SR&DT Batch One: Deliverables and Lessons Learned

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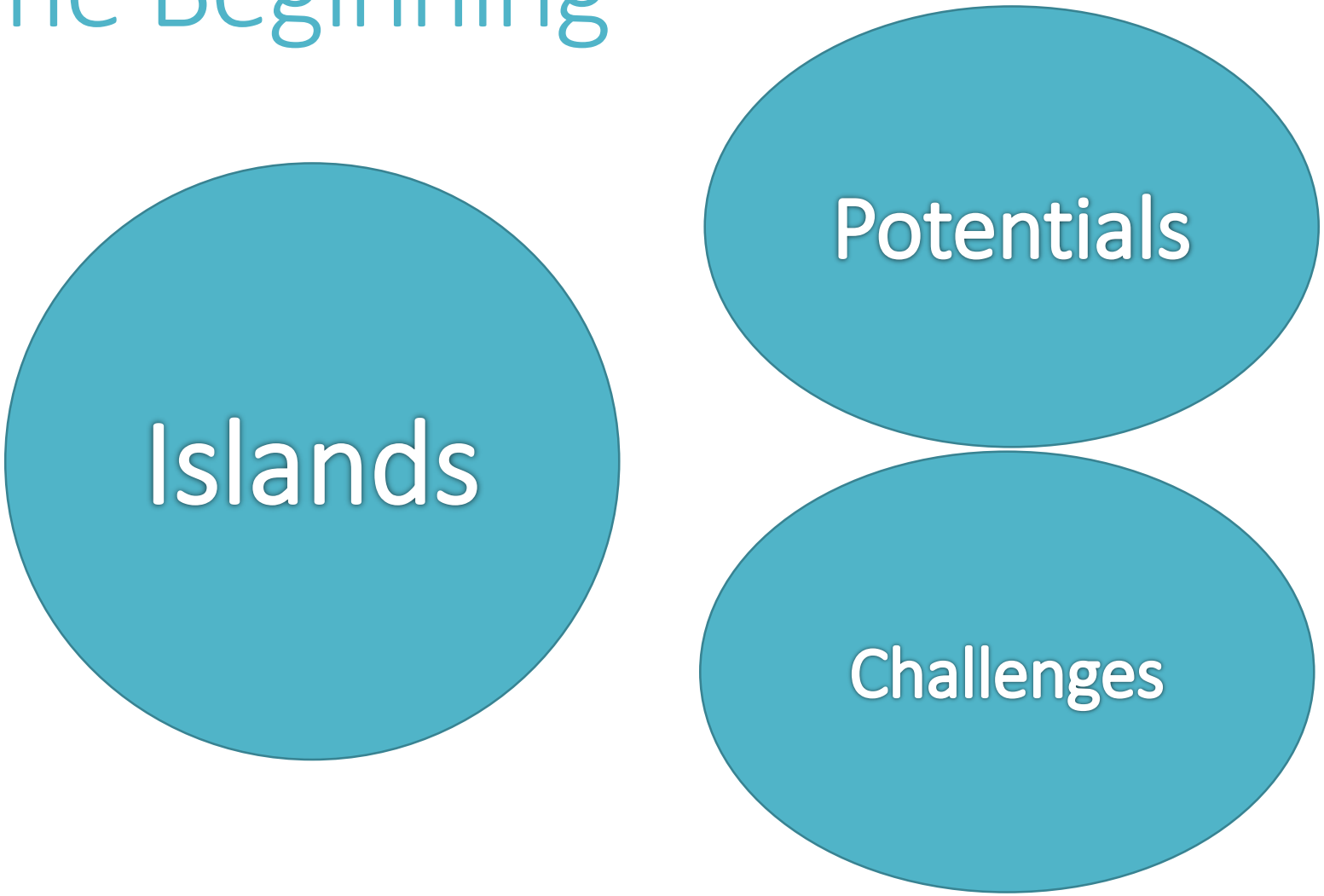
SIDI Week, Surabaya, 24 February 2015

Sustainable Island Development Initiatives

The Beginning



Then ..?

Maratua Island, Berau

Maratua Island, Berau

Maratua in Brief

Maratua Island, Berau

Energy:

- Portable Diesel Gen-set: lack of fuel
- Solar cell: limited, poor maintenance

Water:

- Limited fresh water source: rain

Local Transportation:

- No public transport
- Bad road
- Private boats

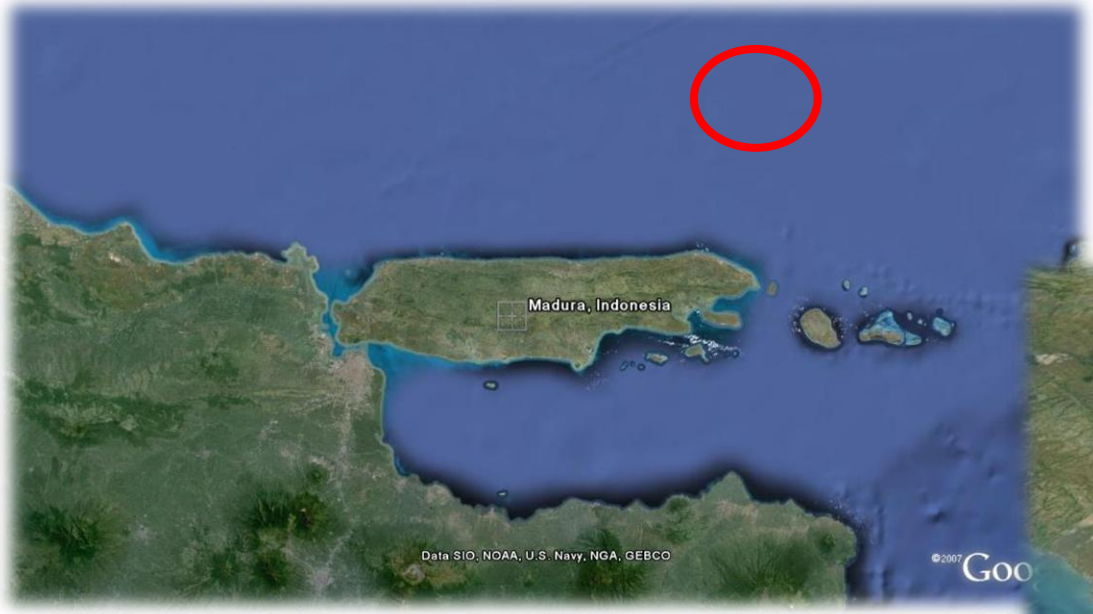
Waste:

- Waste at beach, sea, houses, and roads

Homestay:

- Managed by inhabitants, poor

Poteran



Poteran Island:
Total area - 49,8 km^2
Part of Talango District, Sumenep
Consists of 8 coastal villages

IF

remain, then

- Potentials remain unutilized
- Poverty
- Destroyed nature
- Island left behind: empty

Change

Students' Research & Development Team

- ❑ **Initiative & Project Framework to develop small Indonesian islands**

- ❑ **Joint R&D Germany – Indonesia funded by DAAD:**
  - Hochschule Wismar & Industry Partners
  - ITS Surabaya & Industry Partners

Sustainable Island Development Initiatives

- ❑ **Objective:**
  - Develop tropical islands in a sustainable way = economy + welfare of inhabitants + environment

SR&DT

1. Industry determines the topics of research
2. Students work in 2 teams, each 5-7 persons
3. Students conduct field research on Maratua and Poteran Islands
4. Partners:
   a) Ministry of Ocean Affairs and Fishery
   b) German and Indonesian industries

How?

- Preliminary research
- Training
- Teamwork
- Supervision

Poteran: Deliverables

Site visit to farm field (*Moringa oleifera*)

Site visit to people

Port condition

Sea transportation

Moringa Nutritions

Fresh Leaves
Gram for gram, fresh leaves contain about:

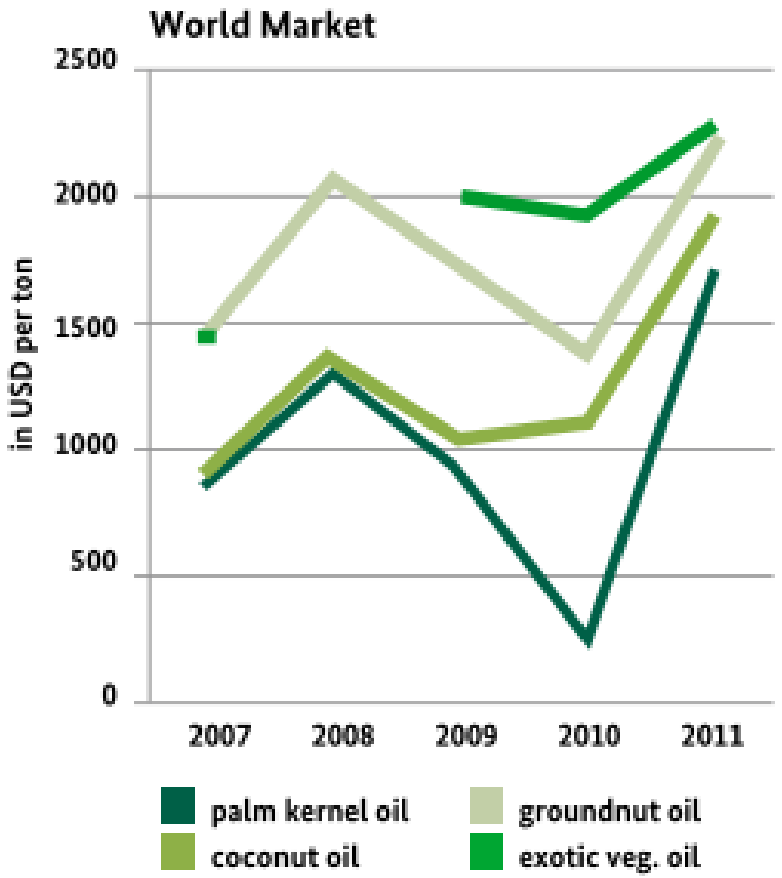
- 4 times the Vitamin A of Carrots
- 7 times the Vitamin C of Oranges
- 4 times the Calcium of Milk
- 3 times the Potassium of Bananas
- 3/4 the Iron of Spinach
- 2 times the Protein of Yogurt

Dried Leaves
Gram for gram, dried leaves contain about:

- 10 times the Vitamin A of Carrots
- 1/2 the Vitamin C of Oranges
- 17 times the Calcium of Milk
- 15 times the Potassium of Bananas
- 25 times the Iron of Spinach
- 9 times the Protein of Yogurt

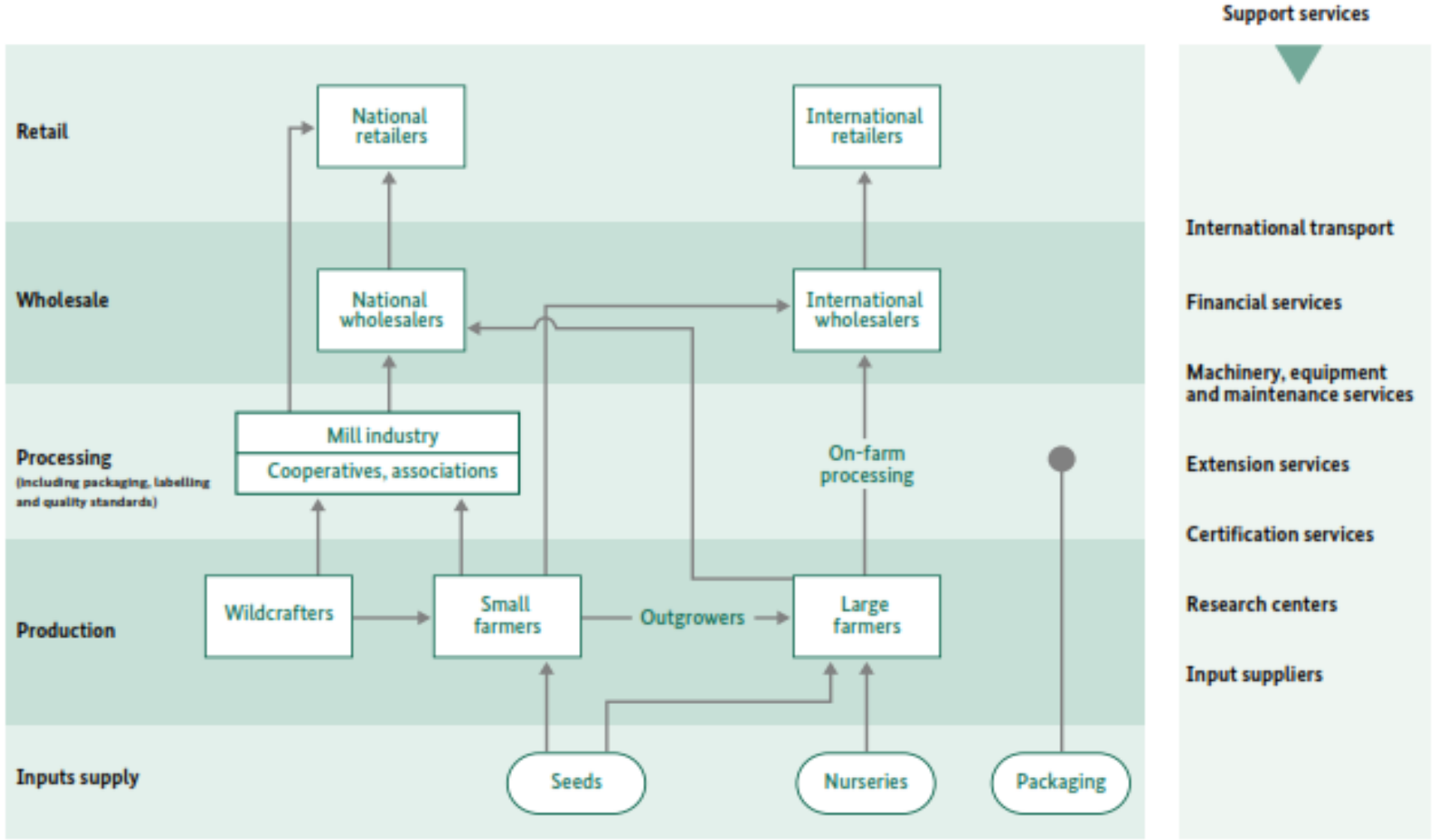
(Bey, 2010)

Moringa World Market

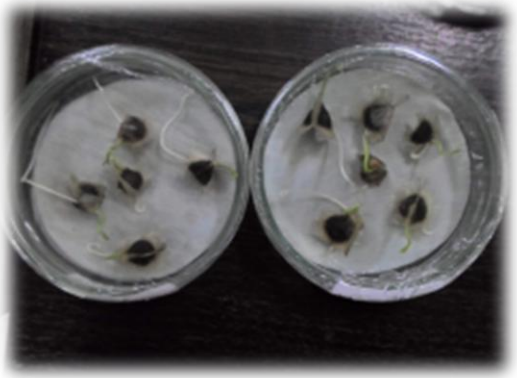


- The price for vegetable oils is considerably higher and has proven more stable than others.
- The world market price for Moringa vegetable oils has grown from around USD 1,450 per ton in 2007 to almost USD 2,300 per ton in 2011

Value chain of Moringa

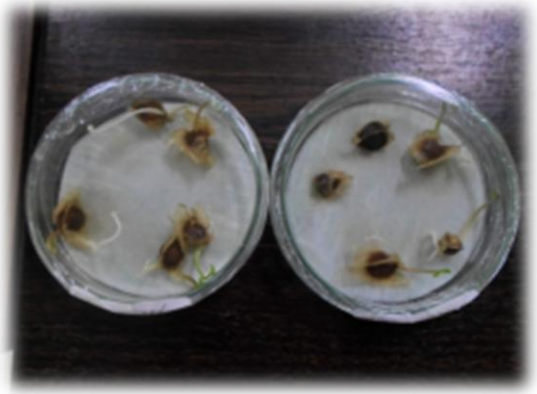


Germinating Test



Indian Moringa

Green Moringa



Red Moringa

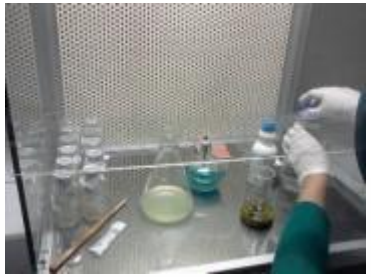
Green Moringa from Talango and India have the best germination level compared with red Moringa

Tissue Culture Method

Sterilized outside LAF

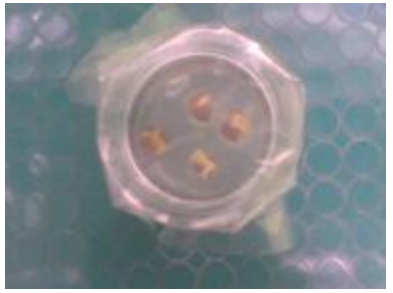
Moringa oleifera
(explant)

+



Srerilized inside LAF

Inoculated in MS medium



After
incubation:
→ Callus

Cultivation

Biopesticide

Mimba (*Azadirachta indica*)

- It is relatively cheap and easily available in Poteran
- Biodegradable
- Active compound: azadirachtin→ against nearly 550 insect species (Debashri and Tamal, 2012).

After Harvest Processing

Leaves Harvesting

Leaves sorting

washing

An oven

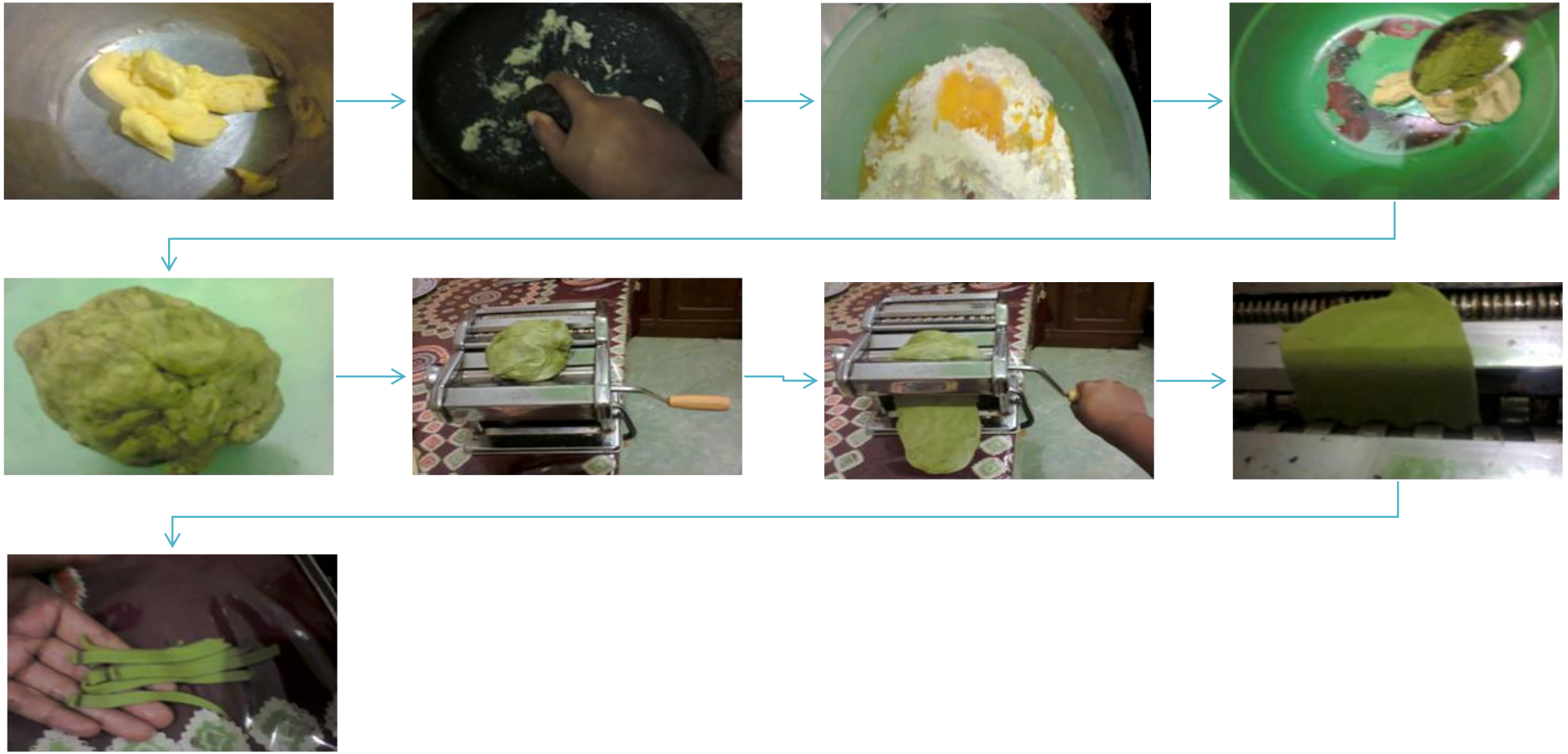
Measure the weight

packaging

product

NOTE: in powder process using stainless steel to make it as powder

Moringa Green Stick (Snack)



How to Transport?

Production Scale

Inland Transport

Transportation to another market

Production Scale

Poteran has 3,836 hectare fertile land

Assumed that Moringa will cultivated in 15% total fertile land

Total fertile land for Moringa Plantation is approximately 575 hectare

Production Scale

Ratio of Moringa Powder Production:

8 Fresh leaves

4 Dry leaves

1 Moringa powder

Production in Poteran :

9,206 ton/harvest

4,603 ton/harvest

1,158 ton/harvest

How to distribute harvesting result to the production center?

Harvesting

- Pick up the leaves from the trees
- We can pick up the leaves manually

Carrying

- Carrying the leaves to production center with truck
- This method to prevent sunlight directly and the leaves will stay fresh

Processing

- Processing activities will be done in the production center

Production Center Planning

Logistic and Processing Center will be build in Talango village

Aspect for determining the location:
-Access easily
-Water suply
-Socio-economy
-Transportation

Poteran Team

Maratua: Deliverables

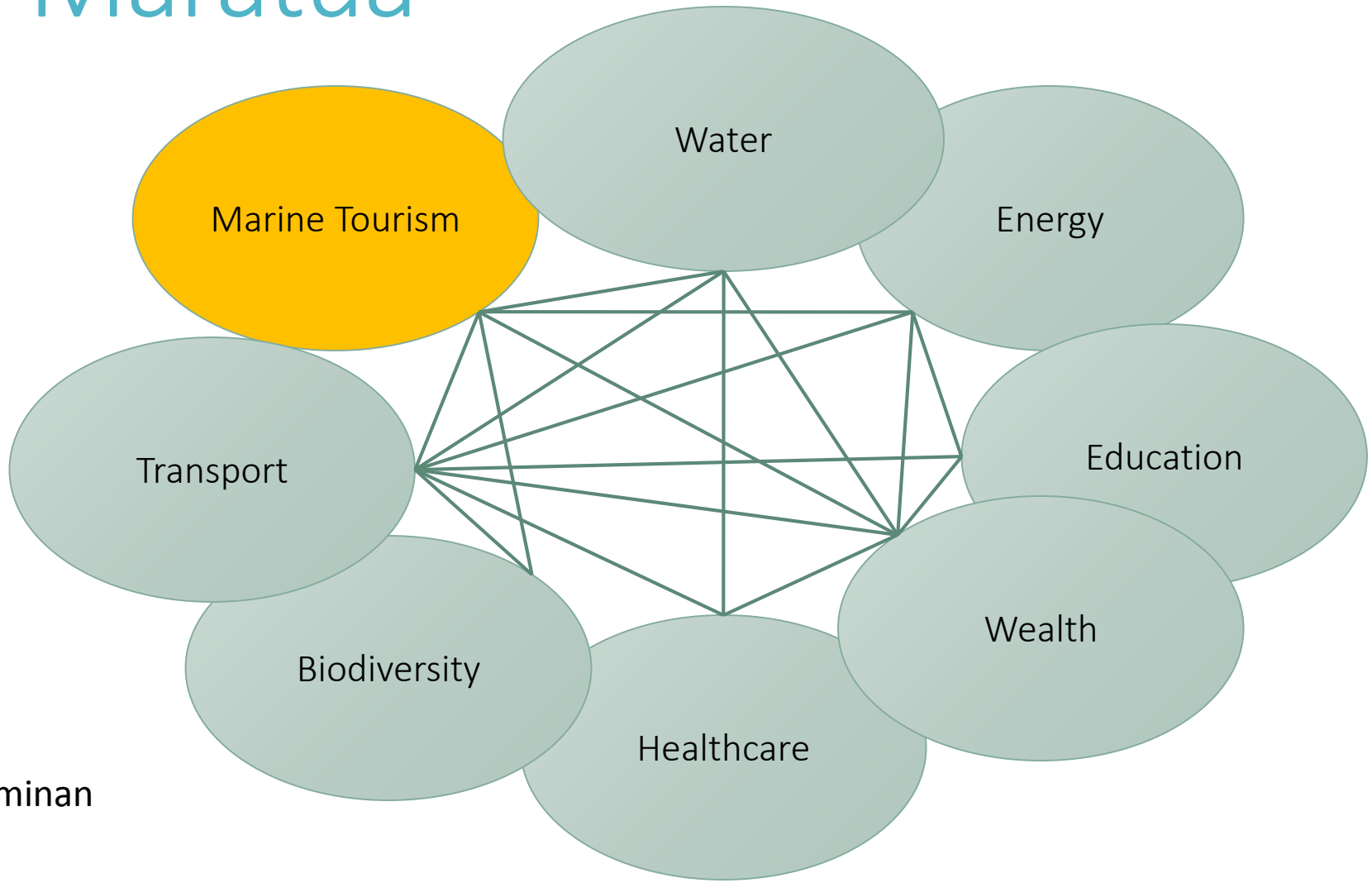
Maratua Potential

Beautiful Scenery

Vast Biodiversity

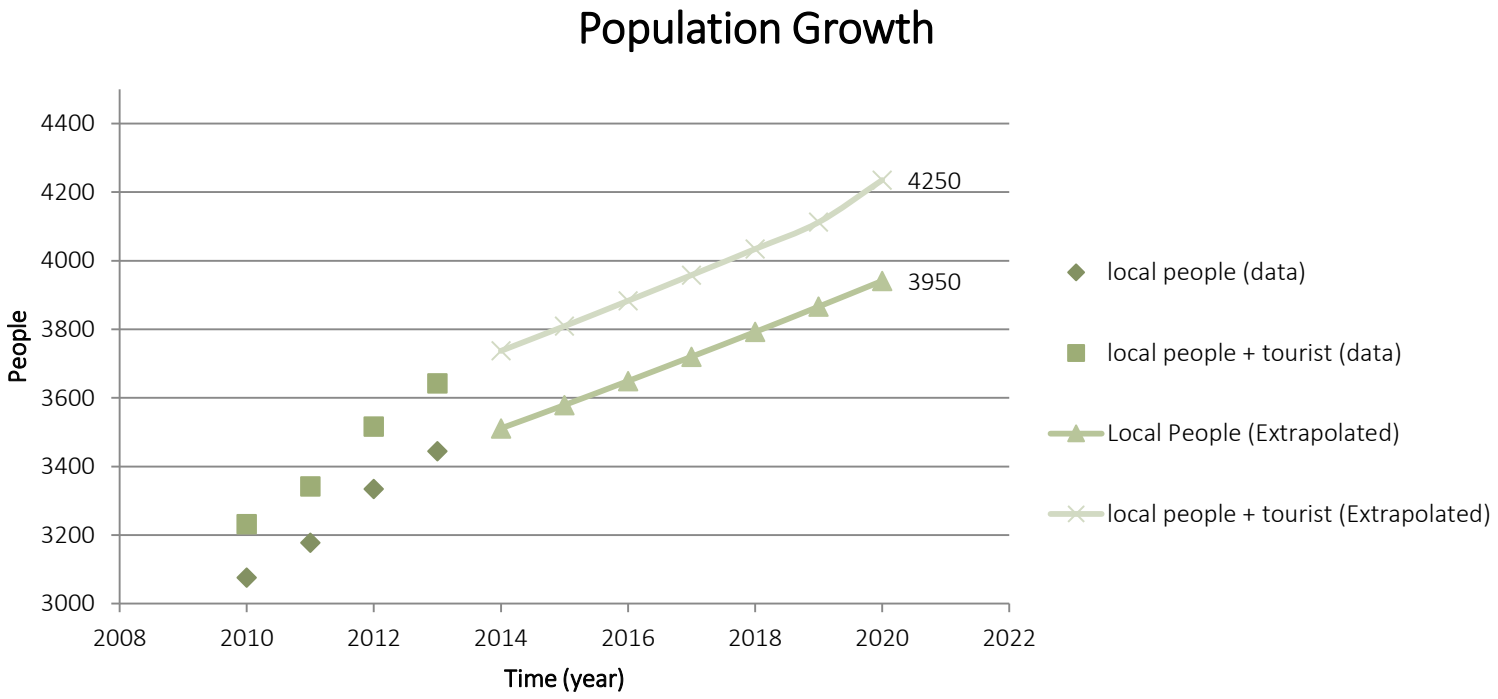
Motivated People

Pulau Maratua



Transport dominan

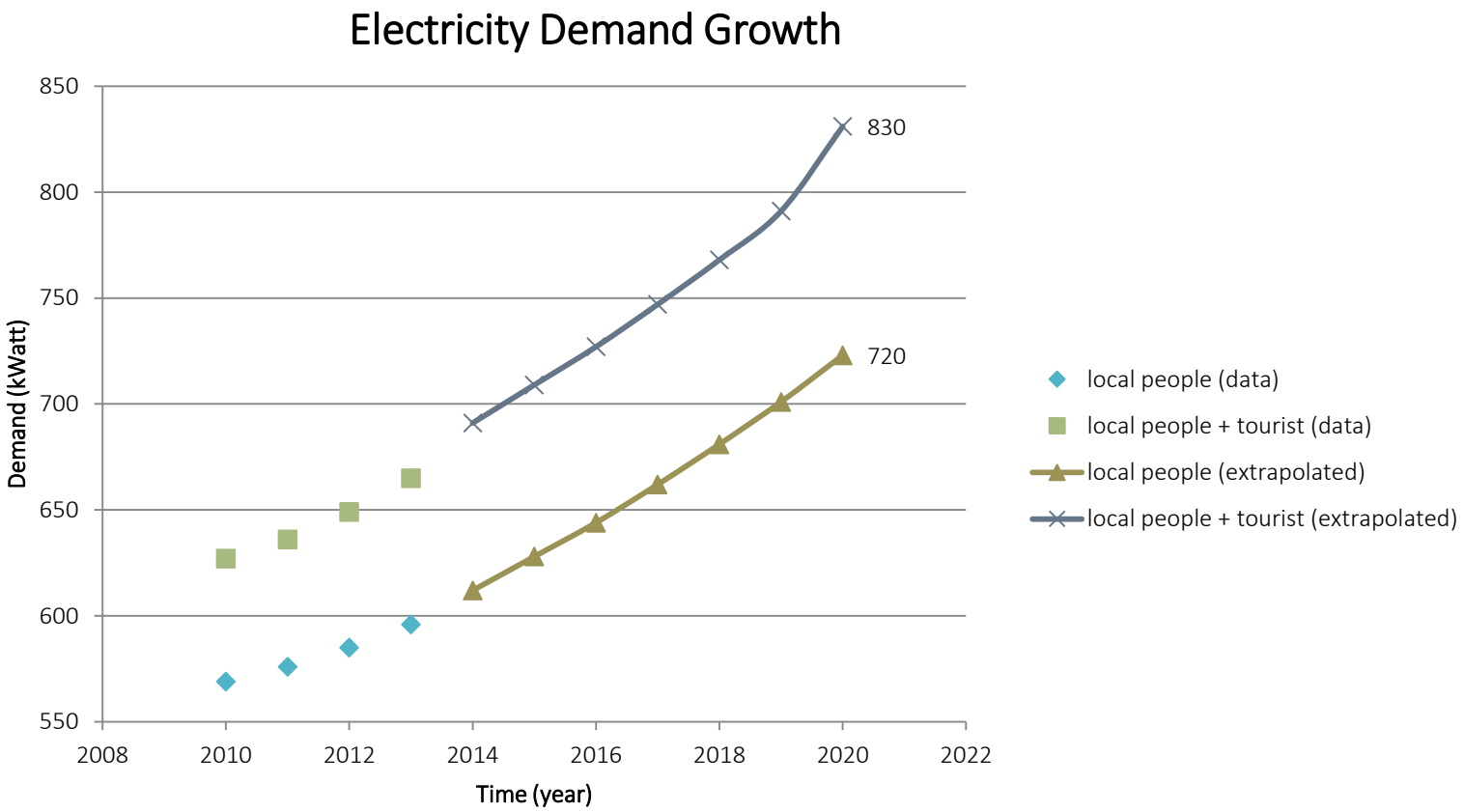
Supporting Data



Bajo Tribe Kids

Note = - Local people population based on BPS (2010, 2011, & 2012) Maratua Master Plan (2013)
- Local people growth rate assumption 1,9%/year
- Tourist visit growth rate assumption 2,5%/year
- Tourist visit initial data based on maximum accommodation capacity in Maratua (incl. Nabucco (34), Nabucco 2 (30), Paradise (30)

Supporting Data



Maratua Diesel Generator (main electricity source)

Note = - Initial data based on Maratua Master Plan (2013)
- Electricity consumption growth rate assumption 2,5%/year with addition 0.1%/year
- Tourist electricity consumption, twice the local people (local people = 170 W/person)

Problem Faced

Environment

SOLUTION ?

Transportation

Accommodation

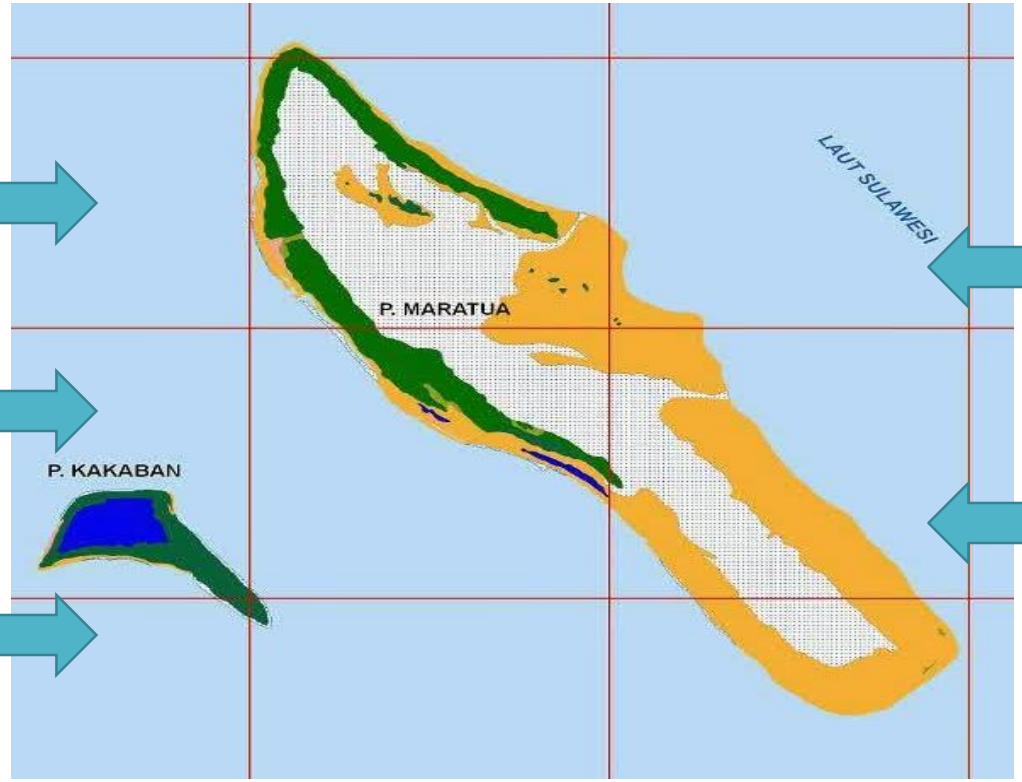
Electricity

PROPOSED IDEA

Bio-Transplantation
Electrict

Solar Boat

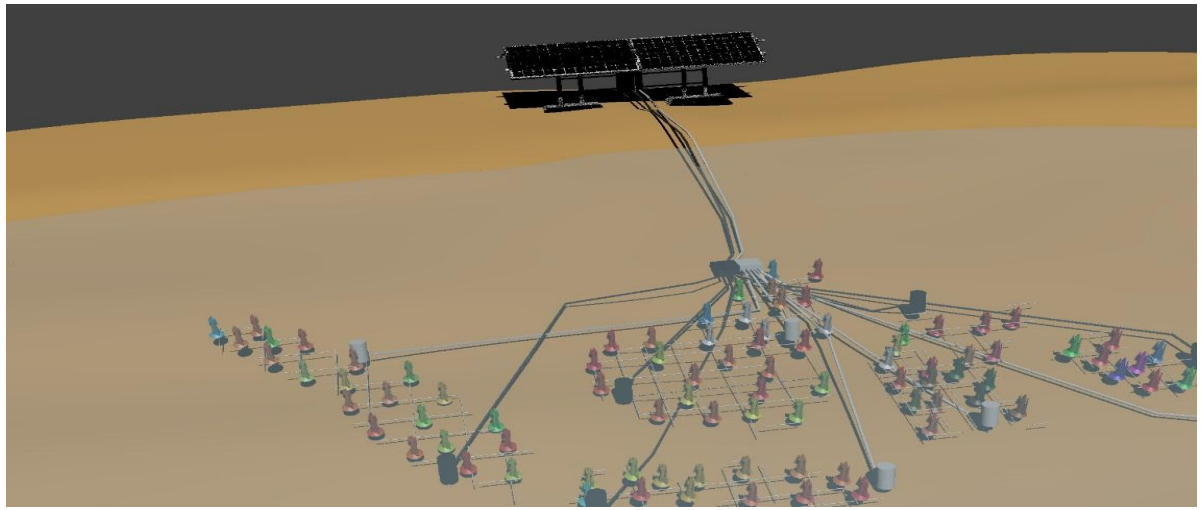
Site Plan

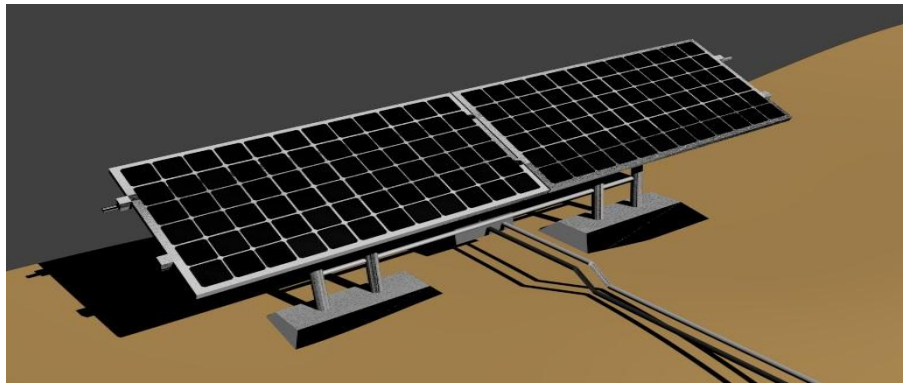


Homestay Regulatior

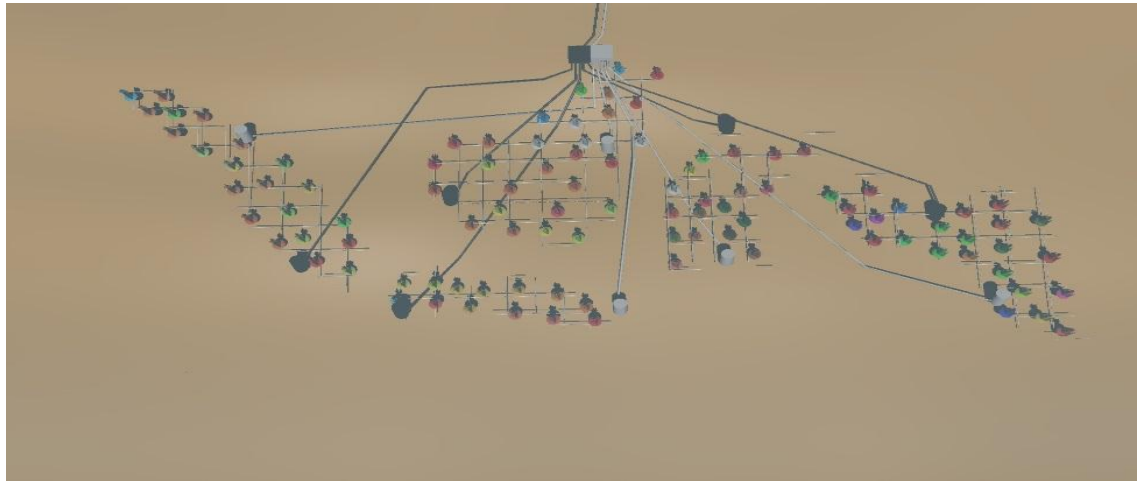
Wind Turbine

BIO-TREC Design





Coral reef net electric in Indonesia Map shape



HOME-STAY SCHEME

Nabucco Resort

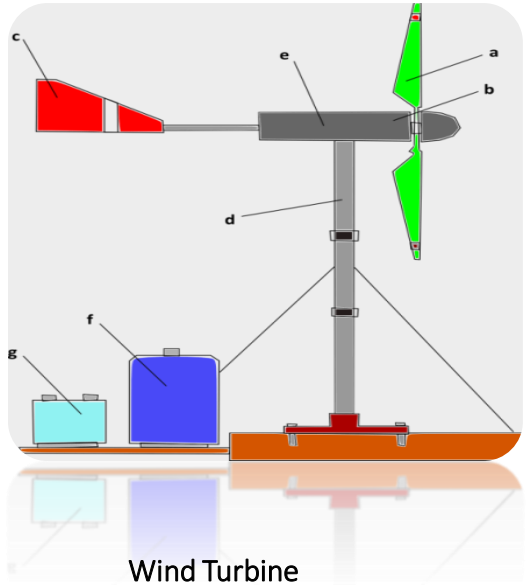
Maratua Home-Stay

Need of Accommodations → Home-stay business → Standards → Sustainable Tourism

Wind Turbine

General Design Calculation Table

Symbols	Design	Value	Units
P_G	Generator power output	300	Watt
Pt	Turbine power	352	Watt
Pa	Wind power	596	Watt
R	Blade radius	1.5	m
B	Number of blades	3	-
TSR	Tip speed ratio	5.16	-
ω	Angular speed	17.2	rad/s
		165	Rpm
Vrel	Relative velocity	26.28	m/s
Re	Reynold Numbers	2636600	-
	Type of airfoil	NACA 4412	-
H	Tower high	10	m



Wind Turbine

Design Proses :

Wind velocity
(2,5 – 5 m/s)

→

Small Scale Wind Turbine
(300 Watt)

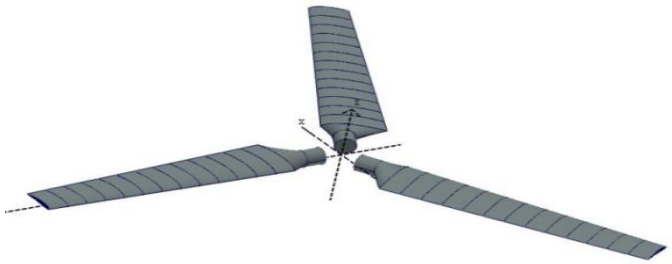
→

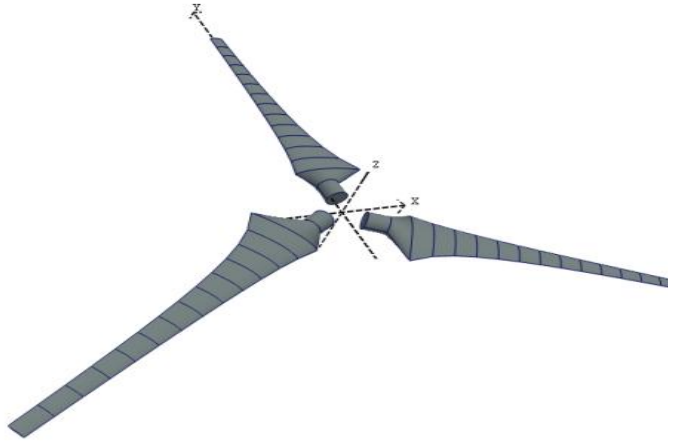
Area Power Generation
(1 ha @36 m^2)

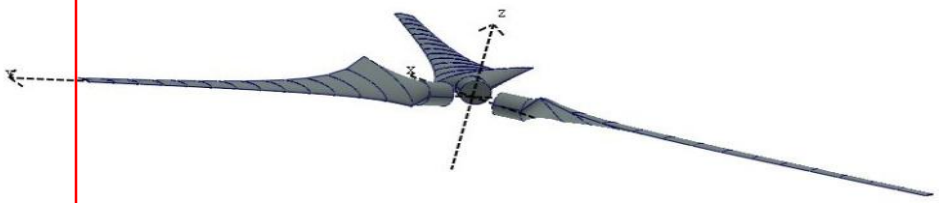
→

With 700 units wind turbine
can generate up to 210 kWatt

Rotor Design :

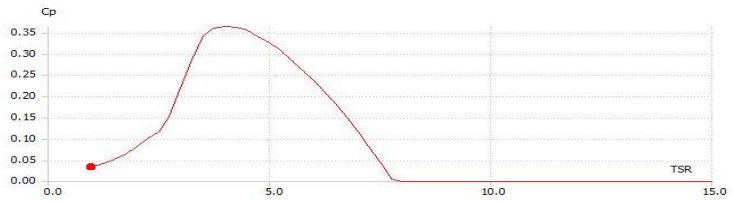


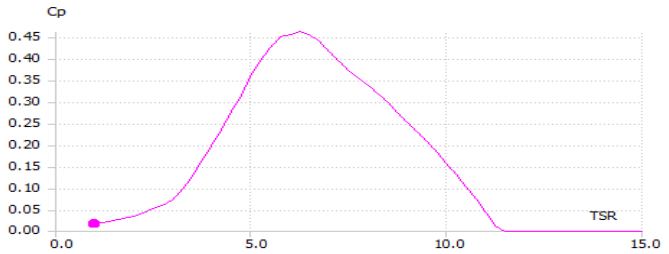


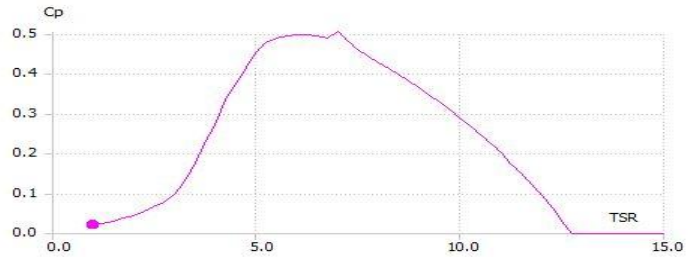


Easy to produce

Coefficient Performance of Rotor :



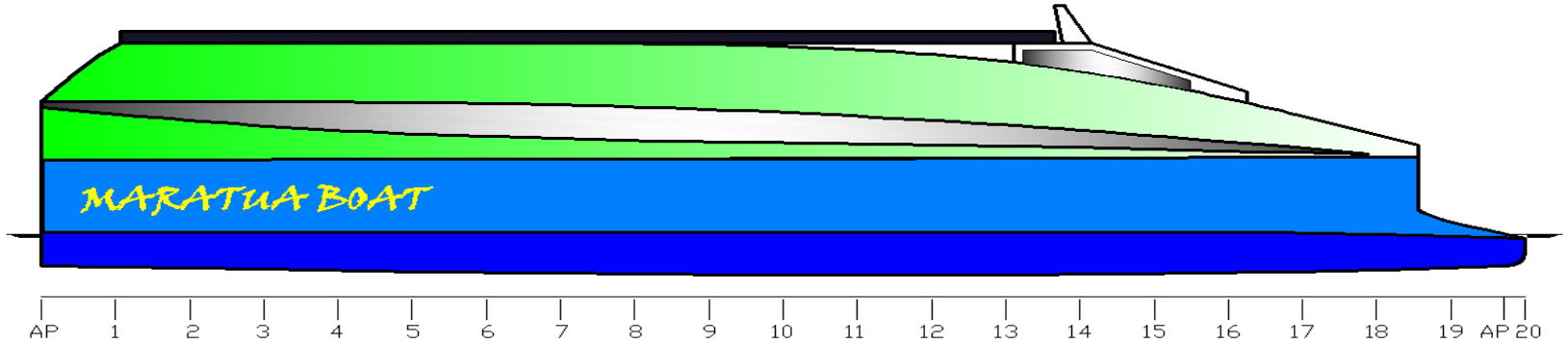




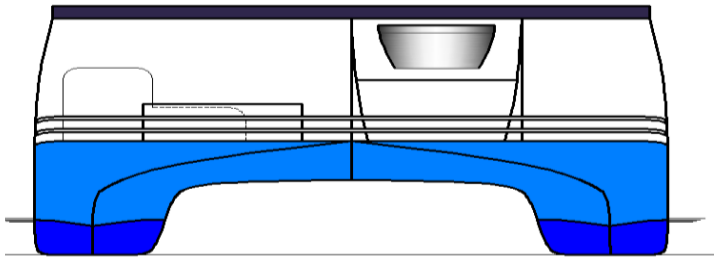
More Efficient

GENERAL ARRANGEMENT

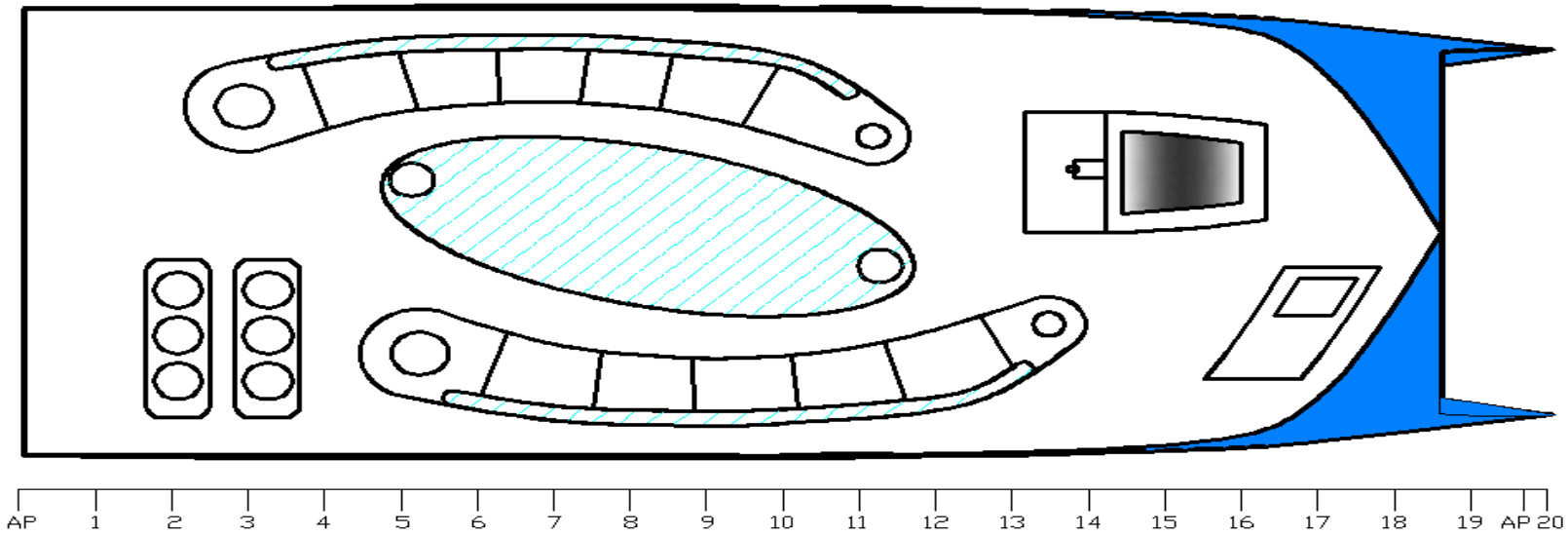
SIDE VIEW



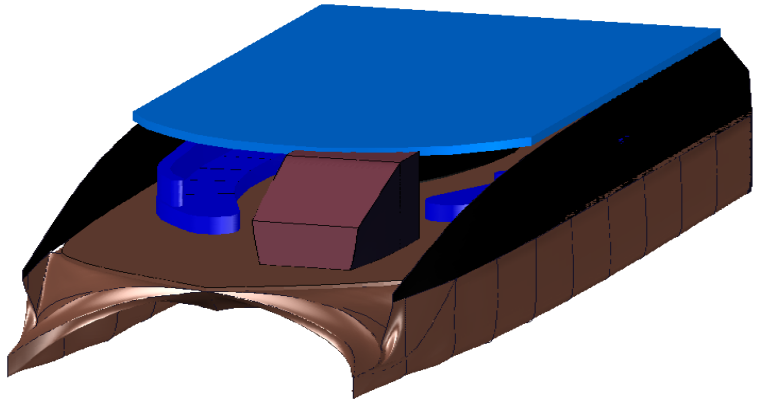
FRONT VIEW

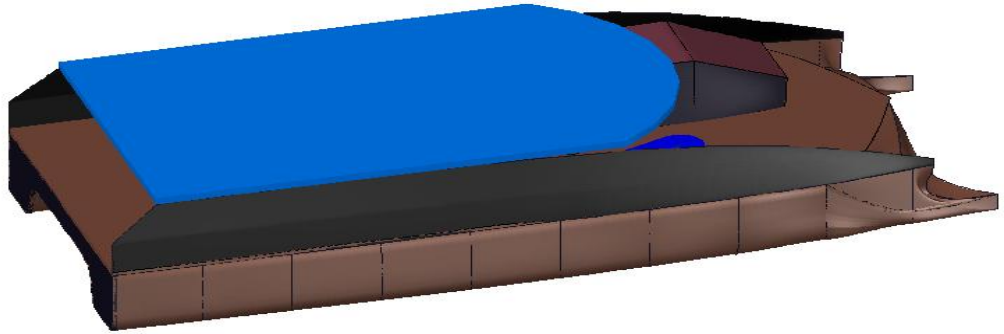


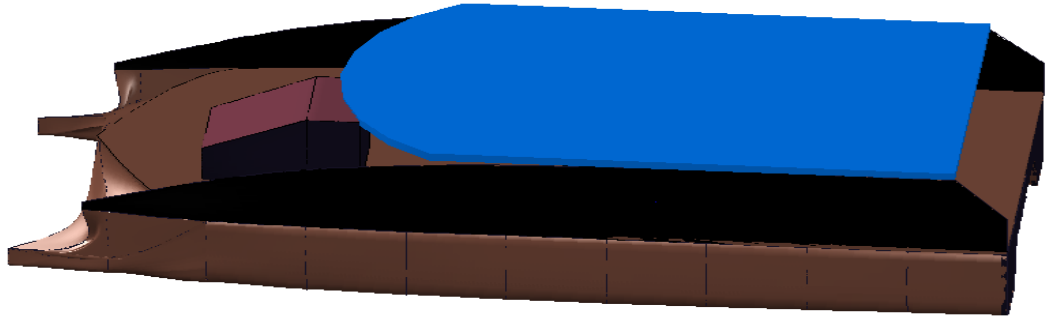
MAIN DECK

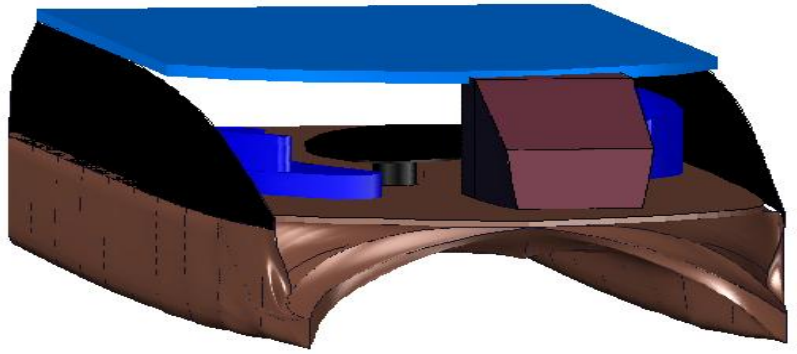


- LOA : 9.5 m
- LWL : 9.38 m
- B : 3.75 m
- H : 1 m
- T : 0.35 m
- Vs: 5 knot
- Capacity : 10 person (@ 80 Kg)

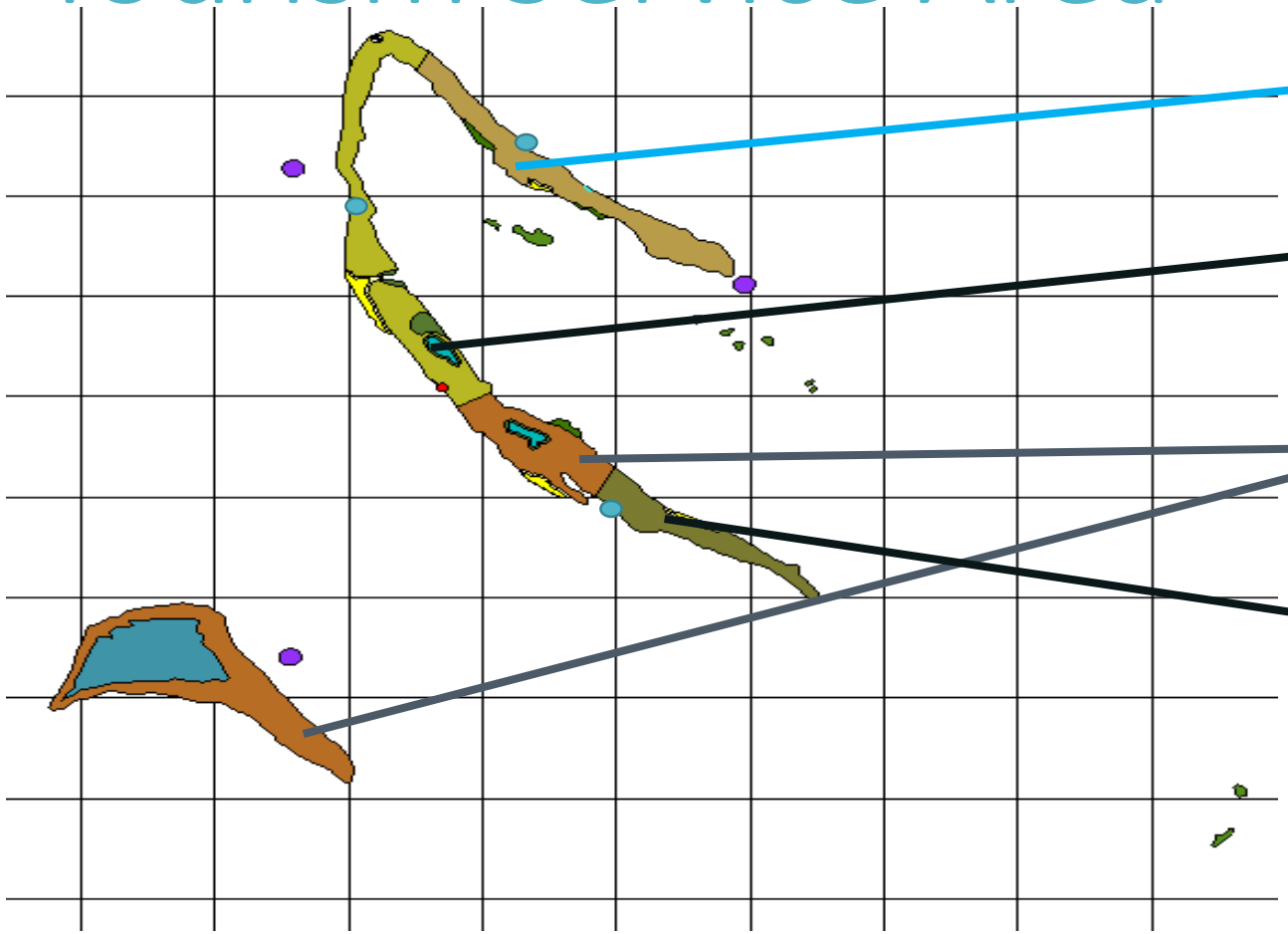








Tourism Service Area



Teluk Alulu Area of Service

Teluk Harapan Area of Service

Payung-Payung Area of Service

Bohe Silian Area of Service

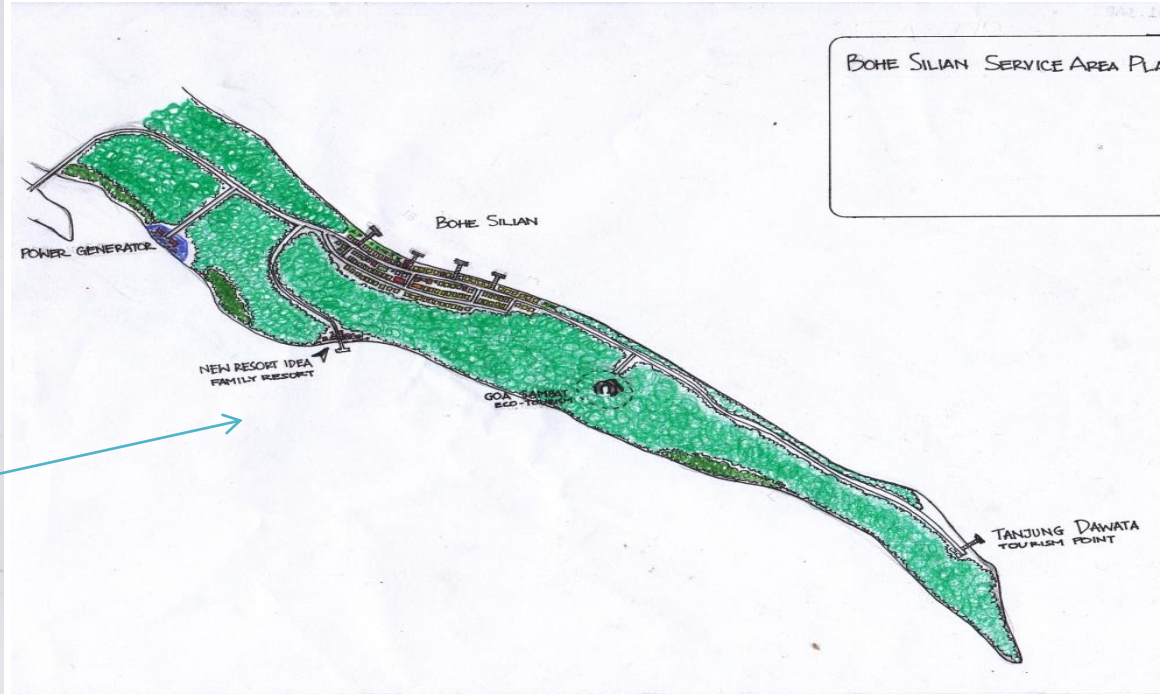
Settlement

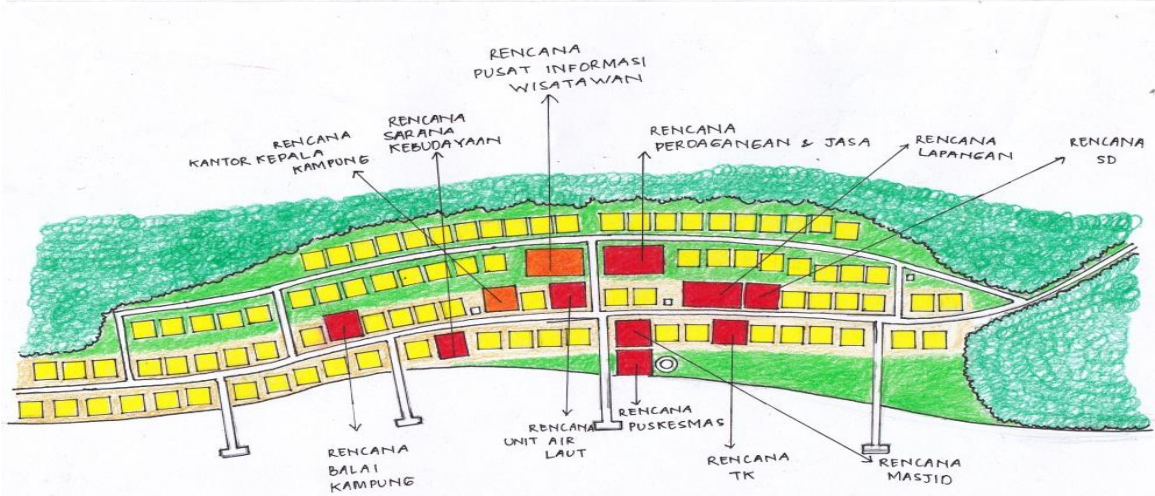
BIO - TREC

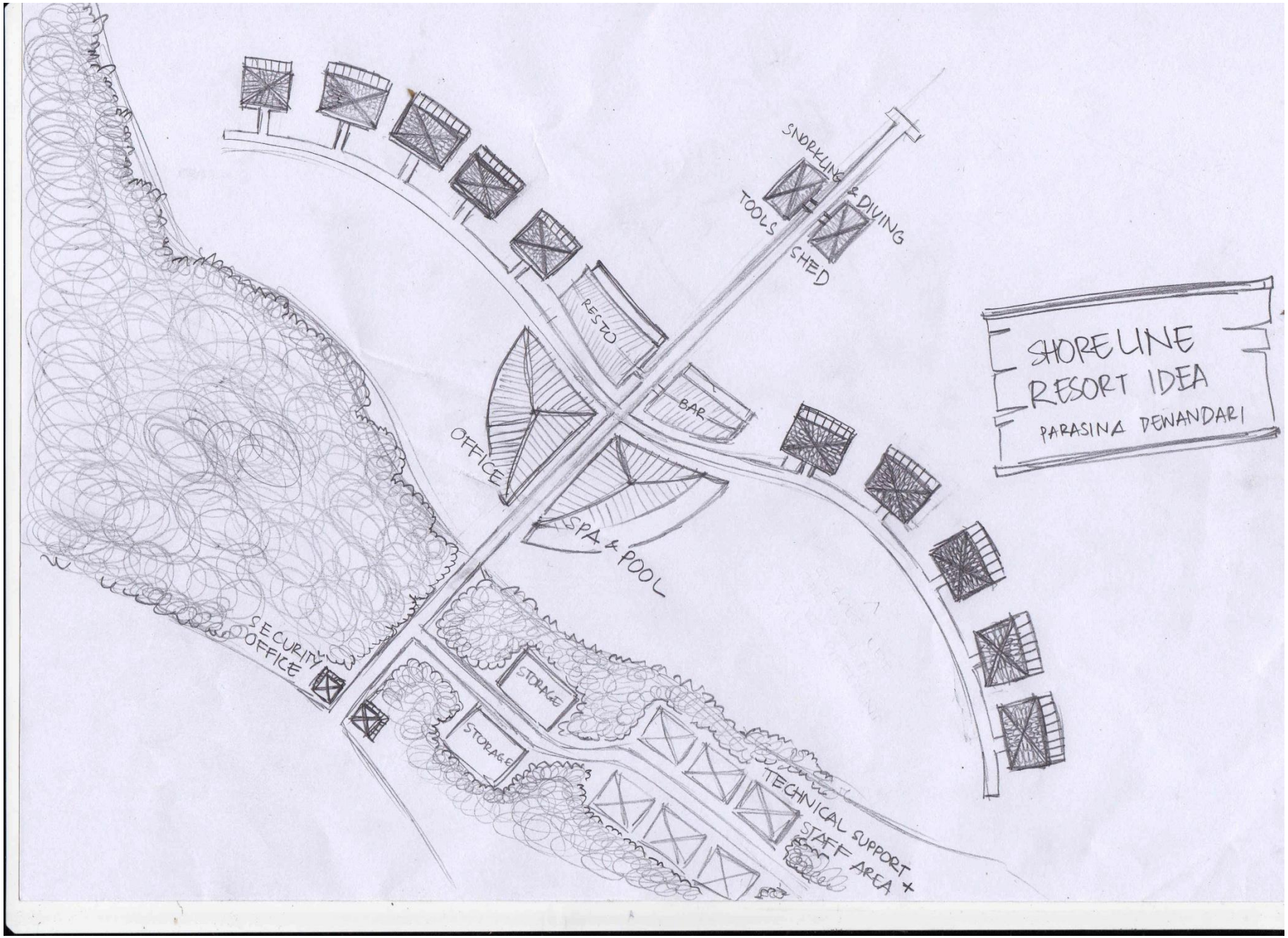
LAKE

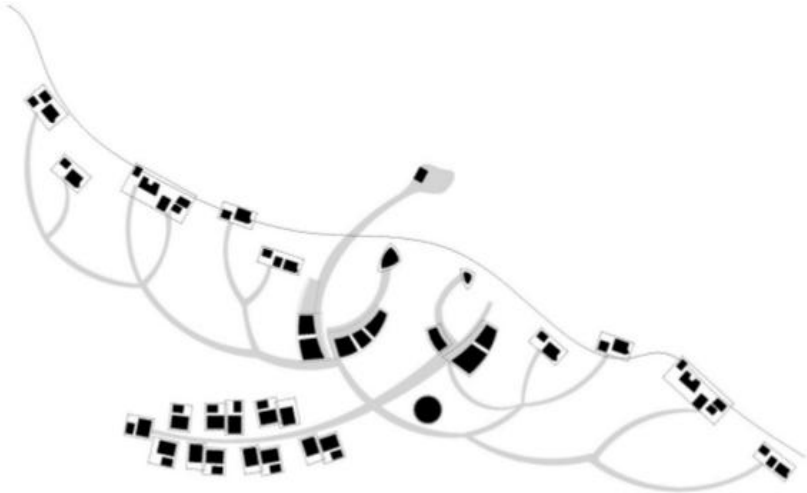
Energy Farm

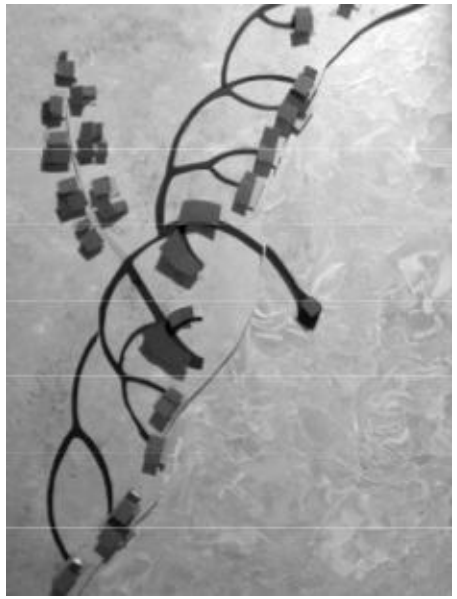
Neighborhood Plan






SHORELINE
RESORT IDEA
PARASINA DEWANDARI
SNORKLING & DIVING
TOOLS SHED
RESTO
BAR
OFFICE
SPA & POOL
SECURITY OFFICE
STORAGE
STORAGE
TECHNICAL SUPPORT +
STAFF AREA





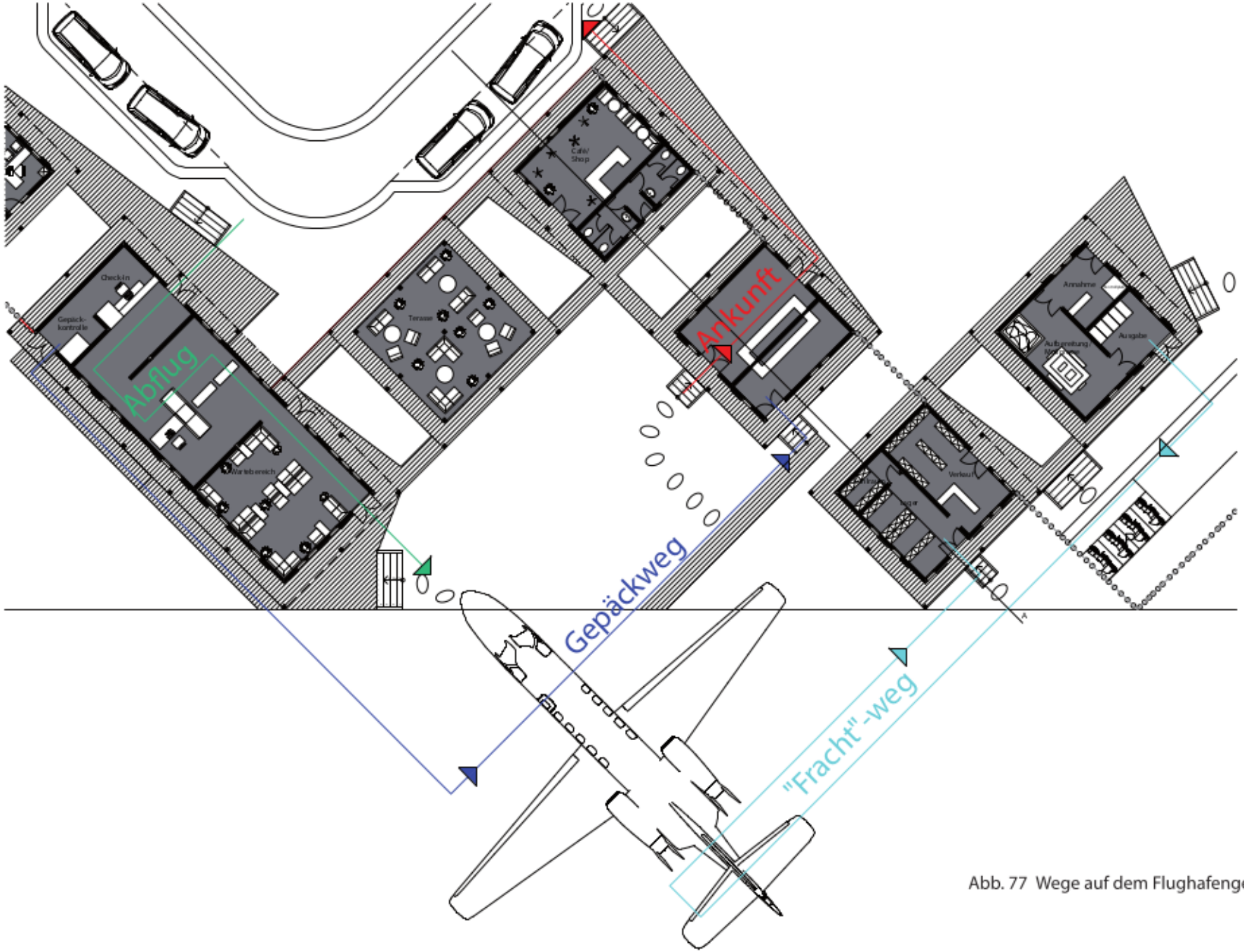


Abb. 77 Wege auf dem Flughafengelände

Abb. 88 Ansicht Osten
Maßstabslos

Abb. 89 Ansicht Süden
Maßstabslos

4.2.5 | Perspektiven

Abb. 92 Perspektive Terminal

Abb. 93 Innenraumperspektive
Warteraum Abflugbereich

Maratua Team

Impacts

Lessons Learned

- Research works in a team:
  Multidisciplinary: necessary and useful
  Challenging

- Comprehensive roadmap
  Raise awareness : maritime issues
  Snowball effect → impacts

Impacts

1. Highly qualified research by students in teams
2. Business potentials identified
3. Alumni Batch 1→ INSIDE
4. New partnerships
5. New research collaborations