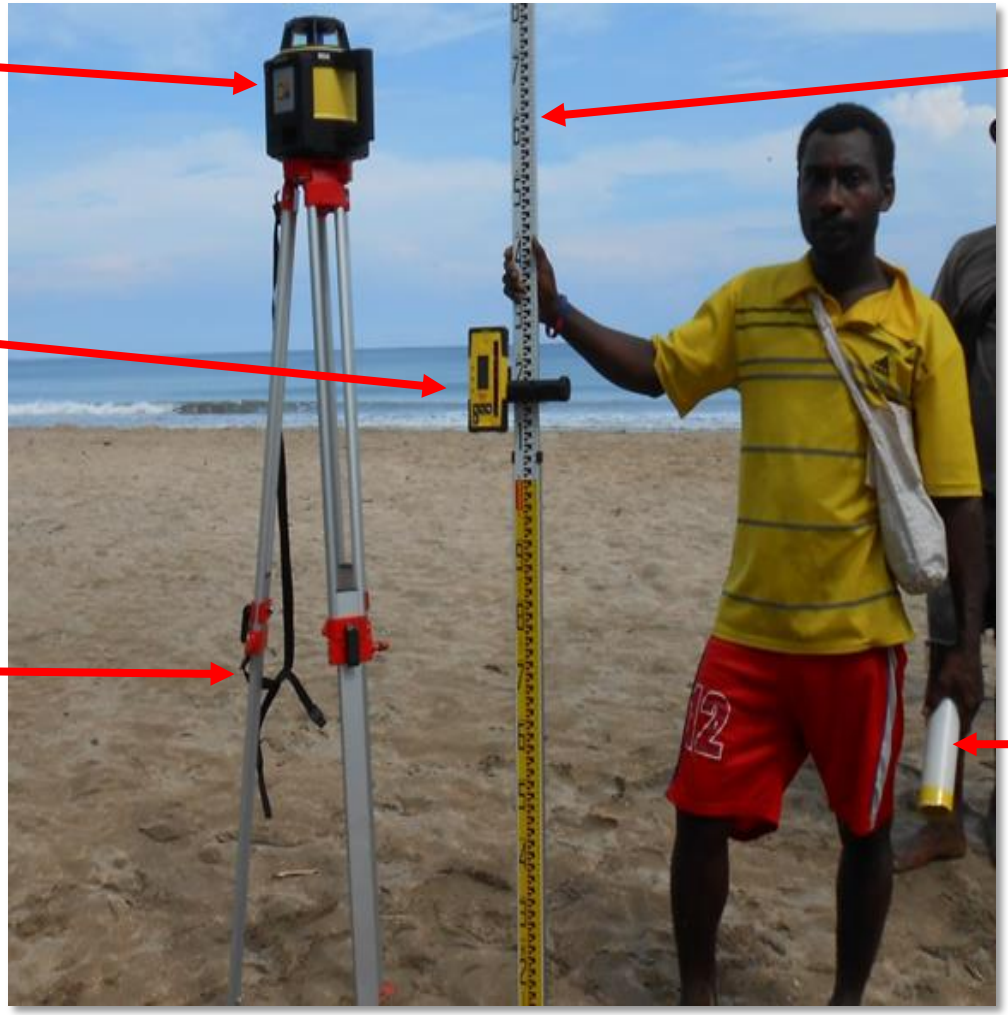
Equipment used for data collection

Rotating Laser

Detectors (Receiver)

Tripod



Survey Staff

Handheld GPS Unit

Peg

RESULTS

- Generate simple Sea level rise maps
- Demarcation of zones vulnerable to inundation
- A tool for local village planning & climate action plans

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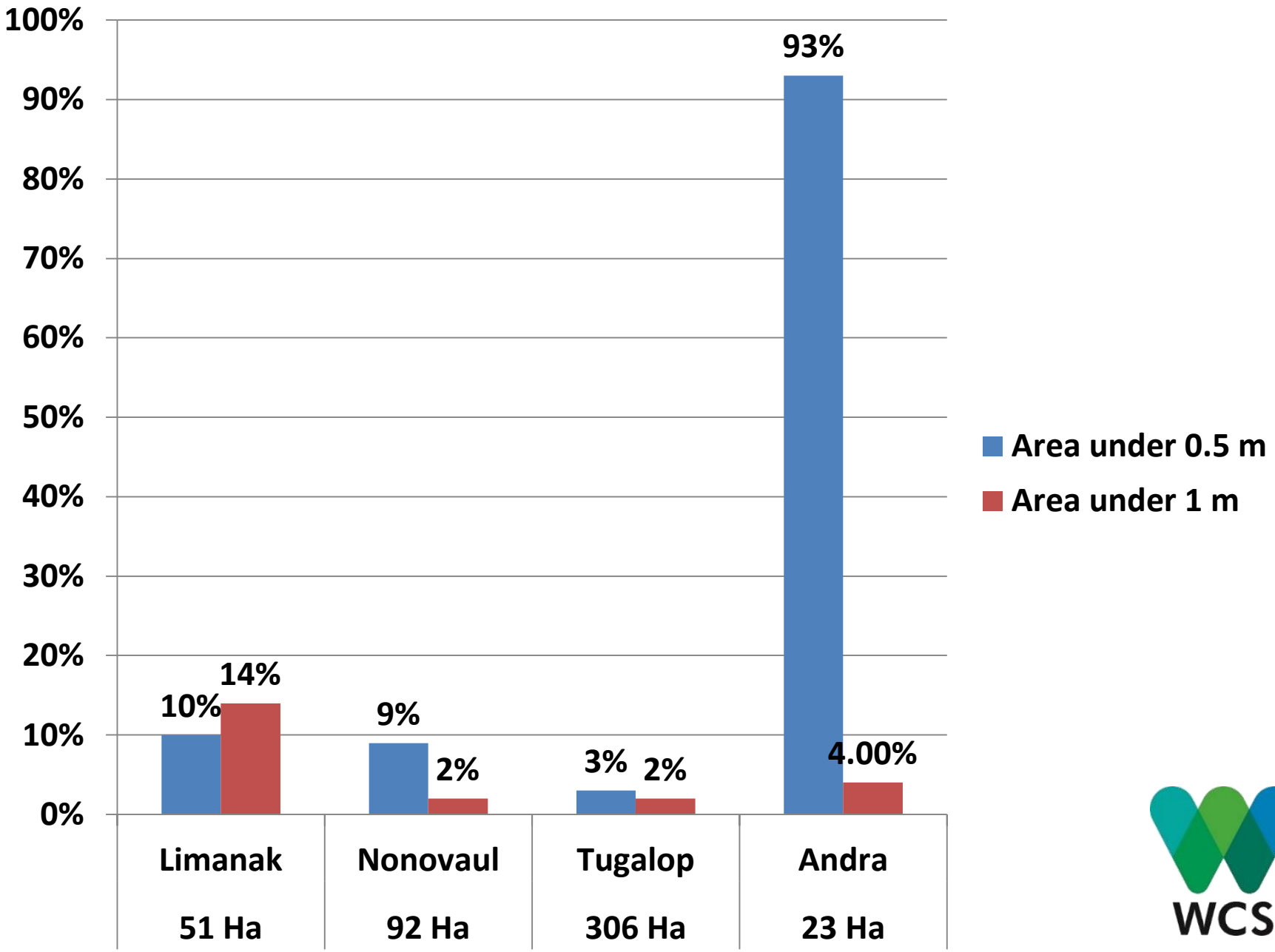
Vulnerability of Island by Total Land Area



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Nonovaul Island
Predictive Sea Level Rise Map
9%
2%
Nonovaul
92 Ha
LEGEND
HAT/High Water Mark
0.5 m Contour
1 m Contour
Total Island Area = 918, 154.5 m2 100 %
Landuse Area/ Housing & Gardening = 126, 550.3 m2
Area between HAT & 0.5 m = 75, 903.7 m2 = 8.3 % if landuse = 59.97 %
Area of land between 0.5 m & 1 m = 23, 983 .8 m2 = 2.6 % if landuse = 18.95 %
N
600 m
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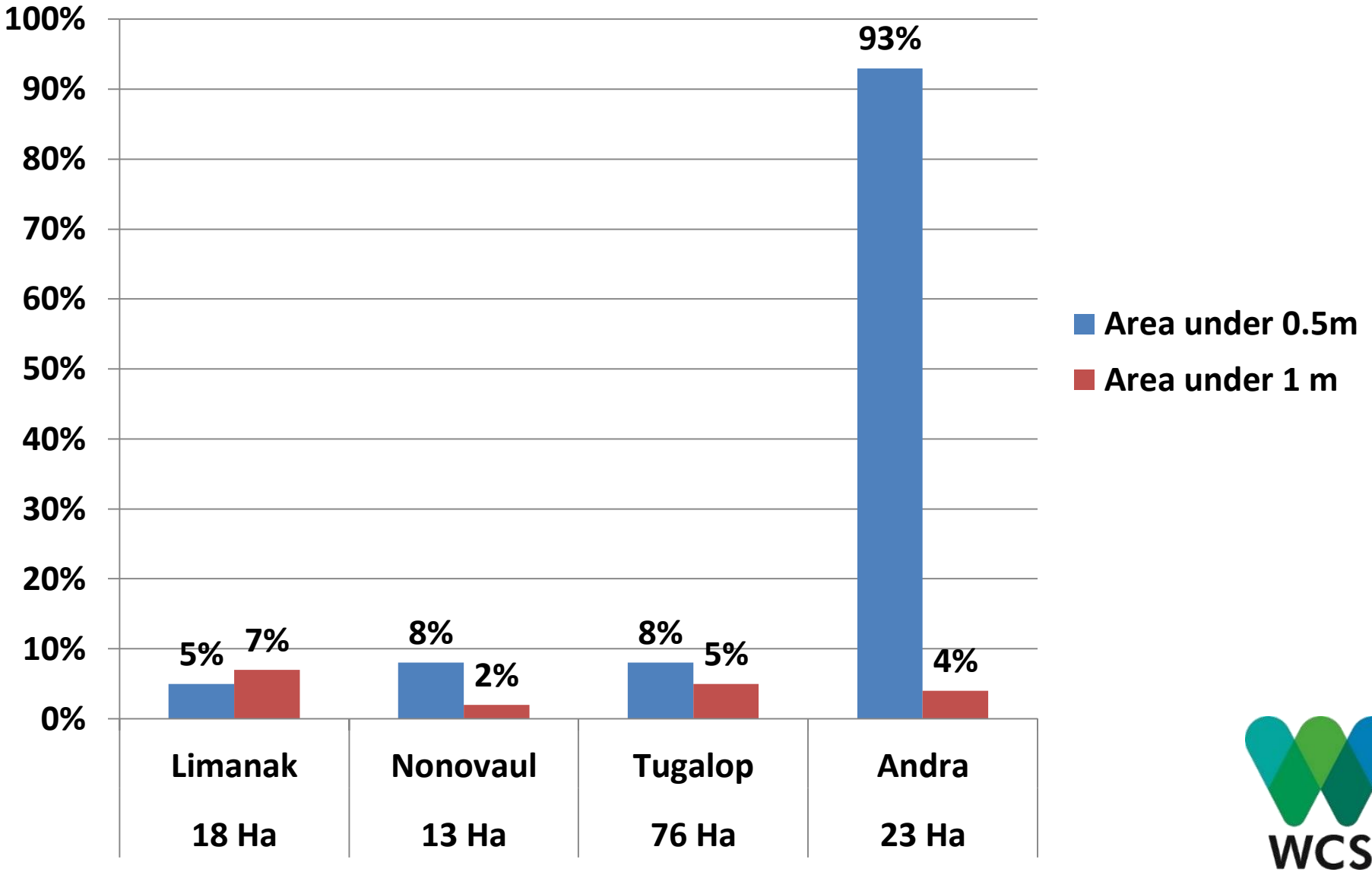
Vulnerability of Studied Communities by Land Suitable for Use



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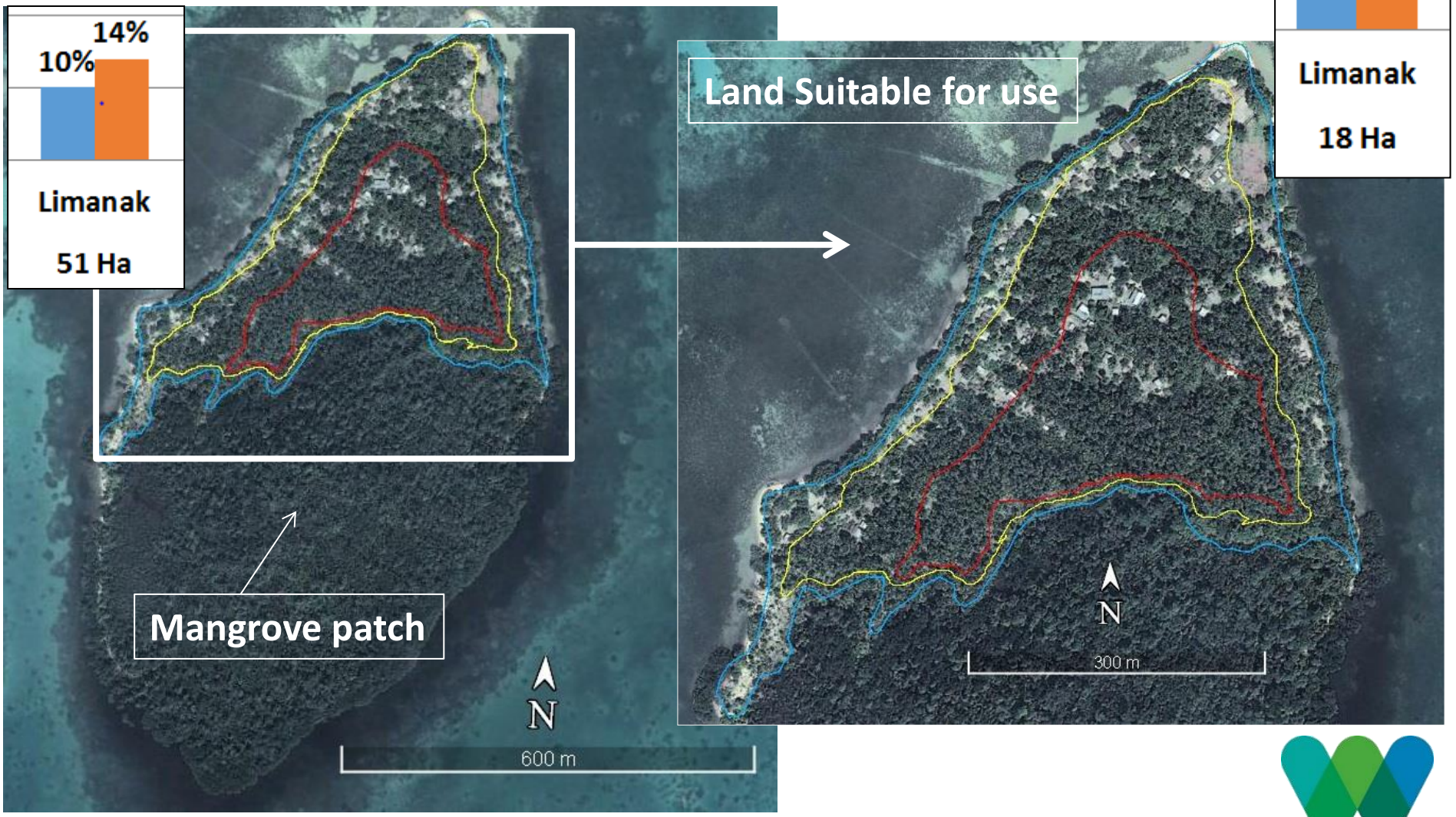
Limanak Island - New Ireland Province



> 60 % of the Island area is mangrove

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Andra Island Sea level Rise Scenario

SUMMARY

- Enhance the visualisation of the area – seriously address adaptation measures
- Support Local /village level planning and Climate Action Plans
- Simplifies the context of SLR for locals to conceptualise & understand
- Push for early local actions
- Adds more weight to Climate Change Adaptation projects

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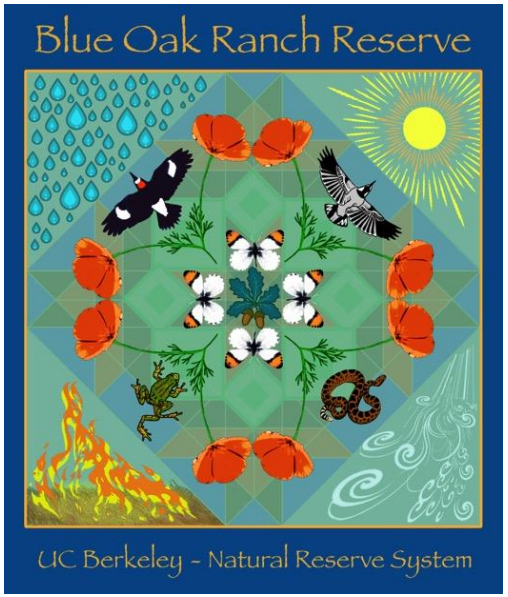
ACKNOWLEDGEMENTS



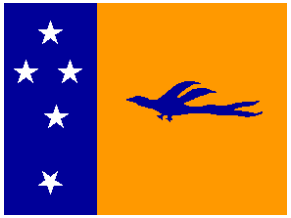
Society for Conservation GIS

juniper GIS

esri

PROJECT DONORS/PARTNERS

Australian AID



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THANK YOU!
WAKAI WE
QUESTIONS, COMMENTS?
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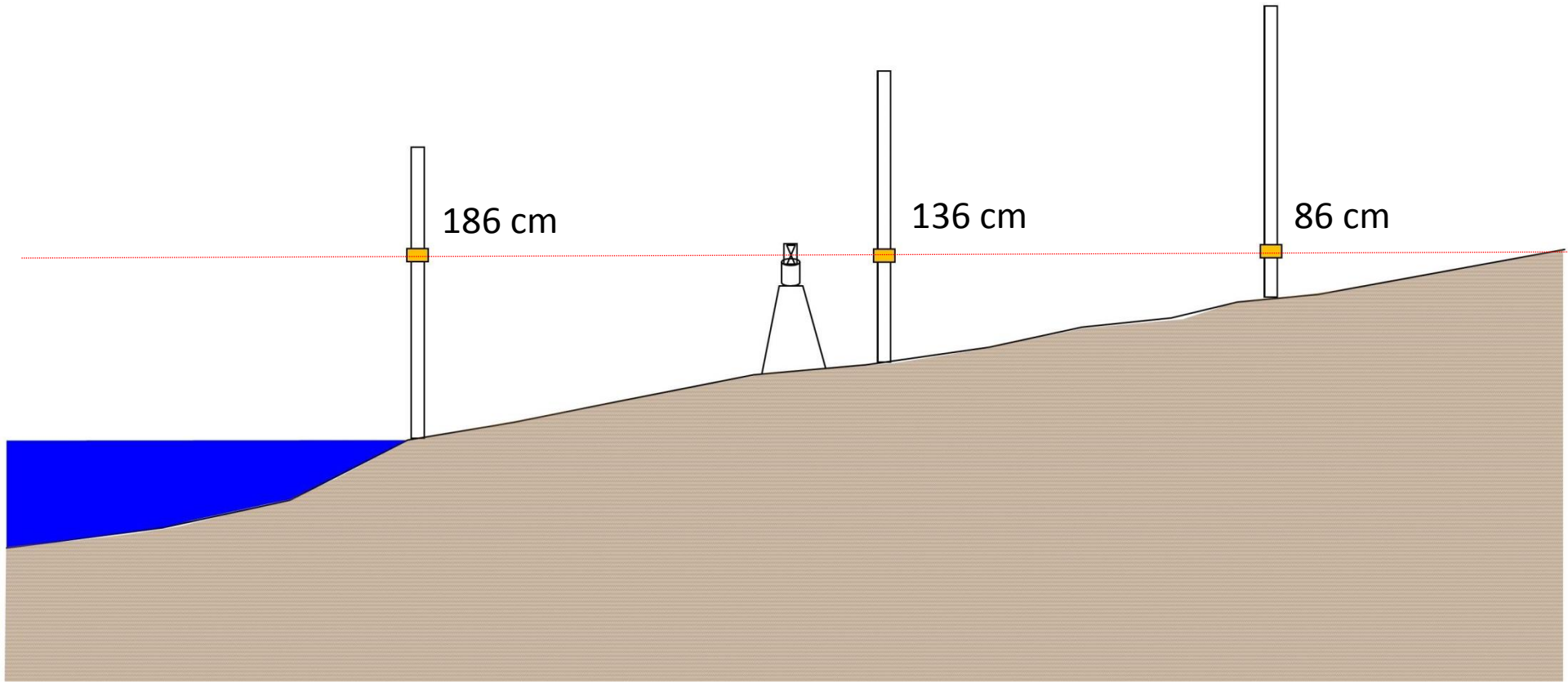
HAT (HWM) as Reference



Reference points