1st Family Farming Lifestyle and Health (FALAH) conference,

Vanuatu, Port Vila, 20-22 June 2023

Family farming, food and health in intertropical Small Island Countries and Territories

Title: Use and Value of *Amaranthus tricolor*: A Traditional Food Crop in the Papua New Guinea Highlands.

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University of Goroka

Key Words: ***Amaranthus tricolor*****, use, value, family farming, lifestyle**

INTRODUCTION

Amaranthus tricolor

- Important traditional leafy vegetable in the highlands of Papua New Guinea (PNG)

- **Why?**

- Rich source of food & nutrients,
- Family income
- Traditional medicine
- Valuable genetic resource
- Customary obligations

FAMILY FOOD SECURITY

Objectives

Our primary objective of the pilot project was to;

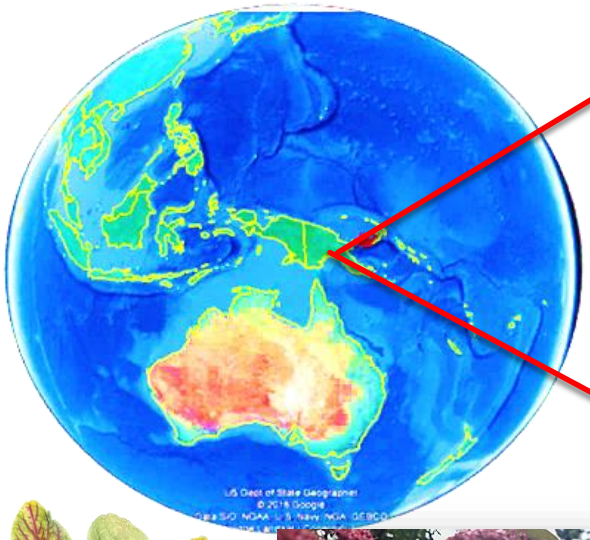
I. *Gather and summarize knowledge on cropping practices, consumption, innovations and the dynamics of family farming in the PNG highlands.*

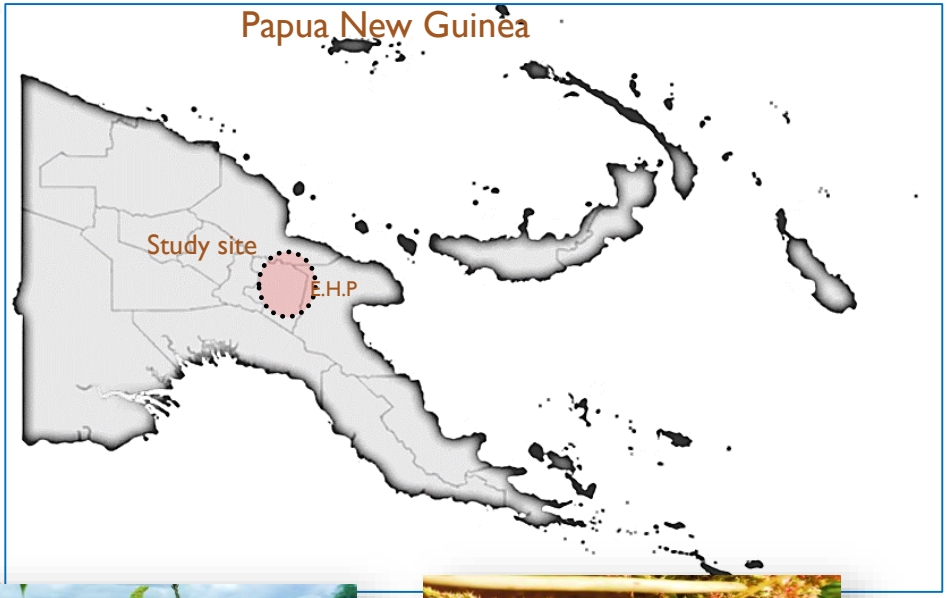
II. *To understand and explore the potential use of traditional leafy vegetables to address the effect of climate change on food security*

MATERIALS & METHOD

Study site:

Daulo & Goroka Districts, Eastern Highlands Province, Papua New Guinea





Red *A. tricolor*

Green *A. tricolor*

Yellow *A. tricolor*

MATERIALS & METHOD

- **Data Collection:**
  - Face to face interview was implemented.
  - Designed questionnaire was used (Qualitative data).
- Statistical analysis was performed using Microsoft Excel
- **Analysis**
  - Thematic statistical analysis was performed using Microsoft Excel

Face – to – Face Interview

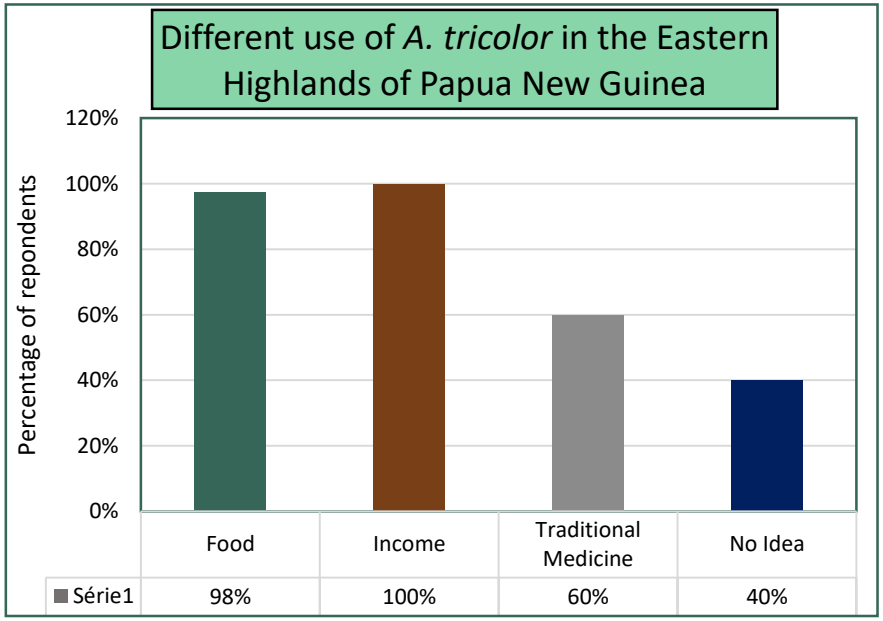
Table 1:0 Sample size

Crop	*Amaranthus tricolor* Users		
	Female	Male	Grand Total
Gender count	24	16	40

UOG CNRRD officer interviewing an amaranthus farmer at Asara, EHP. PNG

RESULTS

Use of Amaranth



- 98% consumes it as food
- 100% sells for income
- 60% uses it as traditional medicine,
- 40 % Uncertain of any other use

Amaranth served on international flights – PNG Air Nuigini

RESULTS

Market Value

According an ACIAR, 2019 report, PNG produces approximately

Volume: **147** tones per year, this is valued at

K441 180.00 (124 748.39 USD)

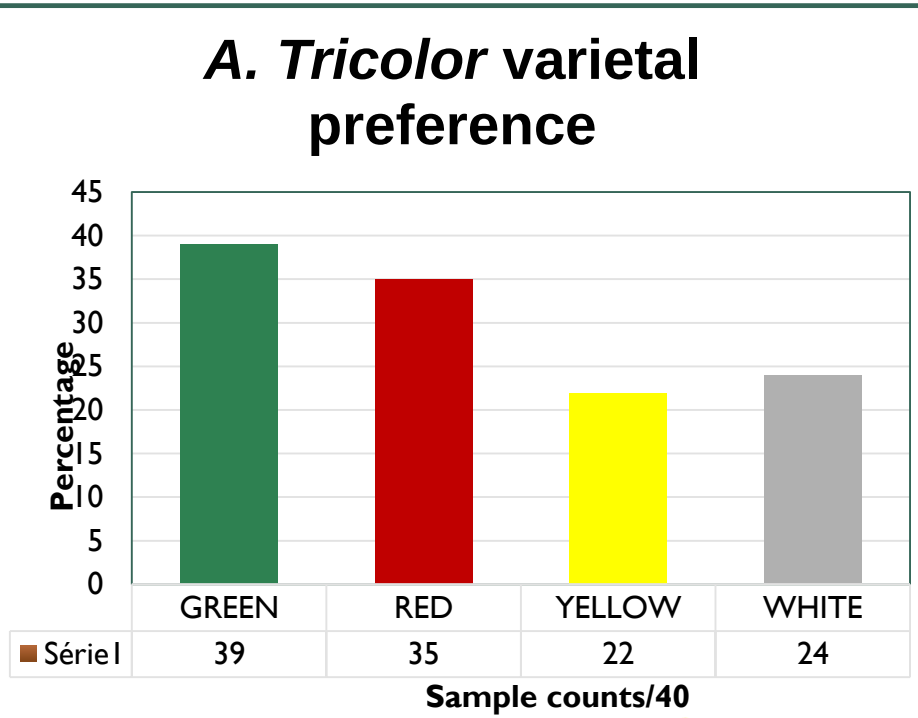
- 100% sells for income
- Current average local market price
- = K0.50 (or 0.14 USD)

Amaranth sold at Asaro station market, E.H.P, PNG

RESULTS

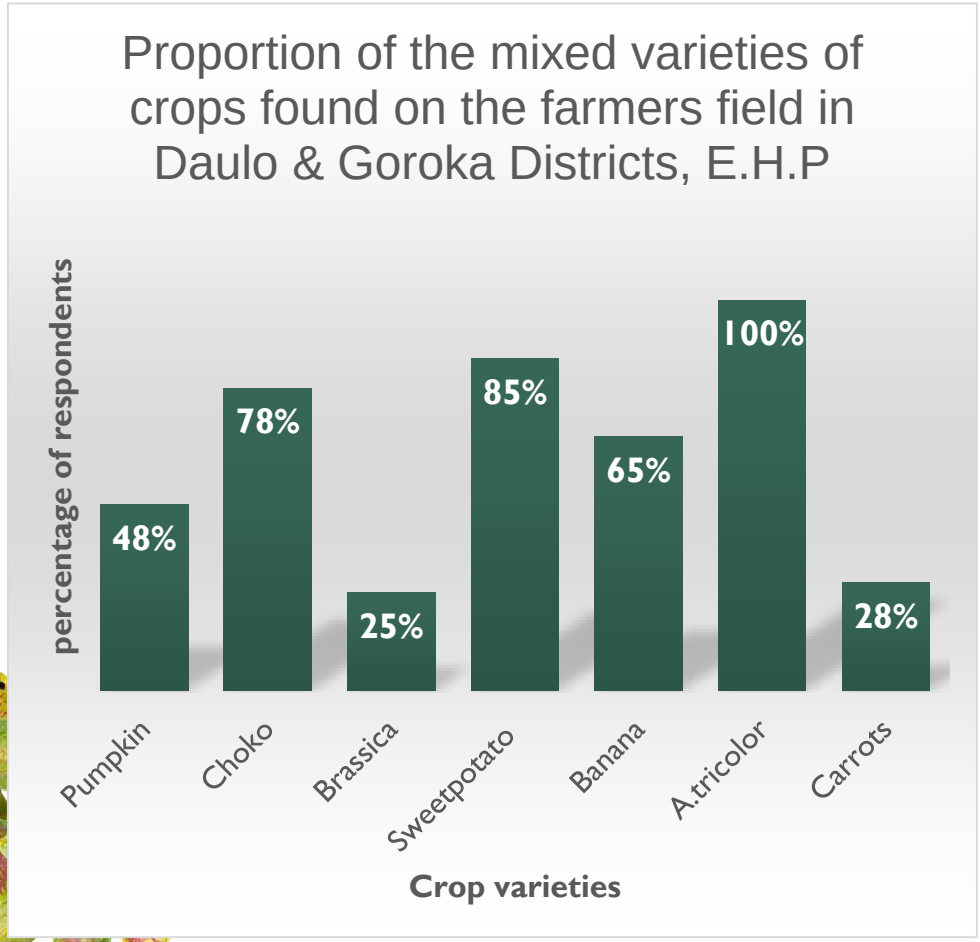
Varietal preference and production.

- **Varieties**
  - Green is the highly prevalent and used variety (97%) followed by red at red 87.5% then white (60%) then yellow variety which is the least used at 55%



RESULTS

Family Farming system.



Women farmers selling their produce at the road side market at Daulo district, Eastern Highlands Province, PNG

DISCUSSIONS

- **PNG Family Farming Dynamics**
  - Mixed cropping system
  - Family labour/ hired
  - Semi-commercial – need basis. eg: Sweetpotato
  - Integrate with commercial cash crops. eg: coffee
  - Own consumption & market
  - Driven by customary obligations. eg. bride price.

- **Paradigm and innovation shift in family farming**
  - Farmers shifting towards introduce crops like cabbage etc.
  - Market and Demand oriented
  - Introduction of new farming ideas by extension services. Eg. Tissue culture/ Pathogen tested technology (PT) in sweetpotato, seed schemes etc.

Typical family plot at Goroka

Mixed veggies purchased at Goroka market

DISCUSSIONS

Issues identified

- Traditional leafy vegetables are consumed only
    - Introduce species are low in supply. Common during seasons. Dry or wet.
    - When consumers do not have access to introduce species
    - Low production
    - Lack of knowledge on traditional species by new generation
    - ing traditional ceremonies

Mix vegetables with different varieties of amaranth growing in a farmers plot. Daulo District. E.H.P, PNG

SUMMARY

- *Potential of using traditional vegetables in family farming?*

- Crops like Amaranthus
  - Good source of food & Nutrition, medicine, income and genetic resource.
  - Easy to cultivate & integrate with out crops.
  - High stress, pest and disease tolerance, good for food security and alleviate nutrition deficiency in the region.
  - PNG family farming is mostly mixed cropping, market, and cultural need oriented.
  - Farmers are shifting towards introduced species – risk
  - More study on nutritional value & other aspects of traditional species *like A. tricolor* and other species must be promoted by FALAH and partners – food security purpose.

Green amaranth variety growing in a farmers plot. Daulo district, E.H.P, PNG

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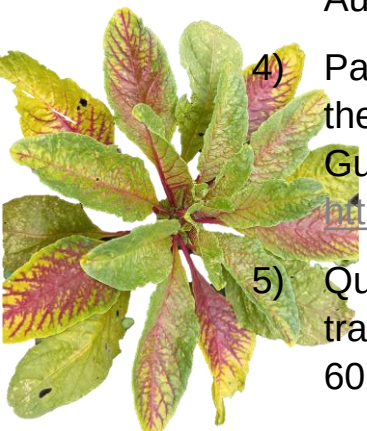


END of Presentation.

Thank you fellow researchers and guest

Any questions

Morpho-agronomic characterization of breadfruit cultivars in Vanuatu

JULIANE KAOH, VARTC

OUTLINES

I. Introduction

II. Hypothesis & objectives

III. Methodology & TOOLS

IV. Results

V. Summary

Fruit on tree

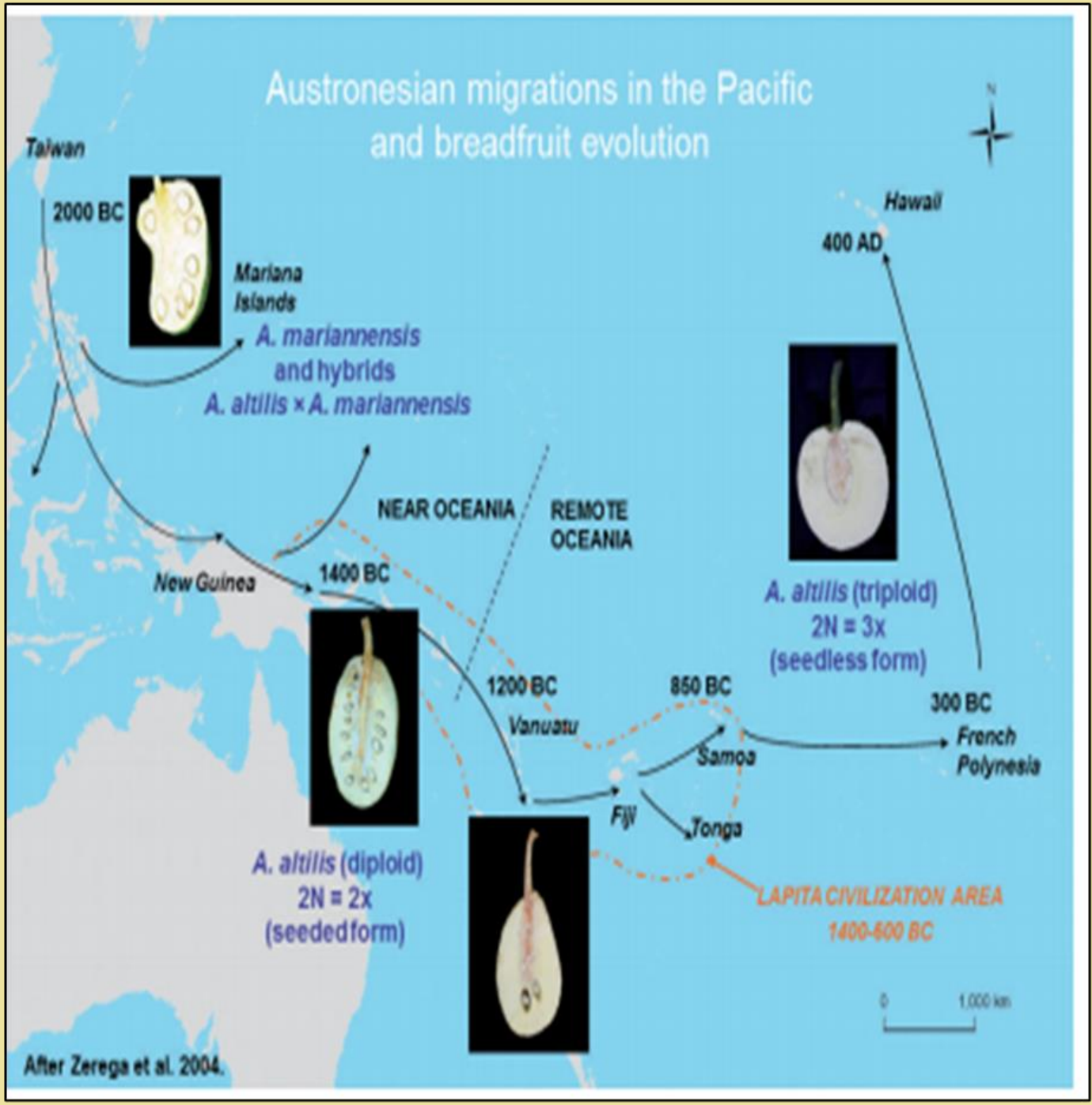
Fruit skin

Mature fruit

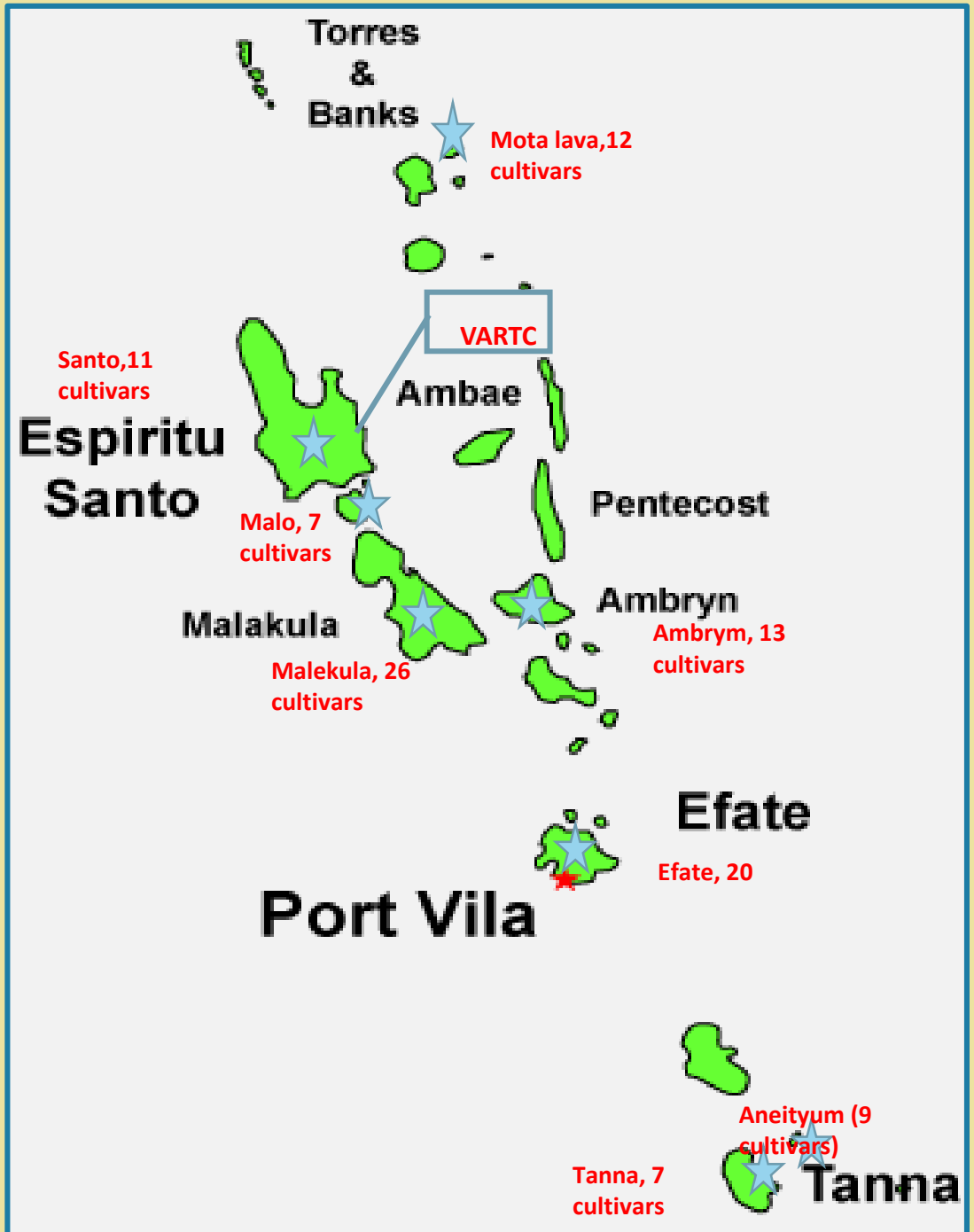
Mature fruit split

INTRODUCTION

- *Var. Artocarpus altilis*
- Monoecious plant
- Moraceae Family
- Starchy & syncarp fruits
- Range in Southeast Asia and the Pacific islands.
- Vanuatu is a center of diversification
- Staple food for many islands in Vanuatu
- Importance in the agroforestry system



Vanuatu map



- 6 provinces (83 islands)
- 138 different indigenous languages➔ Linguistic dilemma

105 cultivars collected in 8 islands and maintained at VARTC

METHODOLOGY & TOOLS

Activities | **Tools** | **Methodology**

Step 1

Field prospection → Field data form →
- Mapping of surveyed plants and collection site
- Census and recording of traditional knowledge by means of questionnaires

Step 2

Characterization at three different level →
1. 18 morpho agronomic descriptors
2. Genotyping
3. Nutritional descriptors →
   - 1. Morphological characterization of the collection maintained at VARTC
   - 2. Genetic characterization and ploidy analysis of leaf samples at the Montpellier laboratories (Cirad)
   - 3. Nutritional characterization of fruit samples at the Tagabé laboratory

step 3

Experiment → Hybridization & breeding → Creation of tetraploid cultivars by hybridization

OBSERVATIONS

MORPHOLOGY

- Tree size & branching layout
- Colour and shape of fruits
- Fruit peduncle length
- leaves

AGRONOMY

- Time of fructification
- Number of seeds
- Productivity/ fruit abundance

USES

- Texture of fruit flesh
- Time of cooking
- Trunk
- Leaves
- Latex

Hypothesis

Today's morphological diversity is the result of dynamic management involving vegetative (asexual) and generative (sexual) multiplication.

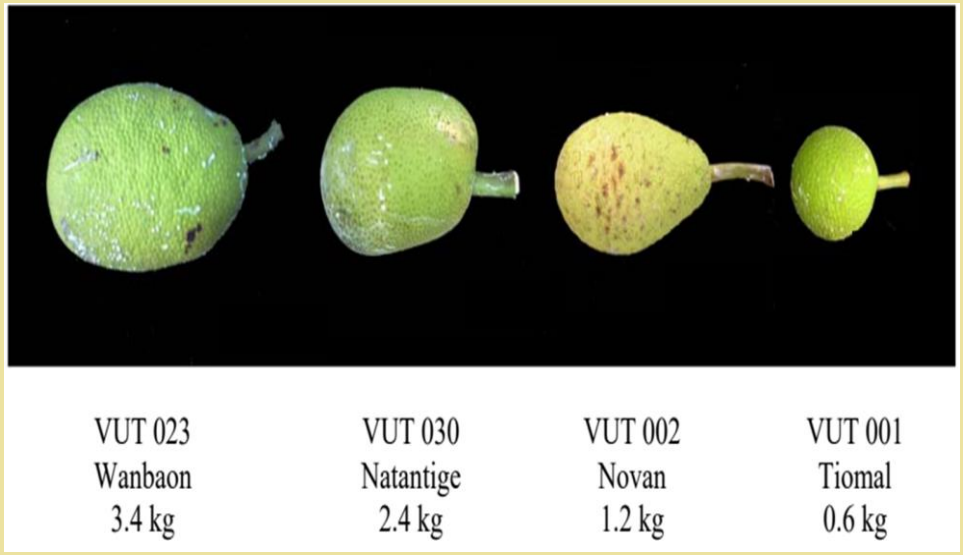
Objectives

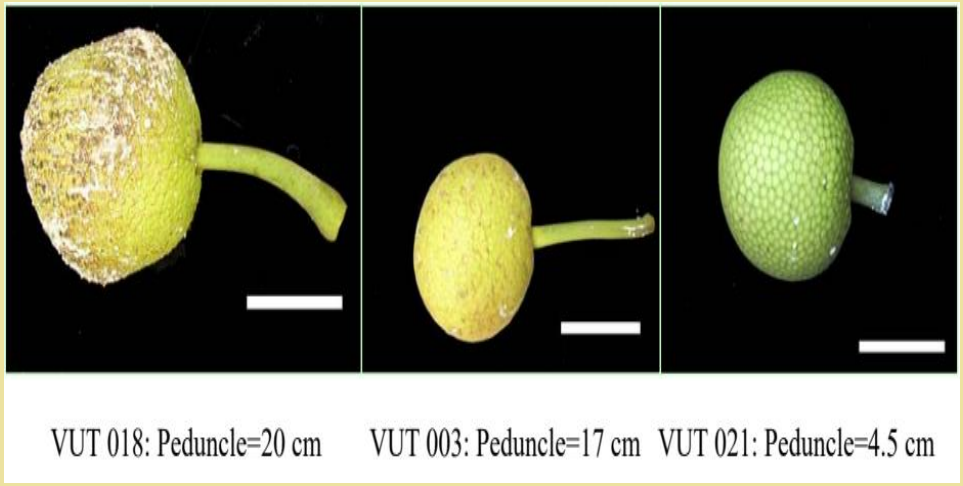
- To characterize 105 cultivars using a set of selected morphological descriptors
- Increase the current diversity to preserve the genetic resources at VARTC

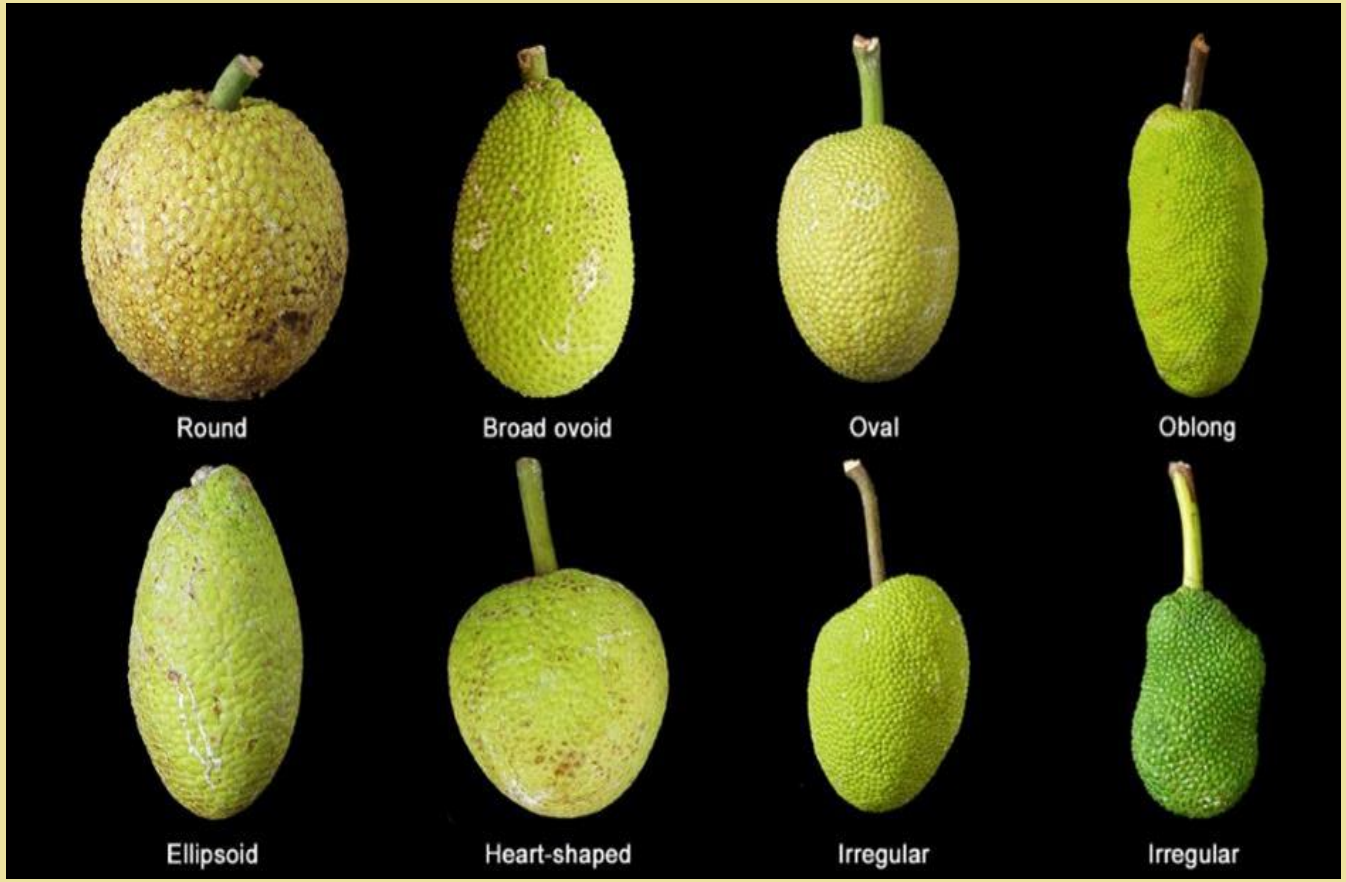
B. MORPHOLOGICAL DESCRIPTORS

B1. Fruit

Fruit : weight (kg); length (Cm); width; peduncle length (Cm); shape





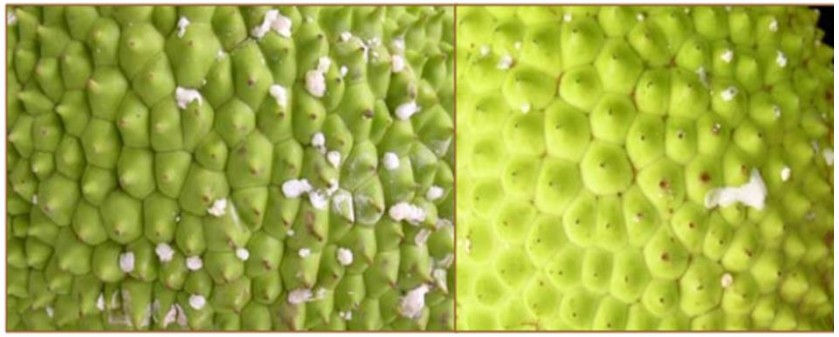


B. MORPHOLOGICAL DESCRIPTORS

B1. Fruit

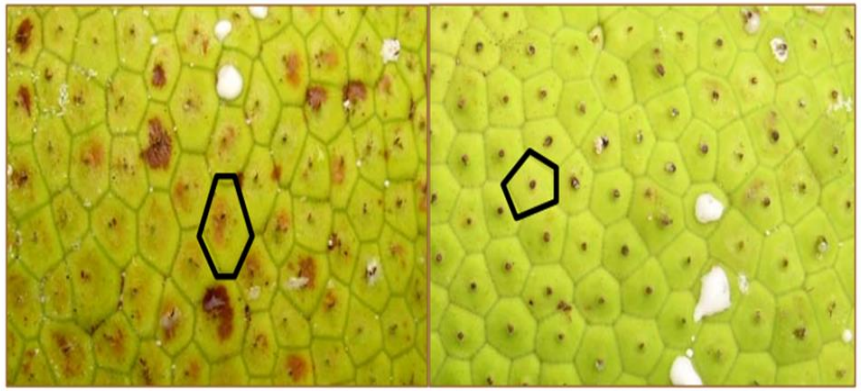
Fruit skin texture; mature fruit color; Amount of latex, colour of latex

Spiky skin :



VUT 006: Lesrakenobos VUT012: Huhadundu

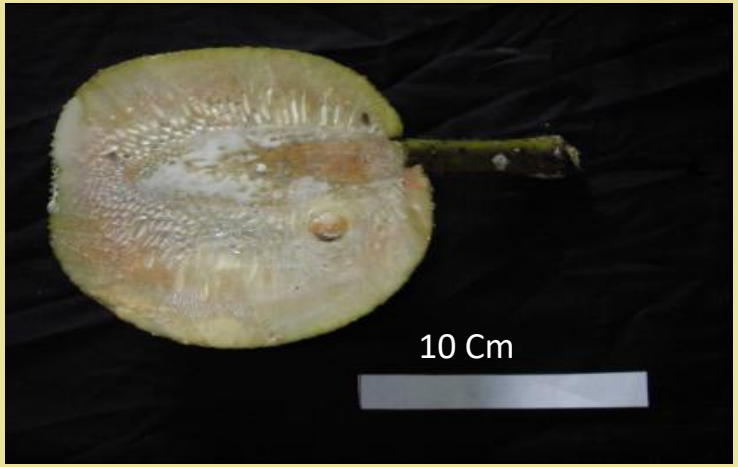
Rough skin :



VUT 008: Tatarlihu VUT 013: Wawahisao

Smooth skin :

VUT 021: Nowokwawa VUT 063: Riovkar



Roasted fruit

B. MORPHOLOGICAL DESCRIPTORS

METHODOLOGY & TOOLS

B1. Fruit

Seeds number; fruit yield; fruit time

April-May

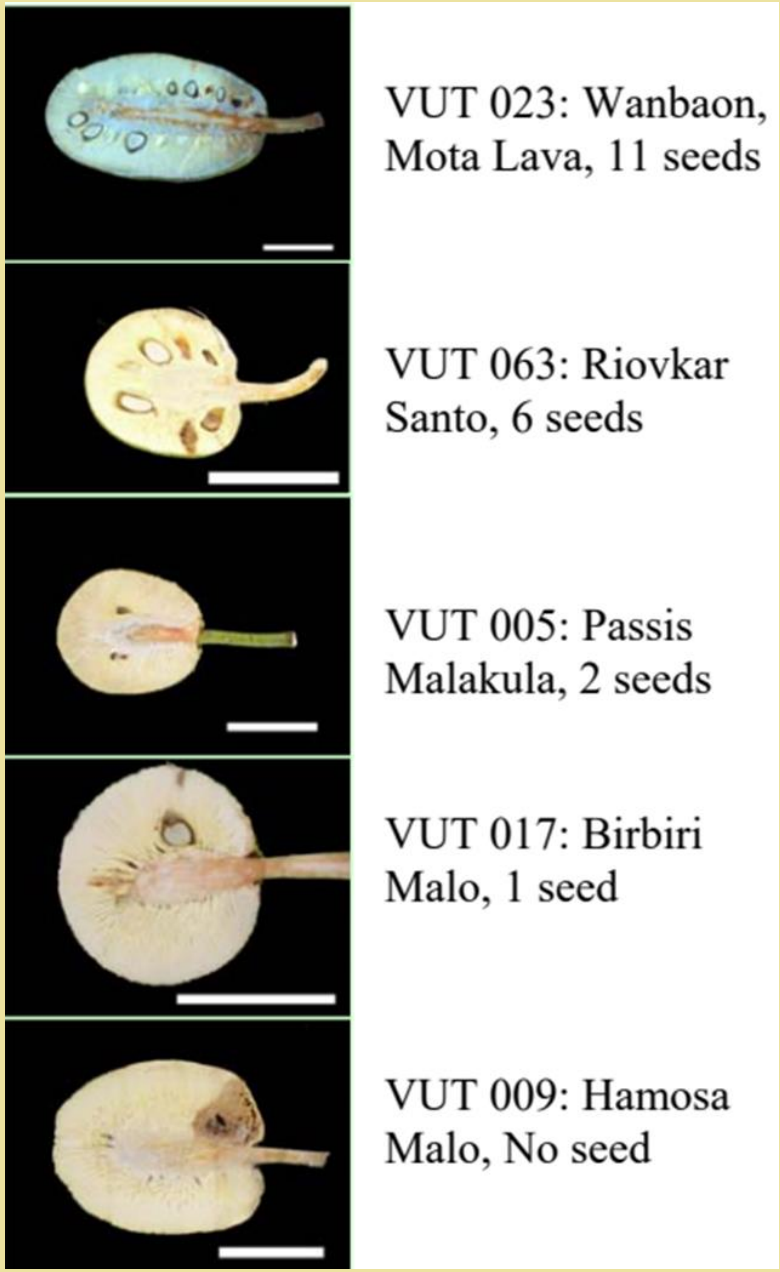
The breadfruit has both male and female inflorescences. The female inflorescence which we commonly called fruit are edible at any stage of

June-August

The deep green fruit at an immature stage of development has a firm, rubbery texture and can be used as vegetables in

September-January

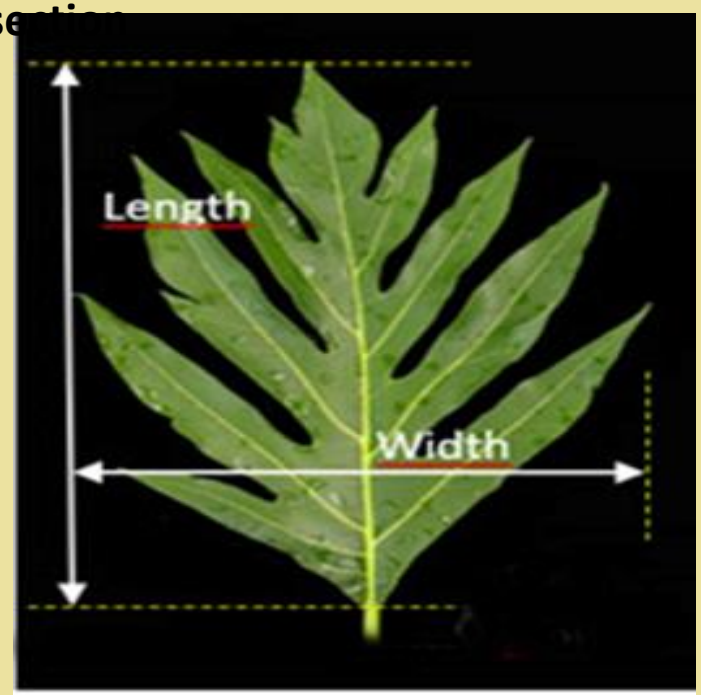
This is a mature fruit that has reached full size and has developed starchy characteristics



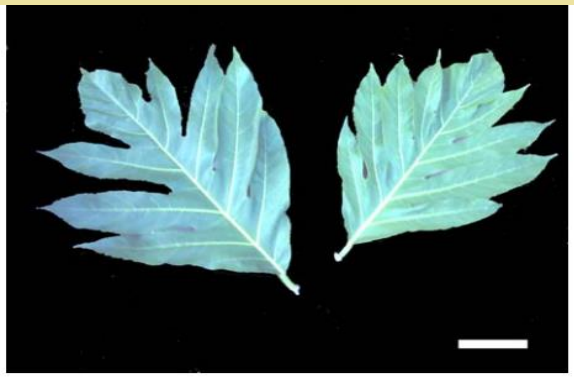
B. MORPHOLOGICAL DESCRIPTORS

B2. Leaves

Leaf: length (Cm); width (Cm); Lobe number; upper surface texture; degree of dissection



VUT 044: Nefitan, very glossy leaves



VUT 039: Wuikar, dull leaves

VUT 064: "Akavon", cultivar of Santo, has closed leaves, without dissected lobes.

VUT 010: "Hotabulu", cultivar of Malo, very dissected leaves with secondary ramifications.

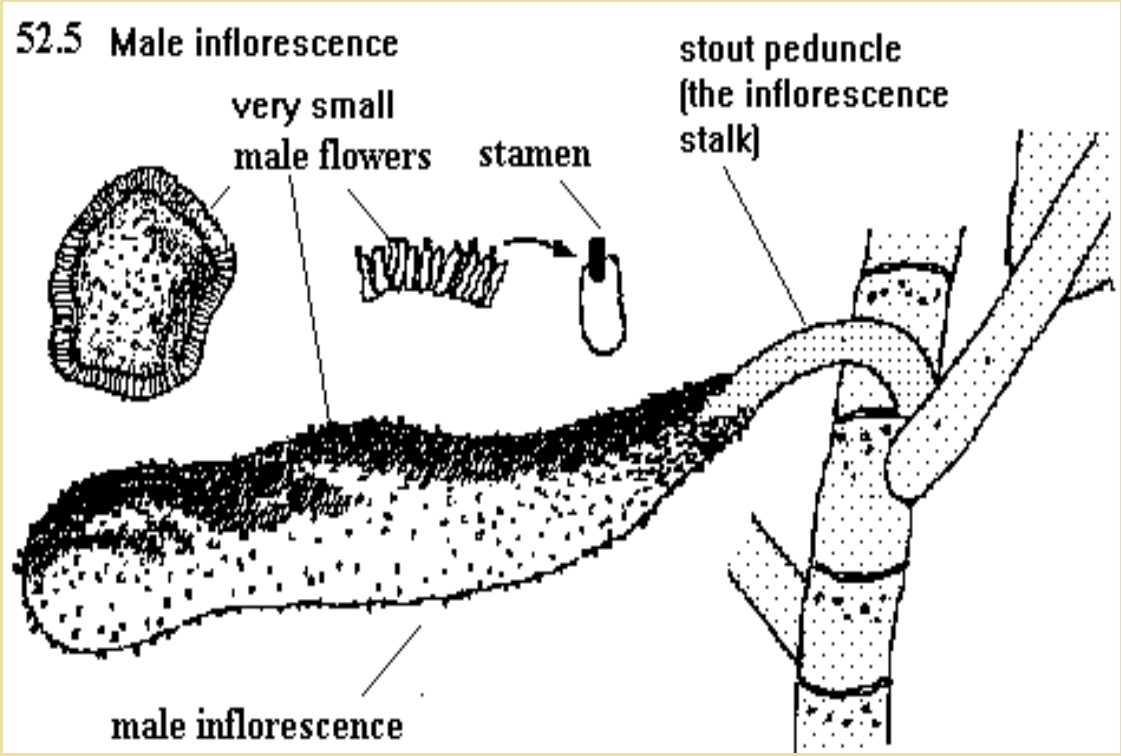
VUT 049: "Inmeretuanga", cultivar of Aneithyum, the most dissected leaves with secondary ramifications.

METHODOLOGY & TOOLS

B. MORPHOLOGICAL DESCRIPTORS

B3. Male inflorescences

Length & Width (Cm)



A. PASSPORT AND COLLECTING DATA

Case 1: Breadfruit trees already established in an e*x-situ* collection (= gene bank) at a research center, agriculture farm…

RESULTS

A.1 Genebank site		
Country:	**Province/Region:**	**Island:**
Institution name:	**Postal address:**	
Longitude (decimal):	**Latitude (decimal):**	**Elevation (m a.s.l.):**
Main characteristics of the site: volcanic/limestone; high/medium/poor fertility; intercrops, etc…		
Name and contact details of the gene bank curator:		

A.2 Accession passport details (within gene bank)	
ACCESSION No. (*): **Must be unique**	CULTIVAR NAME:
TREE LOCATION / TREE LABEL in the gene bank: Plot number, Row number, tree number or Label	
DATE of planting in the field:	
ORIGIN **Unknown** **Collected by the institution** **Collecting number (if any) (*):**	Obtained from a donor Institution/individual name and short address: Donor accession number (if any): Date of introduction:
Tree was grown from: **Seed Cutting**	
Other information: Other name, other number	
Some primary collecting data are available: Yes -> Fill in Tables A3, A4, and A5 **None -> Fill in only Table A.5 (sampling)**	

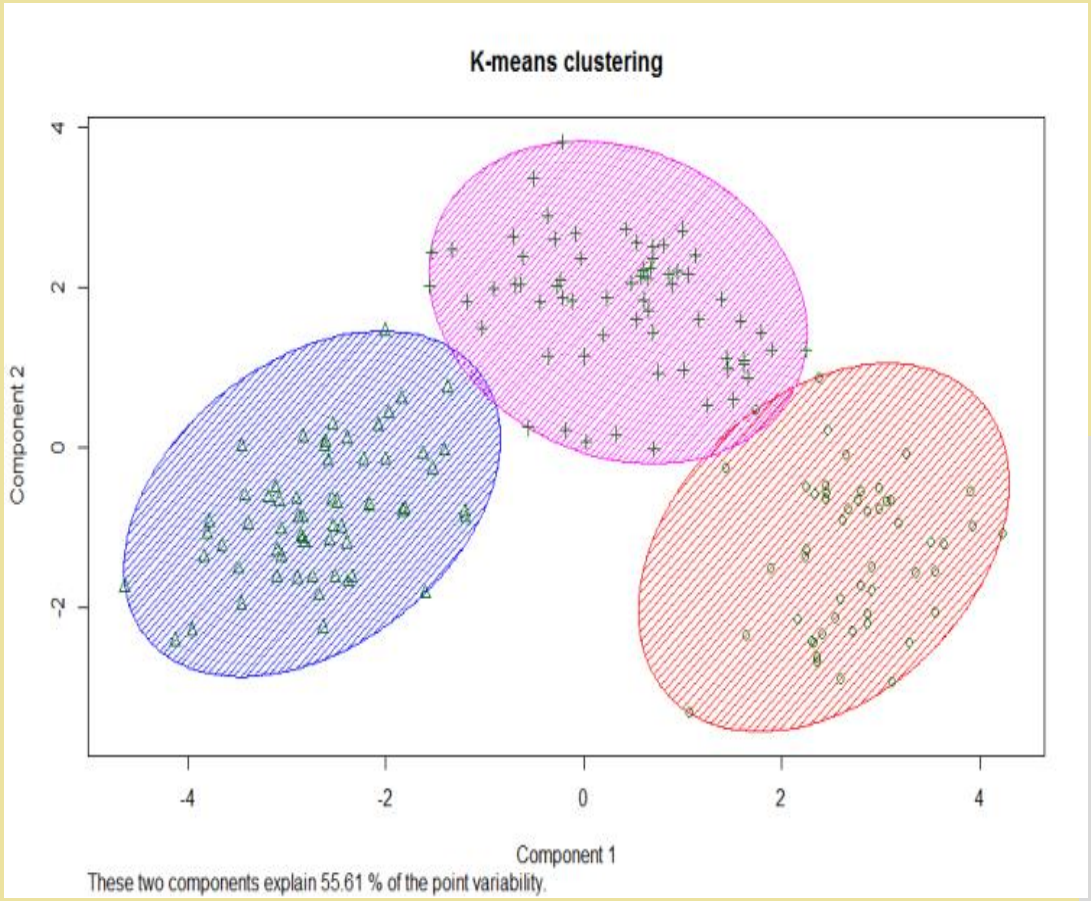
A. PASSPORT AND COLLECTING DATA

Case 2: Data gathering and material sampling are made ***in situ*** (on farm, plantation, backyard, forest, park, etc.)

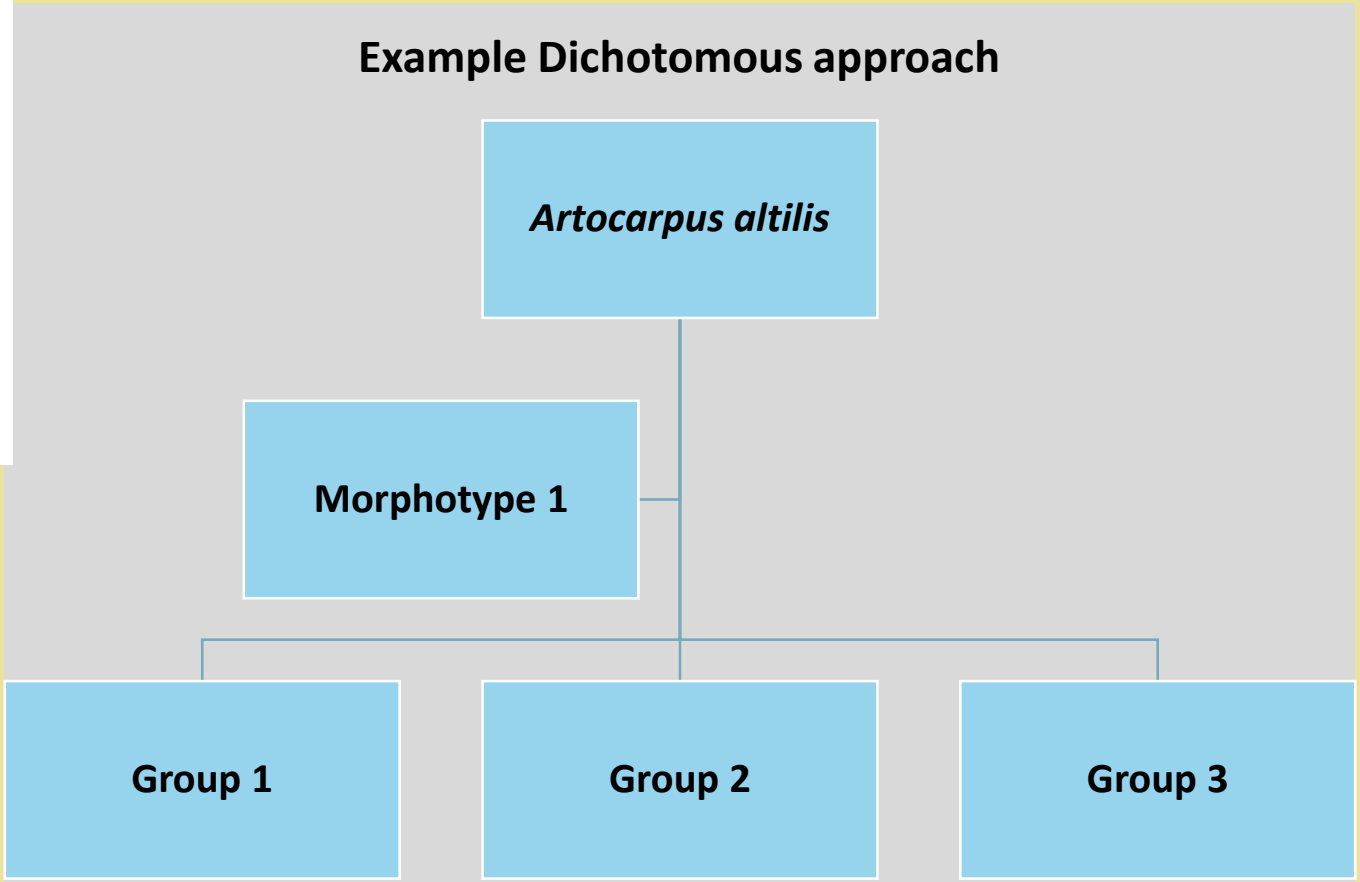
ACCESSION No.:	**Or/and COLLECTING No.:**	**CULTIVAR NAME:**
A.3 Collecting data		
Country:	**Province/Region:**	**Island:**
Town/village:	**Site name:**	**Owner name:** **Phone:**
Longitude (decimal):	**Latitude (decimal):**	**Elevation (m a.s.l.):**
Collecting date:	**Collector name:**	
Collecting institution name:	**Main characteristics of the site: volcanic/limestone; deep/shallow soil; high/poor fertility; intercrops, etc…**	
Habitat: orchard, backyard, garden, plantation (specify the main crop), seashore, roadside, fallow land, park, etc…	**Other collecting information**	

A.4 Other information (ethnobotany, uses, etc)		
"Breadfruit" in local language (specify local language name)		
Cultivar name in local language		
Local name meaning (if known)		
Origin (if known)		
Tree was grown	**From seed** **From cutting** **Unknown material**	
Specific use(s) of the cultivar		
Other details		
A.5. Sampling details and photographs		
Sampling date		
Name of the person(s) in charge		
Collected samples	**Leaf sample for DNA analyses** **Fruit sample for nutritional components** **Cuttings**	
Photographs	**Whole tree** **Fruit** **Fruit on the tree** **Fruit skin** **Fruit + 2 leaves** **Split fruit** **Male flower** **Uses**	

EXPECTED RESULTS



- Create related groups
- Online varietal catalog
- Genesys: international online database



SUMMARY

- The morphological characterization data will improve knowledge of the fruit production range for each cultivar to Enhance food security
- Data will support knowledge of the current diversity of breadfruit in Vanuatu
- Phenomenal morphological diversity

THANK YOU

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Agronomic and morphological characteristics of Island cabbage diversity in Vanuatu

At 1st FALAH Conference, VANUATU, Holiday Inn Resort – 20th of June, 2023

By Floriane LAWAC, VARTC

Outlines

- **Introduction**
- **Context**

- **Problematic**
- **Hypotheses & Objectives**

- **Materials & methods**

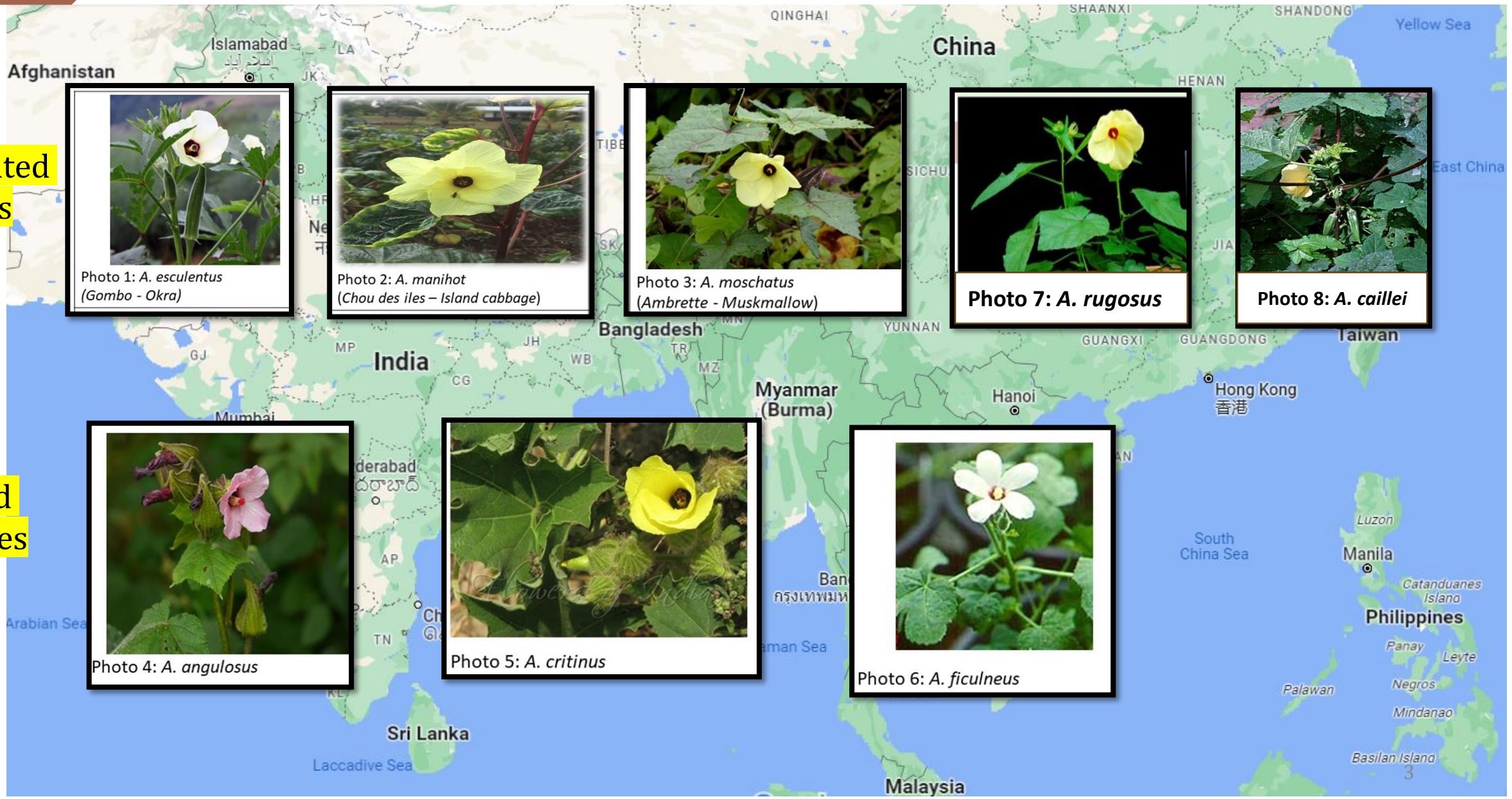
- **First results**

- **Perspectives**

Origin of *Abelmoschus*

5 cultivated species

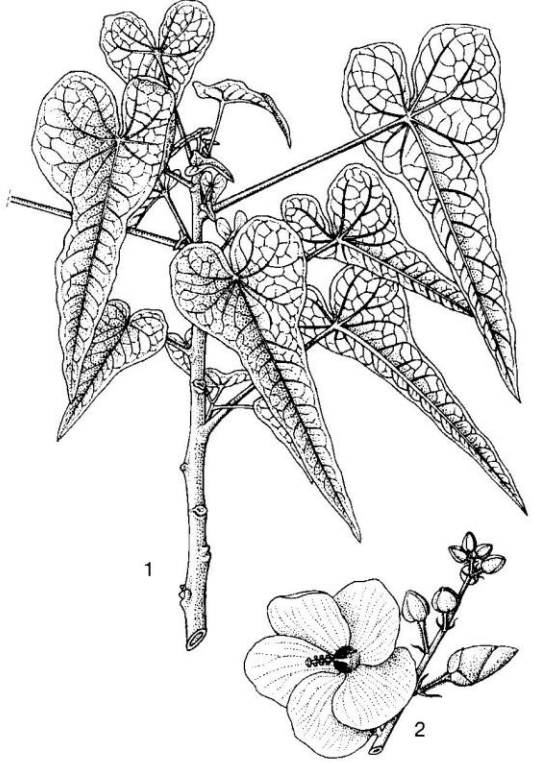
3 wild species



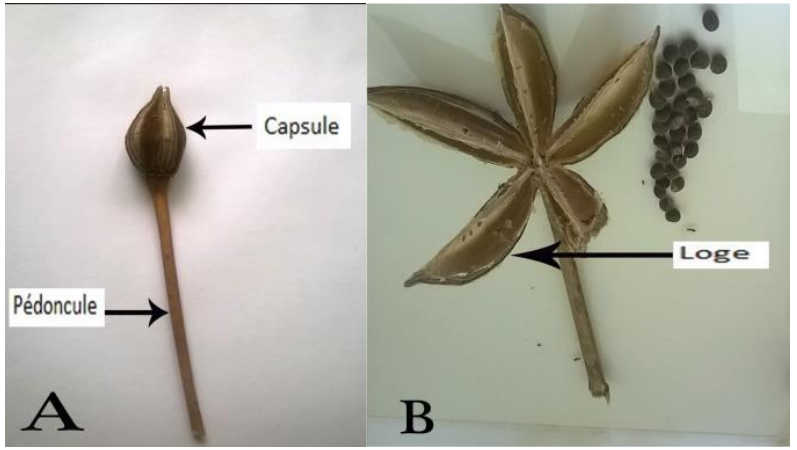
Abelmoschus manihot

- Belong to the Malvaceae Family
- Fast-growing perennial shrub in tropical environments
- In Asia, is mainly used for medicinal and traditional cures for diverse diseases
- By root juice, flower juices,…
- Seed-bearing plant
- Traditional crops propagated exclusively vegetatively

- Island cabbage (VUT), Chou Kanak (NC), Aibika (PNG) & Bele (Fiji)
- Edible leaves as food

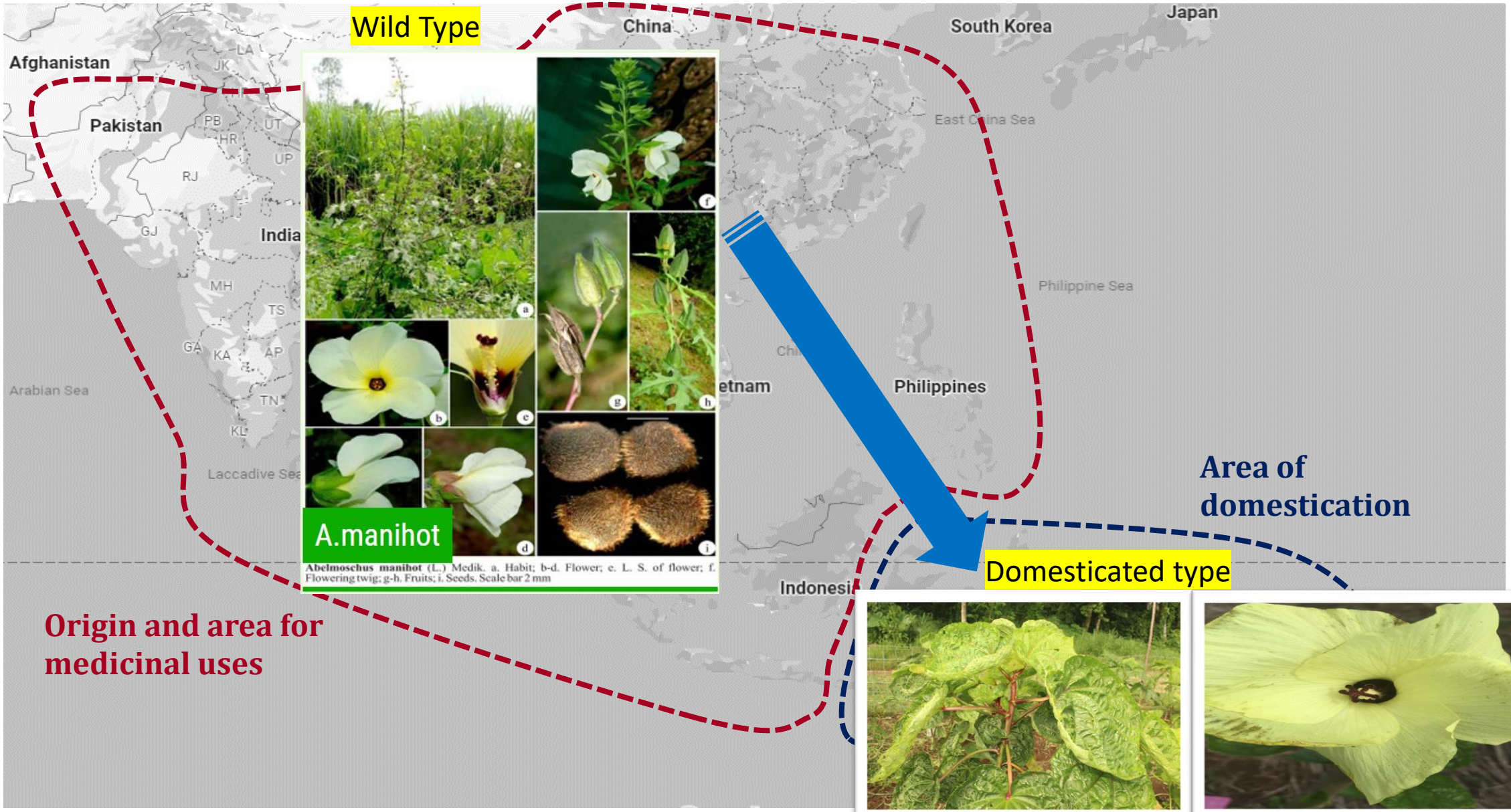


Abelmoschus manihot (L.) Medikus – 1, leafy shoot; 2, flowering shoot (pseudoraceme).



Evolution of *A. manihot*

Evolution of *A. manihot*



A. manihot in Vanuatu

- *Aelan kappish, Never, Were,…*
- Genetic polymorphism is high within islands and between islands of the archipelago

A. manihot in Vanuatu Cuisine

- Continuous supply of leaves and young shoots
- Main component of Vanuatu cuisine
- Important supply of nutrients (proteins, vitamins, minerals), which is not provided by root and tuber crops
- The most cultivated leafy vegetable in Vanuatu.

Fig. 3: Traditionnal dishes
« fried kappish », « Simboro » and « Laplap »

Challenges & Issues

- Highly vulnerable to environmental factors, diseases and pests: 8 cases of diseases and pests recorded in Pacific countries.

Fig. 5: Bele Flea beetle *Nisotra basselae*

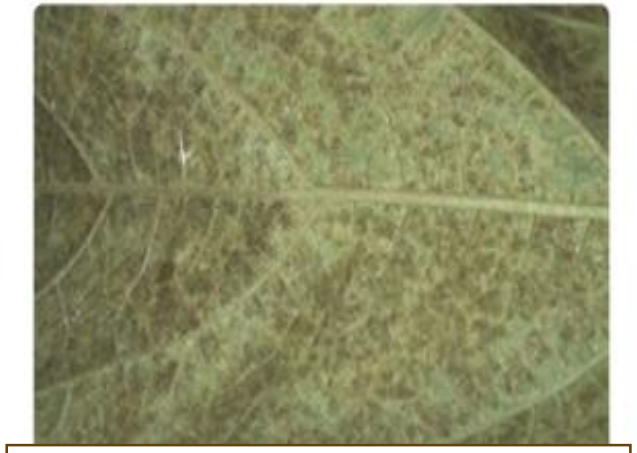


Fig. 6: Under surface of bele leaf covered by sporulating infections of leaf mould, *Pseudocerospora abelmoschi*

Fig.7: Caterpillar of the bele leaf roller *Haritolodes deregata*

Fig.8: Bele chlorotic ringspots

Source: Pacific pest, pathogens and weeds

Research Question

Is the genetic diversity of island cabbage in Vanuatu sufficient to allow its adaptation to climate and societal changes?

Hypotheses & Objectives

1) **H1**: The clonal population of *A. manihot* varies according to cultural choices of use and production.

2) **H2:** The evolutionary pattern of *A. manihot* based on genetic, morphological, and chemical differences is comparable at archipelago and Melanesian scales.

1) To characterize the morphological, chemical, genetic, and cultural aspects of existing cultivars.

2) To trace the evolution of island cabbage at the archipelago level, Melanesian level, and even at the Oceanian level.

Protocols

Step 1: Characterization of cultivars to select the best island cabbage morphotypes suitable to adapt to climate changes

- **Morphological** → Standardized morpho-agronomic descriptors, IPGRI → Genetics resources of island cabbage at VARTC (Fig 7)
- **Chemical analysis** → Fresh leaves samples (Fig. 5a) → SPIR , HPTLC (Fig. 5b) → PCA
- **Genetic analysis** → Dry leaves samples (at 40°C) (Fig. 4) → DNA fingerprinting, **Microsatellites** (Henry, R. J. Ed. 2001) (Fig. 6) → Evolutive pattern, **DARwin software** (X. Perrier, J.P. Jacquemoud-Collet, 2006) → Ploidy level, Staining Pollen fertility test (Datta, P. C., & Naug, A. 1967)
- **Cultural choices of usages** → Field works and interviews, questionnaires

Fig 9: 3 different morphotypes of cabbage at VARTC

Fig 10 : Extraction of secondary metabolites of cabbage, Laboratory Tagabé, 2020

Fig 11 : Leaf samples oven-dried at 40°C for 2 days, (VARTC, 2022)

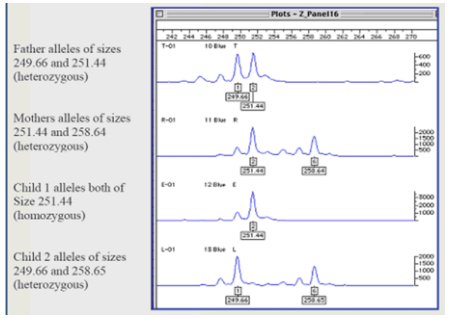
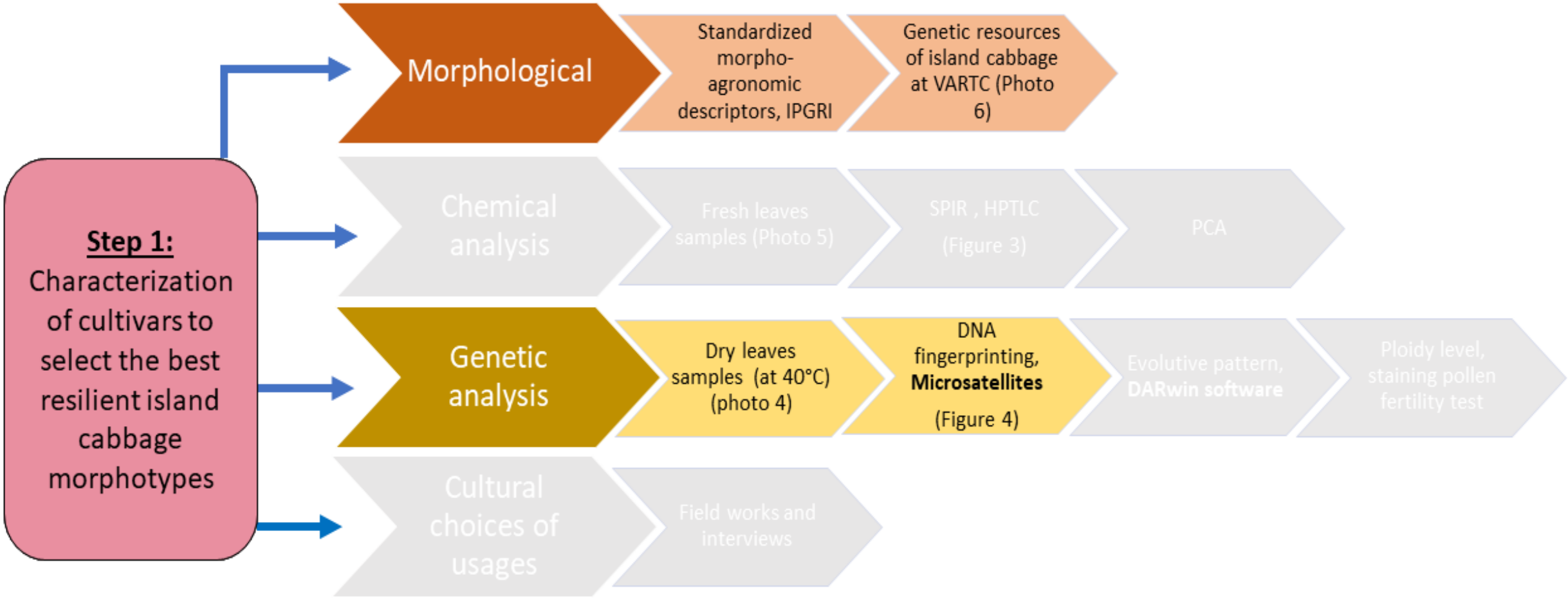


Fig 12 : Allelic diversity

Materials & Methods

Work in progress



Genetic resources of *A. manihot* at VARTC

140 accessions in the *ex situ* collection

Methods

Morphological characterization Descriptors

Plant general appearance

- Height
- Presence/Absence of pest & diseases
- Stem: colour, pith and hairiness

Leaves

- Leave shape, number of segments, level of segmentation, segment shape, margin, tip, base, colour of the upper and lower side, lustre, general aspect of the leave, vein color, petiole colour, petiole insertion point color

Flowering

- Quantity of flower
- Colour of petal, sepal
- Stigma, filament, Presence of seeds on the plant

3.2 Leaf

3.2.1 Leaf shape

1	Linear
2	Lanceolate
3	Cordate
4	Hastate
5	Sagittate
6	Deltoid
7	Orbiculate
8	Pinnatisect
9	Pedate-digitate
10	Palmate

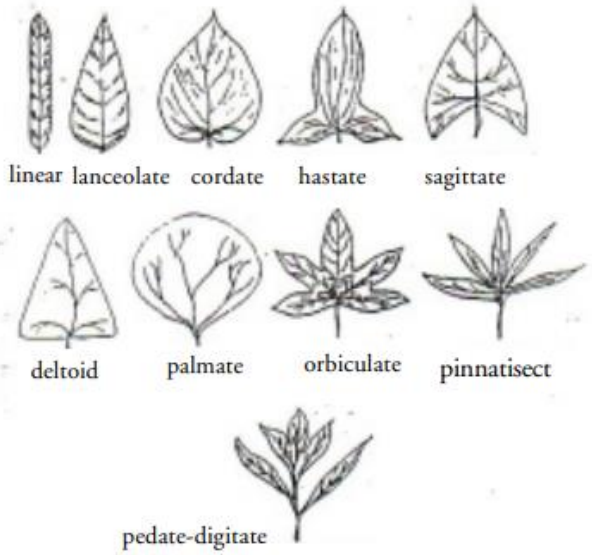
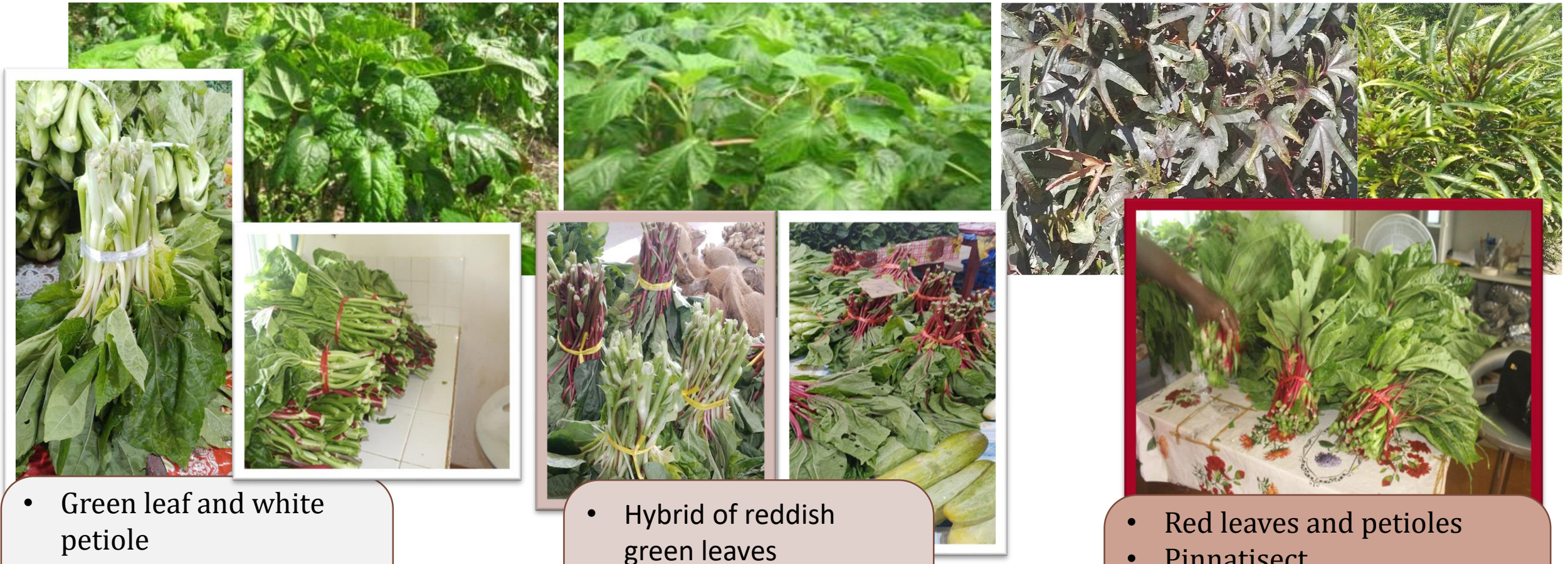


Figure 1: Leaf shape

Preston, S. R. (ed) 1998.

Agronomic characterization Descriptors

Culinary Preferences of Melanesian People



- Green leaf and white petiole
- Palmate leaf
- Very soft and nice texture when cooked

- Hybrid of reddish green leaves
- Palmate
- Very soft and nice texture when cooked

- Red leaves and petioles
- Pinnatisect
- Leaves are tend to be more tough and fibrous when harvest late

First Results

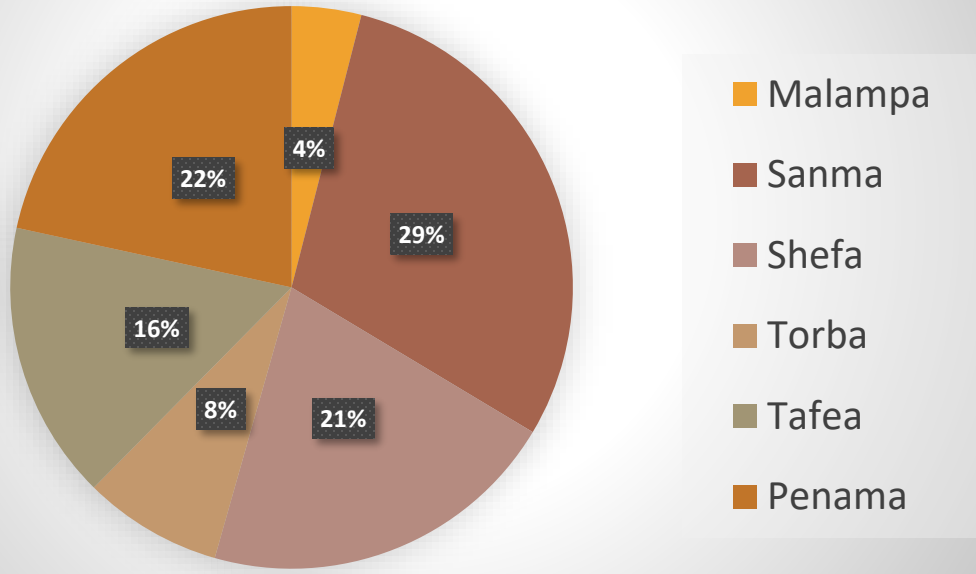
Database

- 140 accessions characterized and sampled for genotyping in 2022

Passport data | Leaves | Stem | Flowering | Pest & diseases

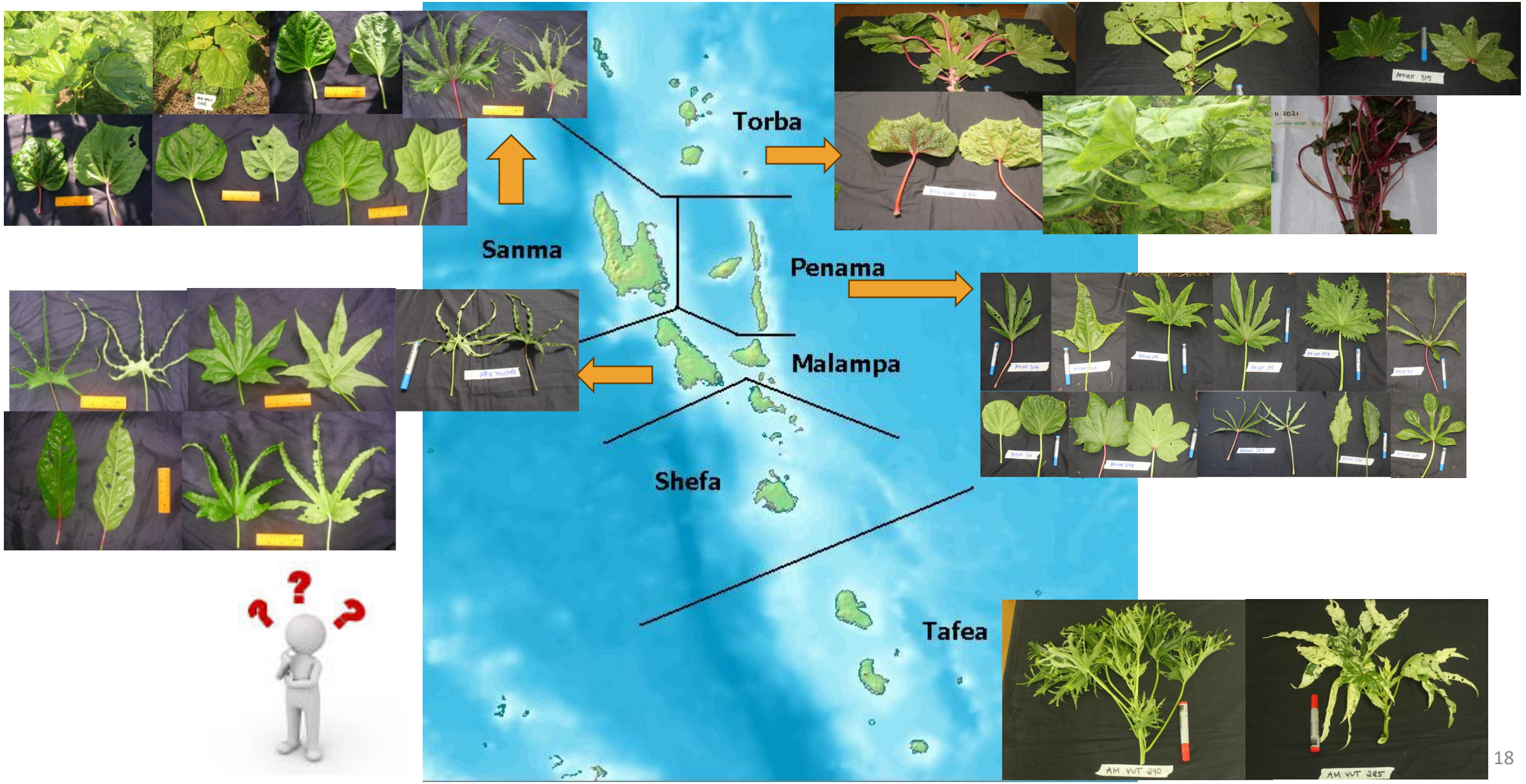
Accession codes	Farmer name	Village name	Collector's note	Plant Growth Vigour	Leaf shape	Leaf segment shape	Leaf margin	Leaf tip	Leaf base	Leaf shape variability	Leaf colour	Leaf lustre	Leaf vein colour	Petiole colour	Petiole length(cm)	Stem colour	Stem pith	Stem hairiness	Flowering habit	Flower Colour	Sepal colour	Stigma Colour and form	Filament	Seed Set	Disease Susceptible	Virus	Dwarfing	Stem rot	Root rot	Other (specify)	Pest Attack	Mealy bug	Scale insects	Leave rolling caterpillar	Tip boring grub	Jassids and other leafhoppers	Leaf eating beetles	Other (specify)
													Red to	Light green	Intermed	Green and																							
84		Lakatoro		Good	Orbiculate	Acicular	Sinuate	Acuminate	Acuminate	Wavy	dark green	Dull	Dark green	Green with purple spots	Intermediate	Green	Entire	Pubescent																					
253	0	Malekula	0	Good	Pinnatisect	Linear	Entire	Acuminate	Cordate	5	Green	Dull	Purple	Purple with	Intermedi	Purple with g	Entire	Glabrous																					
264	0	Malekula	0	Good	Deltoid	Lanceolate	Entire	Acute	Truncate	5	Dark green	Dull	Red	Red with whi	Short	Red	Entire	Glabrous																					
269	0	Malekula	0	Good	Cordate	Lanceolate	Entire	Acuminate	Cordate	5	Green	Shiny	Red	Red	Short	Red	Hollow	Glabrous																					
277	0	0	0	Good	I no gat lon	0	Sluate	Arkitate	Truncate	5	Dark green	Dull	Red	Red	Intermedi	Pink/red	Hollow	Glabrous																					
409	0	Pentecost, Allig	Young lea	Good	Cordate	Lanceolate	Sinuate	Acuminate	Cordate	5	Light green	Shiny	Green	Green to pur	Short	Red with gree	Hollow	Glabrous																					
123		Lovolbini		Good	Orbiculate	cordate	Crenate	Acuminate	Cordate	Smooth	Dark green	Dull	Purple	purple	Intermediate	Purple with green spots	Hollow	Pubescent																					
254	0	Ambae	0	Good	0	0	Palmate	Oblanceolate	Entire	Acute	Cordate	5	Shiny	Dark Green	Green	Green	Short	0																					
259	0	Ambae	Plante out	Good	Orbiculate	Linear	Sinuate	Acuminate	Cordate	5	Green	Shiny	Green	Green	Long	0	0	0																					
260	0	Pentecost	0	Good	Cordate	Elliptical	Sinuate	Acute	Cordate	5	Green	Dull	Green	Green	Intermedi	Dark green	Hollow	Glabrous																					
270	Bradley Soro	Gaiowo	0	Good	Cordate	Elliptical	Serrate	Acuminate	Cordate	5	Light green	Shiny	Red	Pink/White	Short	Light green w	Entire at t	0																					
271	Bradley Soro	Gaiowo	0	Good	Cordate	Elliptical	Sinuate	Acute	Rounded	5	Light green	Shiny	Light gree	Light green	Short	Light green	None	None																					
274	Bradley Soro	Gaiowo	0	Good	Corrdate	Elliptical	Sinuate	Acute	Cordate	5	Light green	Shiny	Green	Lightgreen/w	0	Light green	Hollow	Glabrous																					
275	Dickson	Marino	0	Good	Cordate	Lanceolate	Entire	Acuminate	Cordate	5	Dark green	Shiny	Red	Red	Short	Reddish few p	Entire	Glabrous																					
278	0	Loverbangakor	0	Good	Corate	Elliptical	Sinuate	Acute	Sagittate	5	Dark green	Dull	Green	Green	Short	Light green	Entire	Pubescent																					
279	George Tari	Navona	0	0	Cordate	Elliptical	Sinuate	Acute	Cordate	5	Dark green	Dull	Red	Red/light gr	Short	Red/ green	Hollow	Glabrous																					
293	0	Allgu/ Lavatma	Young lea	Good	Orbiculate	Lanceolate	Sinlate	Acuminate	Cordate	5	Light green	Shiny	Red to gre	Green with q	Short	Green with sp	Entire	Glabrous																					
294	0	Allgu	0	Good	Orbiculate	Lanceolate	Sinuate	Acuminate	Cordate	5	Dark green	Shiny	Red	Light green v	Intermedi	Light green w	Hollow	Pubescent																					
295	0	Allgu	Plant i gro	Good	Pinnatisect	Linear	Sinuate	Acuminate	Cordate	5	Dark green	Shiny	Purple	Light green	Intermedi	Green	Hollow	Pubescent																					
296	0	Allgu	0	Good	Linear	Linear	Sinuate	Acuminate	Acuminate	5	Dark green	Dull	Purple	Purple with g	Short	Purple	Hollow	Glabrous																					
297	0	Lavatnrangenu	0	Good	Orbiculate	Lanceolate	Sinuate	Acuminate	Cordate	5	Green	Shiny	Green	Light green	Intermedi	Light green	Hollow	Pubescent																					

Distribution of Isl. cabbage of VARTC collection by province

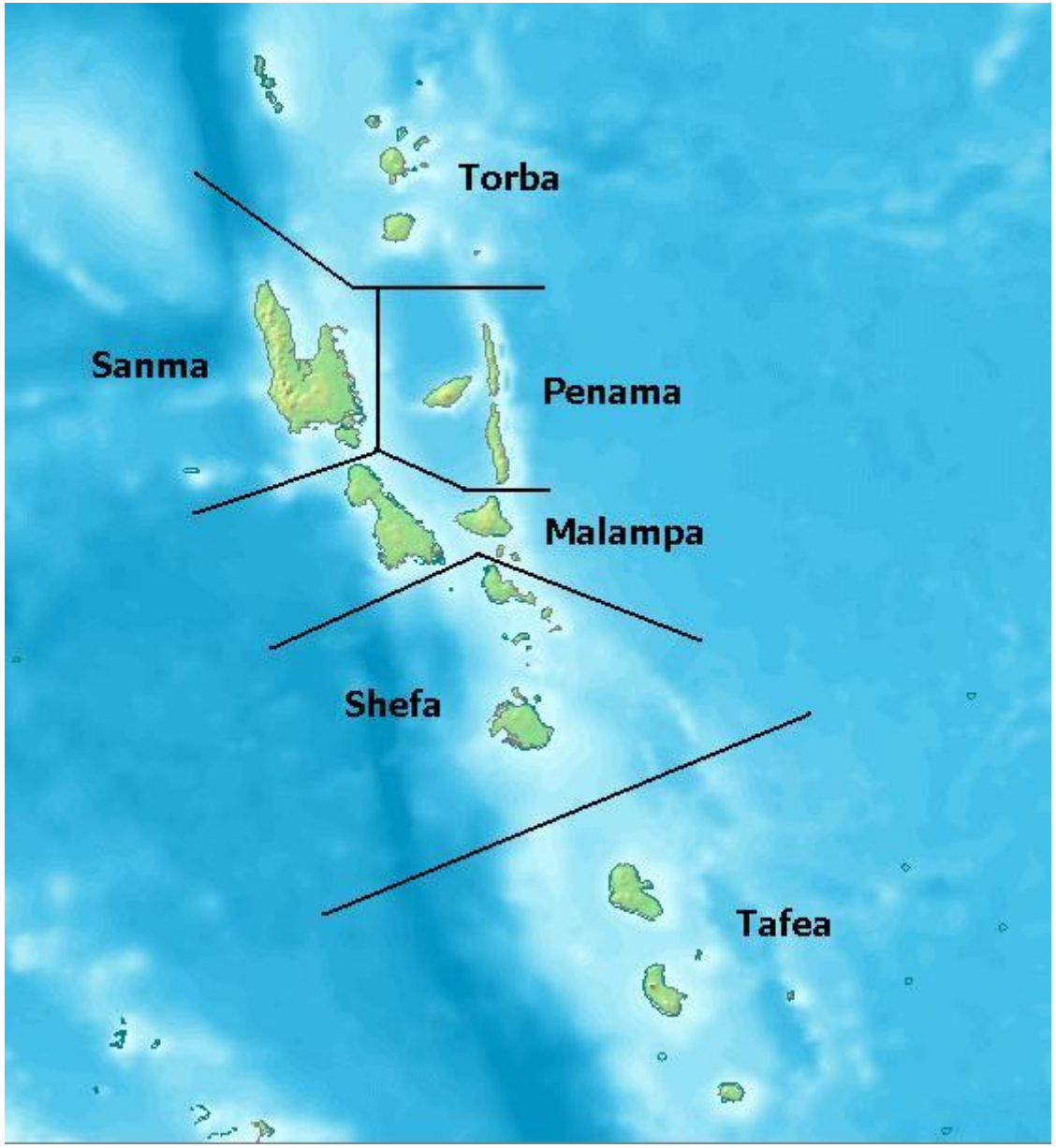


First Results

Genetic diversity by provinces



Latitudinal diversity gradient ?



First Results

Flowering

AM VUT 006

AM VUT 008

AM VUT 015

AM VUT 062

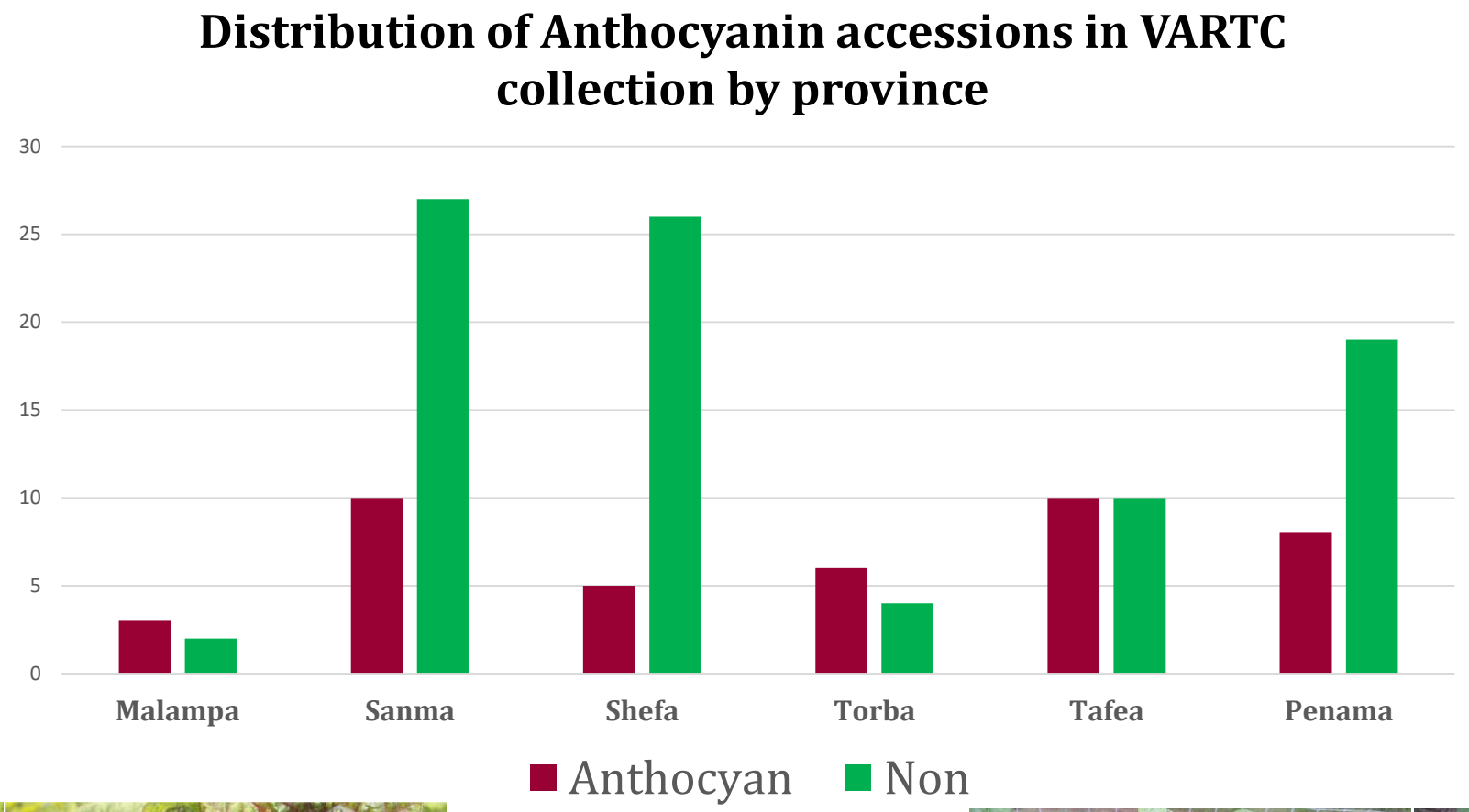
AM VUT 076

AM VUT 252

AM VUT 255

First Results

Presence or absence of anthocyanin



Key descriptors : Leaf shape

3.2.1 Leaf shape

1	Linear
2	Lanceolate
3	Cordate
4	Hastate
5	Sagittate
6	Deltoid
7	Orbiculate
8	Pinnatisect
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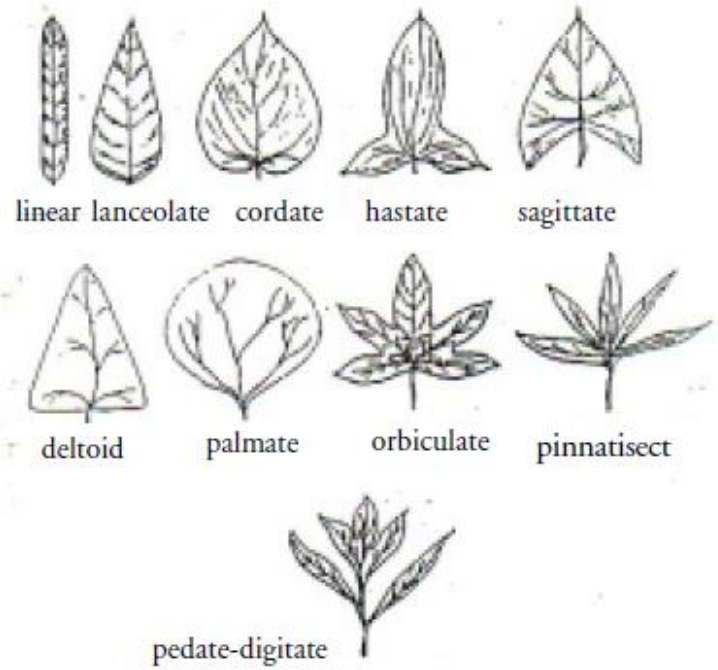
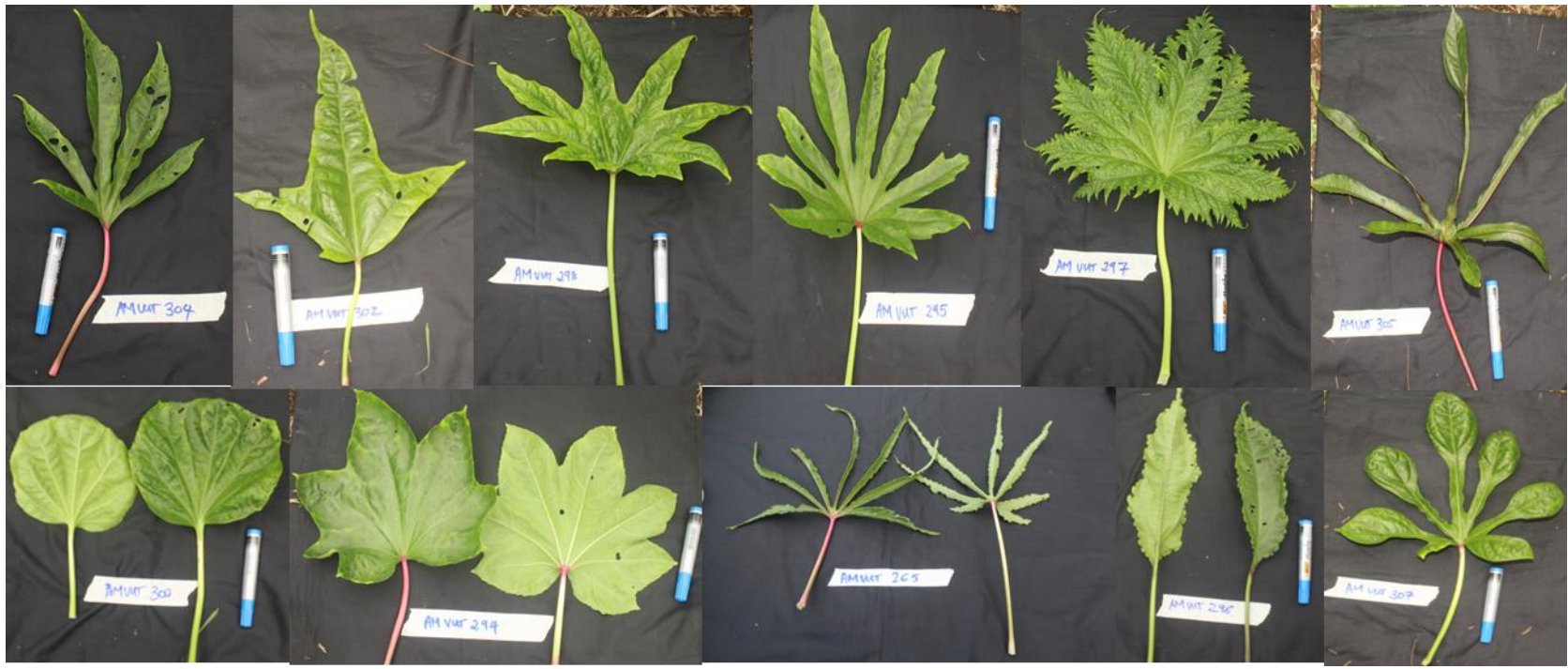




First Results

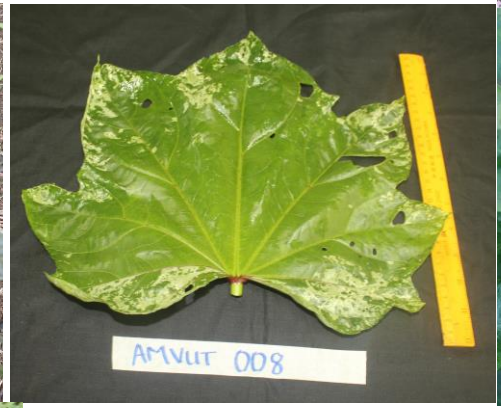
Key descriptors: Leaf colour

3.2.7 Leaf colour

1 Light green
2 Dark green
3 Light/dark green with purple or red spots on upper or lower leaf surface
4 Other (specify)







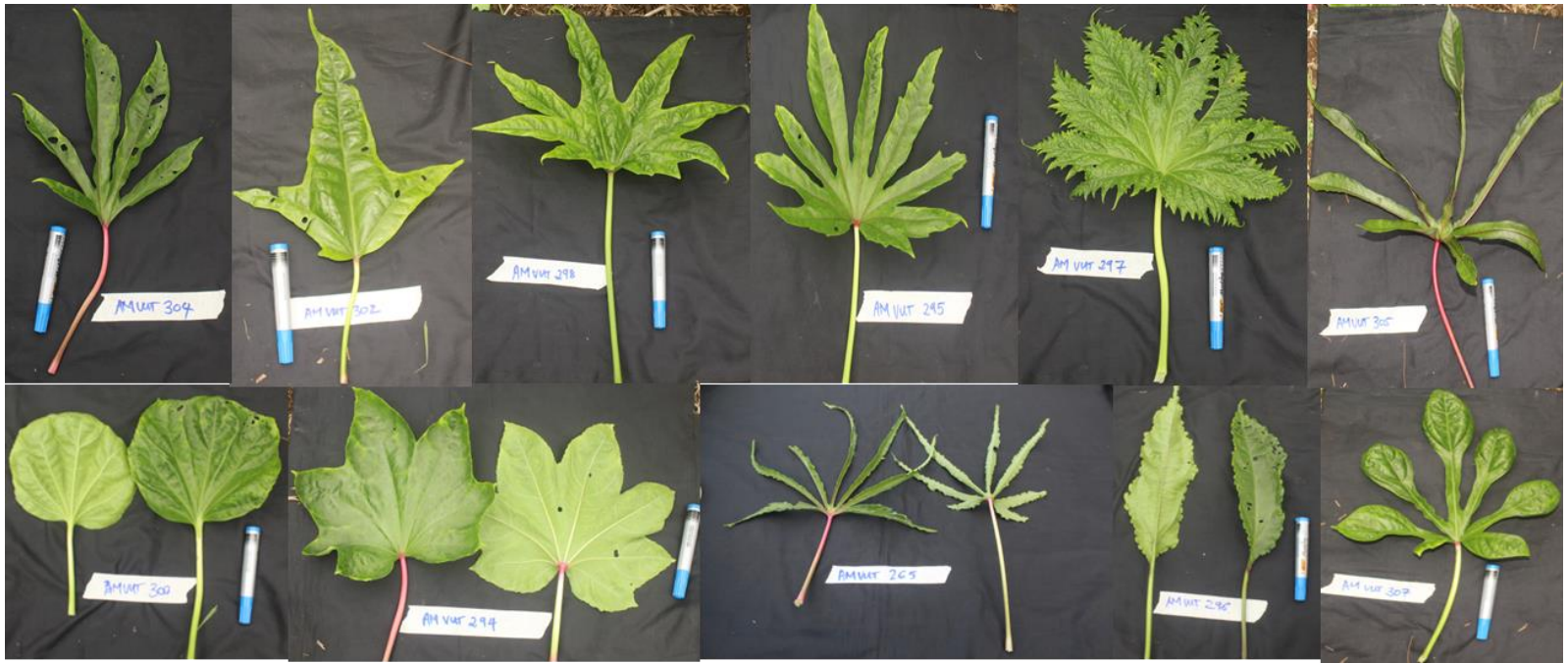




Key descriptors: Leaf segment

3.2.2 Leaf segment shape

1 Acicular
2 Linear
3 Lanceolate
4 Oblanceolate
5 Elliptical



Key descriptors: Level of segmentation

2 levels

6 levels

Complex

Key descriptors: Petiole insertion point colour

First Results

Variety Catalog

Accession Number :VUT 060	Local Name : ECOVOKE

Location		
Country : VANUATU	Province : SANMA	Island : SANTO
Location : NORTH EAST SANTO	Site : PORT OLRY	

Classification	
Scientific Name	Abelmoschus Manihot
Common crop Name	Aelan Kapisch
Local name of the cultivar	Ecovoke
Signification of this local name	All white
Habitat, associated plants	Garden
Recognising descriptors	This cabbage is light green
Origin (provenance and date of introduction)	Santo

Whole plant

Description		
Plant	Height :	1,5 meters
	No pests or diseases	
Stem	Light green, stem is hairless and hollow.	

Leaves, upper and lower sides

Leaf	Leaves are orbiculate, a little cut and each of the three segments is lanceolate. Margin is crenate, tip is cuspidate and base is cordate. Leaves are smooth and dull, dark green (light yellow when young) on the upper side and light green (light yellow when young) on the lower. Their veins and petiole are very light green and its insertion point is light green with pink spots.
Flower	There was no flower but this cultivar will flower in June or July and product seeds too.
Ethnobotany	They cook this one in simborro because it is sweet (but strong when boiled)

Petiole and its insertion point

Collecting Data			
Collecting institute	VARTC		
Collected samples	2 cuttings	Collecting date (DD/MM/YYYY)	17.04.2010
Nursery planting date in VARTC		Field planting date	19.04.2010
Label in the field (field, line, row)	VUT 060		

Island cabbage (Abelmoschus manihot) - CATALOG

Variety Name	0000

Passport ID

Accession cod		Type (Local cultivar or hybrid)	
Genus			
Specie		Origin	
Collection/Creation Date		Conservation site	

Characteristics and performances

Conservation site		Stem color	
plant height		Presence of flower	0
Architecture		Number of fruits/capsules	
Leaf shape/Color		Maturity range	
Leaf color		Yield (Kg	0
Petiol color		Consistence and taste	
Leaf lustre (shine/dull)			

Post-harvest and usages

Dry matter content:	
Conservation	
Oxydation:	
Usage	

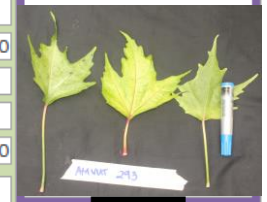
Pestsand diseases

text	

Additional Information

Soil type	
Adaptation	
Popularity	

Picture 1



Picture 2

Picture 3

Picture 4

Vanuatu Agricultural Research and Technical Centre (VARTC) P.O.Box 231, Luganville Santo - Tel: 773 3477 - vartc@vanuatu.com.vu

Way forwards

- Complete database with missing data
- Complete catalog
- Chemical analysis
- Genetic analysis

Thank you for your attention

Methodological orientation test, methodological approaches and first results

25th, 26th and 27th of October 2022

National University of Vanuatu, Port Vila

Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality

Gilbert David

IRD, UMR Espace-Dev

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

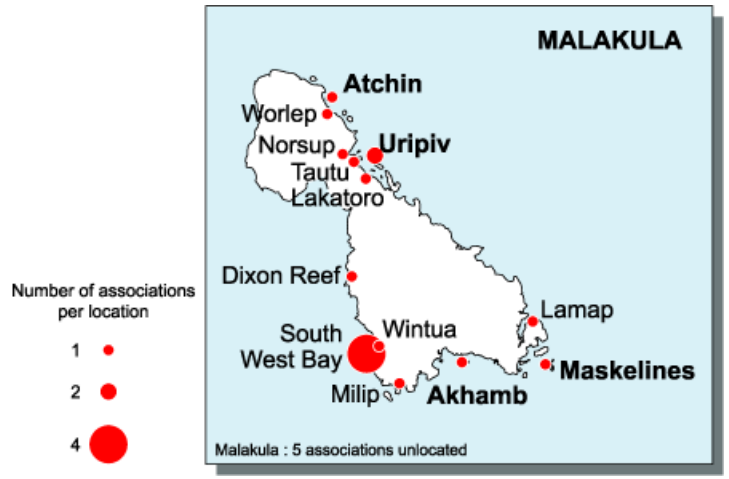
Situation of Vanuatu fisheries in the 1980's

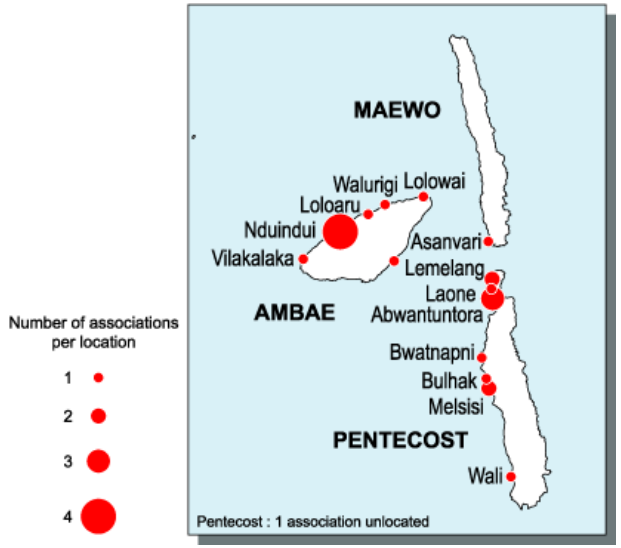
The new government of Vanuatu wanted to diversify its economy and develop artisanal fishing with two targets:

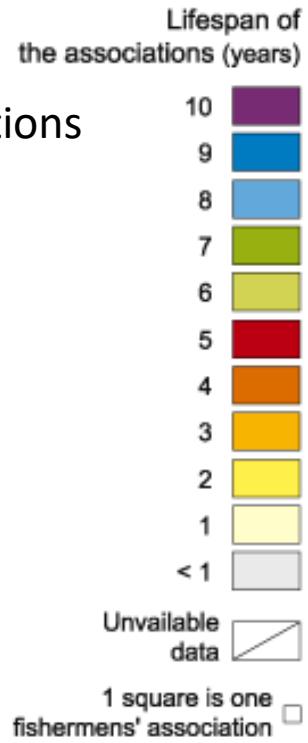
a) pelagic resources (skipjack, yellow fin tuna) around anchored FADs,

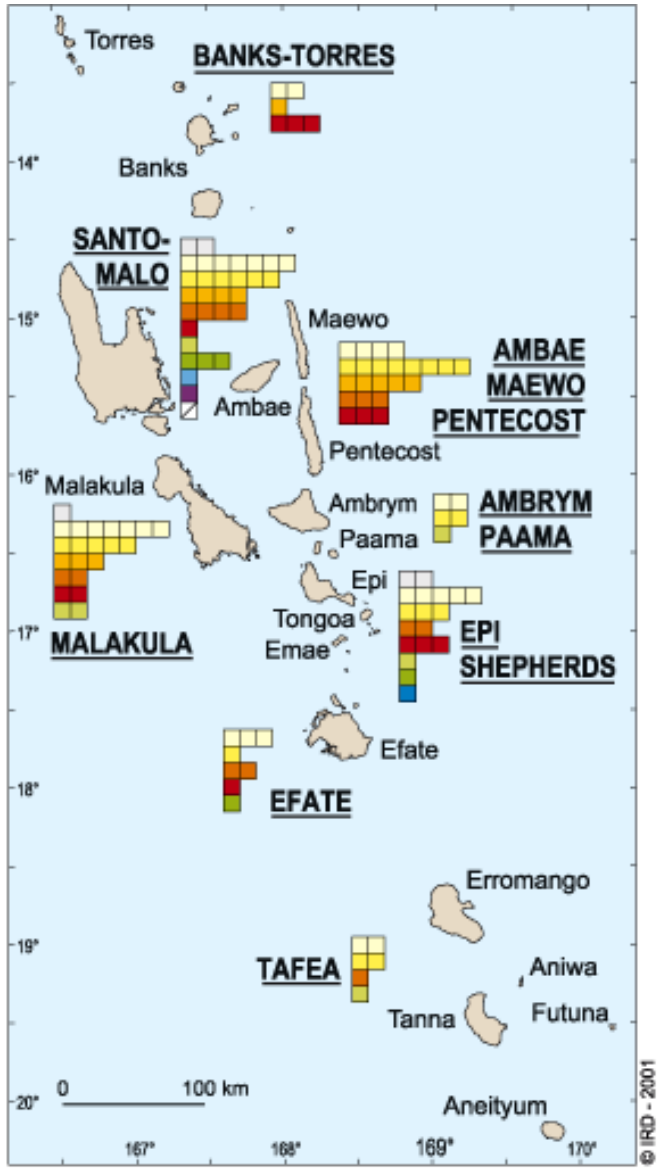
b) deep-sea demersal resources (snappers, poulet fish)

Through the Village Fisheries Developement Programme (VDFP), 119 associations of fishers were created and monitered from 1981 to 1992









Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

Situation of Vanuatu fisheries in the 1980's

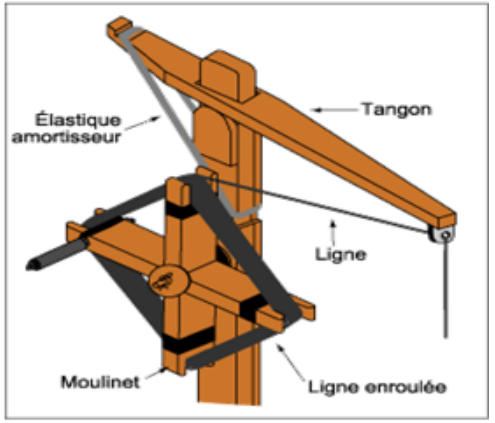
This fisheries development is a true blue revolution:
new fishing gears and techniques, new fishing grounds, new target species, with the aim of developing the cash economy in the islands and supplying the Port-Vila market.

Return from a good fishing trip

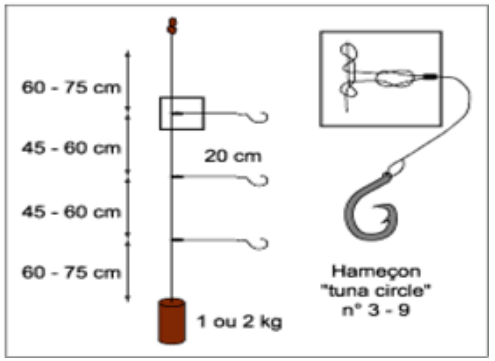
During a single fishing trip,
a fisherman may fish at different depths,
so catches are very diversified

Catch of big red snapper
(Etelis carbunculus)

Le moulinet manuel de pêche
(type Samoa Occidental)



Le bas de ligne



Harvey single-hull boat with two rear-mounted fishing reels

Alongside this fast-growing modern fishery, small-scale family fishing was totally invisible,

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

Why was family fishing invisible ?

Hand spears used for fishing on the reef flats

Shoreline fisherman with a cast net

Traditional bows are also used for fishing

As family fishing was a subsistence activity, it was assumed to be very unproductive. Although it involved a large number of people, fisheries production must have been very marginal in the island's economy, as it was outside the market economy.

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

How did small-scale family fishing emerge from invisibility?

1. The Invisibility of family fishing is a fact

1983: First agricultural census of Vanuatu : 126 villages, 669 households investigated

Fishing production was assessed indirectly by asking about the previous week's catches and then extrapolated to the total Vanuatu population during one year ⬇

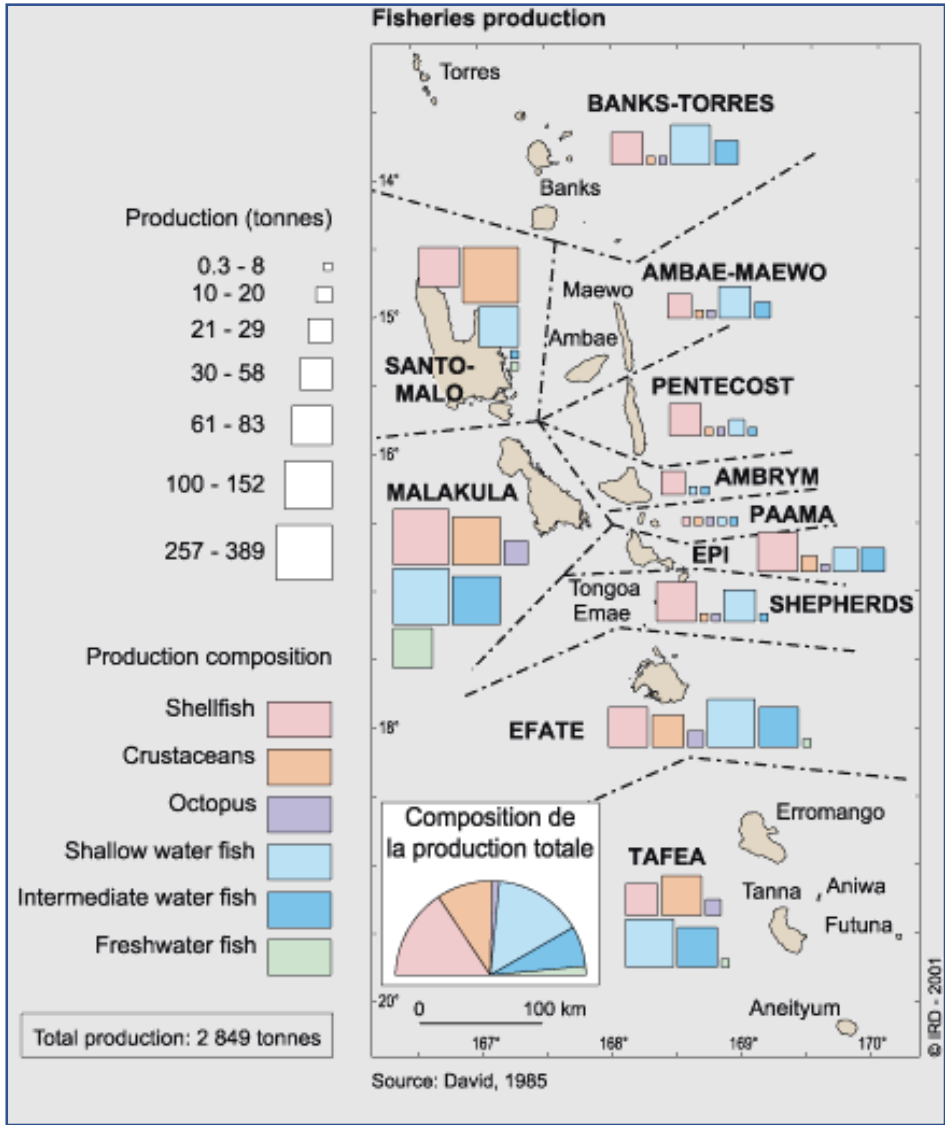
2849 t: **47 % fish, 31 % shellfish, 19 % crustaceans, 3% octopus**

Fish	0-10 m	10-100 m	Freshwater
tonnes	865	387,4	85,7

	Shellfish	Crustaceans	Octopus
tonnes	892,9	547	71

What is the use of such results for island economy ?

Earnings ? Food security ? Gender issues ?



Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

How did small-scale family fishing emerge from invisibility?

2. Moving from seafood production to protein supply

from one kg of product	Octopus	Fish	Shellfish	Crustaceans
Edible part (g)*	950	450	370	310
Protein content (g)*	150,1	85,5	37	55,8

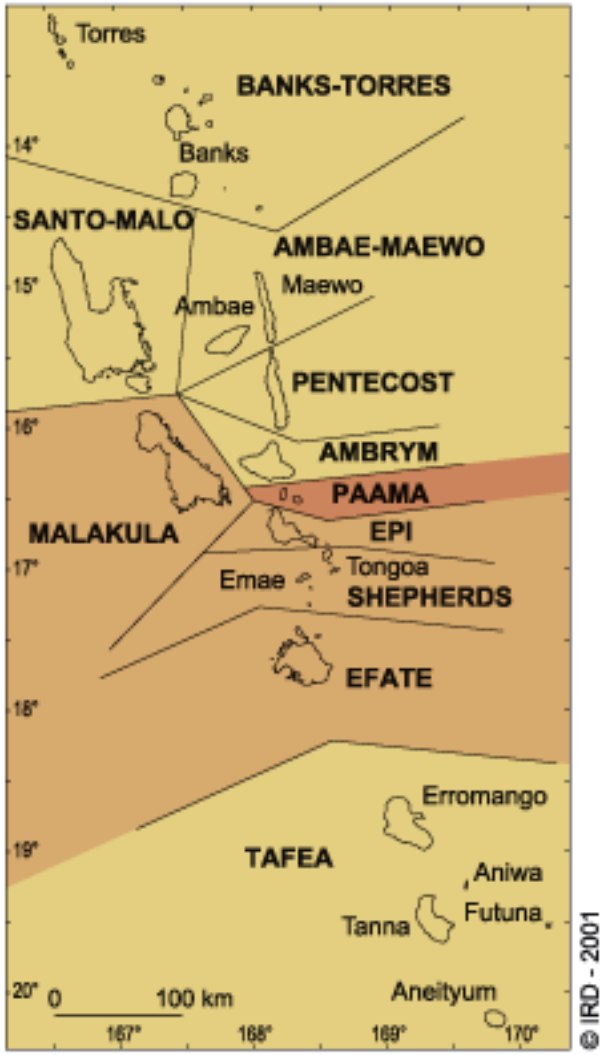
From SPC (Jardin et Crosnier, 1975)

	Fish 0-10 m	Fish 10-100 m	Freshwater F.	Shellfish	Crustaceans	Octopus	total
Production (t)	865	387,4	85,7	892,9	547	71	2849
Protein supply (t)	74,2	33,4	7,4	33	30,3	10,7	189

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

2. **Moving from seafood production to protein supply**

Diversity of the protein supply



Source: David, 1985

	Number of categories of products	Protein supply
	5	Highly diversified
	4	Normally diversified
	2 - 3	Less diversified

Shallow water fish

Crustaceans

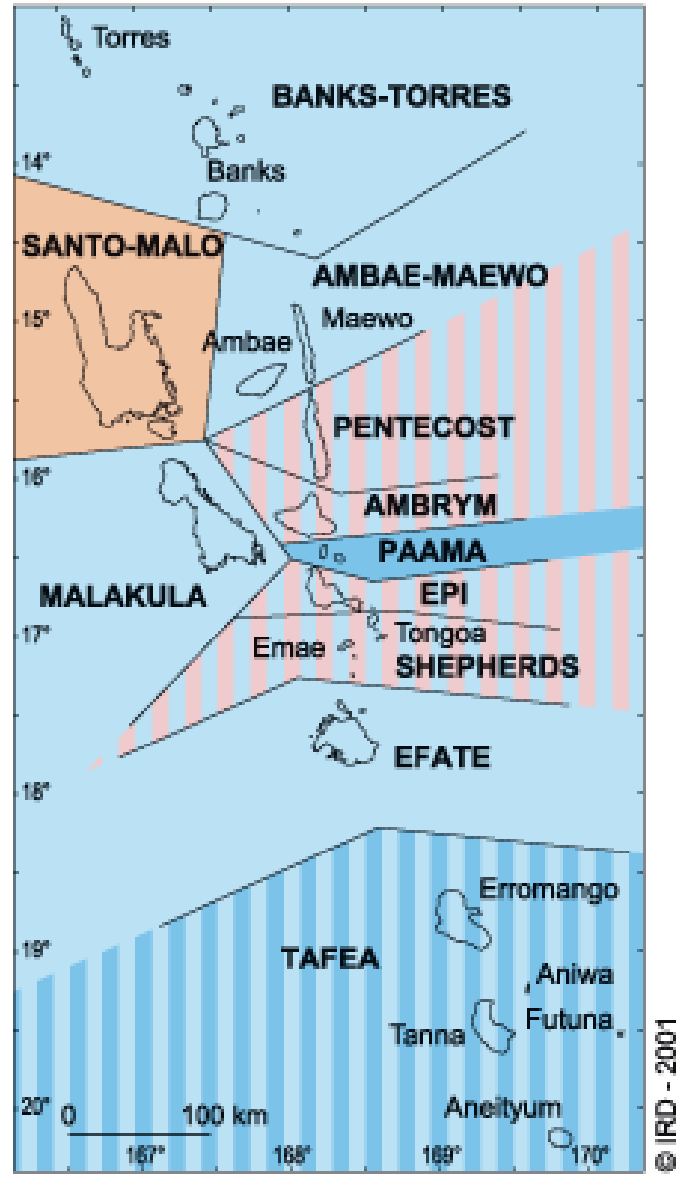
Intermediate water fish

Shellfish and shallow water fish

Shallow and intermediate water fish

(Products representing at least 30% of the total supply)

Composition of the protein supply



Source: David, 1985

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

How did small-scale family fishing emerge from invisibility?

3. Show the contribution of family fishing to cover the proteins needs of the population

Population (n. inhabitants)		Protein needs (t/year)	% of protein needs covered by the fish supply*
Total	124,000	2,263**	8,35
Rural	101,500 inh.	1,852.37	10,2
Coastal	75,100	1,370.57	13,8

*189 tonnes in 1983 228to 263 ** Per capita needs of proteins are 50 g per day and, 18,25 kg per year.

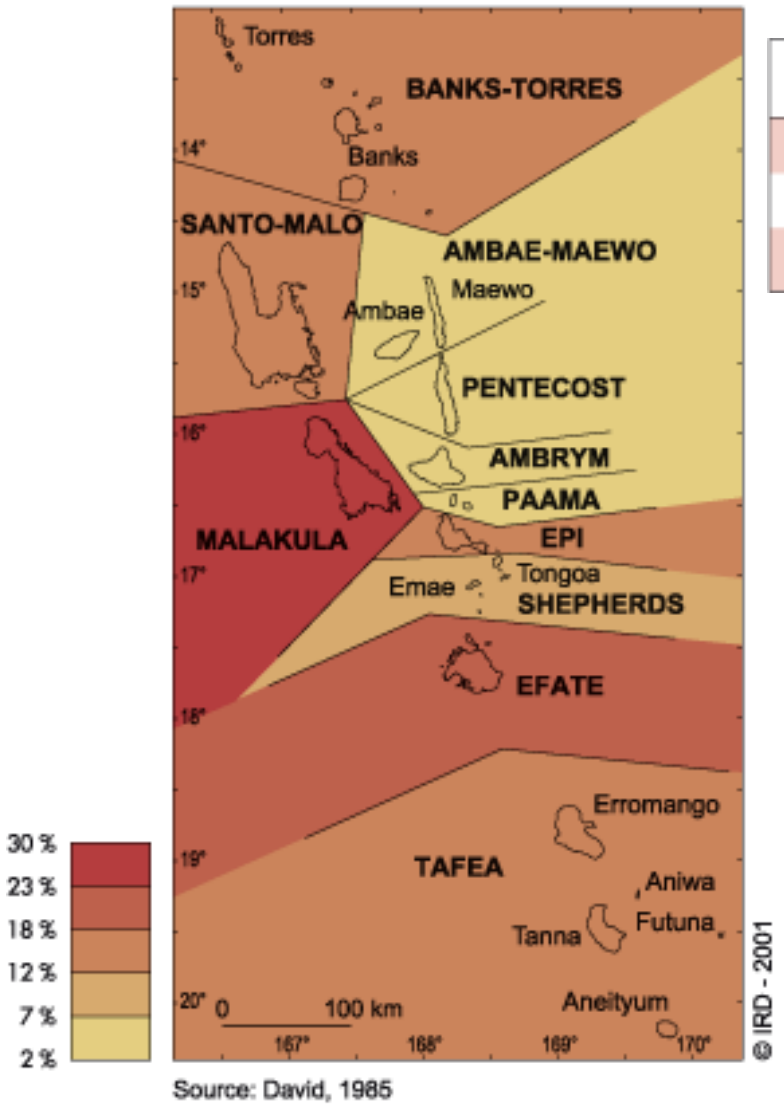
At the planet level, fish consumption was about 13 kg/year in 1984. It provided 1.11 kg of protein which contributes to cover 6 % of the proteins needs of humans.
Situation in Vanuatu was quite better than the worldwide situation

Family fishing provided 61 to 65 % of the Vanuatu seaproteins supply,
Artisanal fishing which concentrates the financial assistance of the governement only 3 to 5 %
Canned seafood products: 31 to 34 %

Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

3. **Show the contribution of family fishing to cover the proteins needs of the population**

Covering protein needs



Source: David, 1985

Composition and protein value of fisheries products

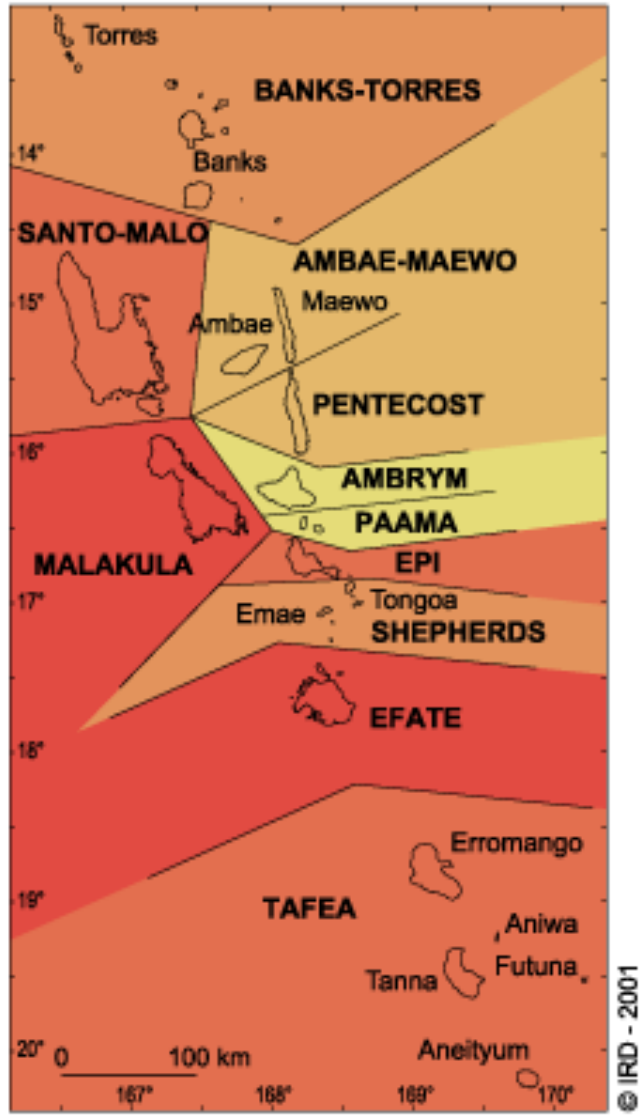
Production	Fish	Shellfish	Crustaceans	Octopus	Total
Total	47%	31.5%	19%	2.5%	2 849 t
Edible	51.6%	28.1%	14.5%	5.8%	1 170 t
Protein	61%	17.4%	16%	5.6%	189 t

Consumption and protein supply (kg/household)

Foods		Protein supply
122 - 166		21 - 27
84 - 106		14 - 15
63 - 69		9 - 11
33 - 34		4 - 6
15 - 16		2 - 3

Source: M. Hung, 1983

Protein supply



Tite: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

How did small-scale family fishing emerge from invisibility?

4. Pricing the family fishing production

Usual way : pricing self sufficiency products according to the market prices

Problem : the fish market was in Port-Vila. In islands, the only market price deals with canned tuna

Solution : Pricing the kg of proteins coming from the canned fish and use it as a proxy for pricing the family fishing production

The price of a kg canned fish in oil is 235 vt. It provides 141,2 g de protéines with a price of 1,664. 3 vatu/ kg of protein

The family fishing produced 189 t of protein in 1984 for a total value of 314.554 millions vatu.

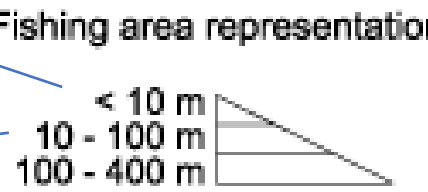
Each ton of protein was equivalent to 5.715 t of canned fish and all family fishing production was equivalent to 1081 tonnes of canned fish. In 1984, 795 t of tinned fish were imported with a price of 120.6 vatu per kg. Thus the **value of family fishing is 130.264 300 vatu** that has been saved for the country's economy by avoiding importing an equivalent value of canned fish.

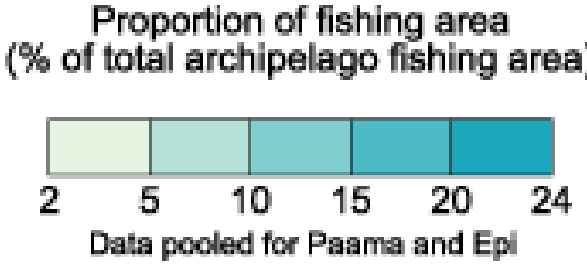
Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

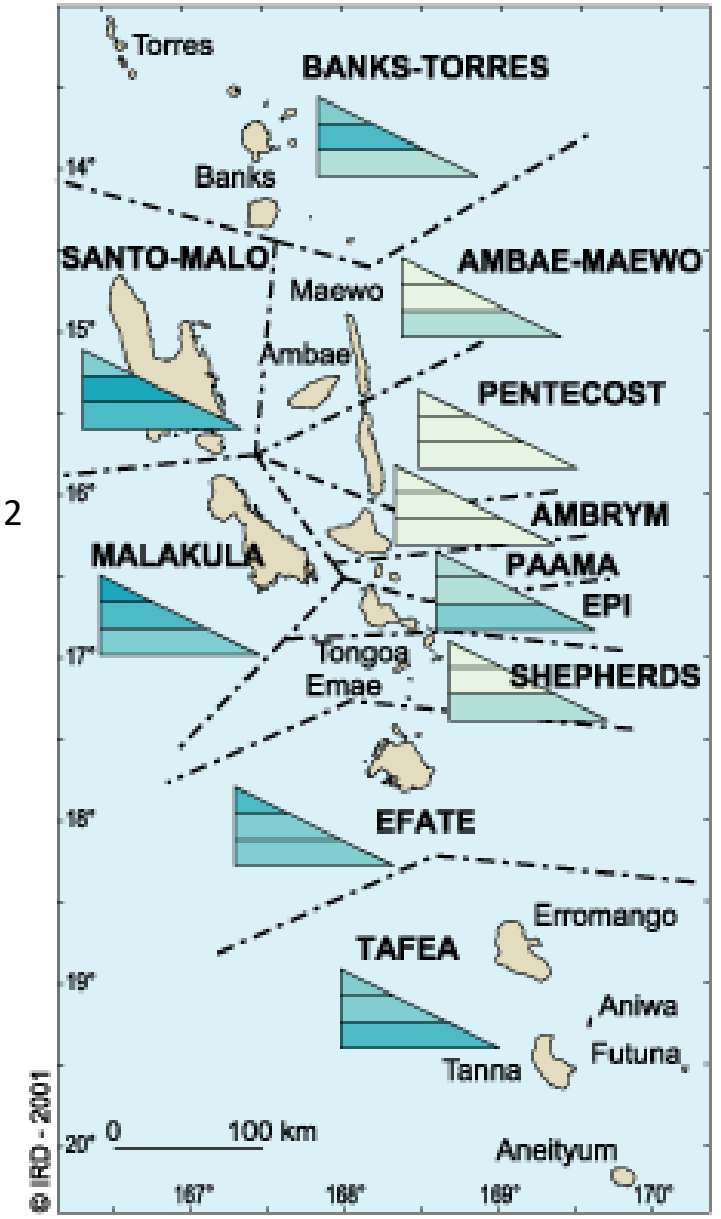
Was family fishing sustainable ?

Production : 2221,3 tonnes on 448 km² ⟹ 4,96 t / km²,
When the reef ecosystem in good health, production can reach 38,5 t / km²

Production : 531,4 tonnes on 2639 km2
0,20 tonnes t / km²







Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

AND NOW ? Necessity to refresh data, notably in terms of fishing pressure

1979 : 111 251 people 1989 : 142 944 people
2021 : 319 137 people

The reef ecosystem is less healthy than in 1983

The fish biomass is less important but the fishing pressure quite higher

Has small fishing kept its major role in supplying the population with protein?

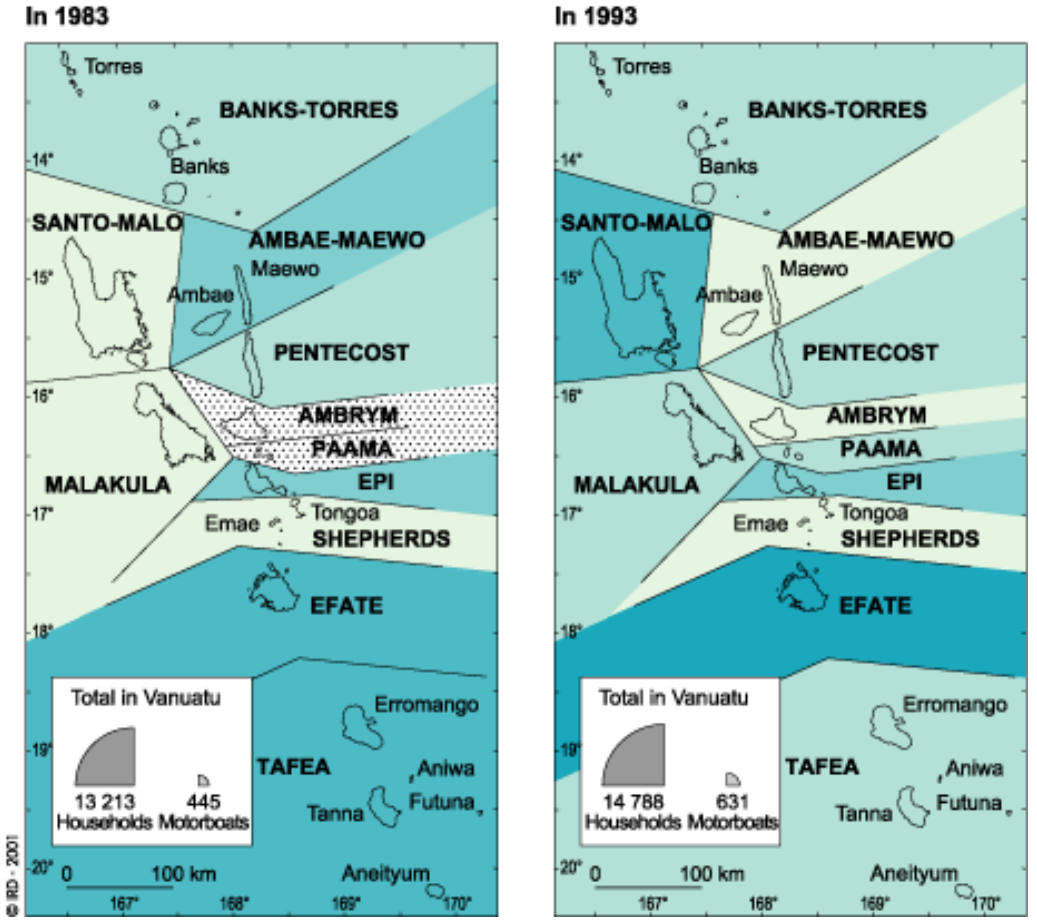
Households (%) owning a motorboat

1 3 5 7 10 12

Shortage of data

Sources: David, 1985; Statistics Office, Port Vila, 1994

Can the reef ecosystem provide in a sustainable way this protein supply ?



Title: *Back to the 1980's, Village fisheries in Vanuatu. From invisibility to an emerging economic reality*

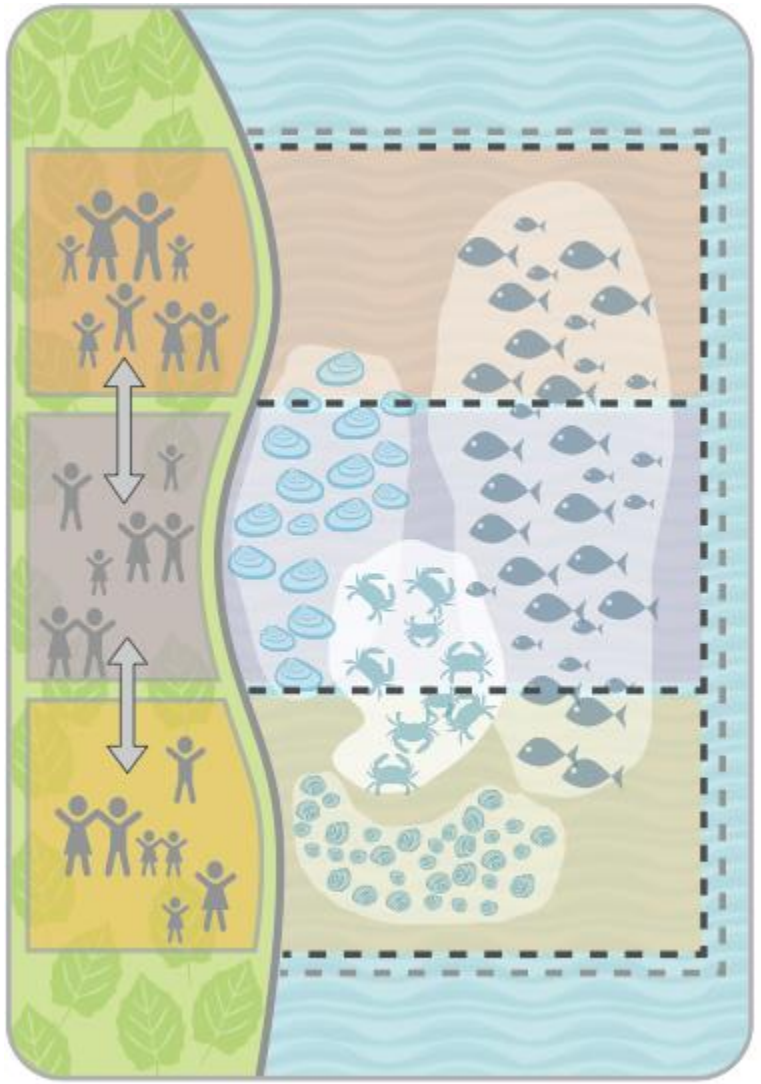
COULD LMMA's BE THE SOLUTION TO SYSTAIN FAMILY FISHING ?

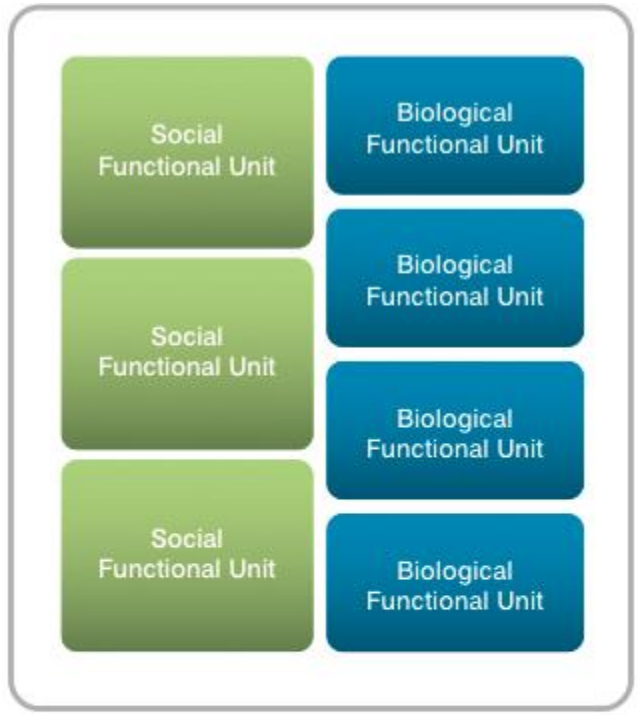
The emergence of LMMA's

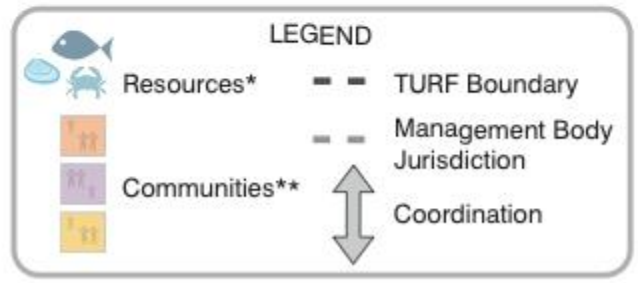
LMMAs aim to revive traditional taboos by prohibiting all fishing for several months or years at a village scale

Main assumption of promoters of LMMAs:
LMMA is efficient because fishing and management are carried out at the same geographical level by the same stakeholders.

Science outputs
- LMMAs are ineffective in terms of stock replenishment if carried out at the village level. The biological fonctionnal unit may be quite wider than the social functionnal unit.
Effective LMMAs require:
1. a strong governance at the village level
2. Coodinations between villages







* Resources represent biological functional units.
** Communities represent social functional units.

MERCI POUR VOTRE ATTENTION

ANY QUESTION ?

FALAH
Family farming, lifestyle & health

FAMILY FARMING, FOOD AND HEALTH IN INTERTROPICAL ISLAND COUNTRIES AND TERRITORIES

20th, 21st, 22nd of June 2023 - Port Vila, Vanuatu

- DAY 1 -

Axis 1 : Presentation 1.5

(20th june 2023)

Contributions of satellite imagery and spatialized data to map small agricultural areas and their evolution in tropical island environments

Pr JM. FOTSING (UNC), **Dr M. DESPINOY** (IRD ESPACE-Dev)
Dr P. DUMAS (UNC / IRD ESPACE-Dev), **M. T. GAILLARD** (ECOSOPHY)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

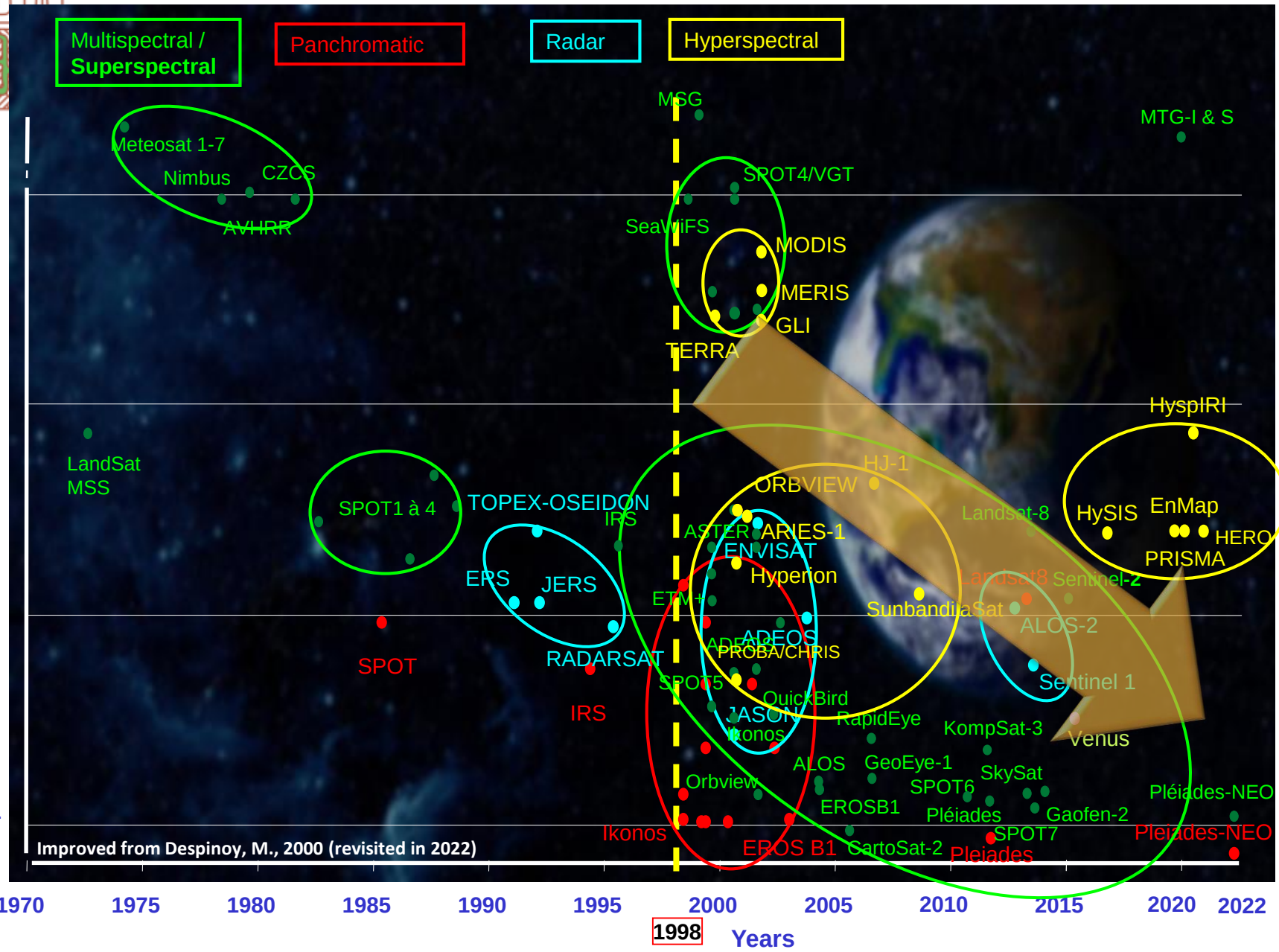
Plan

1. **Satellite evolution: state of art**
2. **From images to land** (geographical point of view : landscapes)
   - Different scale of observation (4 levels)
   - Relations between data (input and output) and processing methods
   - Overview of processing methods of spacialized data
3. **Use of imagery at different scales in tropical environment (family farming areas)**
   - Potentiality at Regional scale
   - Potentiality at Local scale
4. **Conclusions**

Objectives

Geospatial analyses for cartography the farming areas and dynamics (downscaling : urban and peri-urban area)

1. Satellites evolution (1972-2022)



In the last two decades :

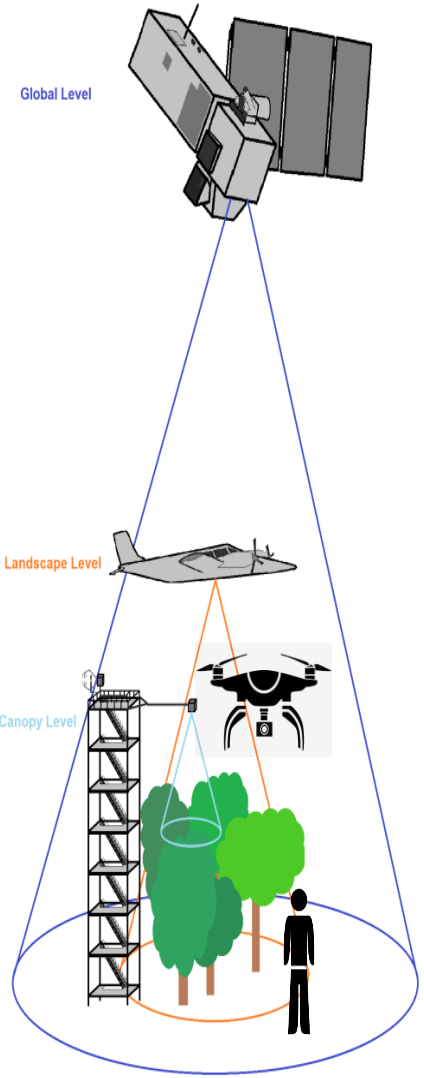
- More Hyperspectral data (hundreds of wavelength)
- More superspectral data (dozen of wavelength)
- More multispectral data (less than 10 wavelentgh)
- Very high spatial resolution emergence from 2,5 m to 0,3 m (WorldView, Pléiades, Pléiades NEO...)
- More temporal data (6 days revisit: Sentinel) : time series

Smaller and smaller pixels
⇒ Clarification of observation details
⇒ More precise spatial analyzes

The use of satellite imagery series (SPOT, Quickbird, Ikonos, Pléiades...) over Sub-urban cultivated areas to analyze the dynamics (migration of people, politics…)

2. From images to Land

Different scales of observation : different informations
=> Geographic scales (3 levels + 1)



Global scale - Level 1 (From world to country)

- Global changes (Large-scale transformations)
- 50 km to 1 km

Regional scale - Level 2 (From City to allotment gardens…)

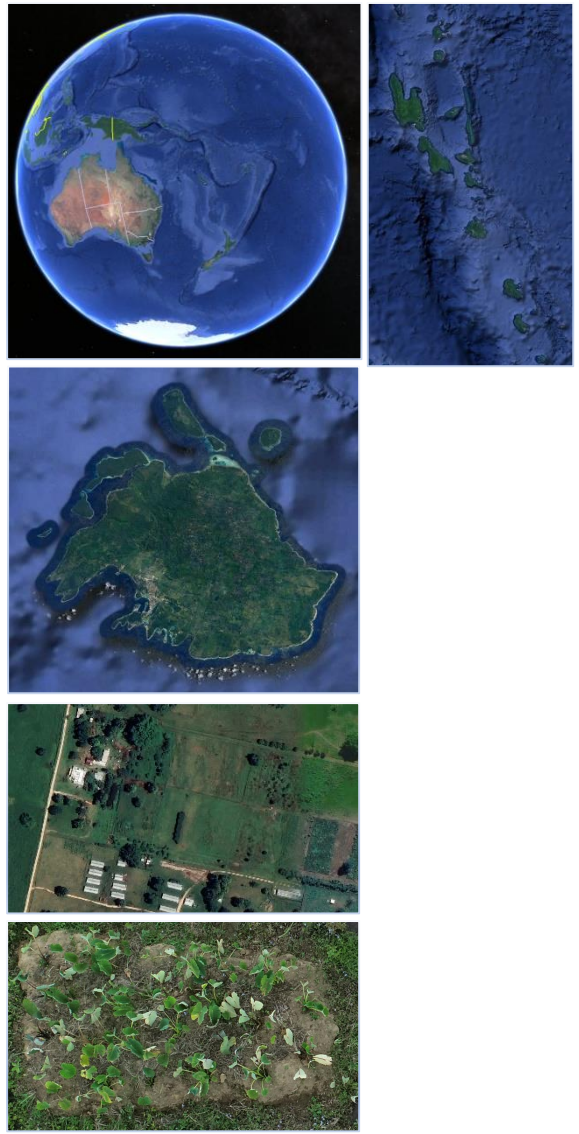
- Land cover / Land use
- Thematic approches… (Landscapes)
- 80 m to 10 m

Local scale - Level 3 (From **parcel** to Plants)

- Rural/Urban areas: Plots, houses, roads, buildings...
- 10 m to 0,01 m

Sites/station scale **- Level 4**: Ground observations (details….Field)

Case studies: urban and peri-urban spaces



© Google-Earth

2. From images to Land : Treatments methods for spacialized data

Imagery treatment methods for island tropical environment

Tropical environment

- Fuzzy environment with mixed vegetation,
- Cloudy
- Rapid evolution of the environment...

Different methods exists for imagery treatments

- Automatic (neo-channel, classifications)
- visual interpretation (vectorization, classification…)

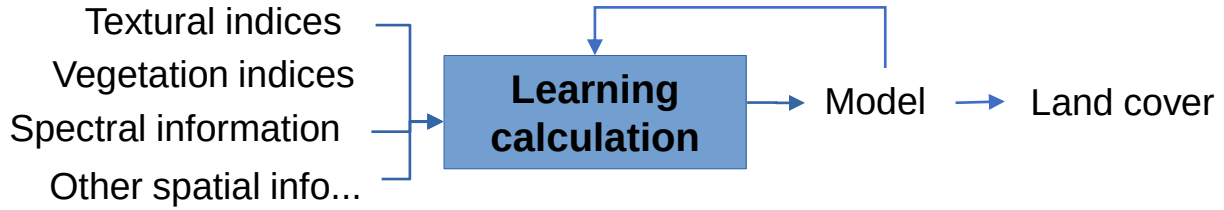
BUT Visual interpretations quickly become ineffective given the amount of information (inside the image, temporal analysis)

➡ **Main challenge** = manage and treat this huge amount of data (Zafari and al., 2019)

✓ « *Efficient supervised classifier should address* » :

- *Handling the Hughes phenomenon or curse of dimensionality that occurs when the number of features is much larger than the number of training samples*
- *Dealing with noise in labeled and unlabeled data, and reducing the computational load of the classification*

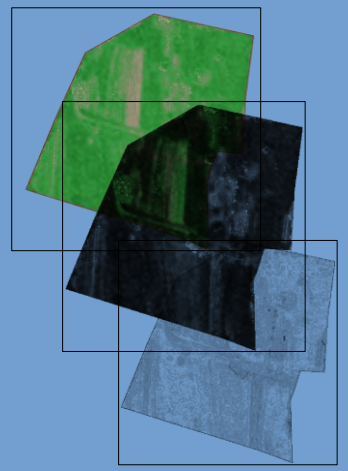
✓ The kernel methods generally show good performance for high-dimensional problems (SVM, classification trees : RF, XGBoost…) = **machine learning algorithms**



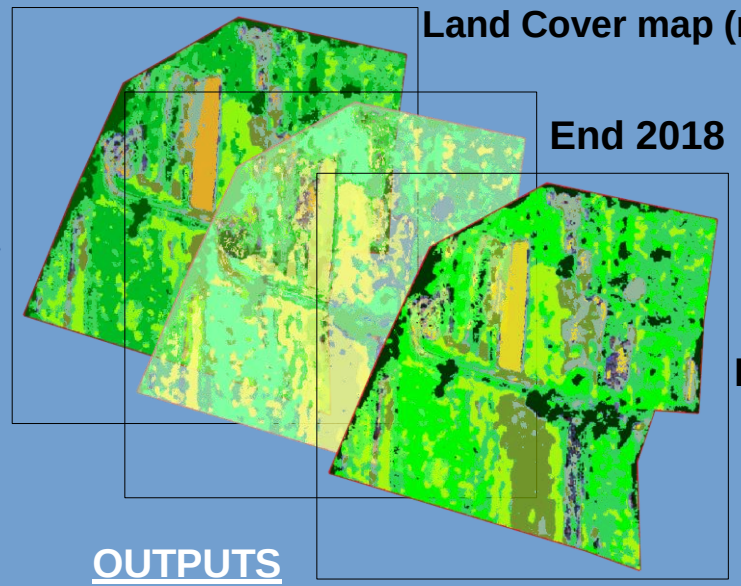
2. From images to Land: RS vs GIS approaches

RS Analysis : submetric satellite imagery (XGBOOST method)

Example of cultivated area (North-Eastern coast of NC) - Pleiades imagery of Mai 2018



Texture, veg. Indice, spectral...



OUTPUTS
Family gardens cartography series

GIS Analysis

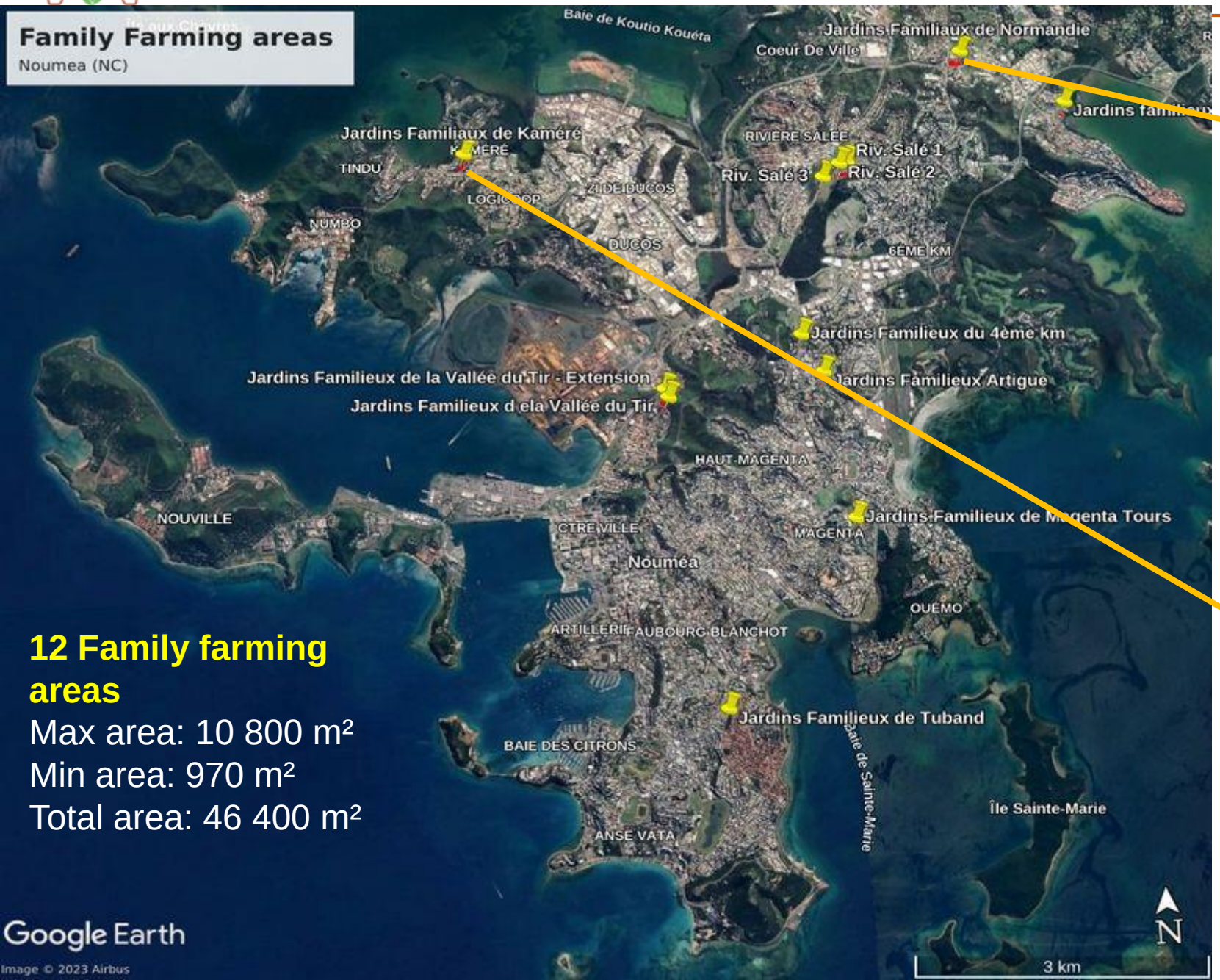
- **Land cover classification**
- **Time evolution of LC**
- **Area**
- **Geographical situation**
- Nb of person / areas
- **Climate impact (stress indices series)**
- Economics info
- Date of installation
- Cadastral info

Geo Database/GIS

Area extension
Nb expansion
Density (area / hab)
Climate change adaptation
Economic adaptation
Resilience
...

Potentiality of imageries at <u>Regional</u> scale in a tropical environment (family farming areas)

Family farming over Noumea (NC)



12 Family farming areas

Max area: 10 800 m²

Min area: 970 m²

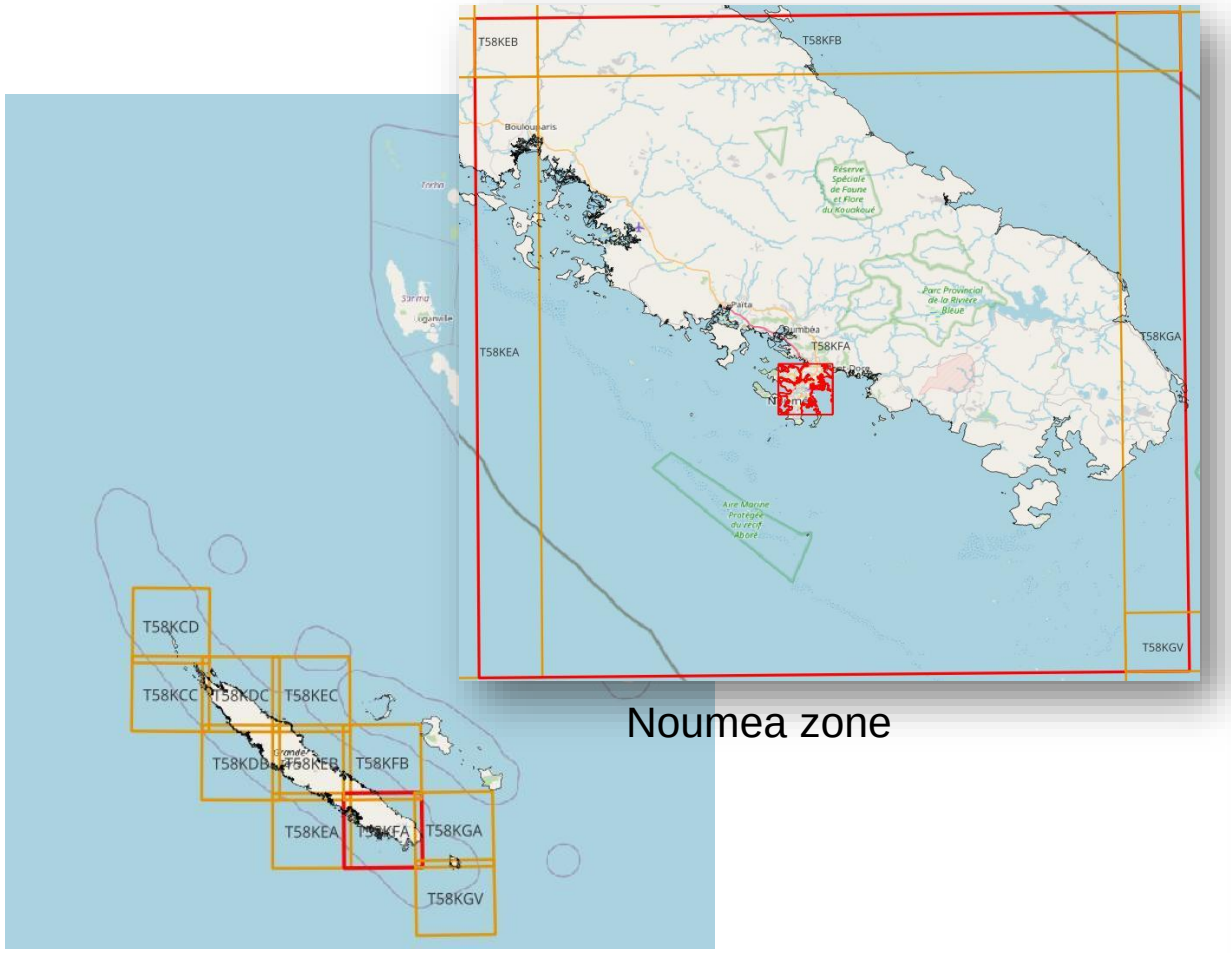
Total area: 46 400 m²

Normandie, 12th 2020

Kamere, 10th 2021

Family farming over Noumea (NC)

Extraction of Sentinel 2 imagery



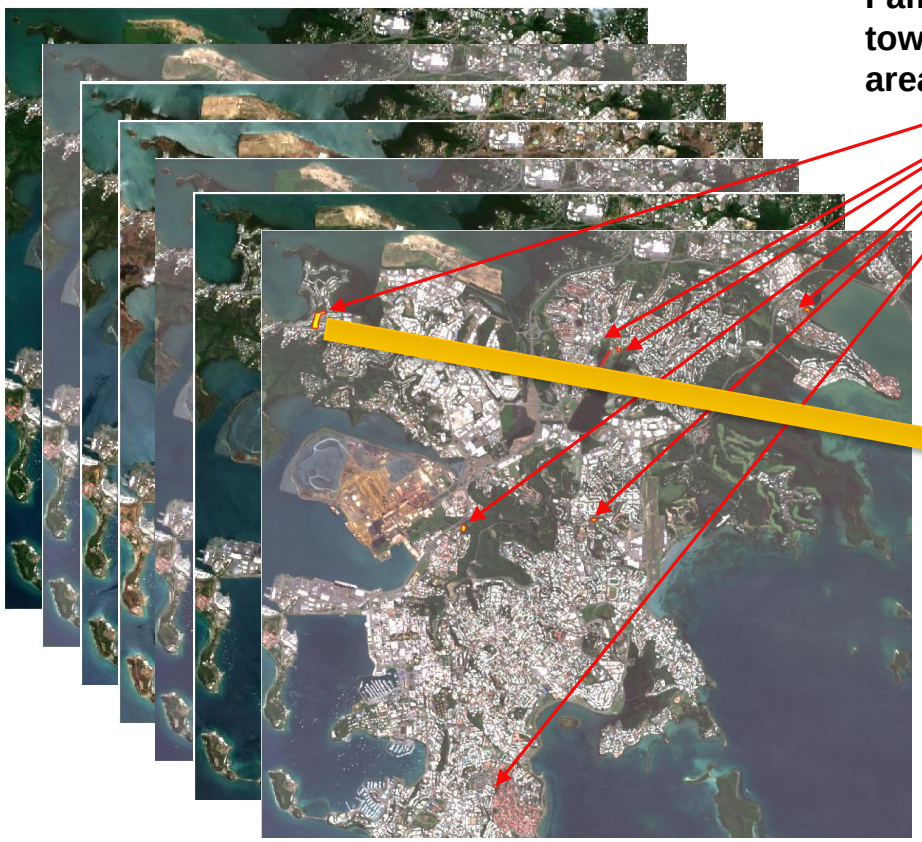
Noumea zone

Footprint of Sentinel 2 imageries over NC (Noumea in red)

Extraction on Noumea (red polygon)

Family farming over Noumea (NC)

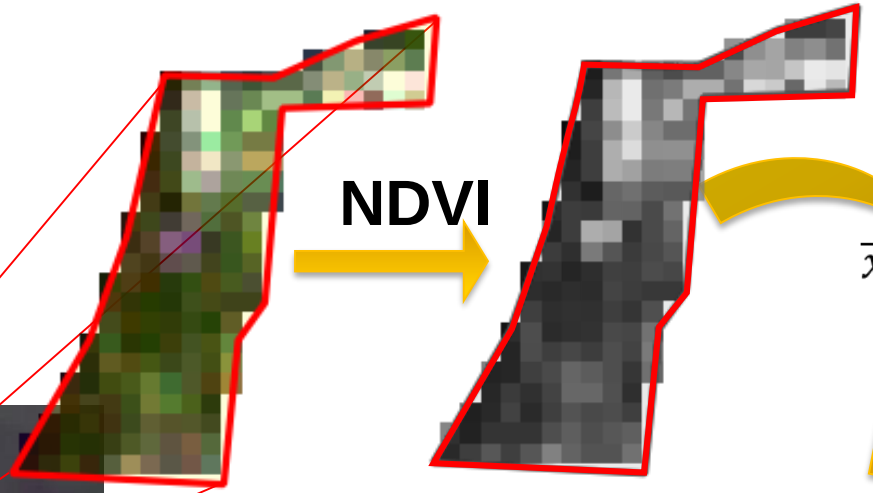
- Download Sentinel-2 images (THEIA): 59 uncloudy images / dates
- Focus on Noumea family gardens (7 gardens) : pixel values extraction / each garden
- Vegetation indices calculation (reactive to chlorophyll activity)
- Chronological statistical results by garden: Mean values series calculation (pixel values)



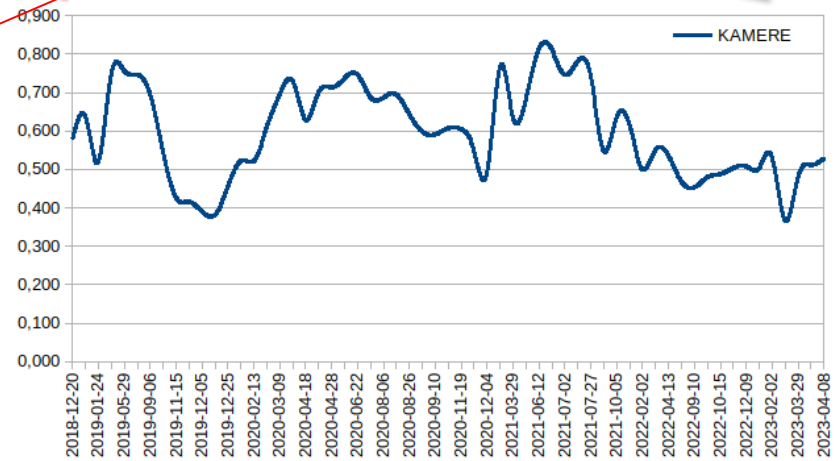
59 Sentinel-2 images (from dec 2018 to juin 2023)

Family gardens on Noumea town (distribution and areas)

Ex : Kamere garden



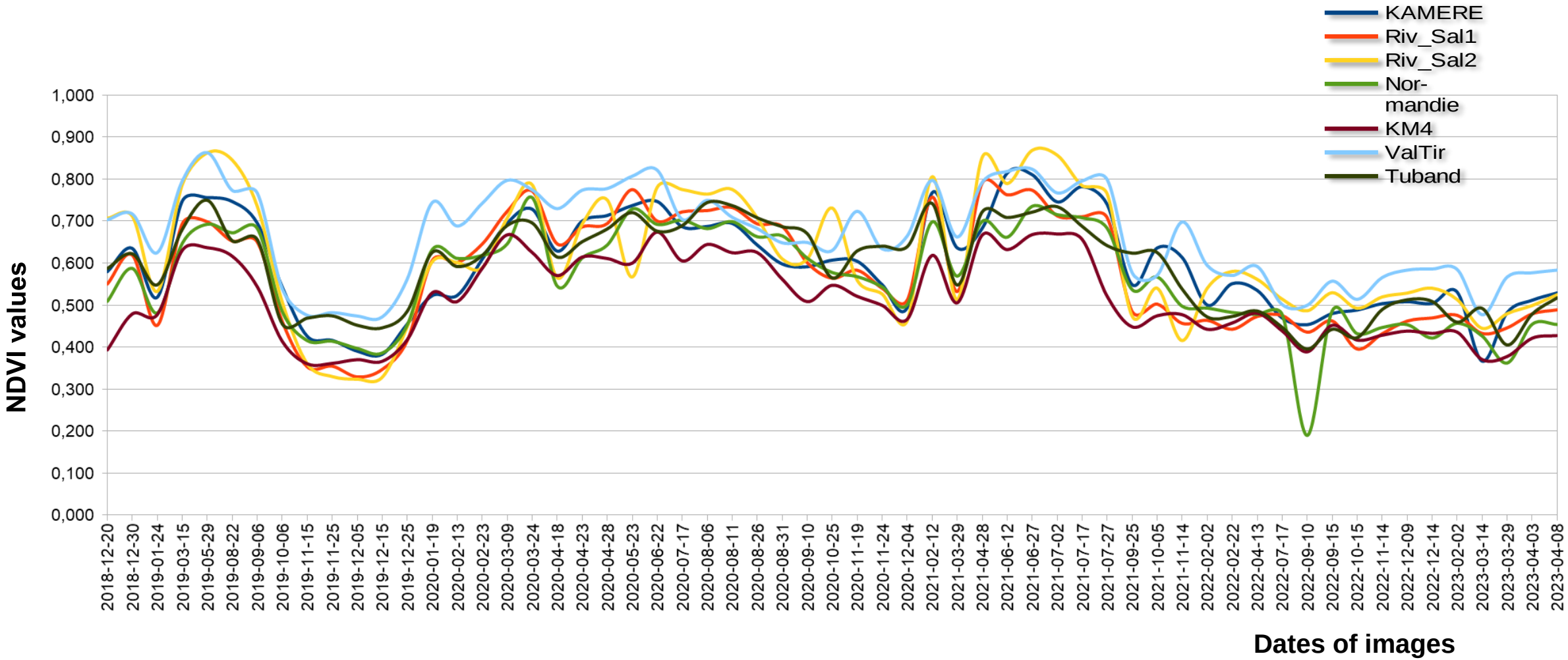
$$\overline{x} = \frac{1}{n}\sum_{i=1}^{k} n_i x_i$$



NDVI mean on Kamere garden over 4,5 years

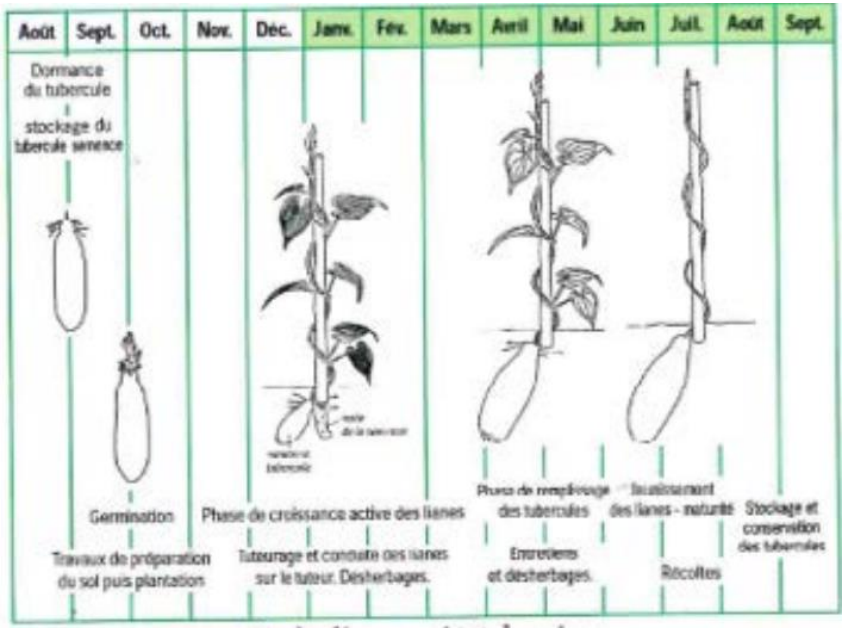
Family farming over Noumea (NC)

Chronological statistical results by garden: Mean values series calculation (pixel values)

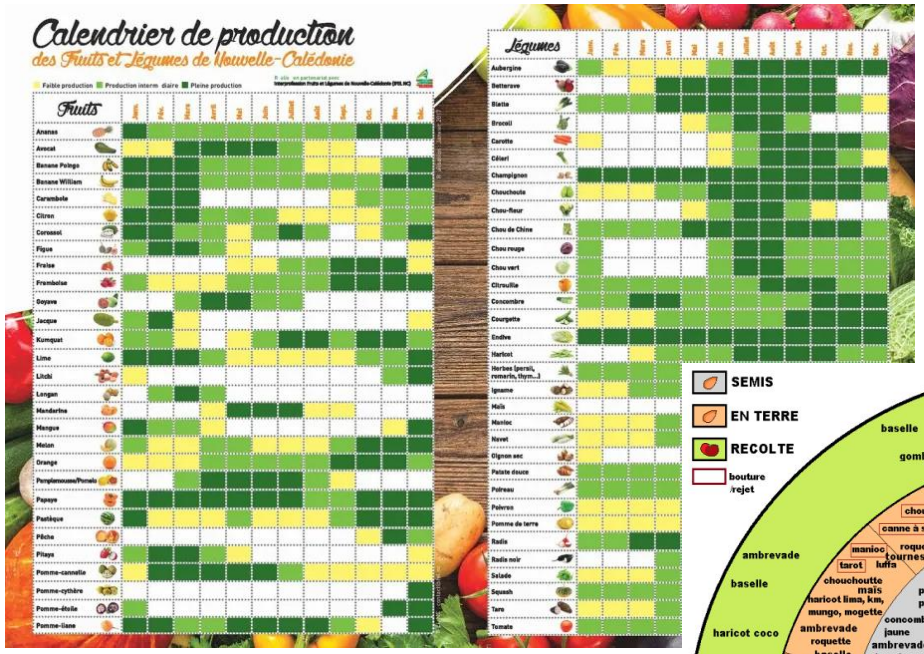


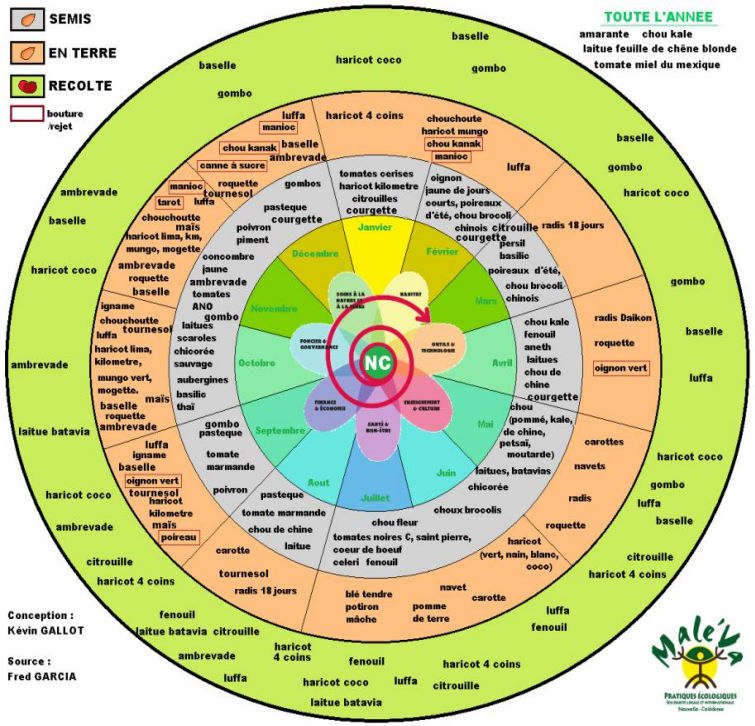
Family farming over Noumea (NC)

Farming calendar



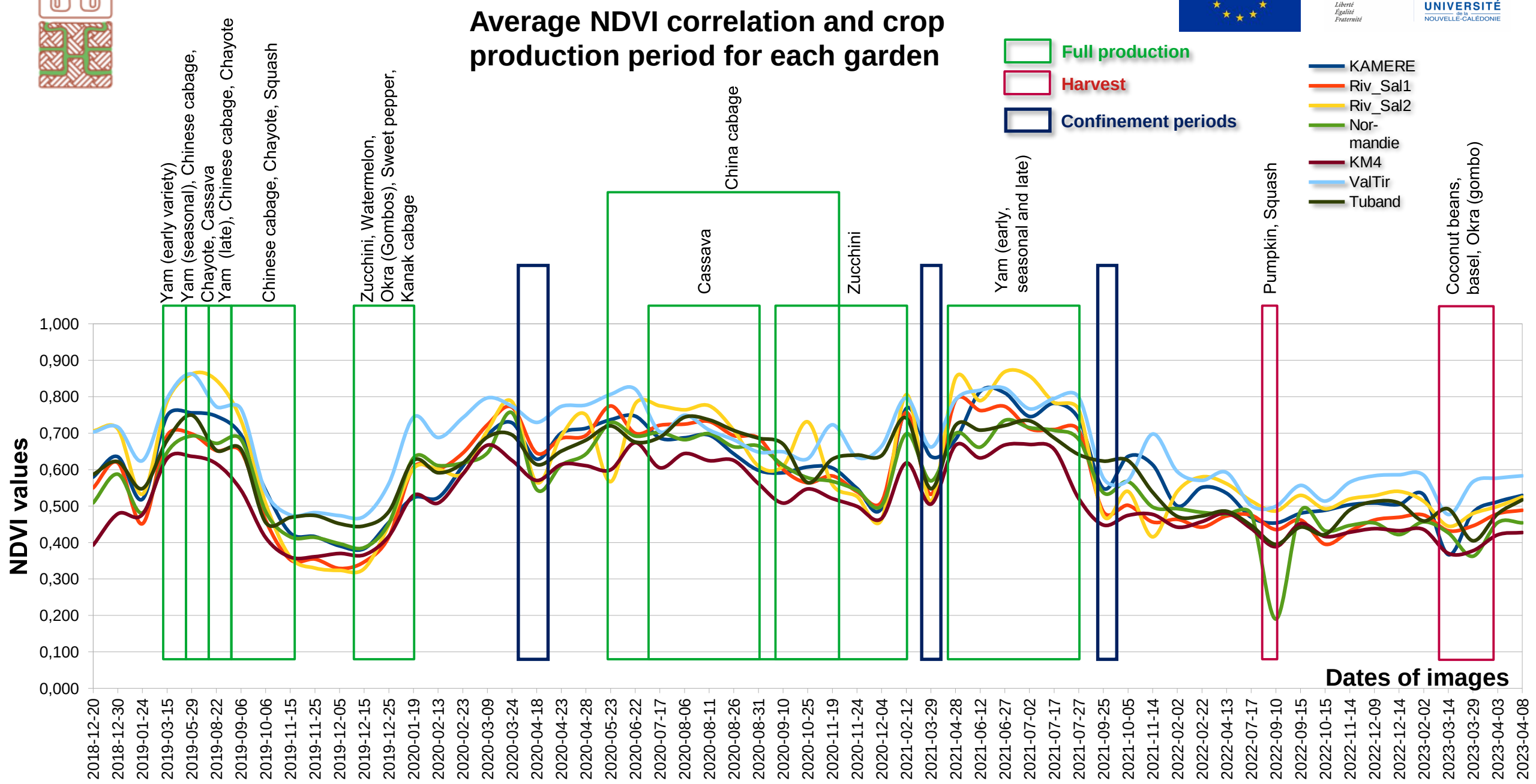
Yam calendar in NC
(Source : Dir. Dept. Rural Prov. Sud)





Production calendar (source : Asso. MALE'VA)

Family farming over Noumea (NC)



3. Use of imagery at different scales in tropical environment (family farming areas)

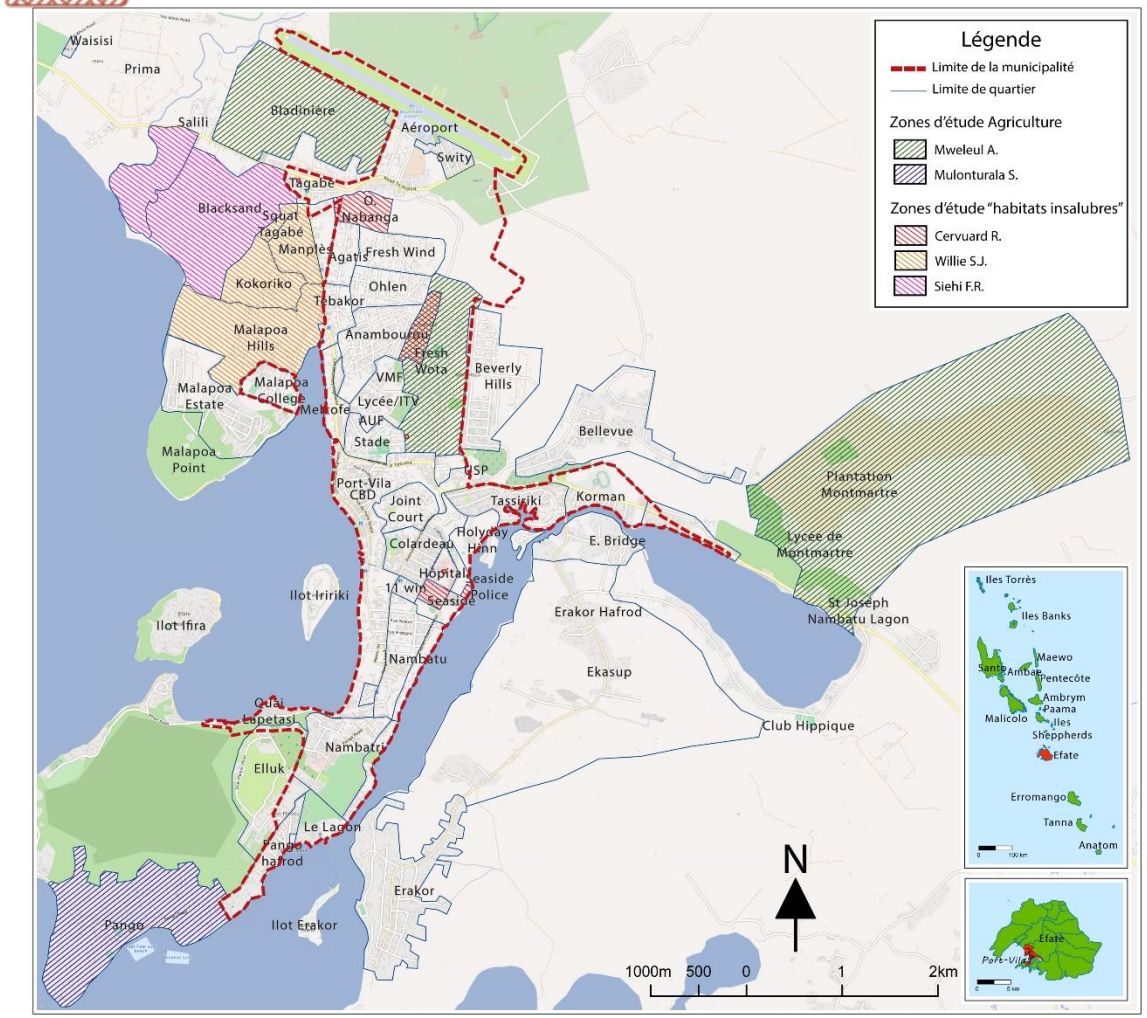
Potentiality of imageries from Regional to Local scale in a tropical environment

Port-Vila: Urban Neibourghoods and informal setlements (environments and urbanization)

Examples of the use of satellite imagery SPOT, Pleiades... (Land Use – Land Cover ; 5m to 1m)

Ground Survey and details observations (landscape description)

Port-Vila: Urban Neibourghoods and informal setlements (environments and urbanization)



Types of urban land uses :

(Size and density of cabins + veget.)

1- Very low density of cabins (0-5 %)

2- Low density of cabins (5-30 %)

3- Medium density of cabins (30-50%)

4- High density of cabins (50-80%)

5- Very high density of cabins(+80%)

=> Next step: Secondary markets and peri-urban limits

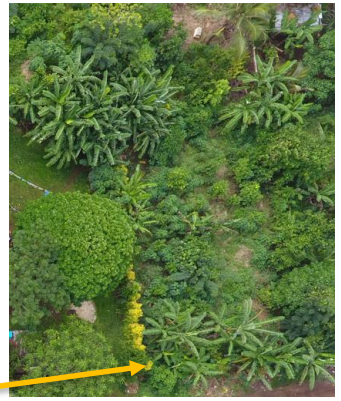
Port-Vila: Urban Neibourghoods and informal setlements (environments and urbanization)

Google Earth satellite image (THR - submetric)
Freswota 6- Port Vila - Vanuatu

UAV image (P4 DJI) April 19/2019
Altitude : 100m /
Resolution : 3,5 cm/pixel Freswota 6

Vertical view

With drone data, the mapping of crop areas becomes possible



Banana tree

Oblique view

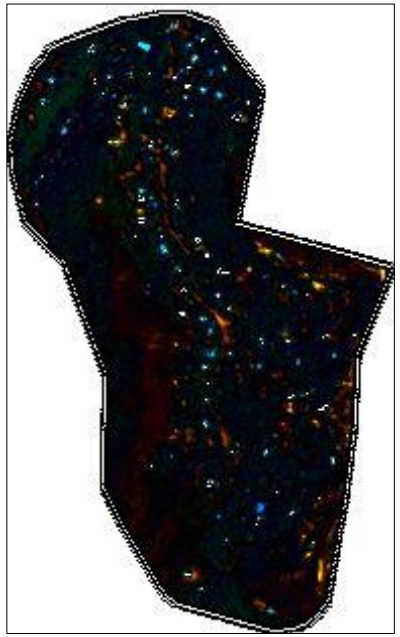
The spatial resolution is not fine enough to characterize food crops

3. Use of imagery at different scales in tropical environment (family farming areas)

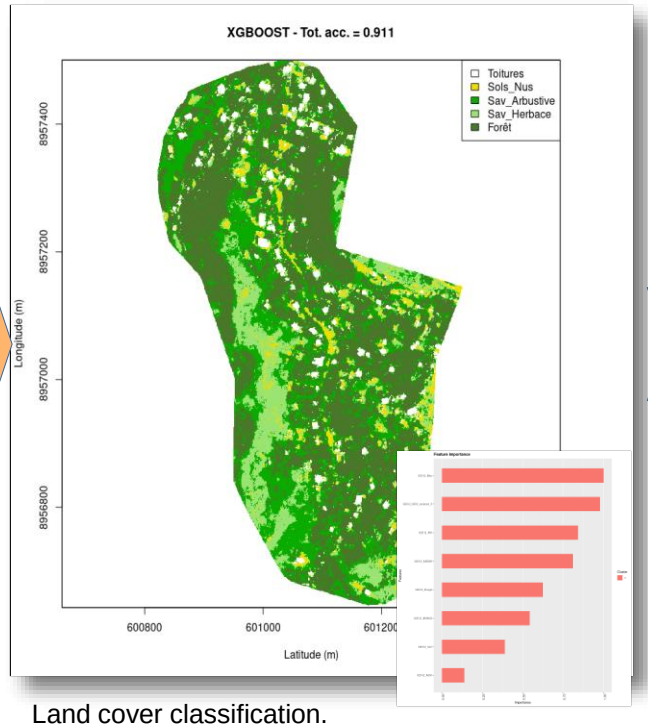
Potentiality of imageries at <u>Local</u> scale in a tropical environment

Informal settlements: Salomon Islands (Honiara)

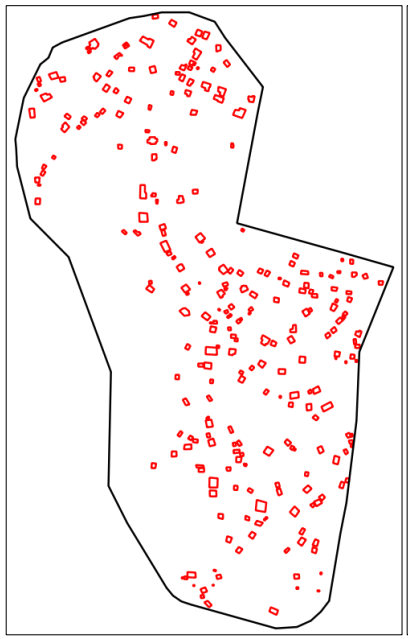
Submetric satellite imagery (automatic approach)



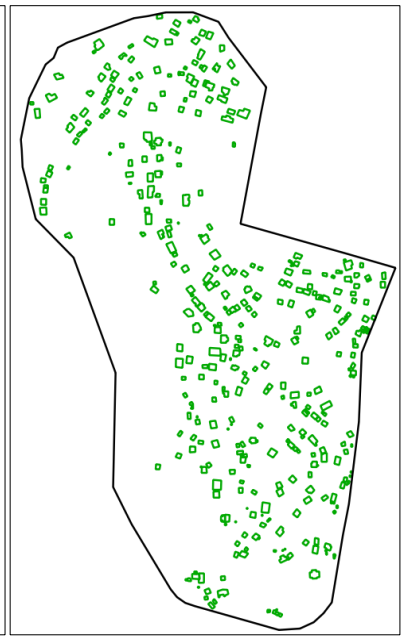
Quickbird 2012
Wind Valley Honiara



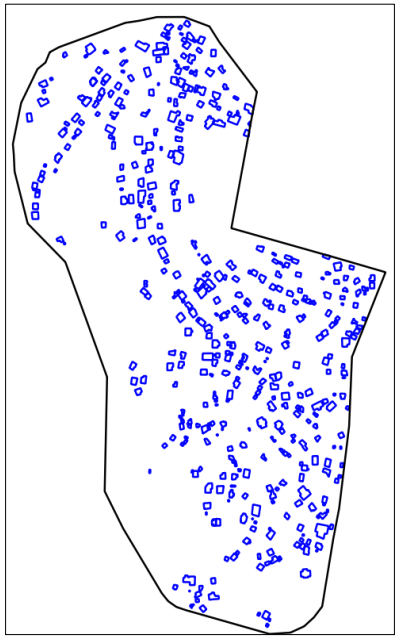
Land cover classification.
XGBoost model result from Qbird imagery of 2012 (Wind-Valley - Honiara)



Informal habitat in 2012



Informal habitat in 2016



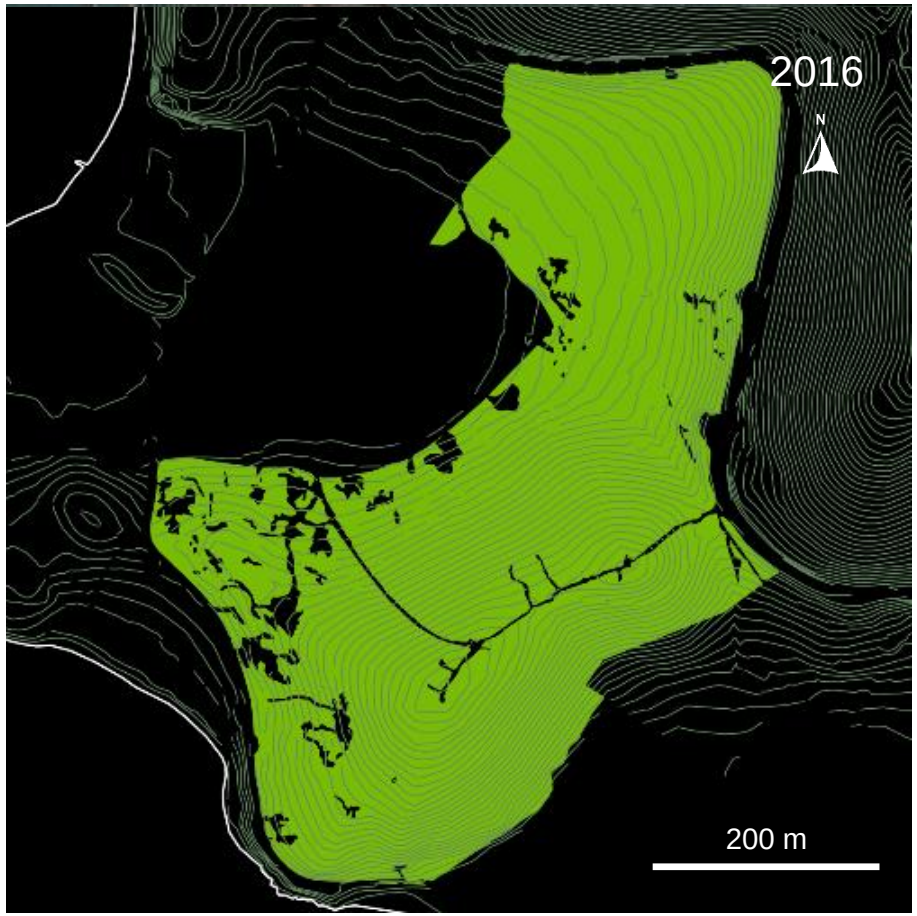
Informal habitat in 2020

Statistic on habitat evolution (percentage growth)
Density, homogeneity, distance between dwellings…Covered area

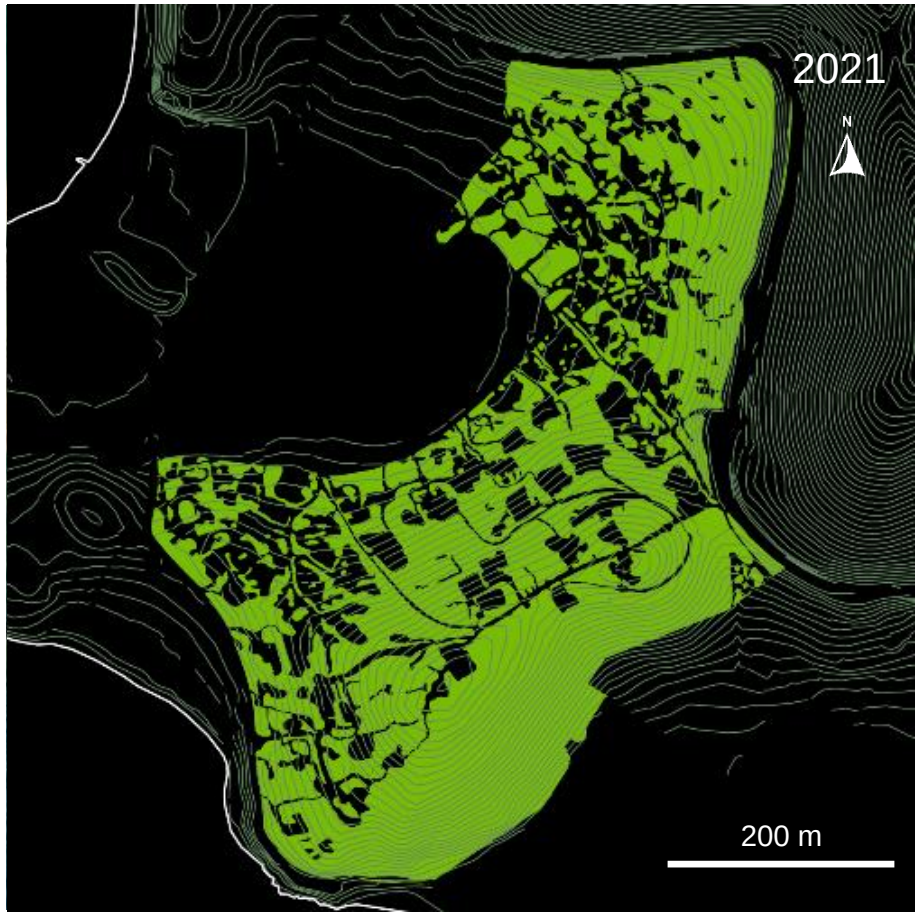
Informal settlements: New Caledonia (Noumea)

Orthophotography imagery (visual interpretation approach)

Zone of KUENDU (Noumea)



91% of the surface covered



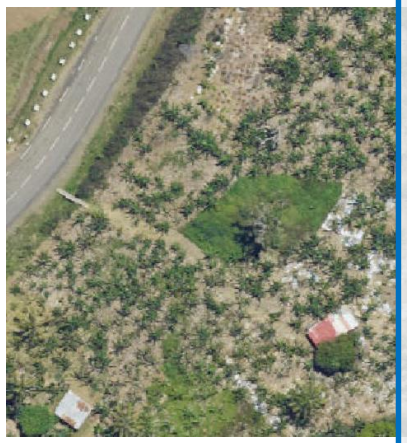
62% of the surface covered

Vegetation area

Family garden: New Caledonia

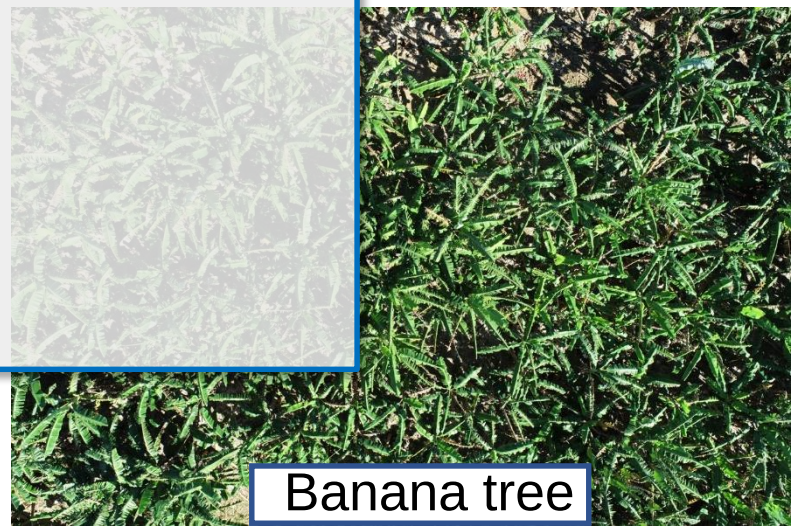
Orthophotography imagery vs UAV

Aerial photography 2020 / SERAIL/ Resolution : 0,5 m



UAV image (P4 RTK / JDI) 14th of June, 2023

Taro plant



Banana tree

Advantages of UAV images vs orthophotos (+)

- Adequate spatial resolution for species recognition
- High temporal repeatability of data (easy mobilization of equipment) and even more so in Oceania (where the technical resources do not exist)
- Low cost of this type of data against aerial photos/sat
- With multispectral sensor: radiometric information

Disadvantages of UAV vs orthophotos (-)

- Low ground coverage per frame

Family garden: New Caledonia

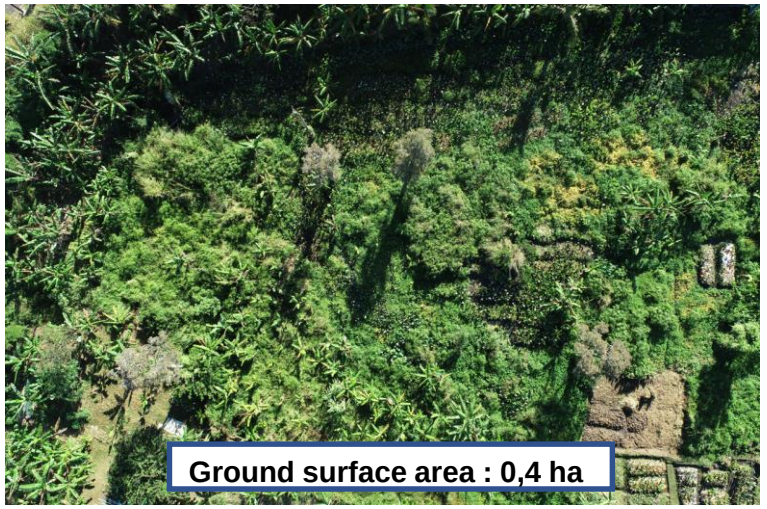
Orthophotography imagery vs UAV

What kind of drone do we use?

Panthom 4 RTK DIJ
Camera : 20 MP
Flight time : 30 min
RTK : Real Time Kinematic
for a geographical centimetric
position in X,Y and Z (altitude)
coordinates

UAV image (P4 RTK DJI) June 14/2023
Altitude : 100 m / Resolution : 3 cm/pixel

UAV image (P4 RTK DJI) June 14/2023
Altitude : 50 m / Resolution : 1,5 cm/pixel

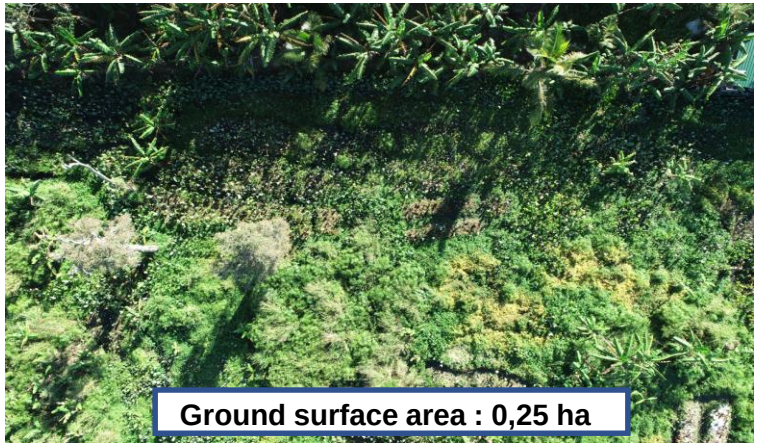


Ground surface area depends on flight altitude

Advantage of UAV :
- Drone is easy to deploy on any terrain, at any time
- Very high data repeatability

With drone data, the mapping of crop areas becomes possible

UAV image (P4 RTK DJI) June 14/2023
Altitude : 30 m / Resolution : 1 cm/pixel



Family garden: New Caledonia

Orthophotography imagery vs UAV

ZAC Panda - Dumbea

August 15 /2021 / Altitude : 50 m / Resolution ; 1,5 cm/pixel

Data providing information :

- on the structuring and organization of fields
- the nature of the species cultivated

Only the drone with a centimetric spatial resolution allows the recognition of species

Cassava plant

Taro plant

With drone data you can :

- **Count the number of plants**
- **Estimate density of plants by hectare and so production**
- **Estimate plant growth stage (size and height of plants)**
- **monitoring plantation dynamics (using images taken regularly of crops)…etc.**

4. Conclusions

DATA	DIFFERENT SCALES OF OBSERVATION	TREATMENT METHODS	RESULTS
Satellite images (10m), economic data (resources), politics decisions (arrangement, town planing), statistics (population, distribution of habitat), cadastral data.	Urban areas	Indicators, models, spatial analysis, typology	Zonation (authorized areas, risk areas, etc.), change indicators (areas dynamics, etc.)
Satellites images (1m), UAV, aerial photographies, economic data (resources), dynamics (appearances, dropouts), ...	Gardens	Indicators, models, spatial analysis, typology	Indicators (shapes, areas, densities, patterns), types of activities, …
Submetric sat. Images, UAV, aerial photographies, economic data (plot resources), dynamics (appearances, dropouts), Cultivation management (crop rotation), composition…	Plot/Parcel	Plot assessment, models, typology	Vegetation indicators (stress…), type of activites, operating report, statistics (yield/performance)
UAV, aerial photographies, GPS data (locations, boundaries), ground field data (species recognition, data from population surveys)	Field / Species	Plant assessment, Models, spatial analysis, typology	Vegetation indicators (stress), statistics (yield/performance), crop rotations, ,…

4. Conclusions

COMPLEX ENVIRONMENT

- **Small areas**
- **Heterogeneous crops**
- **Rapid evolution of the environment**
- **Clouds**

GEOSPATIAL DATA

- **Differents thematics need adequate geospatial information**
  - Identify needs and objectives

- **Family Farming system needs**
  - Information at local scale
  - High temporal data acquisition
  - Multispectral data

FALAH
Family farming, lifestyle & health

FAMILY FARMING, FOOD AND HEALTH IN INTERTROPICAL ISLAND COUNTRIES AND TERRITORIES
20th, 21st, 22nd of June 2023 - Port Vila, Vanuatu

Contributions of satellite imagery and spatialized data to map small agricultural areas and their evolution in tropical island environments

Pr JM. FOTSING (UNC), **Dr M. DESPINOY** (IRD ESPACE-Dev)
Dr P. DUMAS (UNC / IRD ESPACE-Dev), **M. T. GAILLARD** (ECOSOPHY)

Tankyu Tumas

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Methodological orientation test, methodological approaches and first results

25th, 26th and 27th of October 2022

National University of Vanuatu, Port Vila

Fishing activites and food security in very poor island economies, some hints from Haïti

Gilbert David*, Catherine Sabinot*, Samson Jean-Marie**

***IRD, UMR Espace-Dev, GDR LADIVA**

****Université d'Etat d'Haïti**

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

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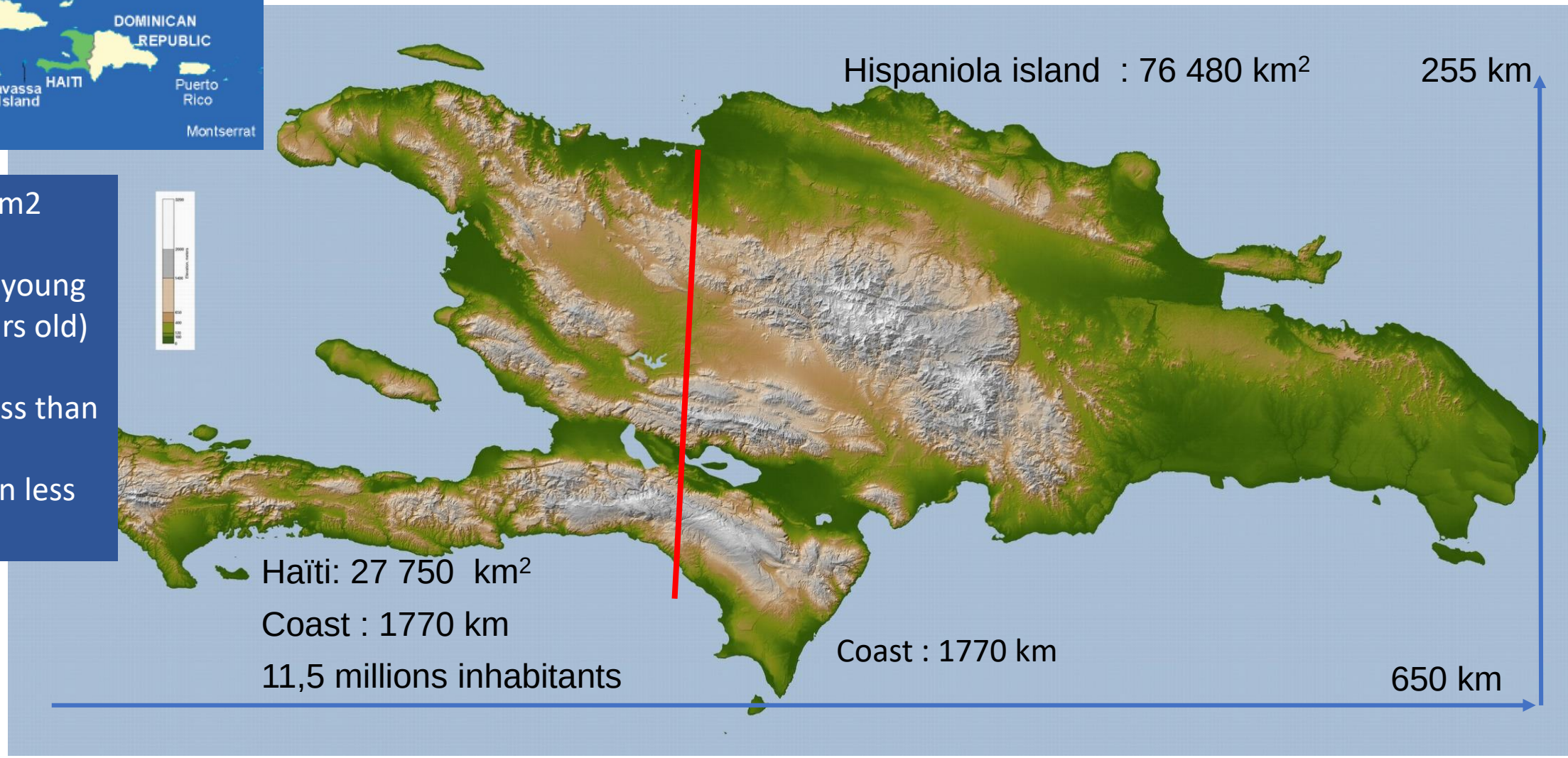
Main historical facts

1492, C. Columbus discovers Hispaniola
1804, J.J Dessalines proclaims independence
1844, partition of the island, creation of the Dominican Republic

Density: 428 h/km2

60 % people are young (less than 25 years old)

¾ people earn less than 2 US $per day,
About 50 % earn less than 1 $



Title: Fishing activites and food security in very poor island economies, some hints from Haïti

What about fisheries ?

In 2019, 28,056 fishing units

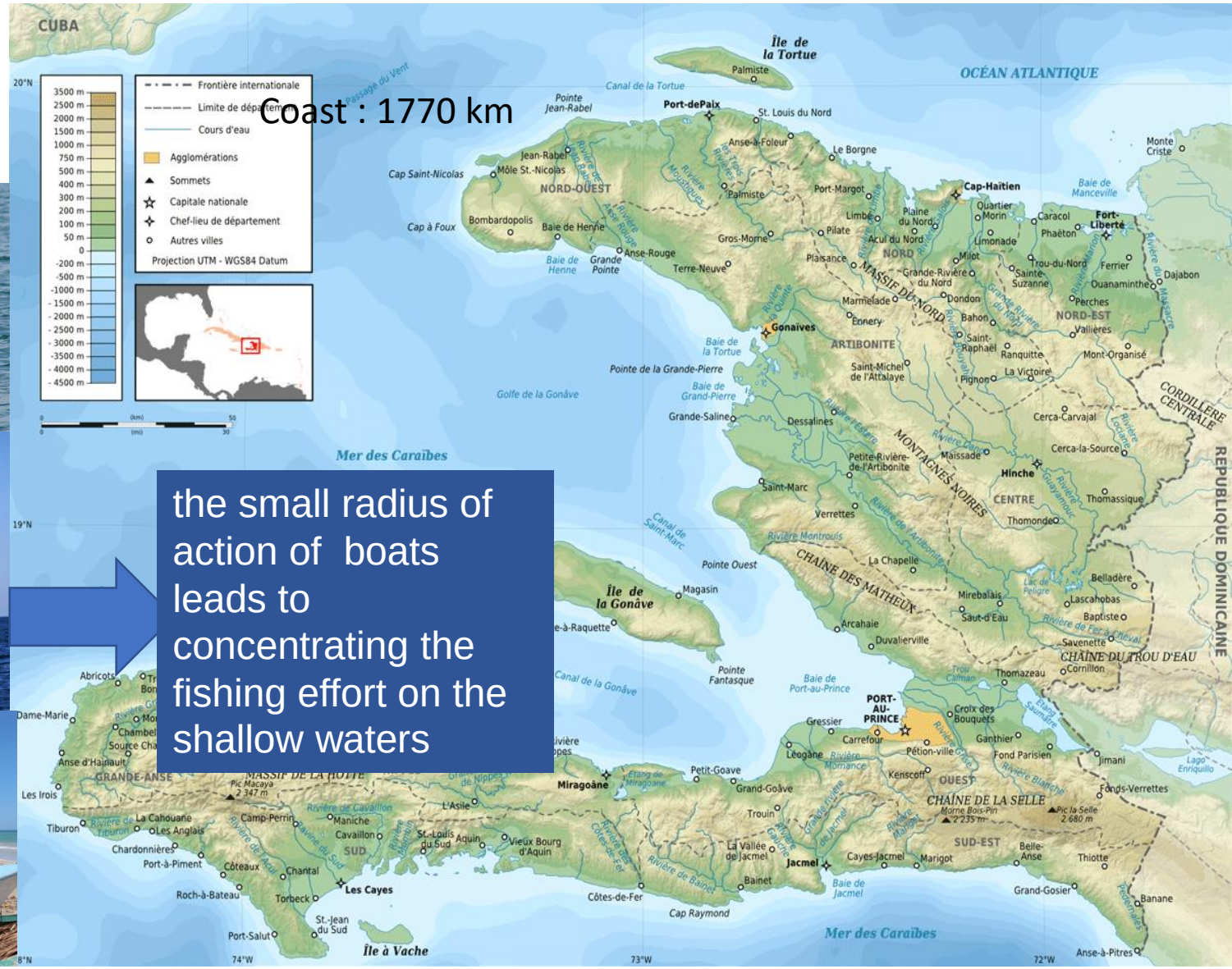
Coast : 1770 km

51% (14,326) are dugout canoes length: 3.5 to 5m

Half go out 11 to 20 times a month . 1/3 from 21 to 30 outings per month.

36% (10,312) are canots, length 5 to 7 m

Only 5% have a motor



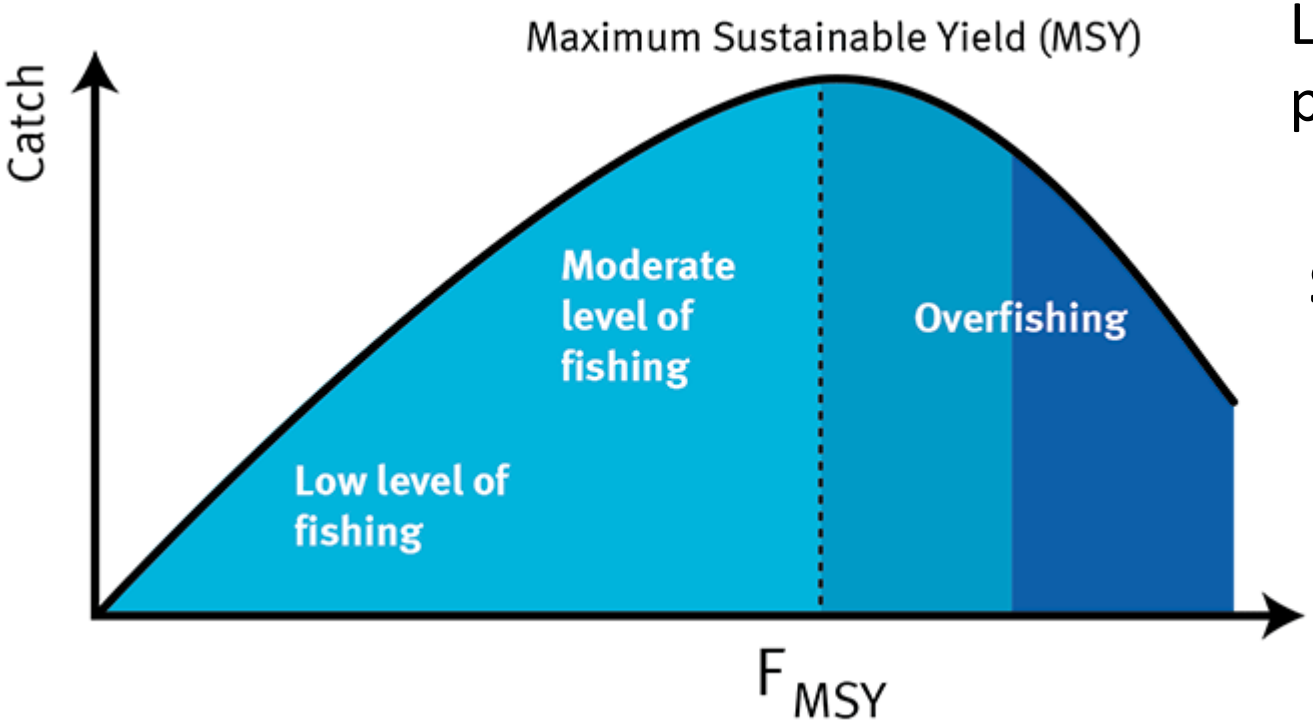
the small radius of action of boats leads to concentrating the fishing effort on the shallow waters

Title: Fishing activites and food security in very poor island economies, some hints from Haïti

The contribution of Pacific islands to the resolution of problems in Haïti

1. The overfishing hypothesis

What the theory says



Problems :

Inability to collect data on catches and fishing effort

Low accurancy of this model when stocks are plurispecific (more than 50 species interacting)

Solution :

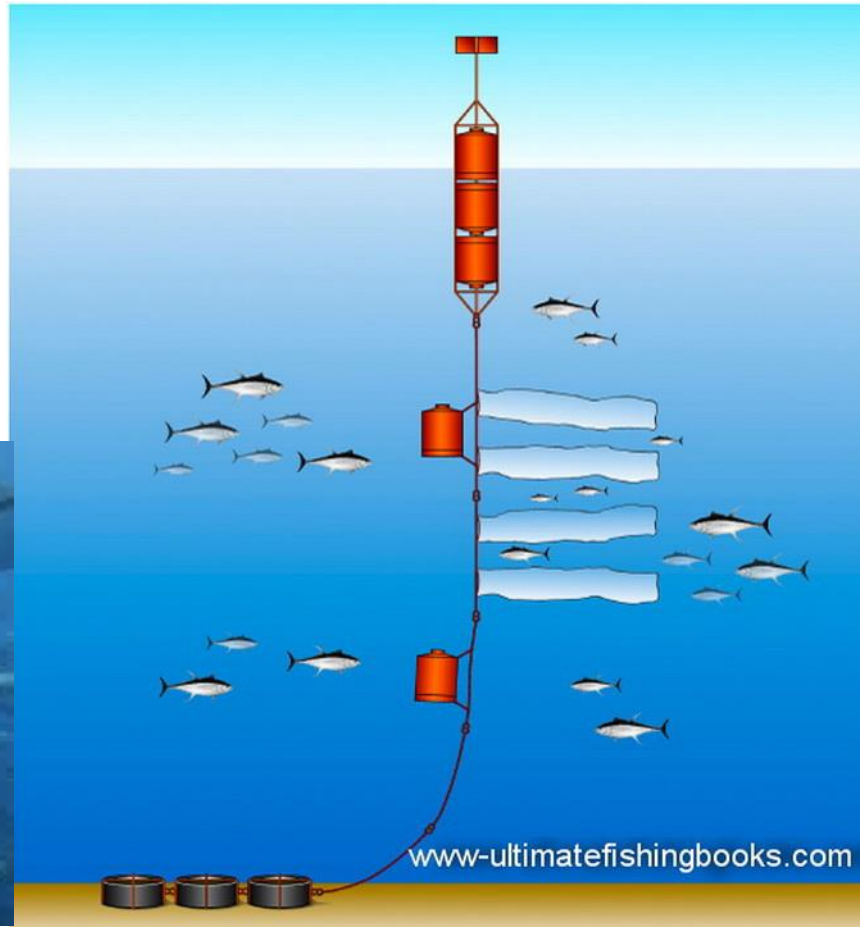
Data less management based on fish size

Title: Fishing activites and food security in very poor island economies, some hints from Haïti

The contribution of Pacific islands to the resolution of problems in Haïti

2. FADs Deployment

Deploying FADs is a good solution to increase fishing space offshore and get available big pelagic species



Problems :

Most FADs in Haiti are anchored on depths of 1000 to 2000 m.

↓

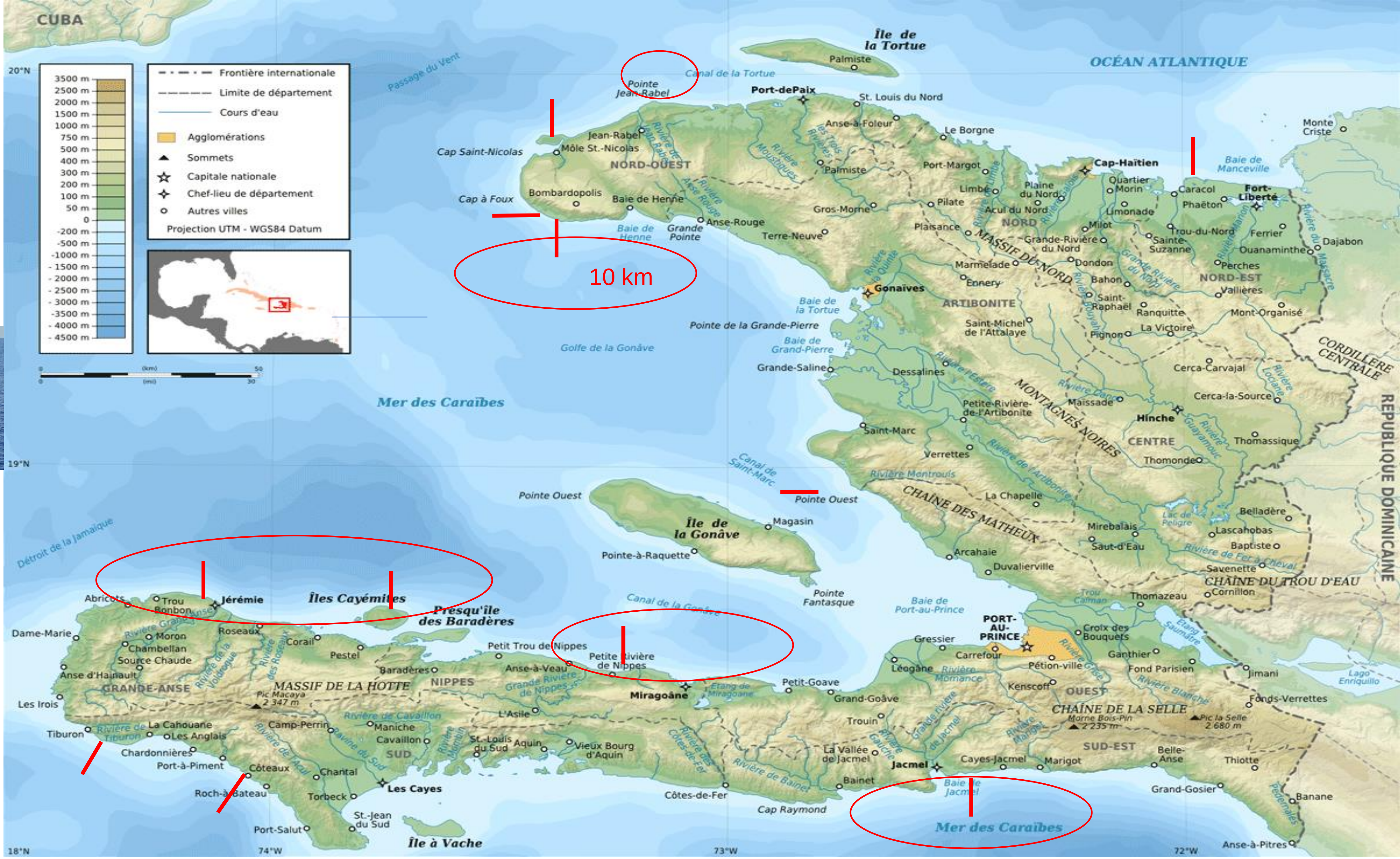
only a few motored boats can operate at such distances

Solution :

Plan the FADs deployment and select places at 1000 m depth but near the coast to anchor them

↓

The profitability of fishing will increase dramatically


CUBA
Île de la Tortue
Palmiste
OCÉAN ATLANTIQUE
Canal de la Tortue
Pointe Jean-Rabel
Port-de-Paix
St. Louis du Nord
Passage du Vent
20°N
3500 m
2500 m
2000 m
1500 m
1000 m
750 m
500 m
400 m
300 m
200 m
100 m
50 m
0
-200 m
-500 m
-1000 m
-1500 m
-2000 m
-2500 m
-3000 m
-3500 m
-4000 m
-4500 m
Frontière internationale
Limite de département
Cours d'eau
Agglomérations
Sommets
Capitale nationale
Chef-lieu de département
Autres villes
Projection UTM - WGS84 Datum
Cap Saint-Nicolas
Jean-Rabel
Môle St.-Nicolas
NORD-OUEST
Anse-à-Foleur
Le Borgne
Monte Cristi
Cap-Haïtien
Baie de Manceville
Cap à Foux
Bombardopolis
Baie de Henne
Palmiste
Port-Margot
Quartier Morin
Caracol
Fort-Liberté
Phaëton
Limbé
Plaine du Nord
Pilate
Acul du Nord
Limonade
Gros-Morne
Anse-Rouge
Baie de Henne
Grande Pointe
Terre-Neuve
Plaisance
NORD
Milot
Trou-du-Nord
Ferrier
Sainte-Suzanne
Dajabon
Grande-Rivière du Nord
Ouanaminthe
10 km
MASSIF DU NORD
Marmelade
Dondon
Perches
Ennery
Bahon
NORD-EST
Gonaïves
Saint-Raphaël
Vallières
Baie de la Tortue
ARTIBONITE
Ranquitte
Mont-Organisé
Saint-Michel de l'Attalaye
La Victoire
Pignon
Pointe de la Grande-Pierre
Baie de Grand-Pierre
Golfe de la Gonâve
CORDILLERE CENTRALE
Grande-Saline
Dessalines
Cerca-Carvajal
Mer des Caraïbes
Petite-Rivière-de-l'Artibonite
Maïssade
Cerca-la-Source
MONTAGNES NOIRES
Hinche
Saint-Marc
CENTRE
Thomassique
Verrettes
Thomonde
REPUBLIQUE DOMINICAINE
19°N
Canal de Saint-Marc
Rivière Montrouis
Pointe Ouest
Pointe Ouest
La Chapelle
CHAÎNE DES MATHEUX
Belladère
Magasin
Île de la Gonâve
Mirebalais
Lascahobas
Détroit de la Jamaïque
Saut-d'Eau
Baptiste
Pointe-à-Raquette
Arcahaie
Savenette
Duvalierville
CHAÎNE DU TROU D'EAU
Cornillon
Pointe Fantasque
Thomazeau
Abricots
Trou Bonbon
Jérémie
Îles Cayémites
Presqu'île des Baradères
Canal de la Gonâve
Baie de Port-au-Prince
PORT-AU-PRINCE
Croix des Bouquets
Dame-Marie
Roseaux
Moron
Corail
Petit Trou de Nippes
Gressier
Carrefour
Ganthier
Chambellan
Pestel
Petite Rivière de Nippes
Source Chaude
Baradères
Anse-à-Veau
Léogâne
Pétion-ville
Fond Parisien
Jimani
Anse d'Hainault
NIPPES
Kenscoff
GRANDE-ANSE
MASSIF DE LA HOTTE
Miragoâne
Petit-Goave
OUEST
Fonds-Verrettes
Les Irois
Pic Macaya 2 347 m
Grand-Goâve
L'Asile
CHAÎNE DE LA SELLE
Morne Bois-Pin 2 235 m
Pic la Selle 2 680 m
Tiburon
La Cahouane
Camp-Perrin
Maniche
Trouin
Les Anglais
Cavaillon
St.-Louis du Sud
Aquin
Vieux Bourg d'Aquin
SUD
La Vallée de Jacmel
SUD-EST
Belle-Anse
Chardonnières
Port-à-Piment
Jacmel
Cayes-Jacmel
Marigot
Thiotte
Côteaux
Chantal
Les Cayes
Bainet
Roch-à-Bateau
Torbeck
Côtes-de-Fer
Grand-Gosier
Banane
Cap Raymond
Baie de Jacmel
St.-Jean du Sud
Port-Salut
Île à Vache
Mer des Caraïbes
Anse-à-Pitres
18°N
74°W
73°W
72°W

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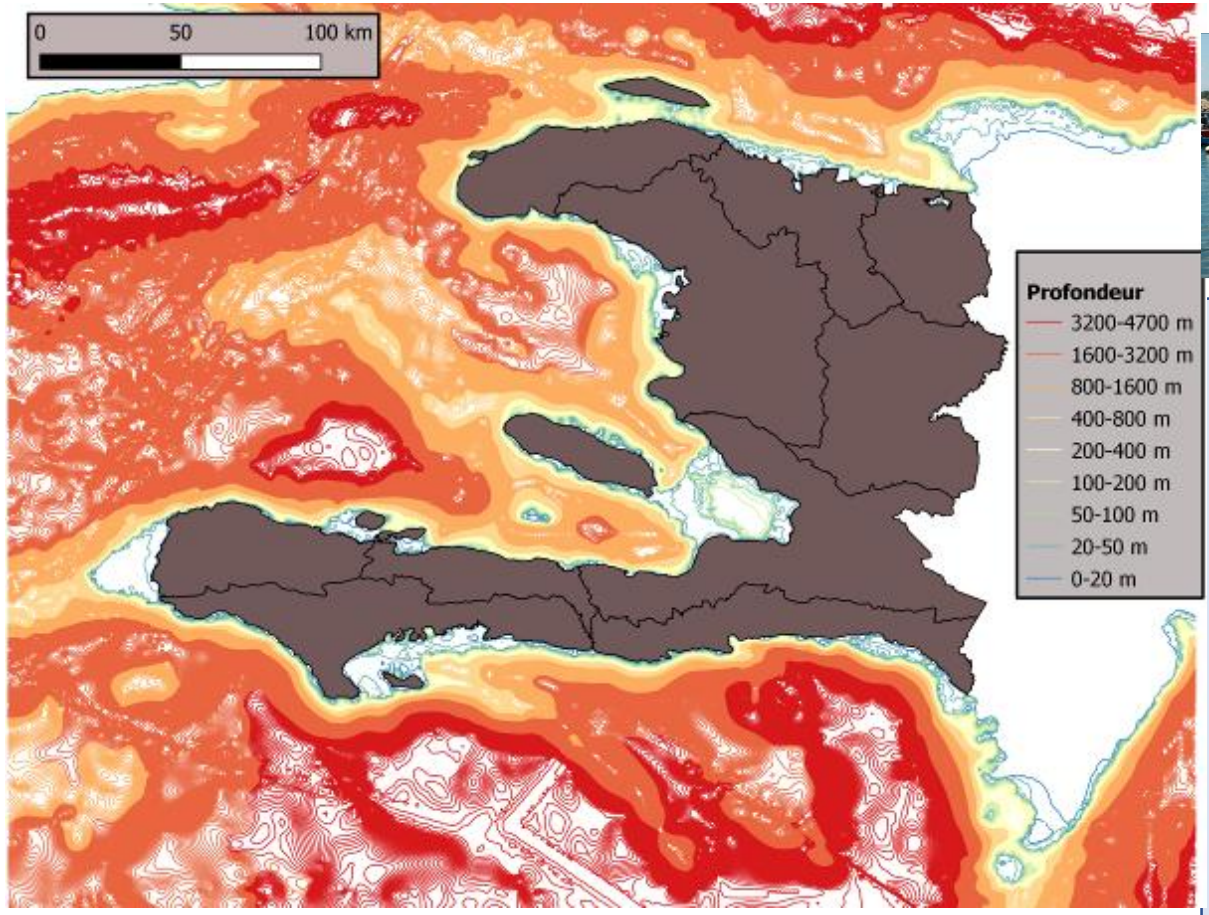
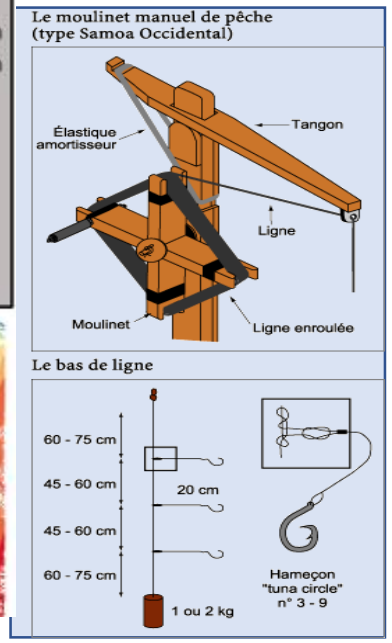
The contribution of Pacific islands to the resolution of problems in Haïti

3. Expansion of the fishing area towards deep sea species





Problem :

what type of sustainable fishing on these species ?

Solution :

Favour multi-target boats (FAD's and deep sea) using reels for deep bottom lining and trolling, with on-board cooler T: 4°C, Ikejime

Only Haitian boats can operate in national waters to obtain a license, the fisherman agrees to provide catch and effort data

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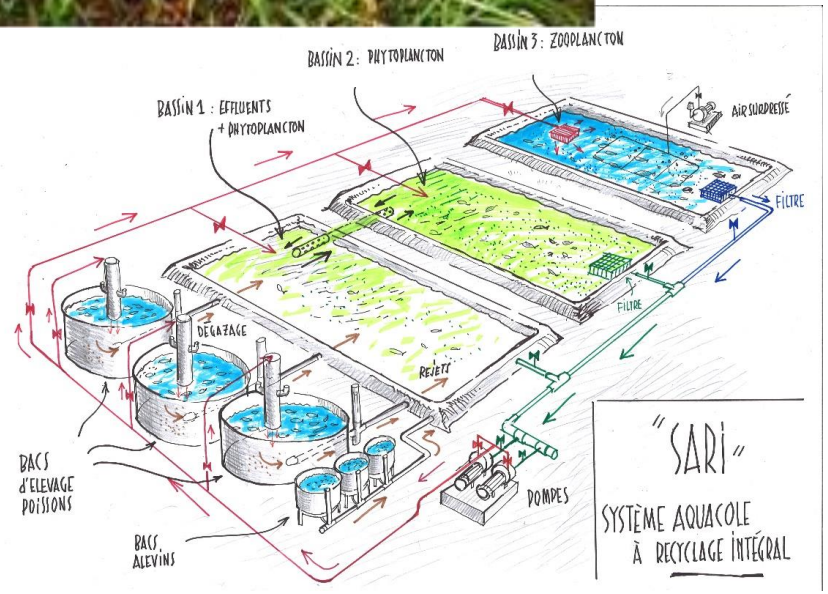
4. Develop multitrophic aquaculture

4 months fry rearing and pre-growth of juveniles (from 40 mg to 40 g)

+

6 months grow-out (from 40 g to 400 g)



Problem : Where to settle the ponds

Solution : on mangrove bare zones

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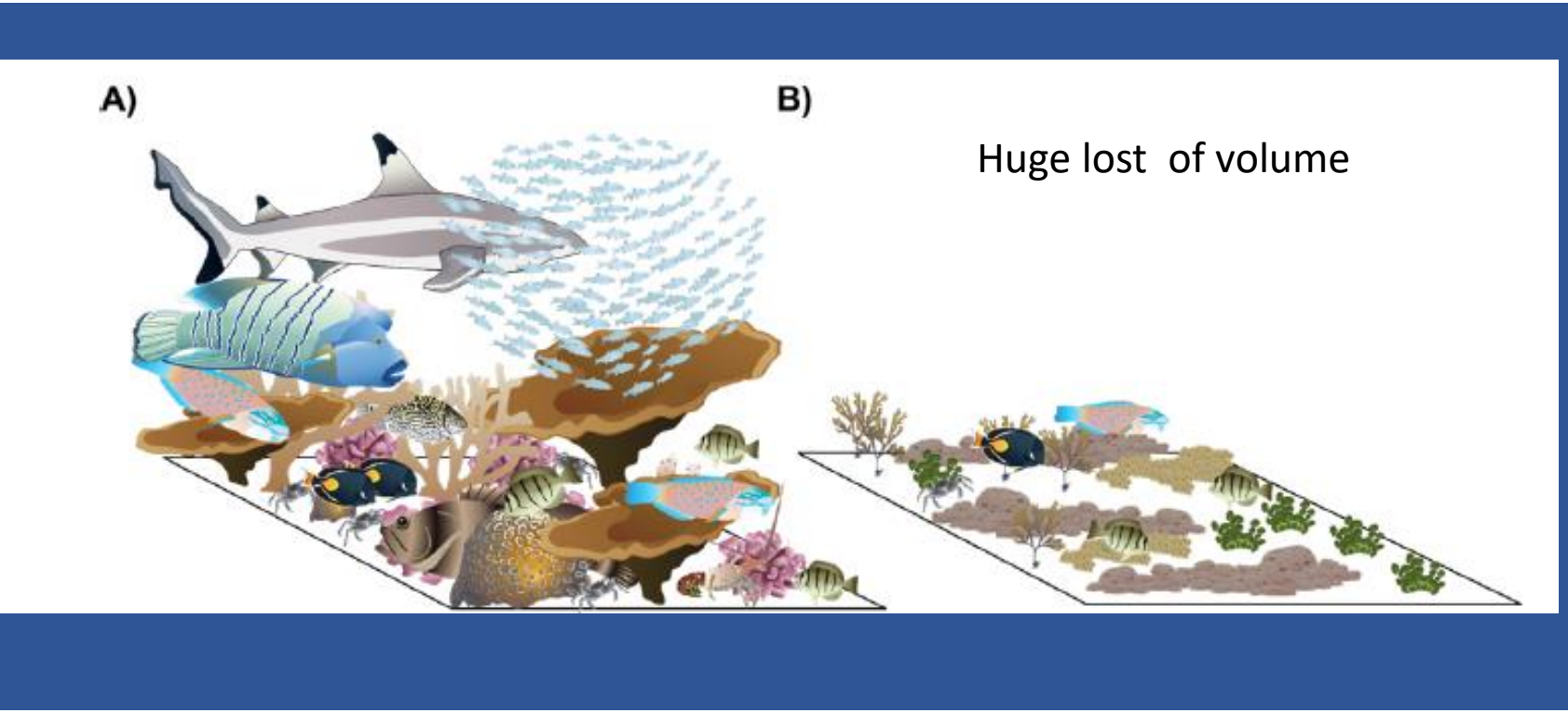
The contribution of Haïti to improve fisheries in Pacific Islands

1. Problem : degradation of reef ecosystem



Ecosystem degradation drives loss of biodiversity and productivity

Solution : Ecological intensification for recovering volume in habitats ➡ artificial reefs

Ecological intensification is a concept from the world of agronomy that aims to make better use of the natural mechanisms, or ecological processes, of ecosystems to produce more efficiently, using available resources and relying on new scientific bases.

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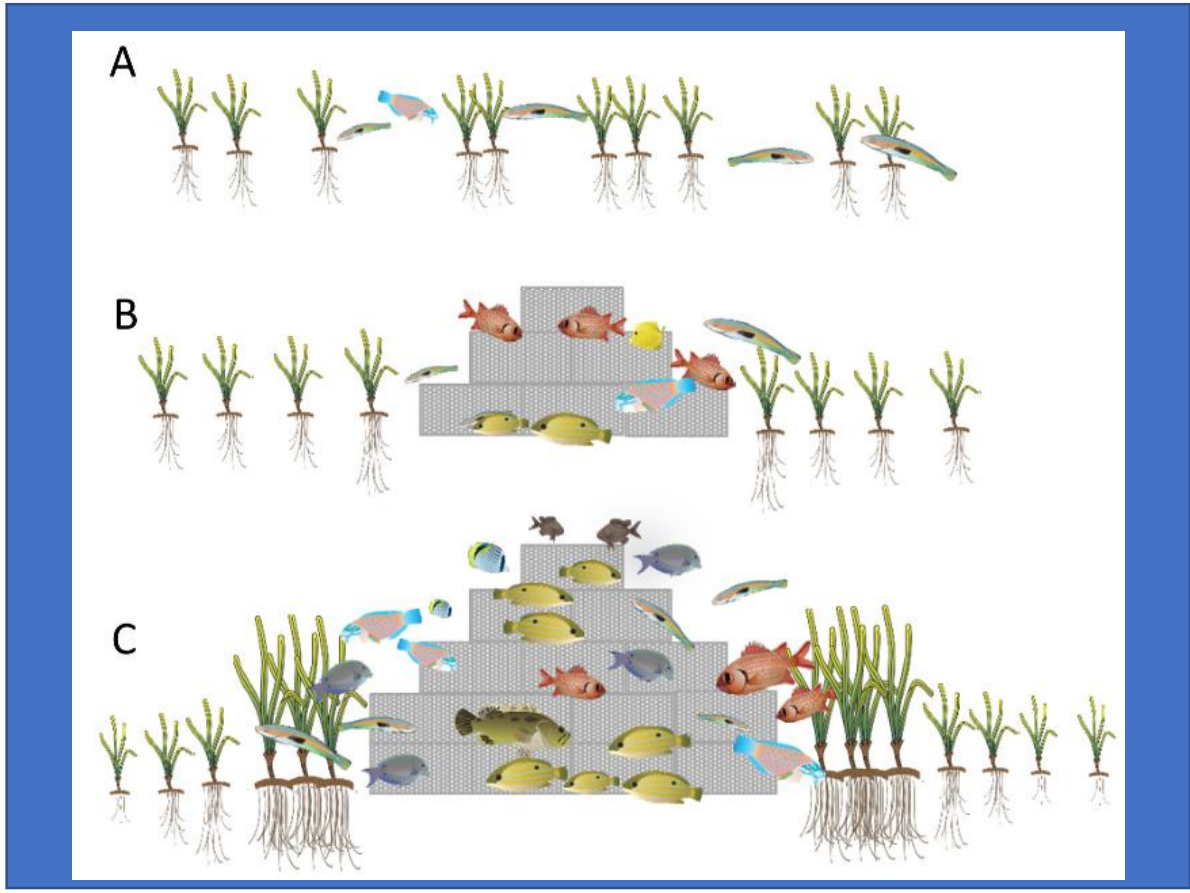
1. Ecological intensification : artificial reefs

10,000 m3 of submerged artificial reefs can produce 200 to 250 t of fish per year. With concrete durability estimated at 50 years, such a project would produce 10,000 to 12,500 t of fish, using local fishing units and methods

The input of artificial reef for improving fish and phanerogam biomass in sea grass beds



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The contribution of Haïti to improve fisheries in Pacific Islands

2. Problem : How to maintain the food value of fish when production declines and the purchasing power of customers remains very low ?

Solution :

. Dried/salted fish is inexpensive

. When added to starchy foods as rice they drive vegetable proteins available

. Back In the 1980s, the FAO recommended storing fish flakes in glass bottles and adding them to starch-rich foods for supplementation.

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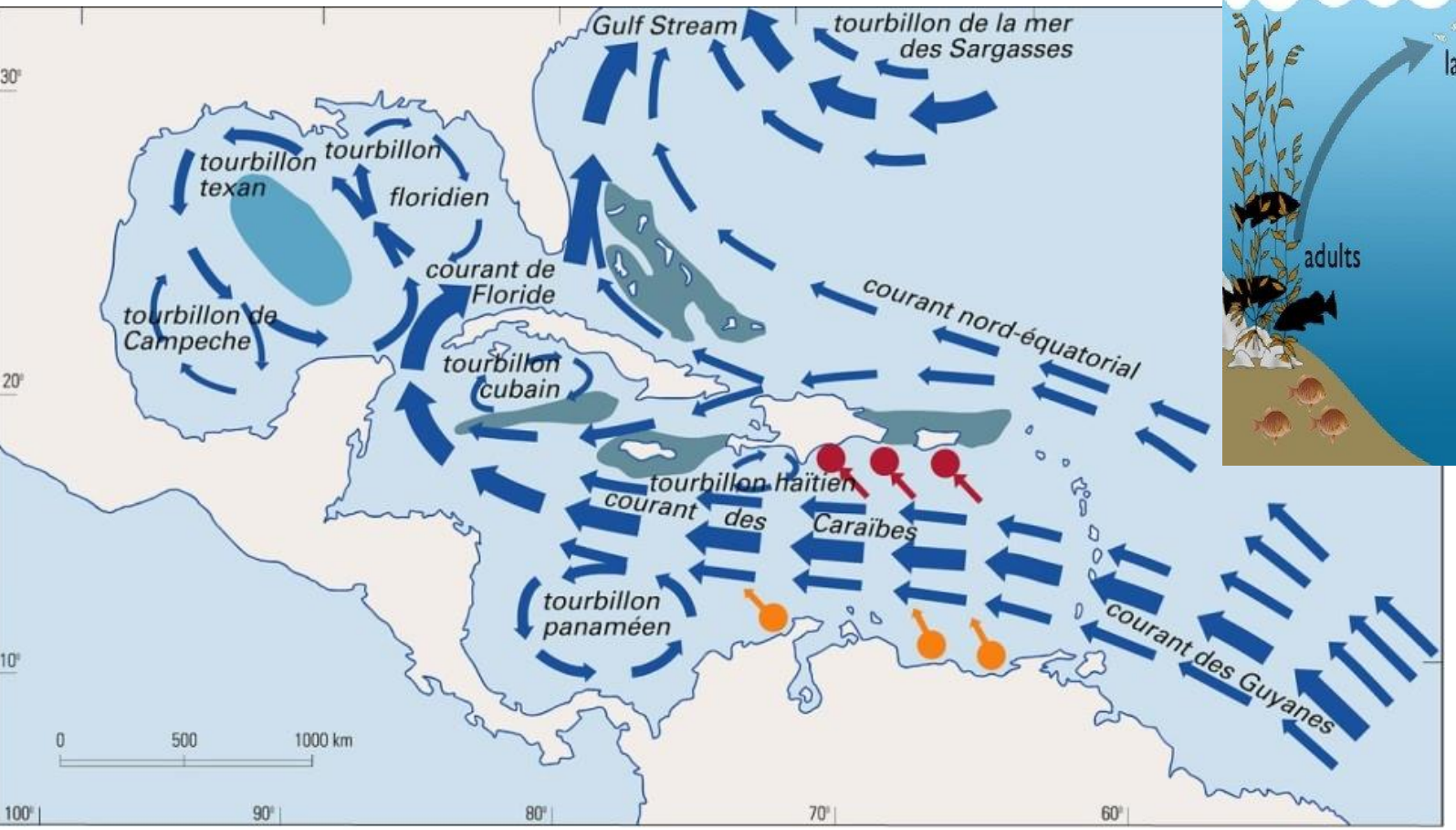
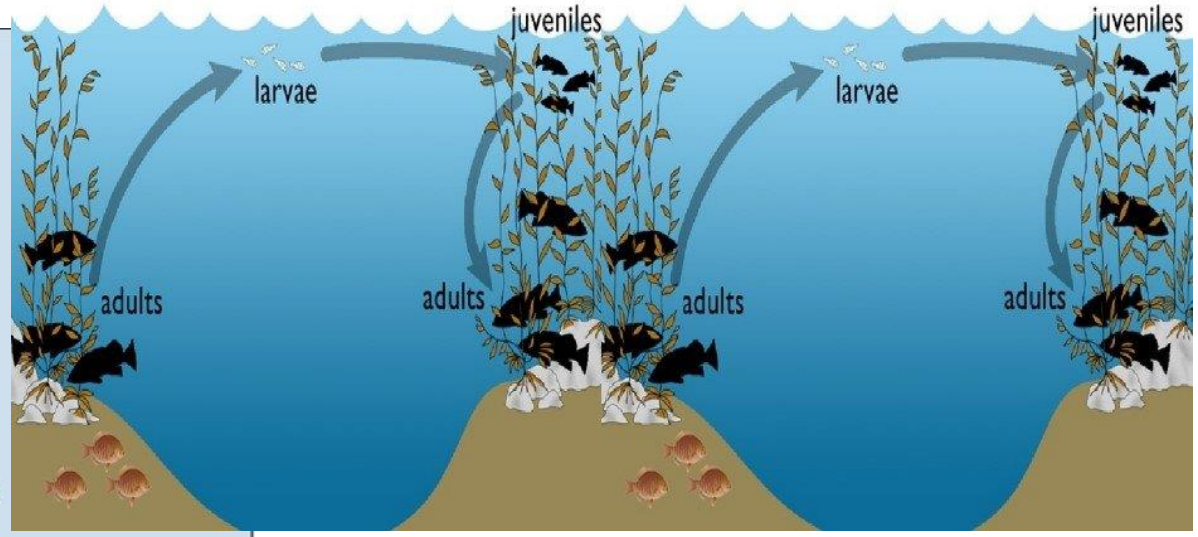
The contribution of Haïti to improve fisheries in Pacific Islands

3. Marine spatial planning using ocean connectivity for improving ecological intensification





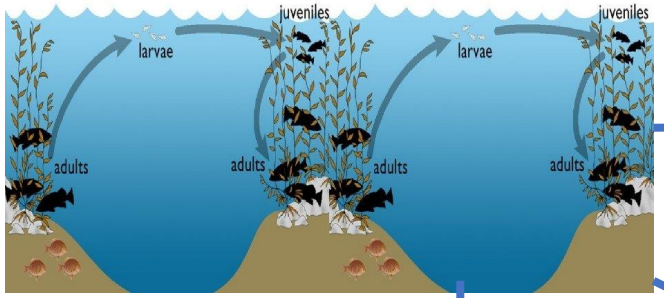
Current

Title: Fishing activites and food security in very poor island economies, some hints from Haïti

The contribution of Haïti to improve fisheries in Pacific Islands

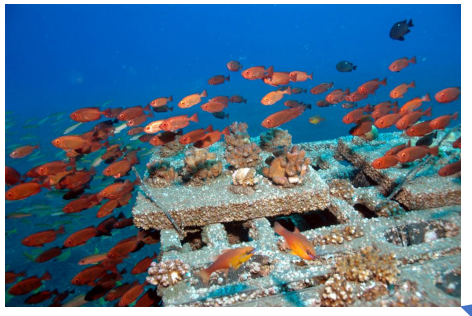
3. The five pillars of marine spaital planning

Connectivity

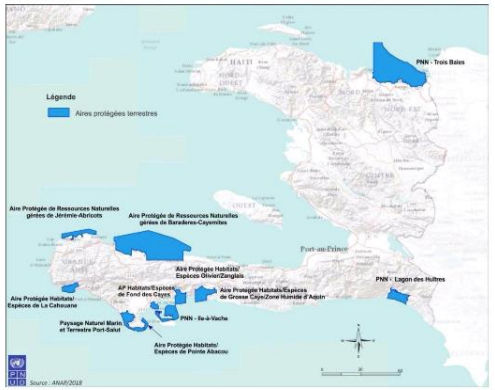


Drives the location of **FAD's**

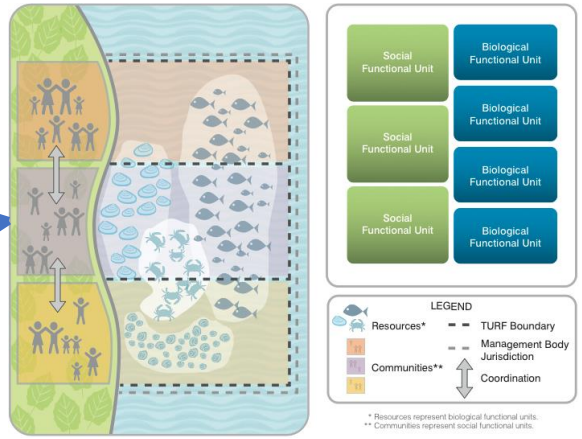
Drives the location of **Artificial reefs** in MPA's and and in the surroundings



Drives the location of **MPA's**



Territorial use rights for fishing



Avoid the tragedy of commons drive by the free access rule


MERCI POUR
VOTRE
ATTENTION
ANY QUESTION ?

1st FALAH conference, Port Vila, Vanuatu
20st to 22th of June 2023

AXIS 2 – LIFESTYLE TRANSITIONS: WHAT ARE THE IMPACTS ON FOOD AND POPULATION HEALTH?

d) Lifestyle : nutrition, physical activity and population health

Food consumption, anthropometric characteristics in transitioning countries of the Pacific region: the case of New Caledonia and Vanuatu

Olivier Galy, Stéphane Frayon, Guillaume Wattelez, Pierre-Yves Le Roux,
Akila Nedjar-Guerre, Adeline Mweleul, Pierre Metsan, Christophe Serra-Mallol,
Juliana Chen, Margaret Allman-Farinelli Jean Marie Fotsing, David Raubenheimer

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Over these last decades, Pacific population faced to cumulative vulnerabilities:

1-a brutal socio-economic transition :

- Fast development (demographic, sociologic, economic)
- monetisation of economic systems,
- increased trade globalisation

2-climate change

3-sanitary crisis

ONENA: Oceanian Non European, Non Asian ascend

Represents 12.5 Million Melanesian and Polynesian in the Pacific

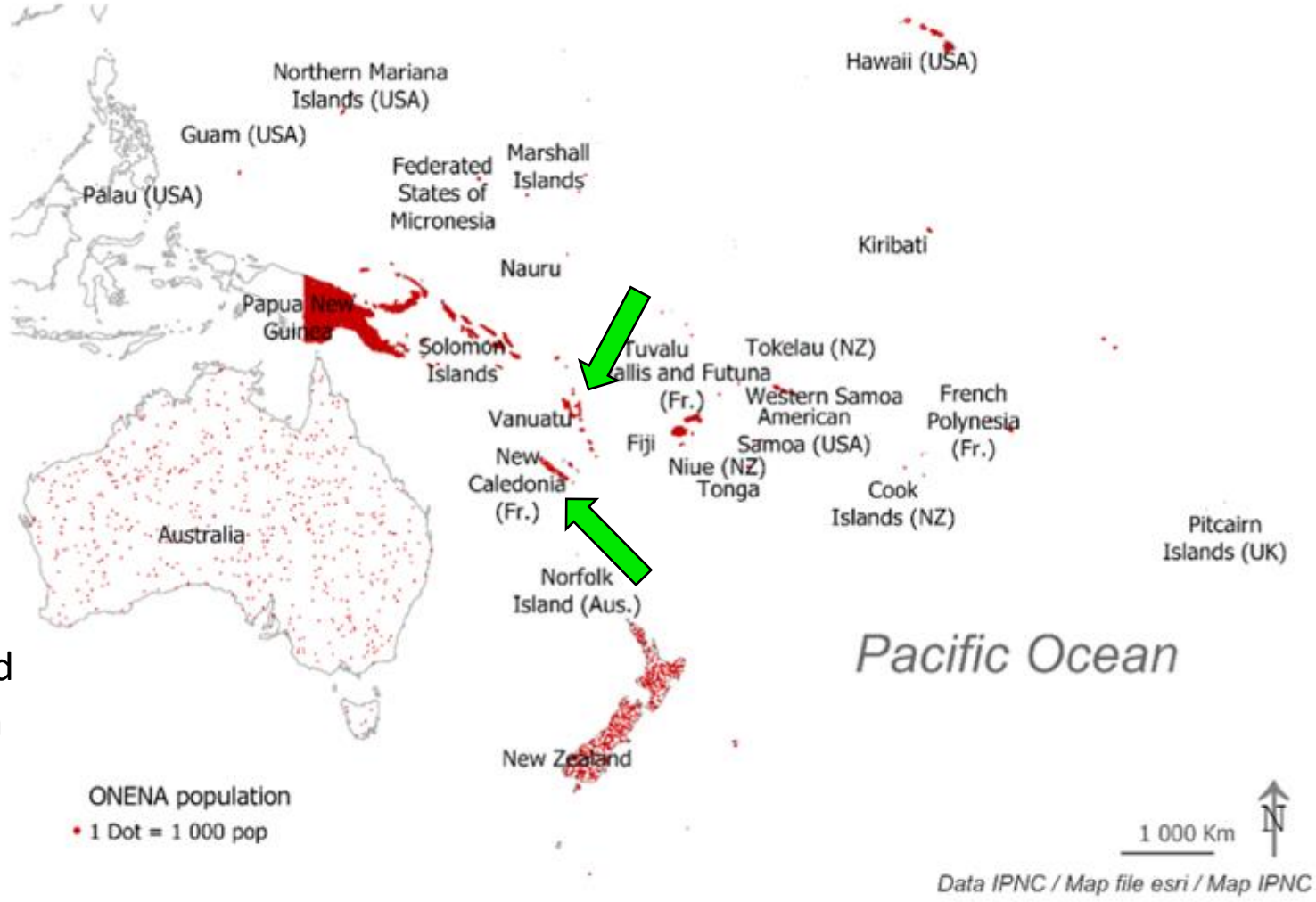


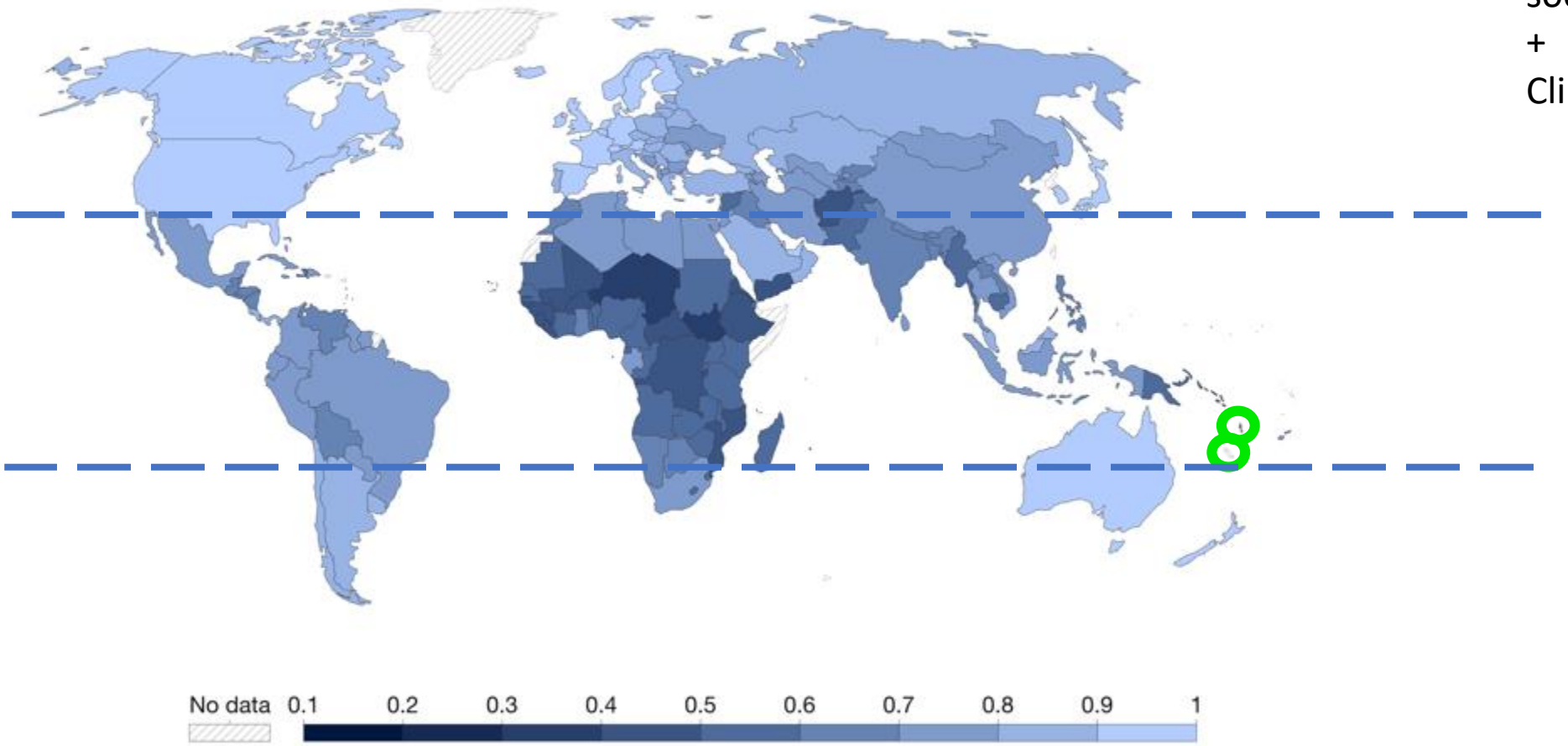
Figure 1. Oceania and relative estimates of population subgroups considered/self-declared as descending entirely or in part of Oceanian of Non-European, Non-Asian descent (ONENA) populations, Pacific region and US State of Hawaii, 2016. Points represent 1 000 pop and are randomly distributed, not georeferenced.

Tarantola et al. 2019

Human Development Index, 2021

The Human Development Index (HDI) is a summary measure of key dimensions of human development: a long and healthy life, a good education, and having a decent standard of living.

Our World in Data



Source: UNDP, Human Development Report (2021-22)

OurWorldInData.org/human-development-index/ • CC BY

Different degrees of socio-economic levels
+
Climate change

HDI RANK		Human Development Index (HDI) Value 2021	SDG 3 Life expectancy at birth (years) 2021	SDG 4.3 Expected years of schooling (years) 2021[a]	SDG 4.4 Mean years of schooling (years) 2021[a]	SDG 8.5 Gross national income (GNI) per capita (2017 PPP $) 2021	GNI per capita rank minus HDI rank	HDI rank
Very high human development								
1	Switzerland	0.962	84.0	16.5	13.9	66,933		
2	Norway	0.961	83.2	18.2[c]	13.0	64,660		
3	Iceland	0.959	82.7	19.2[c]	13.8	55,782		
4	Hong Kong, China (SAR)	0.952	85.5[d]	17.3	12.2	62,607		
5	Australia	0.951	84.5	21.1[c]	12.7	49,238		
6	Denmark	0.948	81.4	18.7[c]	13.0	60,365		
7	Sweden	0.947	83.0	19.4[c]	12.6	54,489		
8	Ireland	0.945	82.0	18.9[c]	11.6[e]	76,169[f]		
9	Germany	0.942	80.6	17.0	14.1[e]	54,534		
10	Netherlands	0.941	81.7	18.7[c,g]	12.6	55,979		
11	Finland	0.940	82.0	19.1[c]	12.9	49,452	11	12
12	Singapore	0.939	82.8	16.5	11.9	90,919[f]	-10	10
13	Belgium	0.937	81.9	19.6[c]	12.4	52,293	7	16
13	New Zealand	0.937	82.5	20.3[c]	12.9	44,057	16	13
15	Canada	0.936	82.7	16.4	13.8[e]	46,808	9	15
16	Liechtenstein	0.935	83.3	15.2	12.5[g]	146,830[f,h]		
17	Luxembourg	0.930	82.6	14.4	13.0[i]	84,649[f]		
18	United Kingdom	0.929	80.7	17.3	13.4	45,225		
19	Japan	0.925	84.8	15.2[g]	13.4	42,274		
19	Korea (Republic of)	0.925	83.7	16.5	12.5[e]	44,501		
21	United States	0.921	77.2	16.3	13.7	64,765		
22	Israel	0.919	82.3	16.1	13.3[e]	41,524		
23	Malta	0.918	83.8	16.8	12.2	38,884		
23	Slov[illegible]ia	0.918	80.7	17.7	12.8	39,746		
25	A[illegible]a	0.916	81.6	16.0	12.3	53,619		
26	[illegible]ted Arab Emirates	0.911	78.7	15.7	12.7	62,574		
27	[illegible]pain	0.905	83.0	17.9	10.6	38,354		
28	France	0.903	82.5	15.8	11.6	45,937		

Vanuatu HDI = 0.607
1-Life expectancy at birth: 70.4
2-Expected years of schooling: 11.5
3-Mean years of schooling: 7.1
4- Gross national income (GNI) per capita: 3085$
GNI per capita rank minus HDI rank: 23;
HDI rank : 142/195

New Caledonia HDI =0.903
Life expectancy at birth: 82.5
Expected years of schooling 15.8
Mean years of schooling: 11.6
Gross national income (GNI) per capita: 45 937$
GNI per capita rank minus HDI rank: -2
HDI rank: 28/195

A food transition with shifted food patterns :
from a traditional diet of mostly fresh fish, vegetables, and tubers TO modern diet (canned food, processed foods)

(Hughes et al. 2005)

-Physical Activity, which was initially based on fishing and agriculture, has shifted to more sedentary activities

(Galy et al. 2020)

Major impact on NCDs' and the process starts at an early age

- A high SSB consummation in rural areas in Melanesian adolescents (4.77 l.week^{-1})

(Wattelez et al.2019),

- Breaksfast skipping before going to school in 18% of boys and in 13% of girls

(Frayon et al. 2018)

- Less PA in rural girls when compared to urban counterparts

(Zongo et al 2017).

So, we hypothesized that Ni Van adolescents living in a strong agro-ecologic environment (agricultural curriculum, school gardens and a strong FF culture) would have a better food environment that bring them healthier lifestyle when compared to NC adolescents, in spite of a higher socio economic level of development (HDI)

The aim of study is to assess food consumption and anthropometric parameters of adolescents living New Caledonia and Vanuatu and understand their relation with the ongoing socio-economic transition in the Pacific region

Material and methods

1469 adolescents (11-16 years old) participated in this study in school context:

-**FFQ => Interpretation with the Pacific food groups**

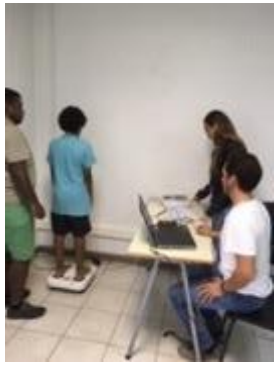
- *(Gwynn 2012)*

(Guidelines recommendations of the South Pacific Community)

-**Body composition:**

Height, weight and BMI adjusted to IOTF cut-offs

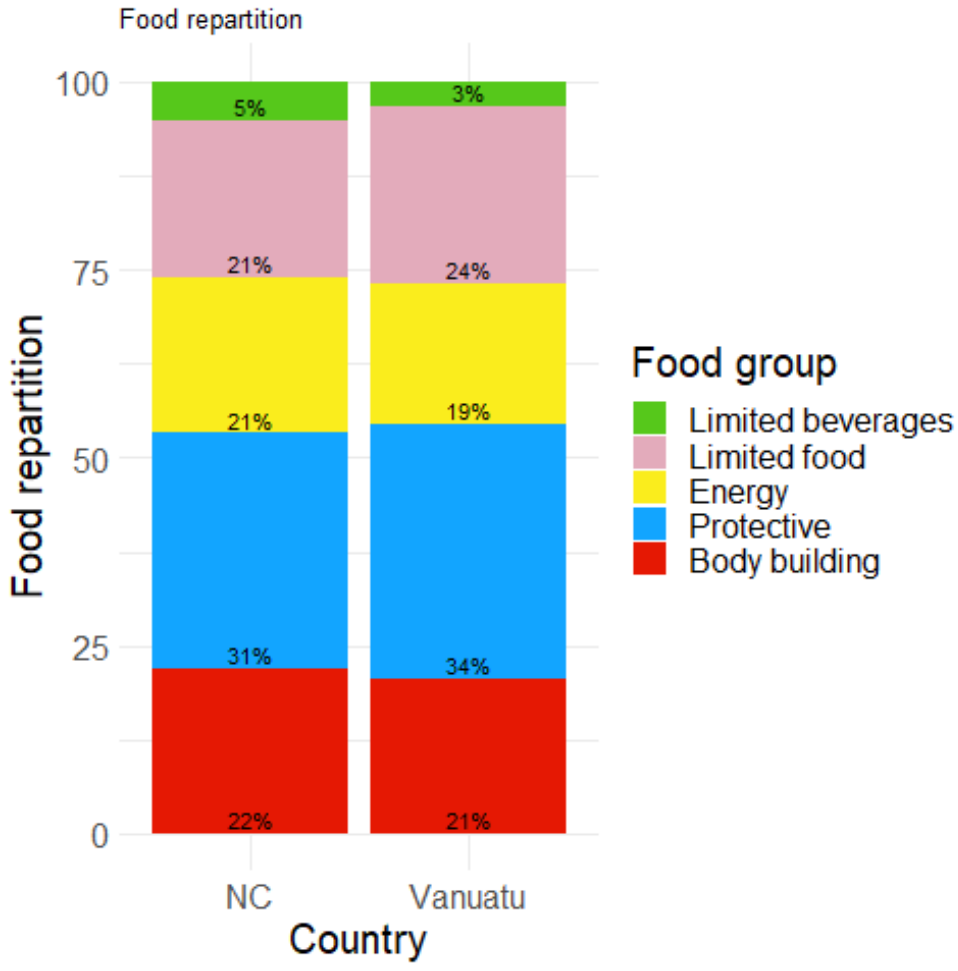
- *(Frayon et al. 2018)*

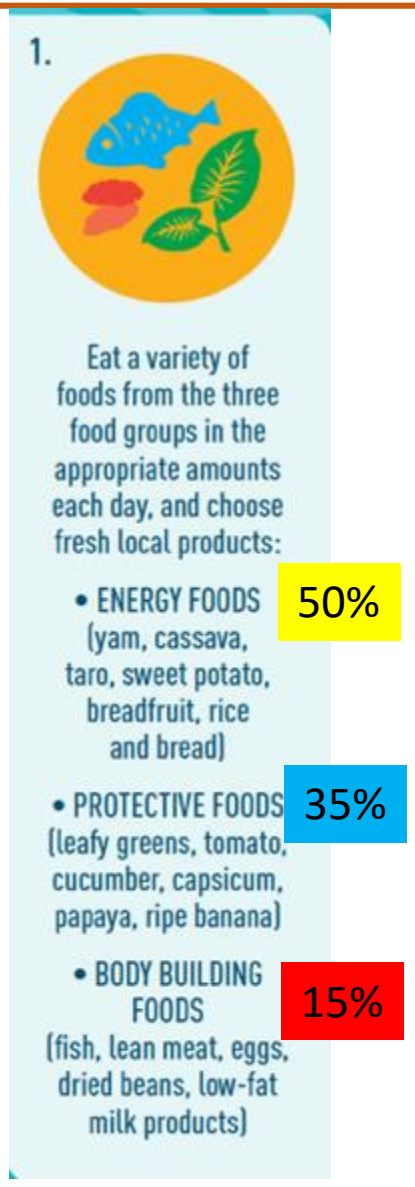


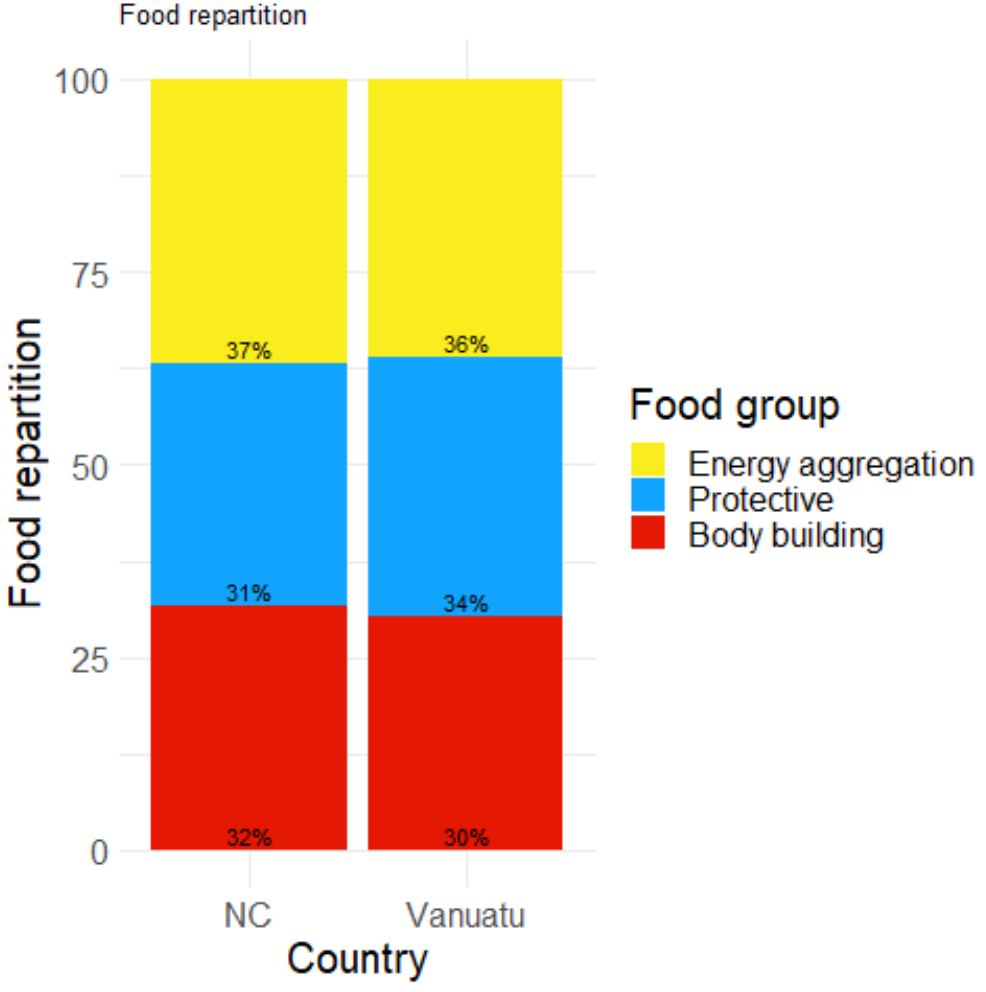
FFQ conversion

Pacific Guidelines Food Groups	Main Nutrients Provided	Food	Question Extracted from Gwynn's FFQ
Energy	Carbohydrates Vitamins Dietary fibre	Bread	How often do you eat bread (piece)? This includes baguette bread, baby bread, coconut bread, sandwich bread, etc.
		Pasta and rice	How often do you eat pasta or rice?
		Tubers	How often do you eat tubers (cassava, yam, taro, sweet potato, etc.)?
Protective	Vitamins Minerals Dietary fibre Phytochemicals Antioxidant	Vegetables	How often do you usually eat vegetables per day (for example, salad, green beans, cabbage, carrots, tomatoes, etc.)? This includes all fresh, frozen and canned vegetables.
		Fruits	How often do you eat fruits per day (for example, papaya, banana, mango, orange, apple, etc.)? This includes all fresh, dried, frozen and canned fruits.
Bodybuilding	Proteins and essential amino acids Vitamins Minerals Fatty acids Fibre (from dried beans and nuts)	Lentils, beans	How often do you eat lentils, split peas or dried beans?
		Milk	What is the total amount of milk you generally drink each day? Take into account all types of milk (brick, powder, milk consumed with cereals, etc.)
		Cheese	How often do you eat cheese?
		Yoghurt	How often do you eat yoghurt?
		Red meat	How often do you eat red meat (such as beef, deer or lamb)? This includes all steaks, ribs, roasts, minced meat, stirfries and stews.
		White meat	How often do you eat white meat like chicken?
		Fish	How often do you eat fish?
		Pork	How often do you eat pork?
		Eggs	How often do you eat eggs?
Limited beverage		SSB	How many sweetened drinks do you usually drink (juice, soda, lemonade)?
Limited food		Butter	How often do you eat your bread with butter or margarine (for example, Meadowlea)?
		Canned meat	How often do you eat canned meat (corned beef, ouaco beef, etc.)?
		Deli meats	How often do you eat cold cuts, sausages, pâté, canned ham?
		French fries	How often do you eat french fries?
		Salty snacks	How often do you eat potato chips or other salty snacks (Twisties, Doritos, etc.)?
		Sweeties	How often do you eat confectionery (lollipops, chocolate etc.)?
		Sweet foods	How often do you eat sweet foods such as sweet biscuits, cake or pastries?
		Breakfast cereals	How often do you eat breakfast cereals?
		Noodle soup	How often do you usually eat noodle soup (bowl of soup, Maggi soup, Yum Yum soup, etc.)?
		Take-away food	How often do you eat meals such as hamburgers, pizzas, fries from places selling take-away food?
Water		Water	How much water do you usually drink each day? It can be tap water or bottled water (a small bottle = two glasses).

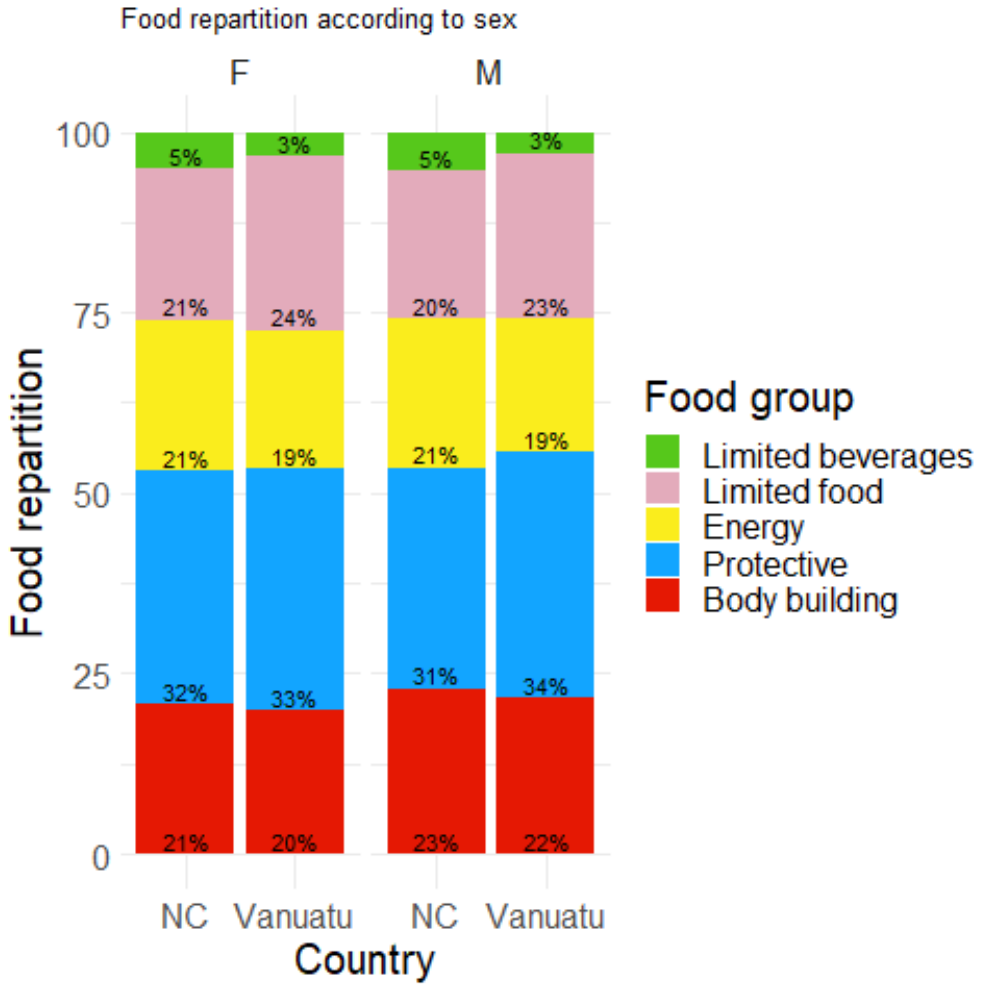
Results


Food repartition
100
75
50
25
0
Food repartition
5%
21%
21%
31%
22%
3%
24%
19%
34%
21%
NC
Vanuatu
Country
Food group
Limited beverages
Limited food
Energy
Protective
Body building


1.
Eat a variety of foods from the three food groups in the appropriate amounts each day, and choose fresh local products:
• ENERGY FOODS (yam, cassava, taro, sweet potato, breadfruit, rice and bread)
50%
• PROTECTIVE FOODS (leafy greens, tomato, cucumber, capsicum, papaya, ripe banana)
35%
• BODY BUILDING FOODS (fish, lean meat, eggs, dried beans, low-fat milk products)
15%


Food repartition
100
75
50
25
0
Food repartition
37%
31%
32%
36%
34%
30%
NC
Vanuatu
Country
Food group
Energy aggregation
Protective
Body building

Results


Food repartition according to sex
F
M
100
75
50
25
0
Food repartition
5%
3%
5%
3%
21%
24%
20%
23%
21%
19%
21%
19%
32%
33%
31%
34%
21%
20%
23%
22%
NC
Vanuatu
NC
Vanuatu
Country
Food group
Limited beverages
Limited food
Energy
Protective
Body building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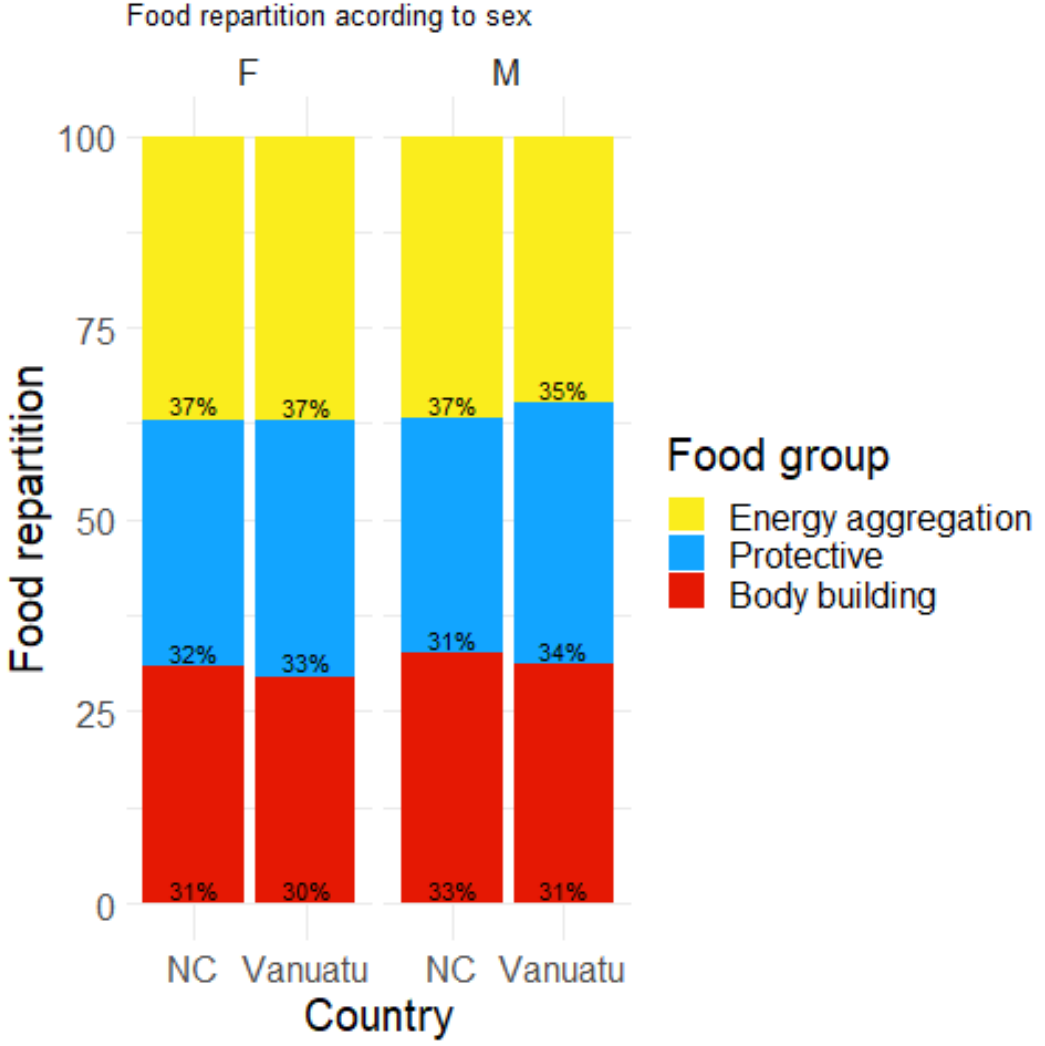
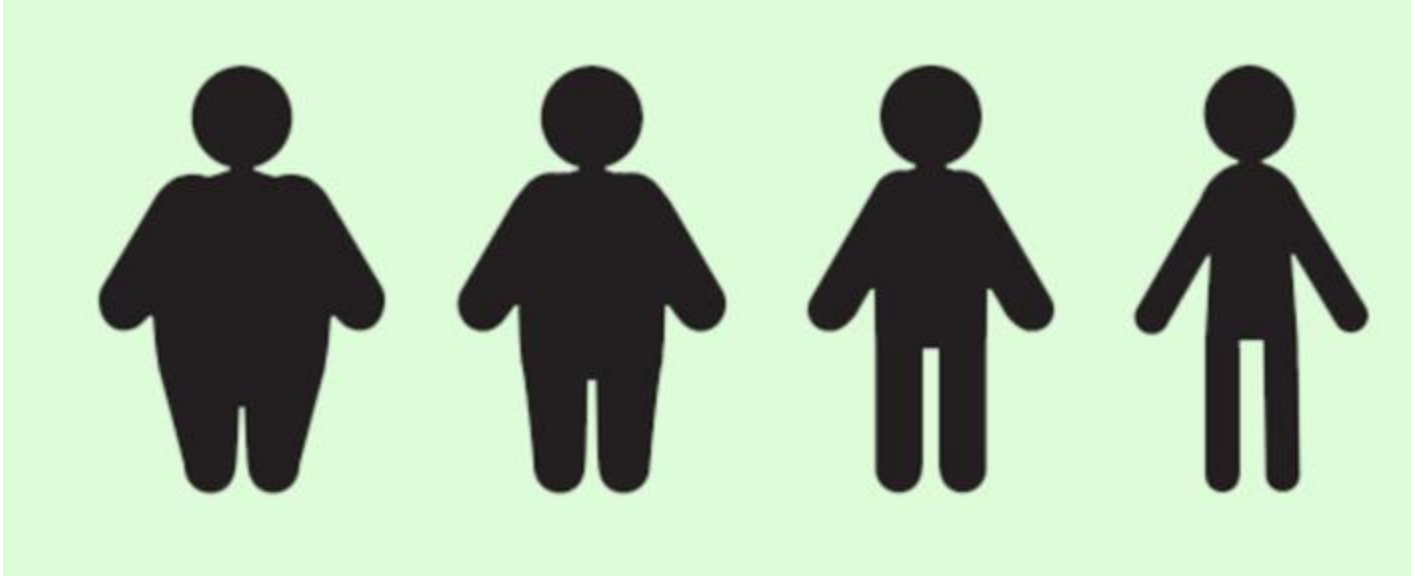
15%


Food repartition acording to sex
F
M
100
75
50
25
0
Food repartition
37%
37%
37%
35%
32%
33%
31%
34%
31%
30%
33%
31%
NC
Vanuatu
NC
Vanuatu
Country
Food group
Energy aggregation
Protective
Body building

Results

IOTF nom used for BMI adjusted to:
-sex
-age



Obese | Overweight | Normal weight | Underweight

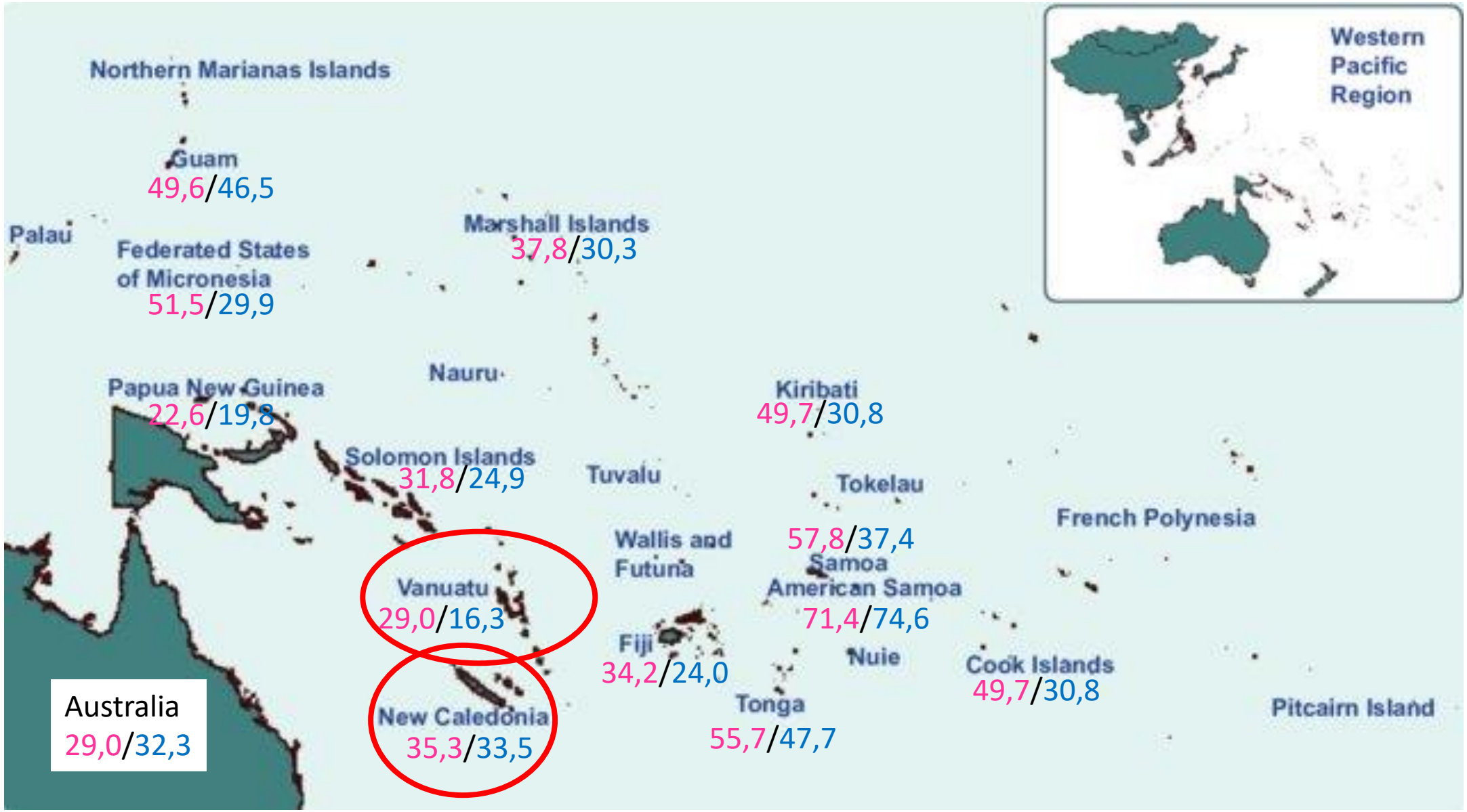
33% for New Caledonian adolescents

12.5% for Vanuatu adolescents

Age:
NC: 13.2 yrs
VAN: 15.3 yrs

Overweight in girls/boys from 10 to 24 years old in 2016 in the Pacific region

The Lancet (2019)



Discussion

Similar food consumption whatever the level of development of country of the adolescents with a higher level of overweight in NC when compared to VAN

-Malnutrition occurs in NC and VAN whatever the HDI level in boys and girls with about :

* UNDERCONSUMPTION: **-50%** of energy group recommandations

* OVERCONSUMMPTION :+**100%** of of body building group recommandations

50%

35%

15%

Discussion

In NC

-a superposition of traditional and modern food already observed

(Serra Mallol et al. 2020, Galy et al. 2021)

-Temporality of food intake

(Frayon et al. 2020)

-Media influences

(Nedjar et al. 2023)

In VAN

-adolescents are more physically active in Van? Studies in progress in 2023

-skipping breakfast

In NC and VAN

-immediately acces of processed food (limited food and drinks) in schools (VAN) and around (NC)

- Role of gardens in schools in VAN and NC, while we know that agriculture courses are present in VAN

Conclusion

This example of NC and VAN shows that the socio-economic development of a country does not necessary drive future generations to healthy body composition.

For NC and VAN, the role of school remain central with :
*creation (NC) revitalisation (VAN) of farming in schools
*the importance of Physical education in the curriculum (VAN)
*educational actions through the curriculum on health education based on objective data (NC, VAN)

=> Deeper analysis from macronutrients to micronutrients including other variables of lifestyle are needed to understand nutrional patterns in adolescents

FALAH
Family farming, lifestyle & health

Thank you for your attention

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Understanding divergence in physical activity through the prism of spatial, temporal and socio-cultural dimensions: the example of France *vs.* New Caledonia

Thibaut Derigny[1*], François Potdevin[1], Marie-Jeanne Urvoy[2], Joseph Gandrieau[1], Pierre-Yves Leroux[3],

Guillaume Wattelez[2], Paul Zongo[2], Stephane Frayon[2], Christophe Schnitzler[3], Taha Hamadene[4], Olivier Galy[2]

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[2] Interdisciplinary Labooratory for Research in Education, EA 7483, School of Education, University of New Caledonia, BP R4, Avenue James Cook, 98851 Nouméa Cedex, New Caledonia

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Wednesday 20th june 2023

An **international** & **collectif** research project

Thibaut Derigny

PhD, PE teacher

University of Lille

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Full Professor

University of Lille

Christophe Schnitzler

Associate Professor

University of Strasbourg & Sherbrooke

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Olivier Galy

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University of NC

Guillaume Wattelez

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PhD, PE teacher

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Marie-Jeanne Urvoy

PhD Student

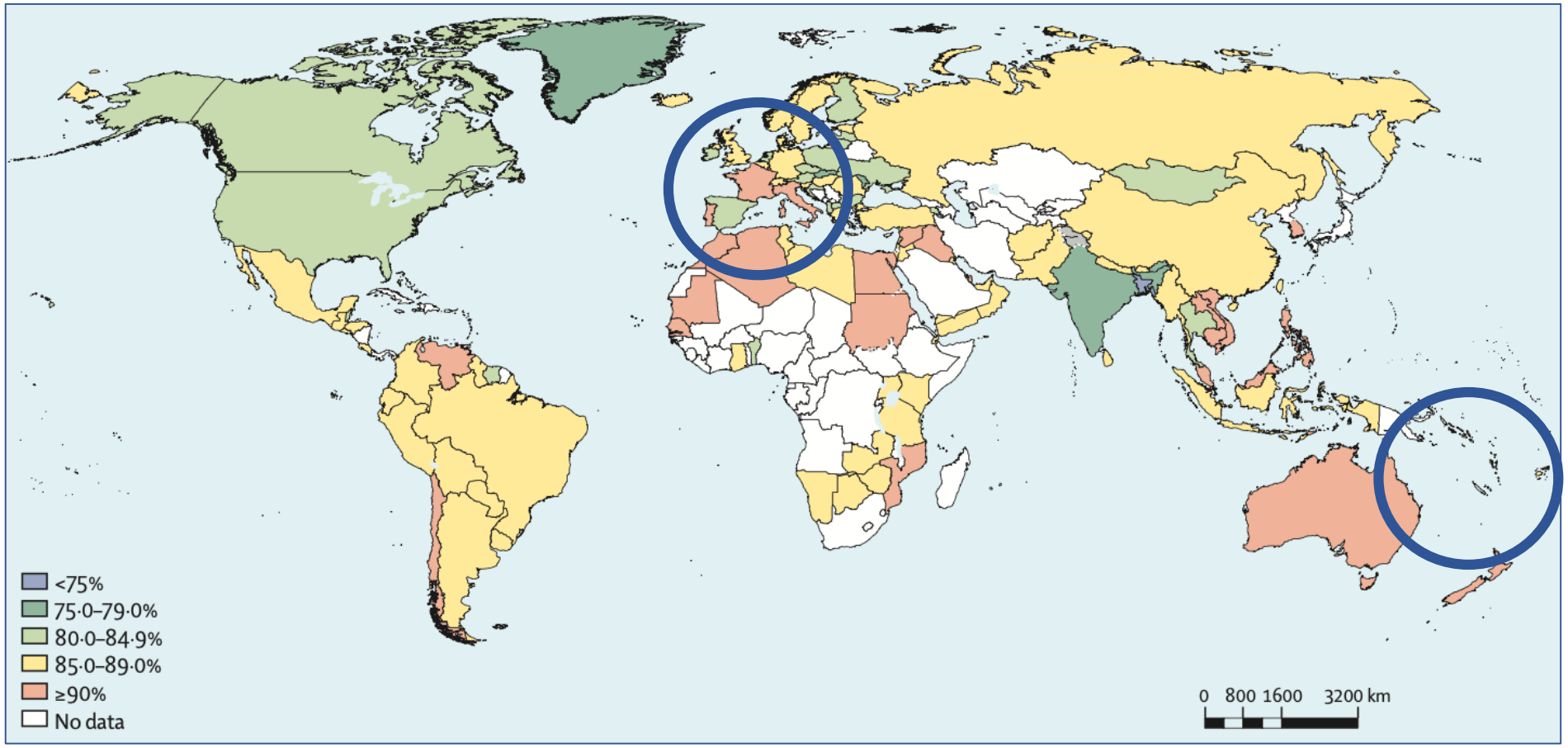
University of NC

Stephane Frayon

PhD, Sciences teacher

University of NC

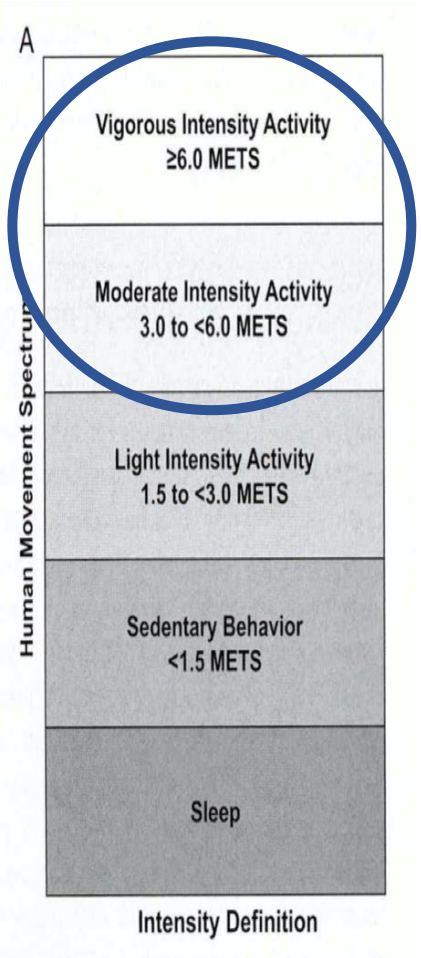
Alarming levels of physical inactivity



THE LANCET

Guthold et al., 2020

The **positive** effects of physical activity on **health** ...



EUFIC, 2020

Barriers to PA engagement

Barriers

Individual

Perception of not looking good as others in PE classes (16, 36)
Physical appearance (sportswear, sweating, weight) (33, 34)
Lack of perceived competence/capacity/skills (16, 32, 33, 36)
Lack of knowledge about PA benefits (36)
Lack of time (16, 30, 32, 33, 35)
Perception that PA is not fun (33, 35)
Discomfort during and after PA (33–36)
Increased obligations and responsibilities to family and friends (16, 32, 34, 36)
Preference for other leisure activities (16, 32, 33, 35)
Perception of being bullied in PE classes (35, 36)
Increased school and homework commitments (16, 36)
Working in part-time (16)
Perception of inferiority in PE classes (36)
Fear of failing in front of their peers (33)
Lack of motivation (33, 35, 36)

Interpersonal

Verbal and physical bullying by peers (35, 36)
Social exclusion by peers (36)
Lack of peer support (16, 32, 33, 35, 36)
Lack of family support (16, 33–36)

Lack of teachers support (16, 31–33, 35)
Competitive environment in PE classes (31, 33)
Friends do not engage in PA (16, 33)
Family members do not engage in PA (33)
Poor performance in PE classes (35)
Boys' dominance in classes (31)
Prejudiced attitudes of boys (34)
Negative experiences with friends (33)
Negative experiences at school (31, 33)
Lack of PA choices in PE classes (16, 35)
Highly structured activities at PE classes (31, 34)
Parents encouragement for different subjects (16)
Parents' focus on achieving high grades (16, 33)
Lack of financial support and transportation to gyms (33, 35)
Adverse household conditions (36)
Stereotyping by peers (16, 36)

Environment

Promotion of sedentary activities (36)
Perception that PA is not culturally valued (16, 36)
Social pressure of feminine appearance and behavior (16, 35)
Safety concerns at neighborhood outdoor areas and environment (33, 35, 36)
Limited access to sports/programs in the community (clubs, preferred sports) (33, 35)
Limited activities choices in rural settings (16)
Expensive activities (16, 32, 33, 35)
High distance from recreational centers at community (33, 35)
Lack of facilities (30, 33)
Fewer opportunities than boys (35)

Limited access to sports/programs in school (33)

Duffey et al., 2021

Bauman et al., 2012

Main barrier: **‘Lack of time’**

Embersin et al., 2007

Boiché & Sarazzin , 2009

Lemoyne et al., 2012

Baromètre CRESCO, 2020

Duffey et al., 2021

A time that passed *vs.* a time that is seized

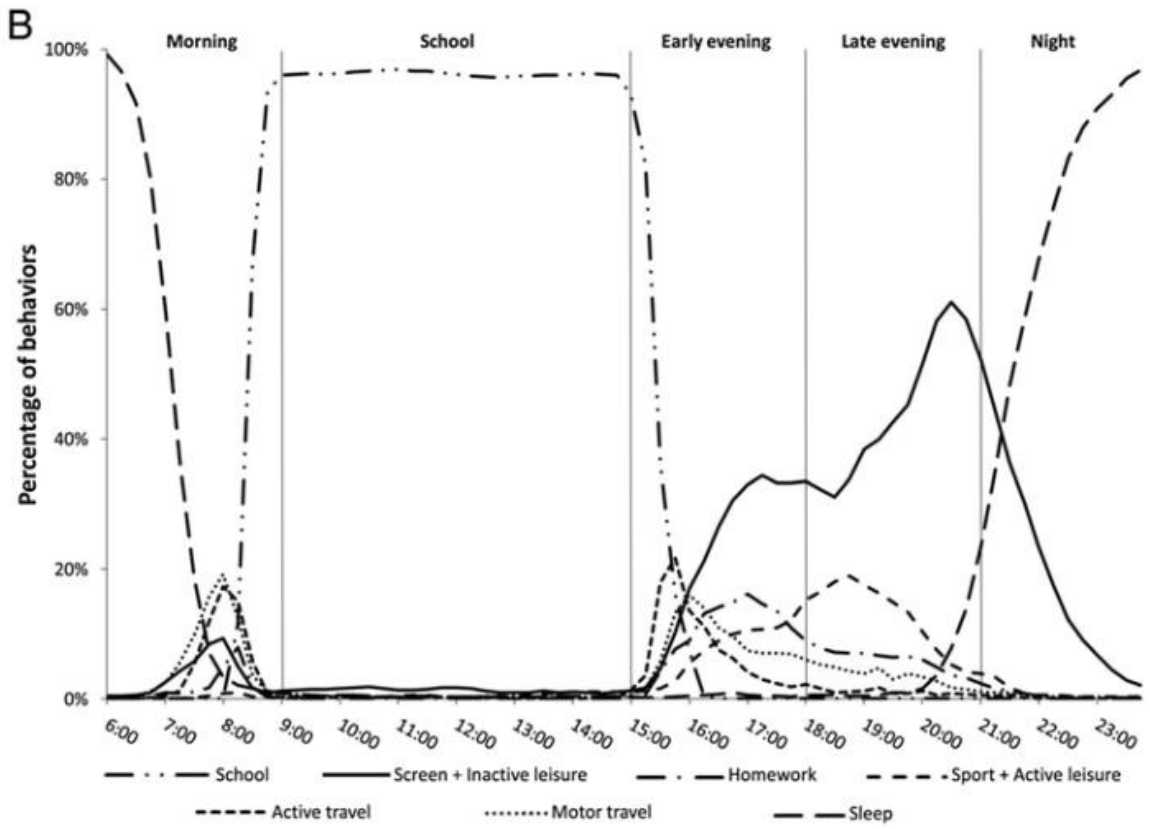


Fig. 1 Occurrences of the different intensity levels (Fig. 1a) and behavioral domains (Fig. 1b) as a function of time on regular weekdays

Élias, 1997

De Baere et al., 2015

Klinkler et al., 2014

Remmers et al., 2021

‘Chronos’ → ‘Kairos’

RESEARCH Open Access

Catch me if you can! How French adolescents seize social occasions and opportunities to be active

Thibaut Derigny[1*], Christophe Schnitzler[2], Teun Remmers[3], Dave Van Kann[3,4], Joseph Gandrieau[1], Ndongo Seye[5], Georges Baquet[1] and François Potdevin[1]

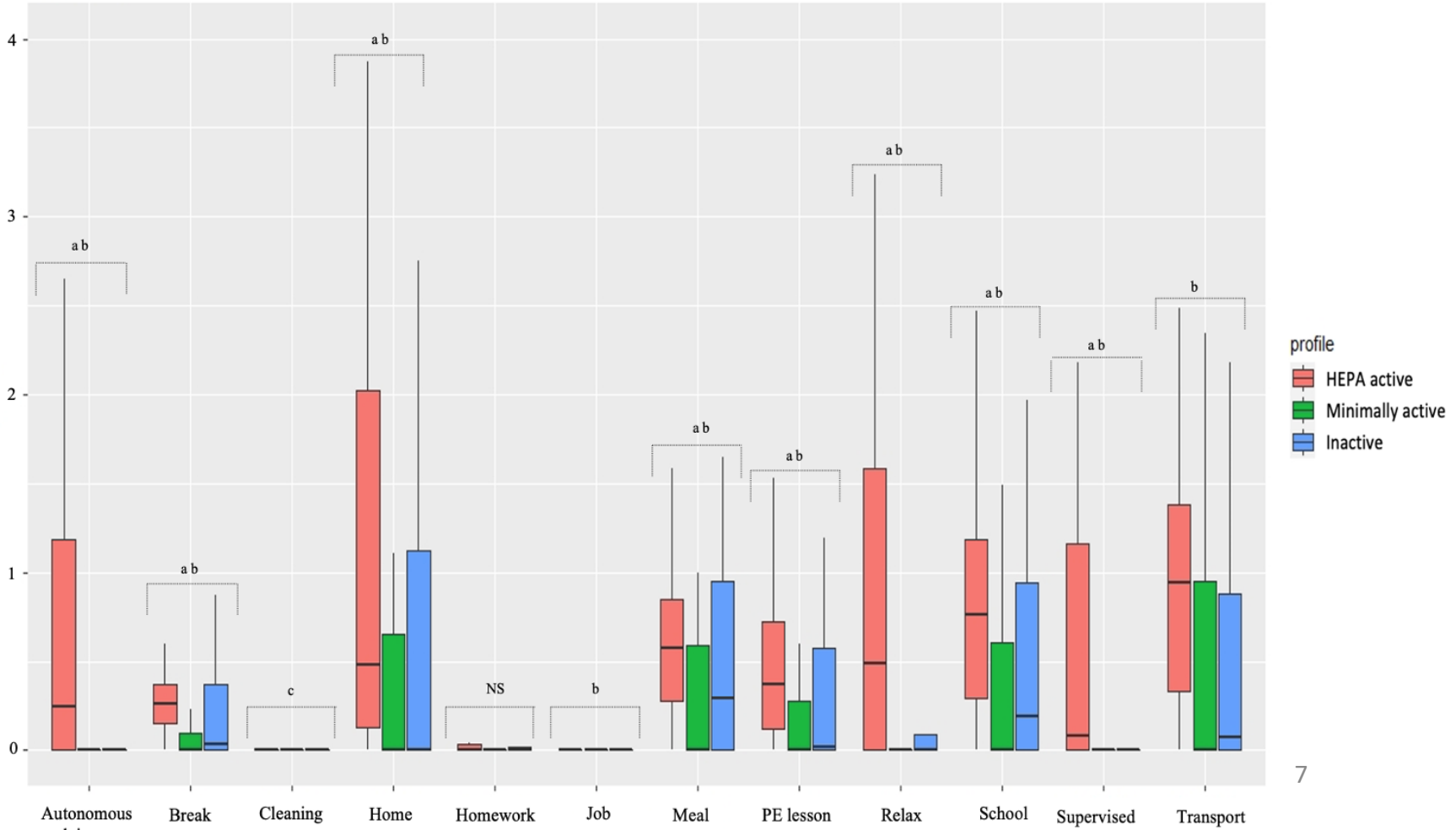
Repeated two-ways ANOVA

Transition effect : p<0.05

Social times effect : p<0.05

*Transition * social times effect : p<0.05*

N=119



Derigny et al., 2022

Time perceived and invested according to cultures?

« *Each society shapes the rhythm of their activities, since each society perceives time differently* »

Thompson, 1993

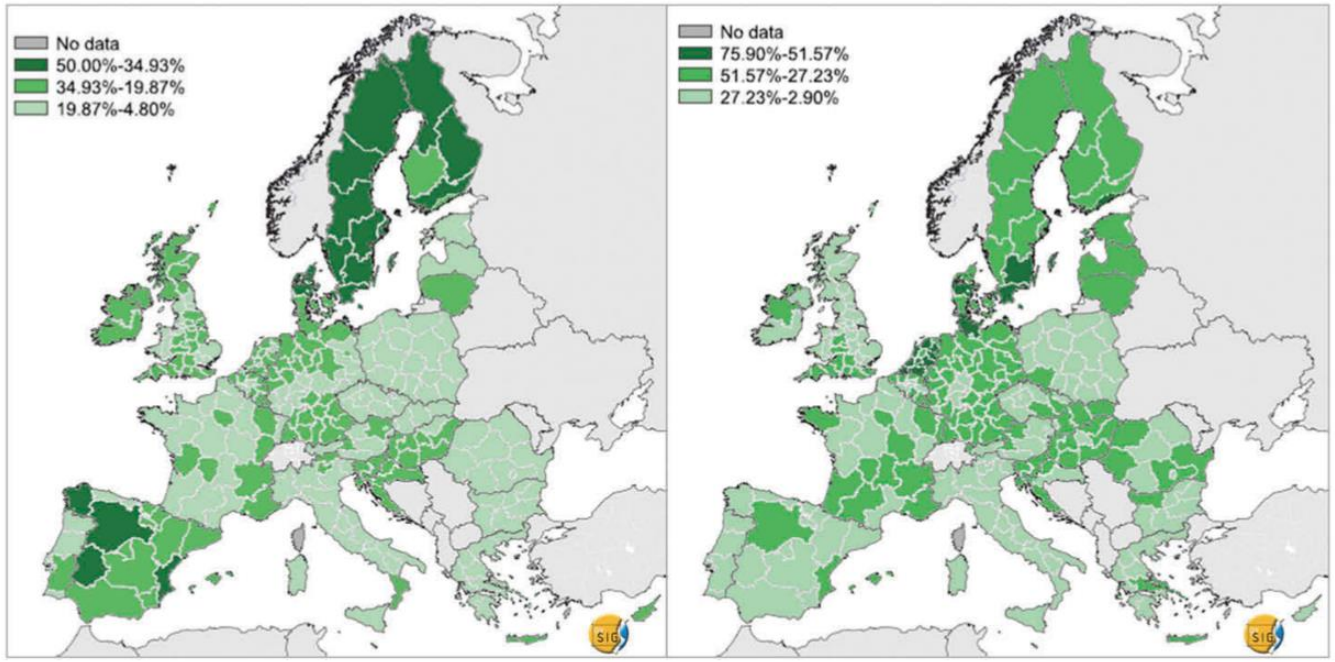
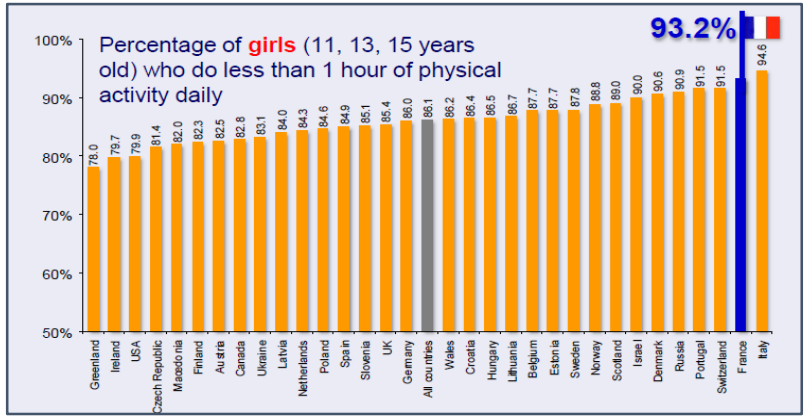
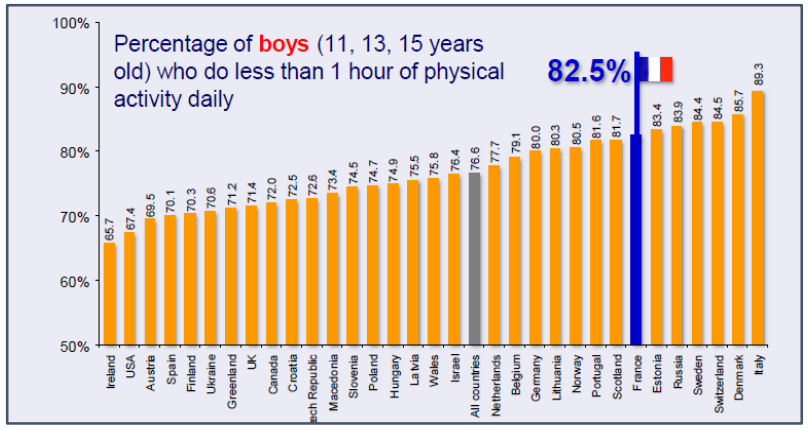


Figure 3. Healthy sports participation (left) and healthy physical activity (right) according to participation level across the EU regions.

Lera-Lopez et al., 2018

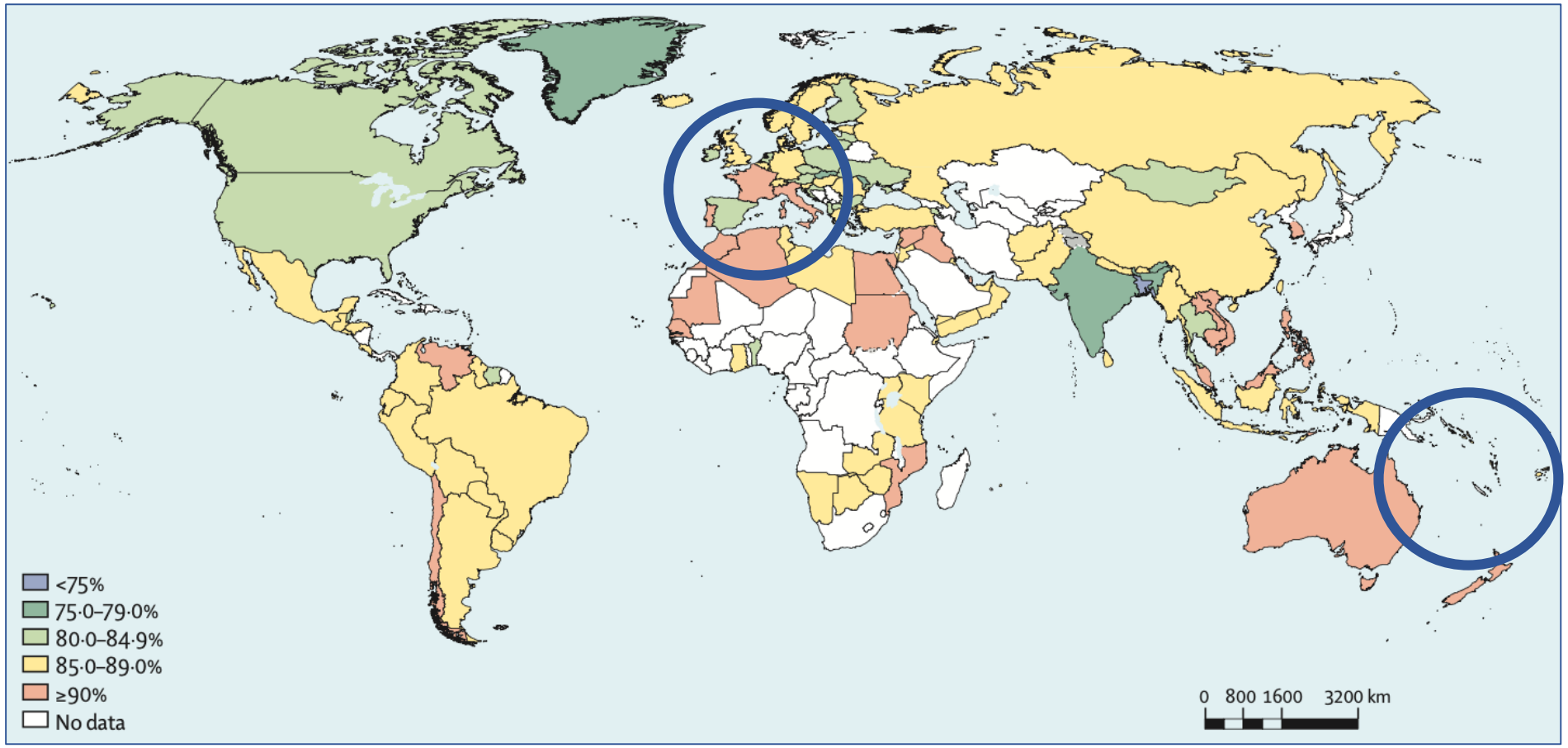




Kalman et al., 2015

What about when the are common policies,

but the cultures are different?

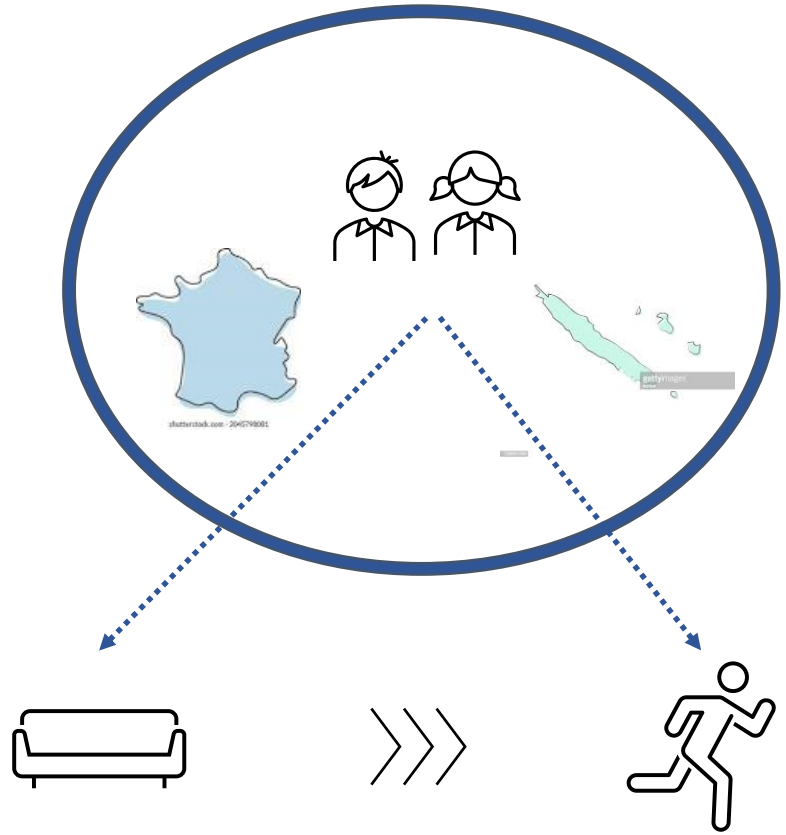


THE LANCET

Guthold et al., 2020

Temporal patterns according to cultural dimension?

Reconstructing personal temporal equations



With a cross-cultural comparison

between France and New Caledonia

→ <u>Descriptive</u> and <u>comprehensive</u> approach

Hypotheses

1. The global PA level is not significantly different between French and Caledonian adolescents;

2. Distribution within opportunities varies significantly between these two cultures, since the process of "perceiving - seizing" opportunities varies according to local culture.

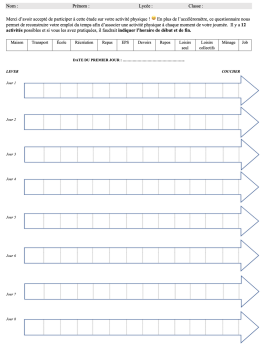
Participants & tools

N=125

Girls: 86

Boys: 39

Age_{mean}= 17.1 ± 0.6

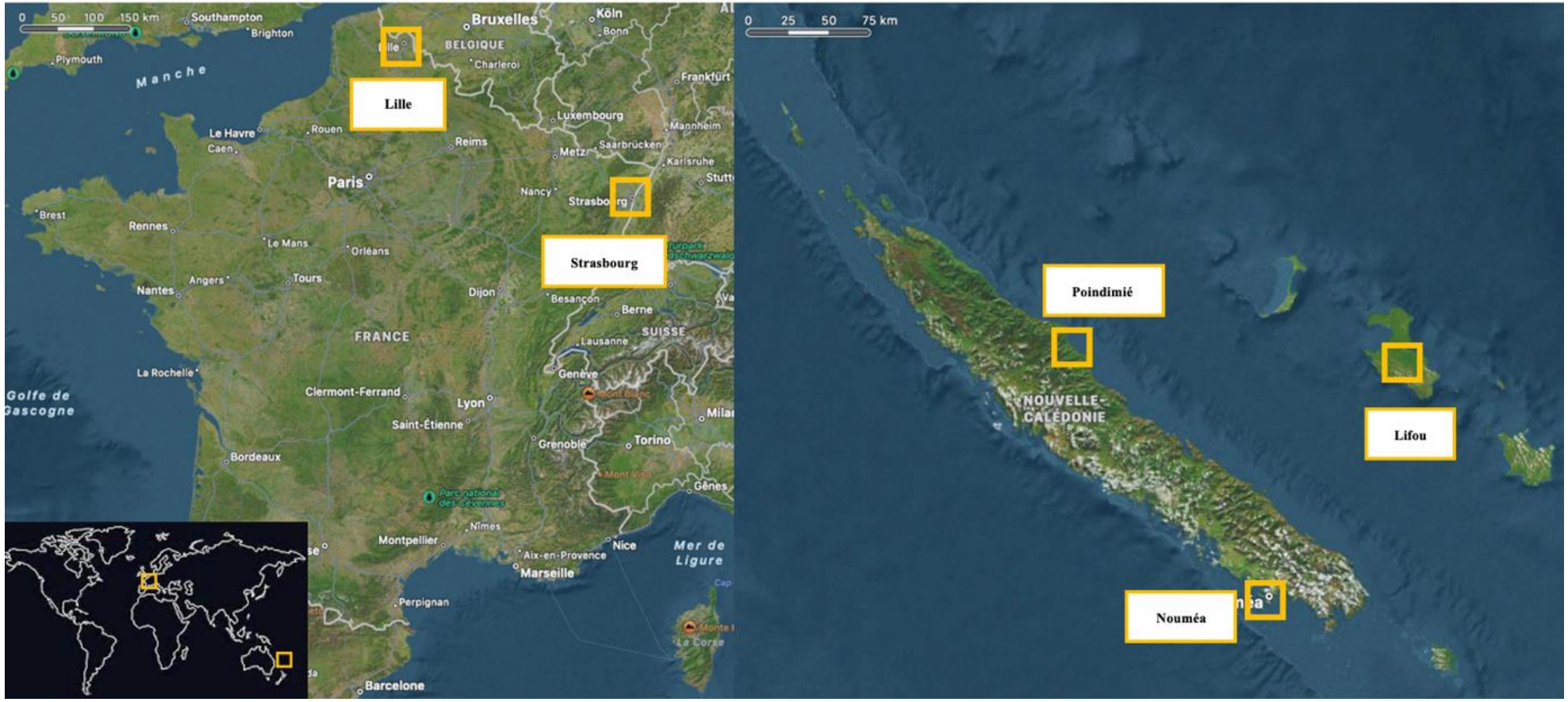


7 jours consécutives days

Accéléromètres GT3X

Logbook every days

Localisation



N=72 (69% filles)

Age_{mean}= 17.0 ± 0.62

N=53 (68% filles)

Age_{mean}= 17.2 ± 0.59

Logbook: reconstruct temporal opportunities

11h00

- Maison
- Transports actifs (vélo, trottinette, etc.)
- Transports passifs (voiture, bus, etc.)
- École
- Récréation
- Cours d'EPS
- Devoirs
- Repas
- Activités rémunérées
- Activités physiques et sportives
- Loisirs (amis, familles, etc.)
- Tâches ménagères
- Repos
- Dormir

Nom : Prénom : Lycée : Classe :

Merci d'avoir accepté de participer à cette étude sur votre activité physique ! En plus de l'accéléromètre, ce questionnaire nous permet de reconstruire votre emploi du temps afin d'associer une activité physique à chaque moment de votre journée. Il y a **12 activités** possibles et si vous les avez pratiquées, il faudrait **indiquer l'horaire de début et de fin.**

Maison	Transport	École	Récréation	Repas	EPS	Devoirs	Repos	Loisirs seul	Loisirs collectifs	Ménage	Job

DATE DU PREMIER JOUR : .....

LEVER *COUCHER*

Jour 1

Jour 2

Jour 3

Jour 4

Jour 5

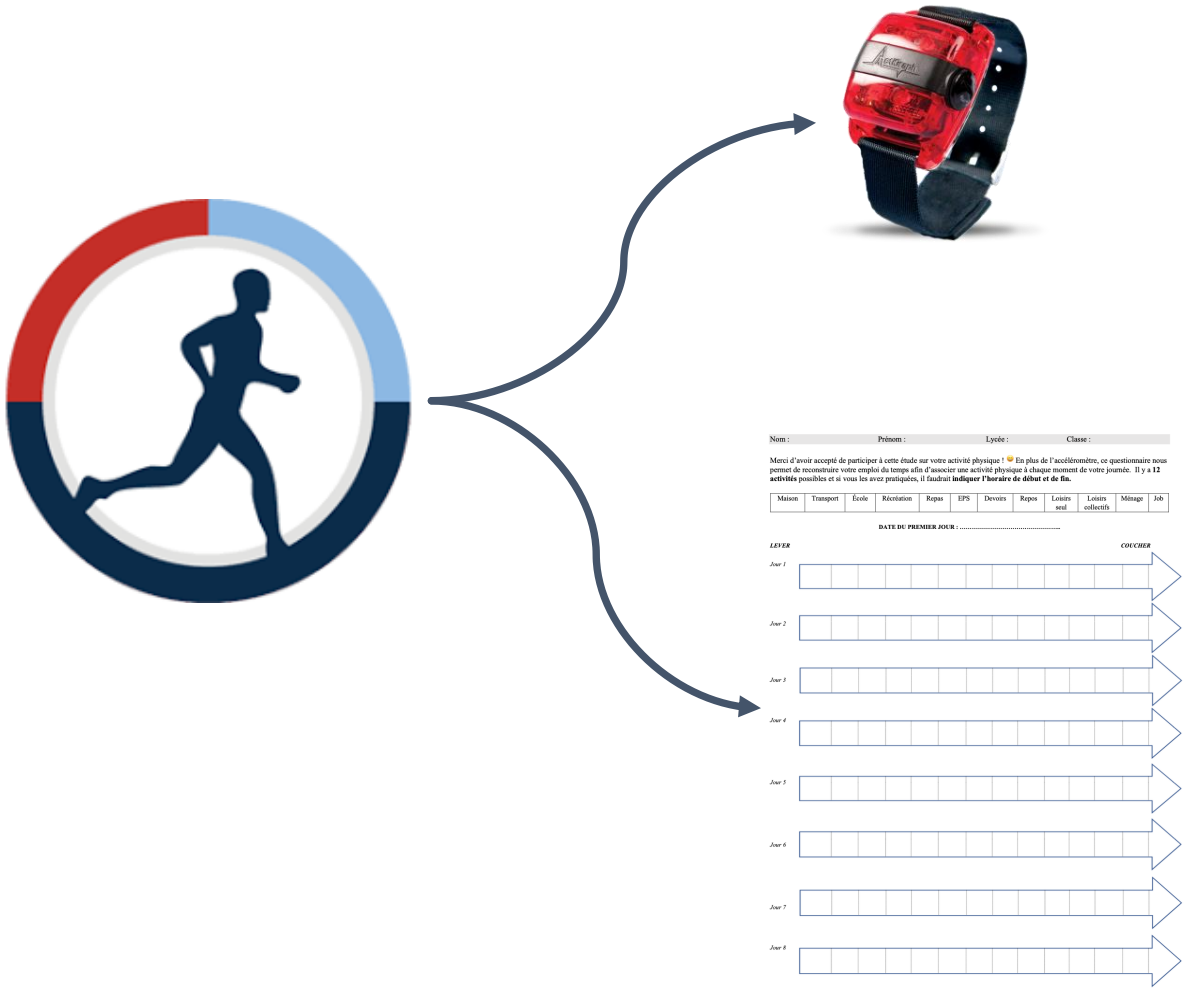
Jour 6

Jour 7

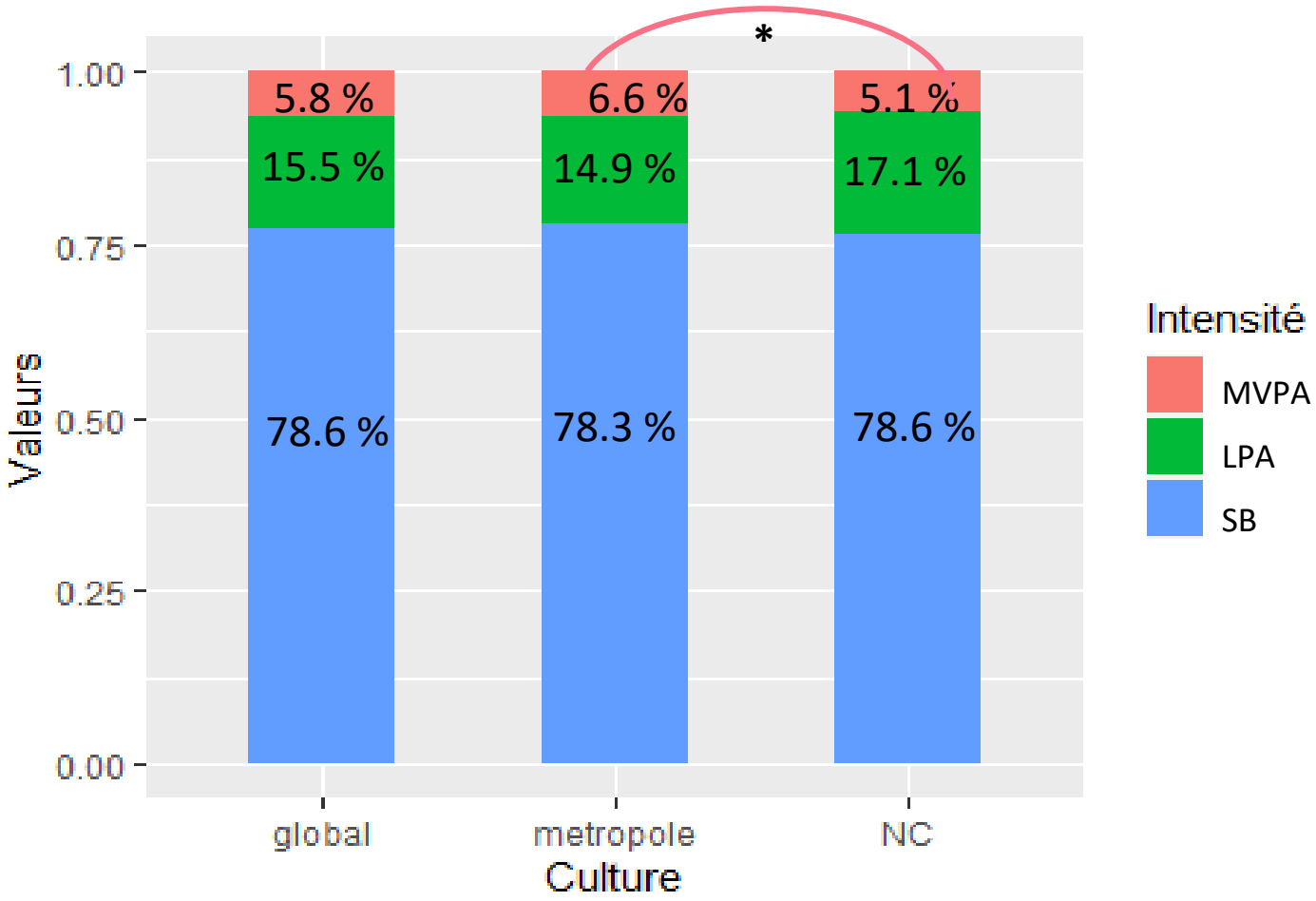
Jour 8

70% completed

Crossing accelerometers and logbook



Cultural effect on sedentary behaviour and physical activity intensities



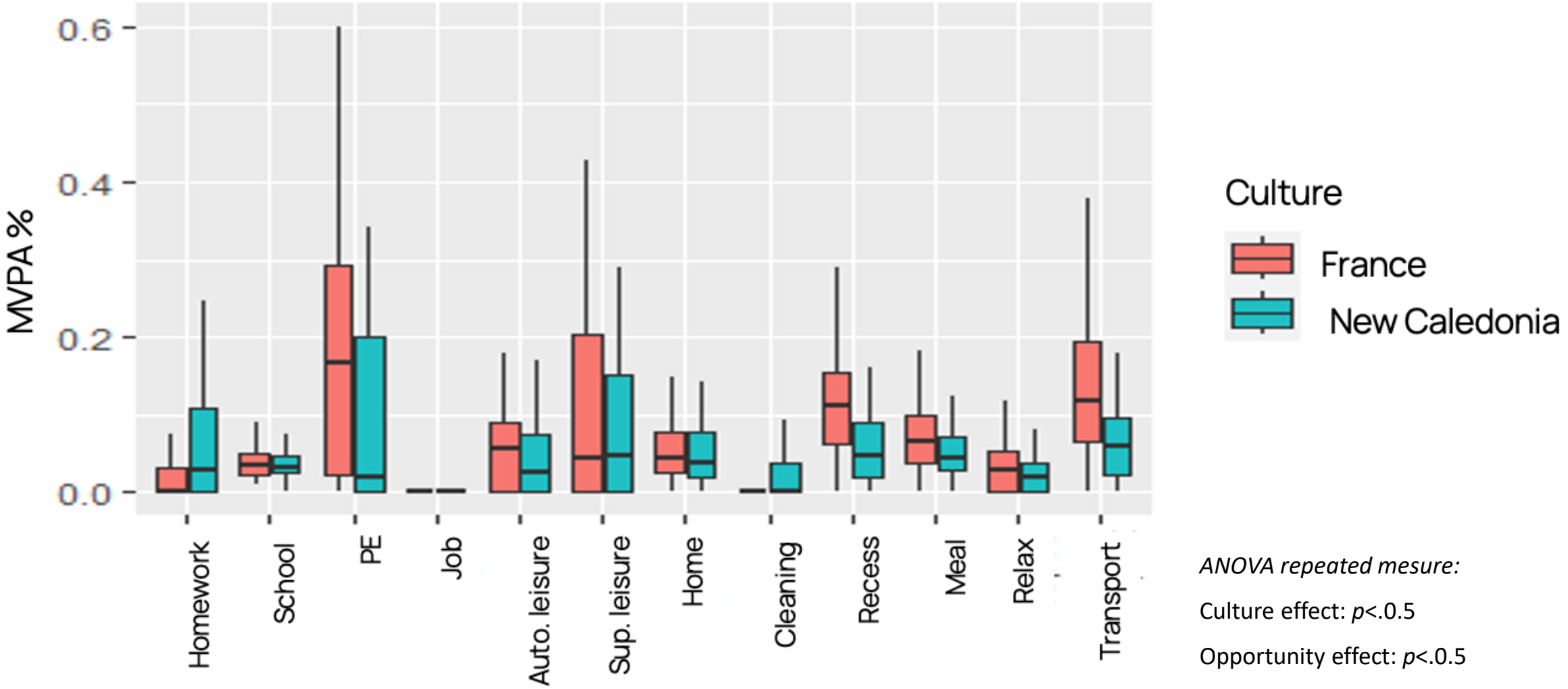
Kruskal-Wallis tests, France vs. NC

SB% : NS

LPA% : NS

MVPA% : *p*<0.05

Cultural effect on MVPA temporal distribution (opportunities)



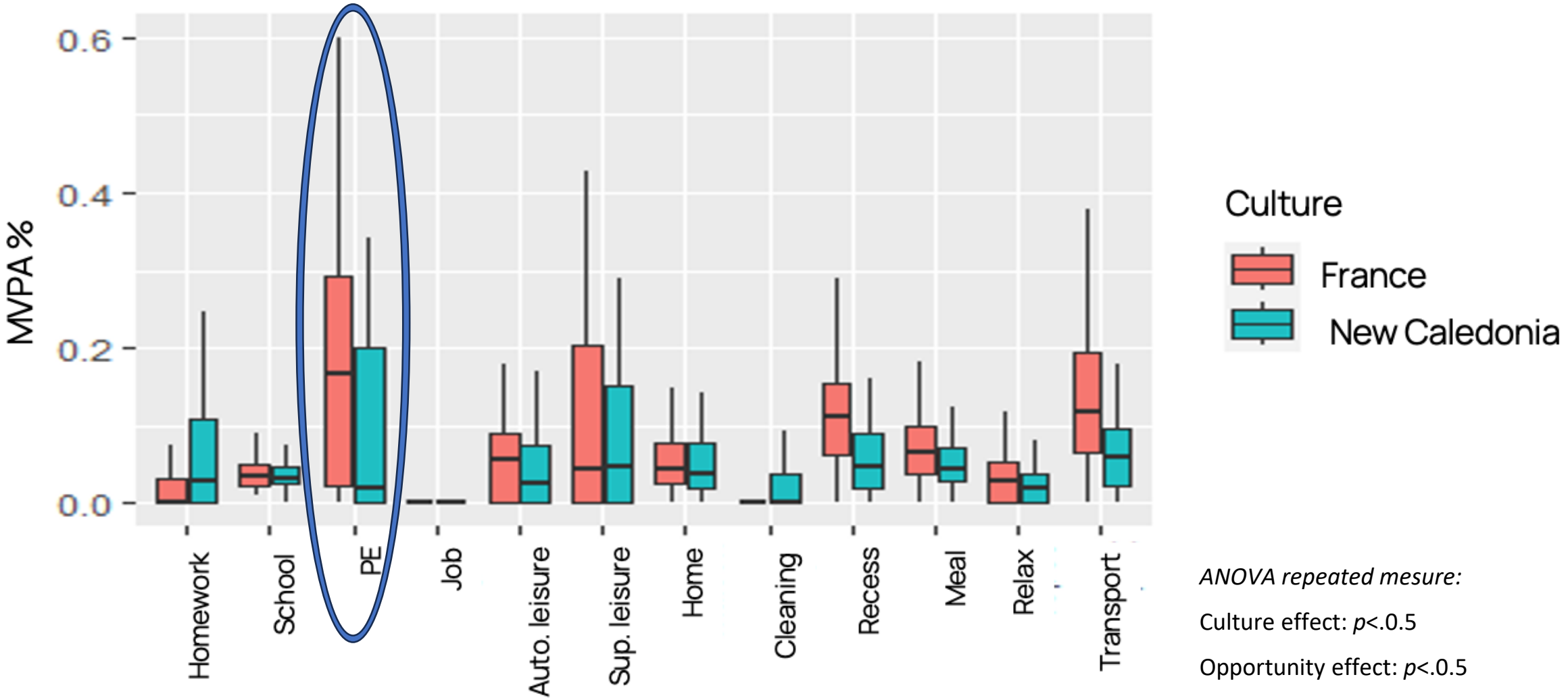
ANOVA repeated mesure:

Culture effect: $p<.0.5$

Opportunity effect: $p<.0.5$

Culture*opportunity effect: $p<.0.5$

Cultural effect on MVPA temporal distribution (opportunities)



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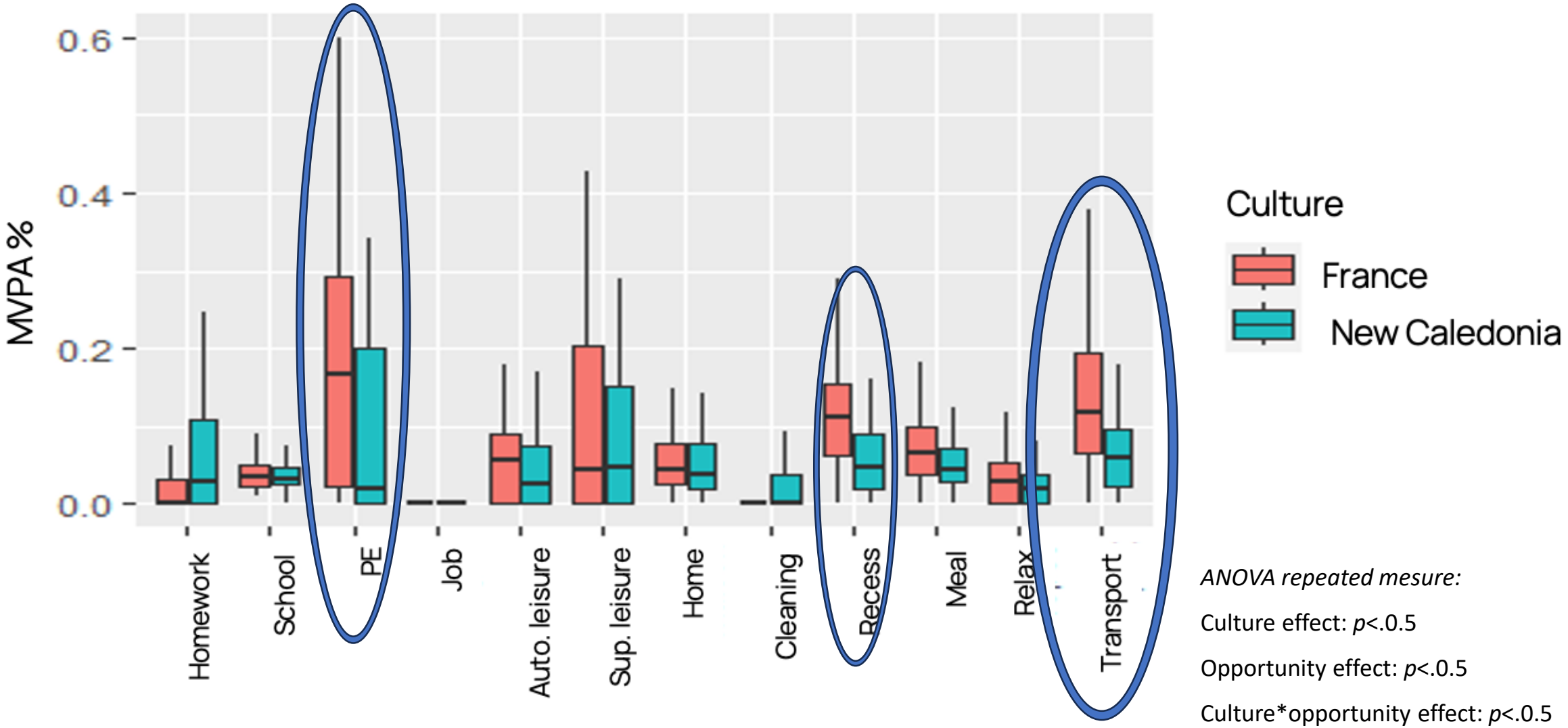
Cultural effect on MVPA temporal distribution (opportunities)



ANOVA repeated mesure:

Culture effect: $p<.0.5$

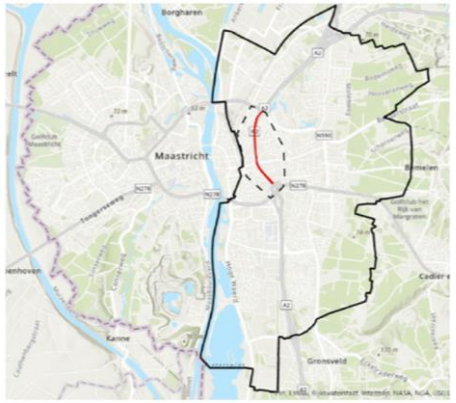
Opportunity effect: $p<.0.5$

Culture*opportunity effect: $p<.0.5$

Three main messages

1. **Social time**: a new way of analyzing physical activity;
2. **Time education to promote physical activity:** focus on school time and active transport to school;
3. **Opportunities are culturally rooted**: the educational process of 'identifying', 'seizing' and even 'provoking' cannot be copied and pasted.

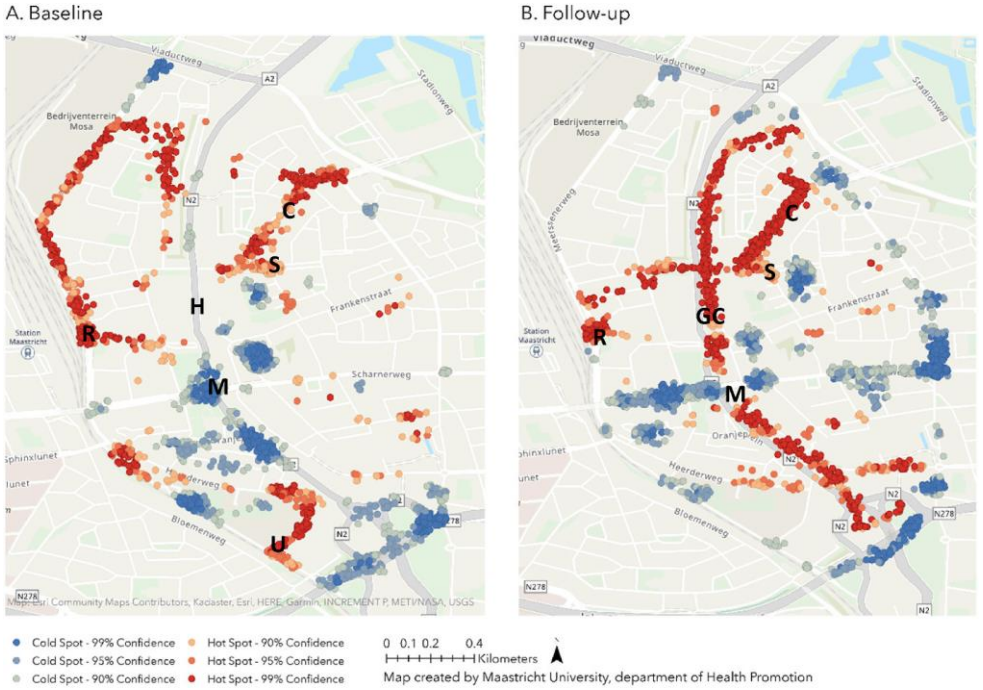
Methodological perspectives



Stappers et al., 2022

Building a bike tunnel did not increase MVPA, but did change behavioural patterns

GPS BTQ1000XT



Time-geographic

Mapping the PA

according to space-time opportunities

Thank you for your attention!

Understanding divergence in physical activity through the prism of spatial, temporal, and socio-cultural dimensions: the example of France *vs.* New Caledonia

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20 June 2023

1st FALAH conference, Port Vila, Vanuatu

20st to 22th of June 2023

LIFESTYLE, MIGRATION AND HEALTH IN TONGA

- A CLOSER LOOK AT FAMILY FARMING LIFESTYLE AND HEALTH, AND HOW MIGRATION PLAYED A ROLE IN WHERE TONGA COMES TO BE WHERE IT'S AT TODAY
- QUALITATIVE METHODOLOGY
  - In-depth interviews of towns ordinary people, town officers, clergy members of various religious denominations, scholars of the nation, and national and international reliable annual and quarterly reports

By Palei Fonua Liua, and Matangi To'aho

FALAH
Family farming, lifestyle & health

Representing “Christ’s University in Pacific” (CUP)

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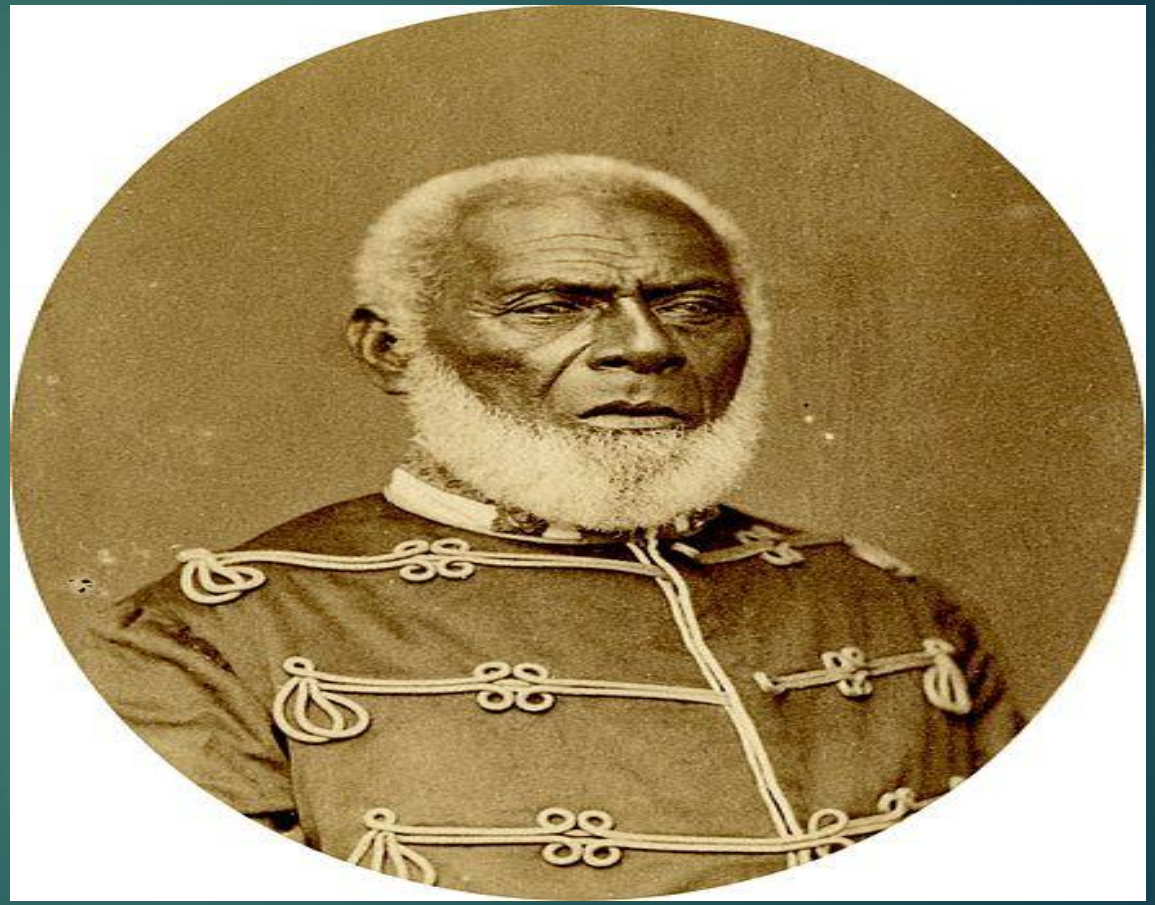
TONGA

- King George Tupou 1. first to unite all of Tonga under one ruler
- A Nation of 109,000 people strong
- Located in the middle of the South Pacific
- ONLY SURVIVING MONARCH IN OCEANIA
- Humpback Whales Travel 3,000 Miles to Breed and Give Birth in Tonga



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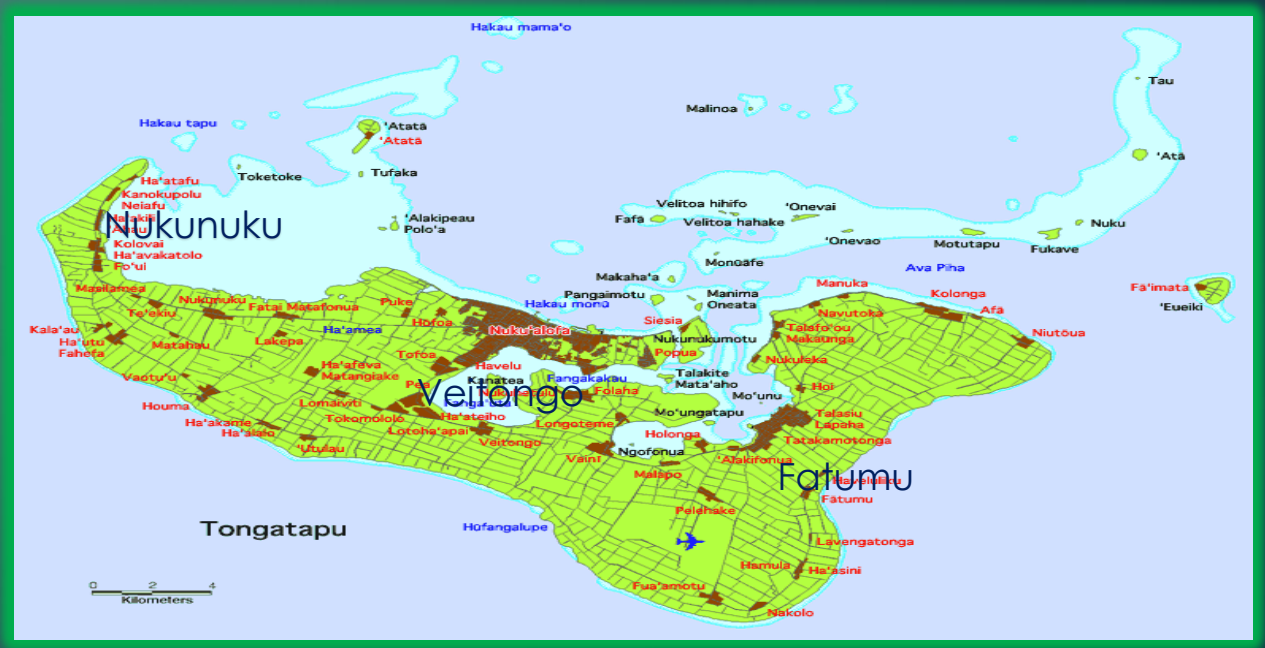
In family farming, this research looked at three different villages: Fatumu, Veitongo, NukuNuku, in terms of:

* *the current lifestyle in family farming*
* *health, and*
* *migration.*

They represent three different regions of Tonga from the east, west, and the central



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3 Areas People of Fatumu, Veitongo, and Nukunuku farm locally for their livelihood; Family Farming, Fishing, Handicrafts and Cultural Arts.

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Agriculture and Livestock

- Family farming consists of growing sweet potatoes (over 10 different types), squash, coconuts, Kava, vanilla, bananas (various kinds), hopa, papayas (various types), water-melon, mangoes, kuava, passion fruit, pineapple, tava, moli (mandarin), manioke (kasava many various types), taro (over 5 different types)), pele, kape, yams (over 10 different types), potatoes, ginger, Tongan taro (various types), breadfruit, lemon, lime, ifi.
- They also raise pigs, chickens, cows, goats, sheep, horses
- They ensure that food security are safe for the present
- New phenomena is happening, perhaps its due to the volcanic eruption and the dust it came with last year.
  - For an example, Watermelon crops are failing, and are rotting sooner now than before, for reasons we don't know
  - Of course the methods of planting and keeping it are the same as always

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Fishing

Villagers use different kinds of methods to catch fishes, shell-fishes, octopuses etc.

- Fishing nets, fishing pole and hooks, uku (diving), long lines, ama, spear fishing, fish bars
- There are over 650 different kinds of fishes found in Tonga.
- Now, there is a new phenomena happening, new shell fishes are showing up and are found in places where they were never found before
  - Such as in Fatumu, for hundreds of years. Sea urchins was never found in the ocean area of this village. In recent years there are plenty
    - What has changed?
    - This research does not have the budget to find the answers
    - More research are needed to be conducted

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Cultural arts and handicrafts

Ngatu (tapa clothe), fala (mats), tau'ovala, various fine baskets, various fine bags, fine arts, various fine mats, poetry, arts …

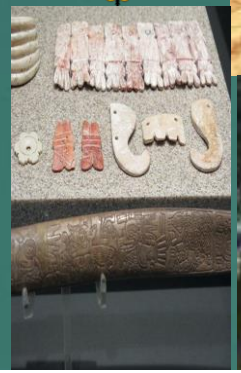
Handicrafts are mainly for women. Some families it's a collective effort for the whole family, including the husband

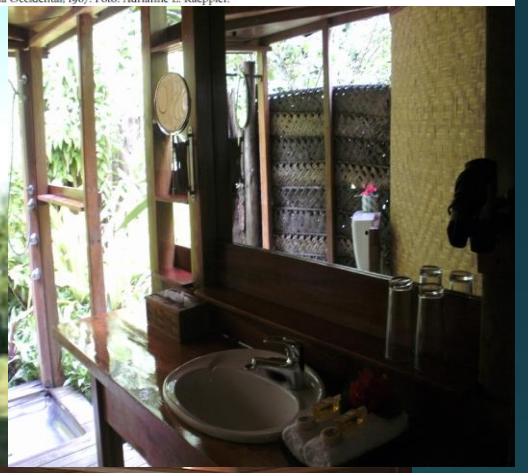
The Kingdom of *Tonga* is well known for its *handicrafts* including bone carving, wood carving, basket making and fine weaving using traditional techniques

These activities earn income for the people of the local villages, especially with new technologies and the open internet-based advertising and sales

For women's groups, a market is needed for their goods


Performance lakalaka de Tonga. Polinesia Occidental, 1967. Foto: Adrianne L. Kaeppler.





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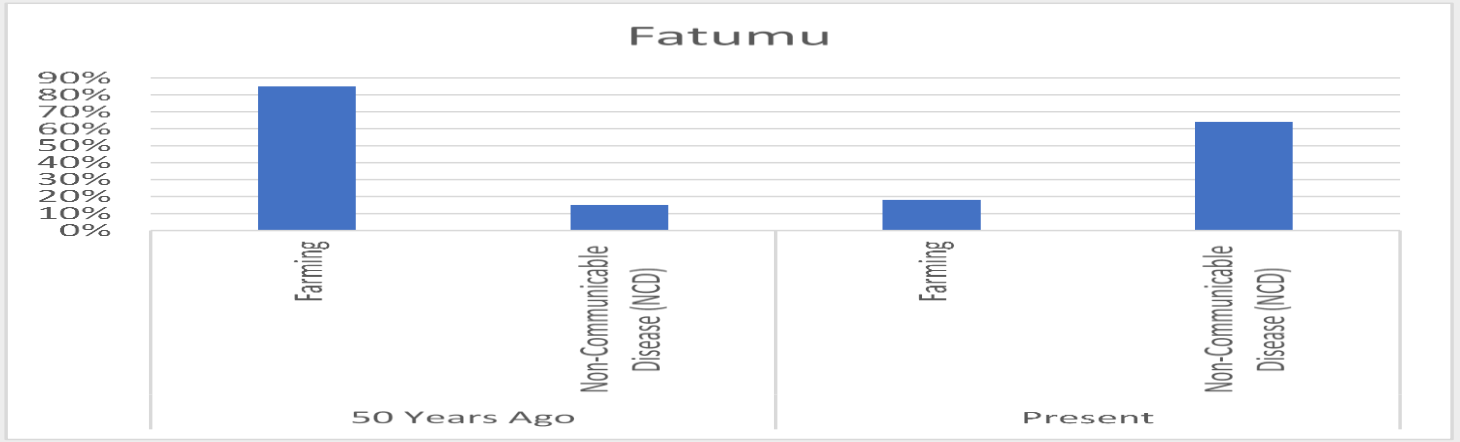
International Programs:
The Toli Program

- Annually, about 300 young people (male, female, married and unmarried) from these three villages leave home to participate in this program to either New Zealand, or Australia.
- On the national level, over 5000 participate, and family lives improve greatly.
- They pick fruits for up to a year, or work in meat packing facilities for three years
- Many express their desire to stay home if there are more local opportunities, because
  - Some families end up splitting due to the long separations of young families



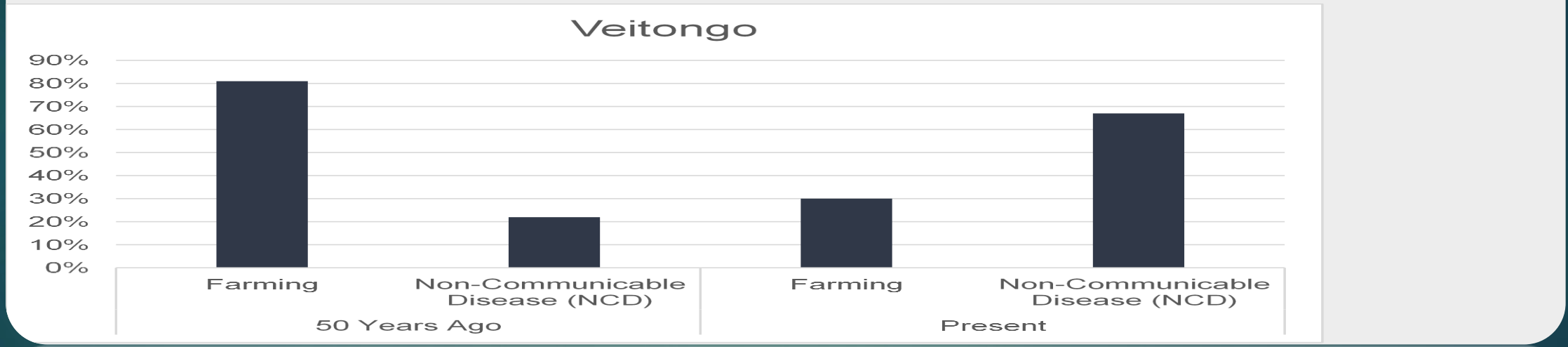

Health and Lifestyle…Fatumu

	60 Years Ago		Present	
	Farming	Non-Communicable Disease (NCD)	Farming	Non-Communicable Disease (NCD)
Fatumu	85%	15%	18%	64%



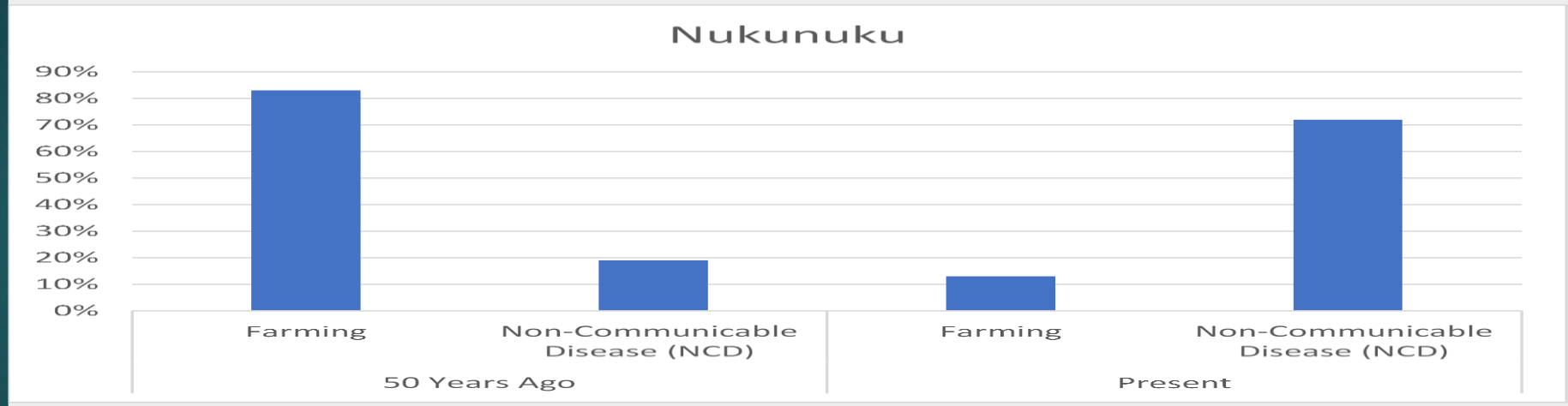
Health and Lifestyle…Veitongo

	50-60 Years Ago		Present	
	Farming	Non-Communicable Disease (NCD)	Farming	Non-Communicable Disease (NCD)
Veitongo	81%	22%	30%	67%



Heath and Lifestyle…Nukunuku

	50-60 Years Ago		Present	
	Farming	Non-Communicable Disease (NCD)	Farming	Non-Communicable Disease (NCD)
Nukunuku	83%	19%	13%	72%



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Women's Groups

- They teach each other to sew their own clothes
- be better homemakers (in cooking, grow gardens, keeping a better home, etc.)
- grow vegetables
- make tapa clothes
- make mats, and fine mats
- weave baskets, etc., for their families and to sell for income
- Today, they bare most of the burdens for providing for their families, because farming by men has not produced income like previous generations.

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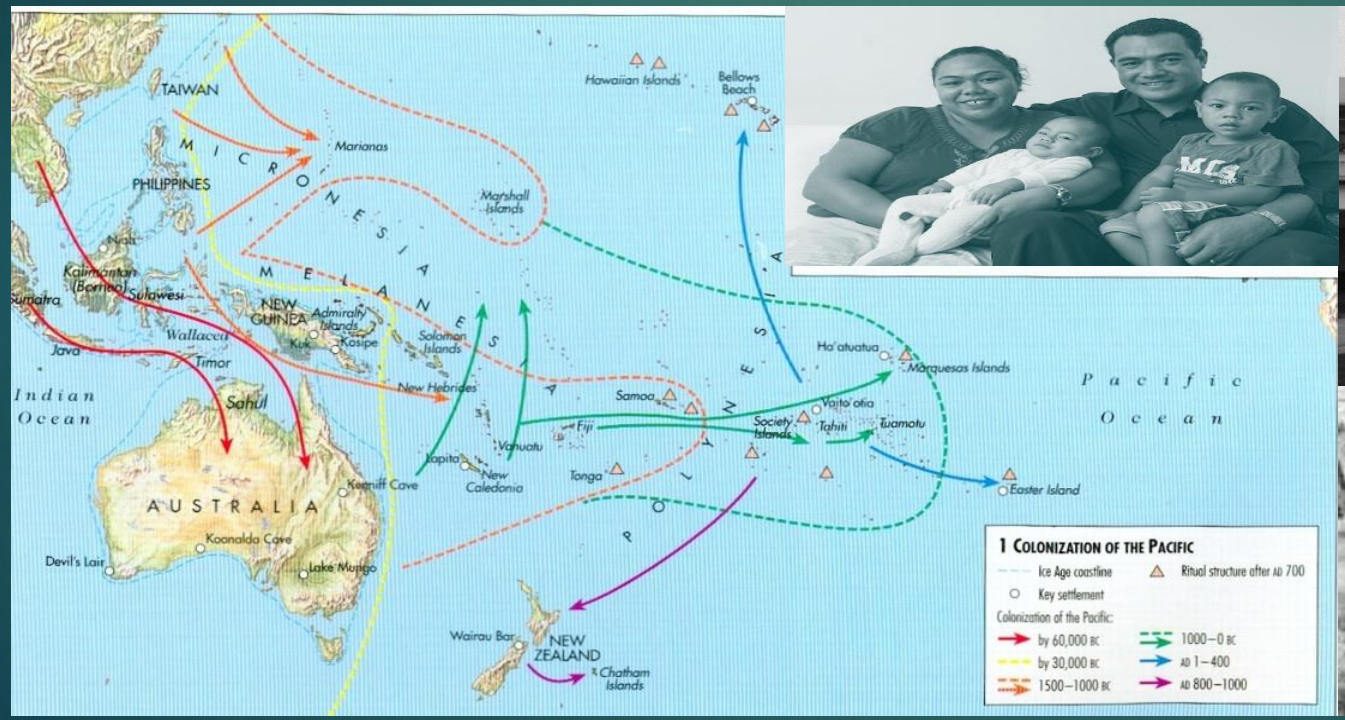
Migration

* Today, there are more Tongans living outside of Tonga (150,000) than there are living in Tonga (109,400)
* In every village, there has been over 50% migration
* About 95% migrated to New Zealand, Australia, and the United States
* Migration contributes an average of around 35% to the annual budget of the nation
* Along with them also, left a wealth of knowledge and experience. To know the tradeoffs, a more in-depth study needs to be done



Conclusion

Family Farming

- It isn't an understatement that farming has taken a drastic drop today as compared to the previous generation
- More people will go back to farming, and fishing if there's a sure market overseas, with help
- Close to 90% of the people of the previous generation farmed their land, and they were much healthier

Health and Lifestyle

- Certainly, the generation of today have much more choices to earn a living.
- At the same time, we can not ignore the impacts of climate changes when it comes to the health of the nation. The true impacts remains to be researched
- Lifestyle and health raises concerns
- Women's groups needs the most help

Migration

- Migration has been both good and bad for the nation of Tonga
- It has brought great economic opportunities
- It has displaced much knowledge, experience, and wisdom
- It continues to draw the young people overseas looking for better opportunities for their future, and for their young families

References:

FATUMU TOWN OFFICER; TANIELA FOTUMOKO INUKIHA'ANGANA

FATUMU ORDINARY MEMBERS OF THE VILLAGE

NUKUNUKU TOWN OFFICER: MOALA 'ANISEKO

NUKUNUKU ORDINARY MEMBERS OF THE VILLAGE

VEITONGO TOWN OFFICER: HOUMA NEPOTE

ORDINARY VILLAGERS OF THE TOWN OF VEITONGO

HTTPS://TONGASTATS.GOV.TO/

SOURCE: **WORLDOMETER** (WWW.WORLDOMETERS.INFO) **WORLD POPULATION PROSPECTS 2022 - THE UNITED NATIONS**

WIKIPEDIA

HTTPS://EN.WIKIPEDIA.ORG › WIKI › DEMOGRAPHICS_OF_TONGA

FORMER MINISTER OF EDUCATION, CURRENTLY A MEMBER OF THE PRIVY COUNCIL, OF HIS MAJESTY KING TAUFA'AHAU TUPOU THE VI; EMERITUS PROFESSOR DR. 'ANA MAUI TAUFEHULUNGAKI.

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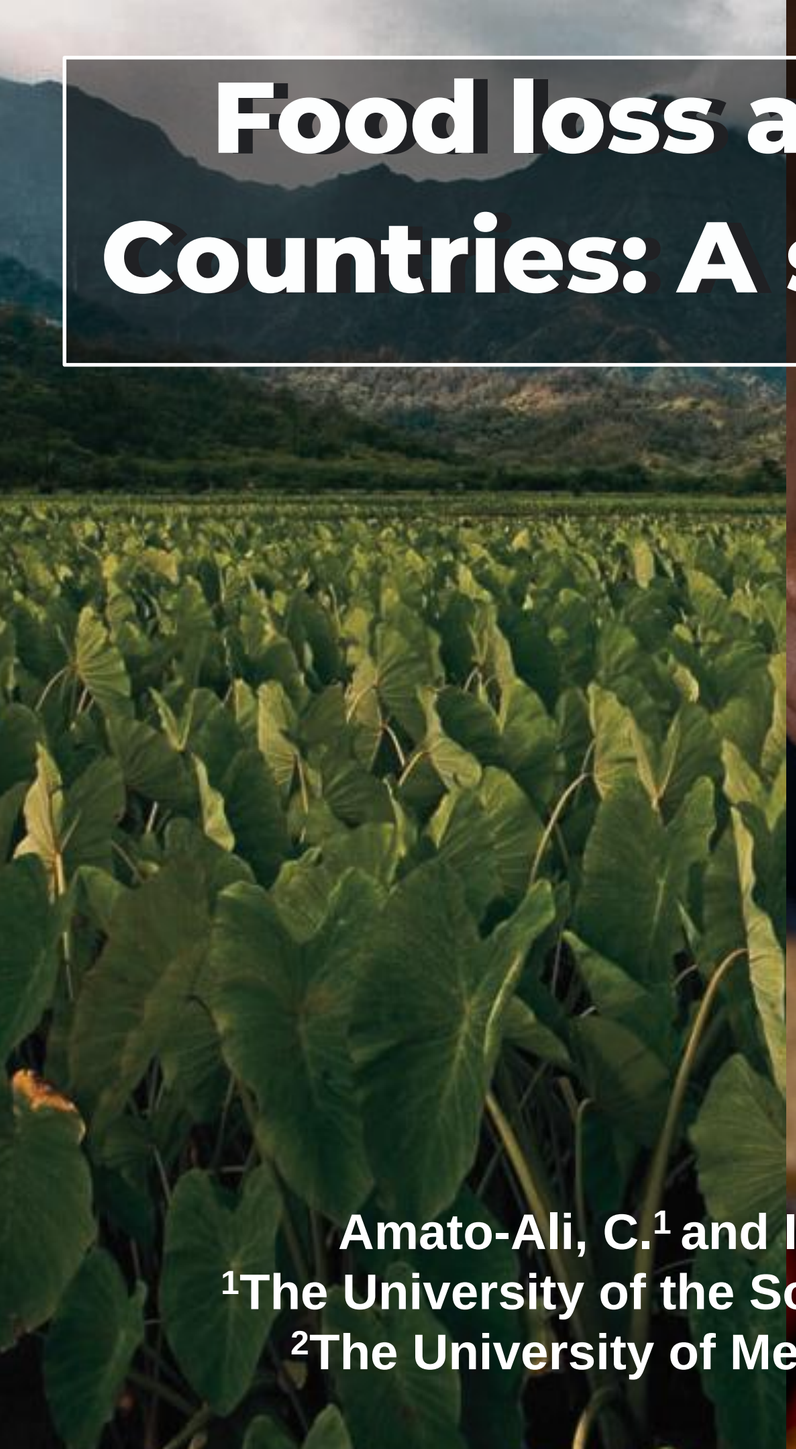
Thanks for your time, Questions

Food loss and resilience in Pacific Island Countries: A scoping review of the literature



Amato-Ali, C.[1] and Iese, V.[2]
[1]The University of the South Pacific
[2]The University of Melbourne

Australian Centre for International Agricultural Research

Australian Aid

USP
PACIFIC CENTRE FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Outline:

1. Introduction
2. Objectives
3. Methodology
4. Key Findings
5. Implications

Introduction

•Food loss and waste is a global challenge impacting food security, economic development, and the environment.

•Approximately one third of all food produced, equivalent to $USD 1 trillion or 1.3 billion tonnes, is lost or wasted at various stages in the food system.

•In the Pacific Islands, limited infrastructure, market access, market information, and climate change impacts contribute to the pressing issue of food loss.

•Resilience is a critical concern for Pacific Island Countries (PICs) striving for secure and sustainable food systems due to limited resources, geographical isolation, and vulnerability to climate change.

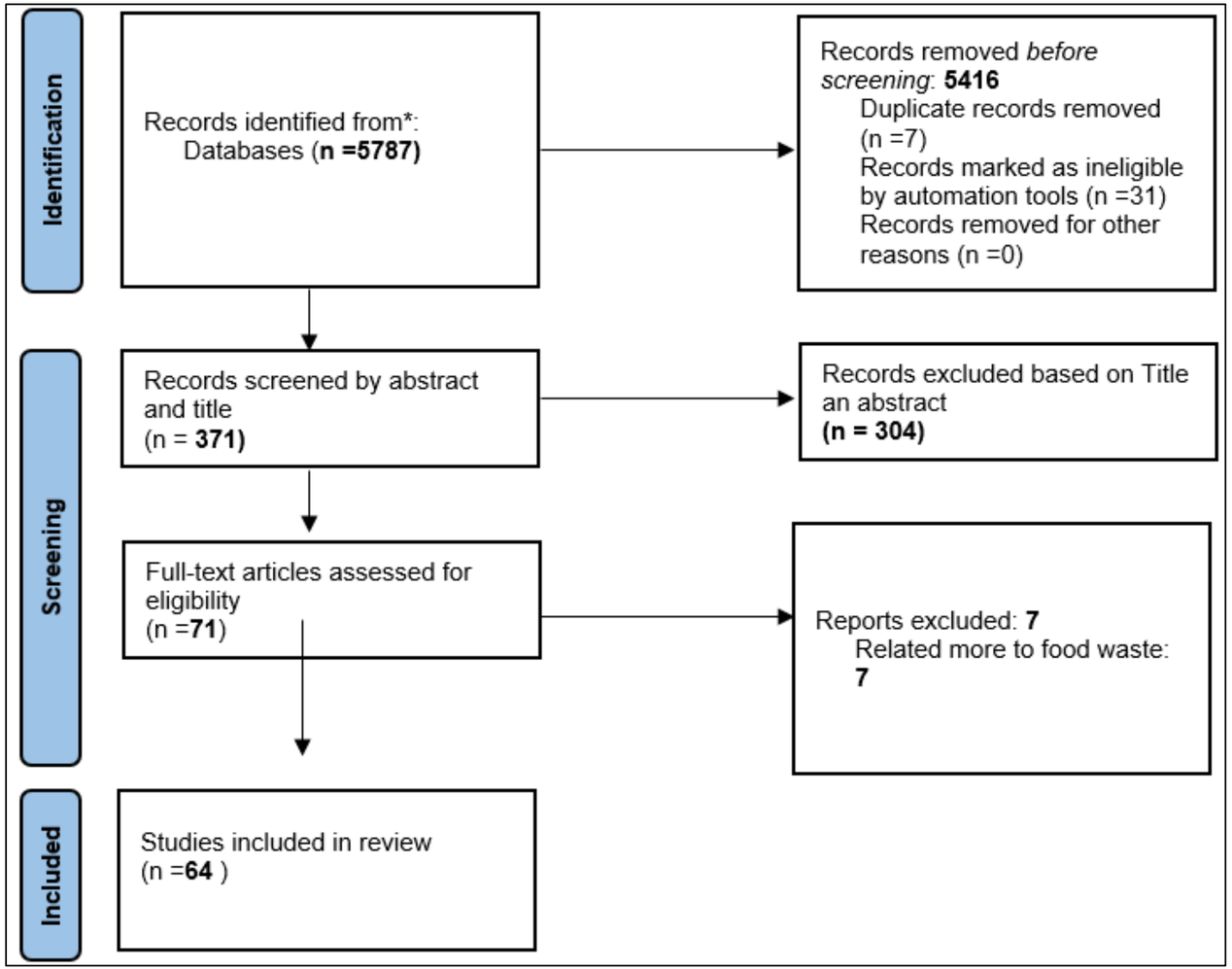
•One notable research gap in the Indo-Pacific region is the lack of focus on the connection between food loss and waste and resilience.

Objectives

1. Offer a comprehensive synthesis of the available literature,
2. Identify any gaps in the literature
3. Inform future research, policy and field applications of food loss and its linkage past the norm of economics, to climate resilience in PICS

Methodology

This scoping review follows the **PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews)** methodology.



The Study exclusion criteria excluded Studies if they:

- Studies conducted outside of Pacific Island Countries: Exclude studies that focus on regions or countries outside of the Pacific Islands apart from select few from the Asia-Pacific region.
- Did not include a Food Loss reduction intervention.
- Were not written in either English or French
- Studies that do not directly address the topic of food loss and resilience in Pacific Island Countries.
- Exclude non-peer-reviewed sources such as conference abstracts, opinion pieces, editorials, and letters to the editor.
- Exclude studies published before 1993, more than ago decades ago
- Exclude studies for which full-text articles are not available or accessible for review.

A scoping review was conducted to explore published literature on food loss and resilience in the Pacific.

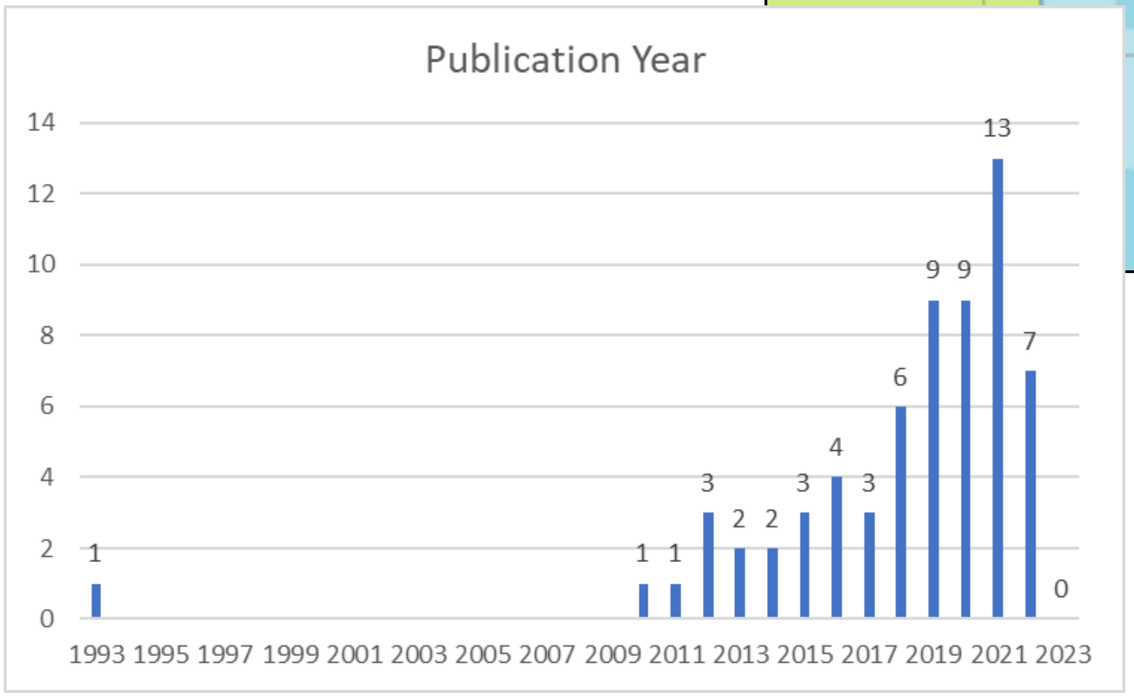
Our search identified 5787 potentially relevant articles, of which 371 were screened by abstract and title where **64** met our inclusion criteria. including research articles, reviews, and policy documents.

Key Findings

1.Overview of food loss in Pacific Island Countries (PICs)

Food loss in PICs is a significant concern, resulting from factors such as

- limited infrastructure
- climate change impacts
- post-harvest losses.



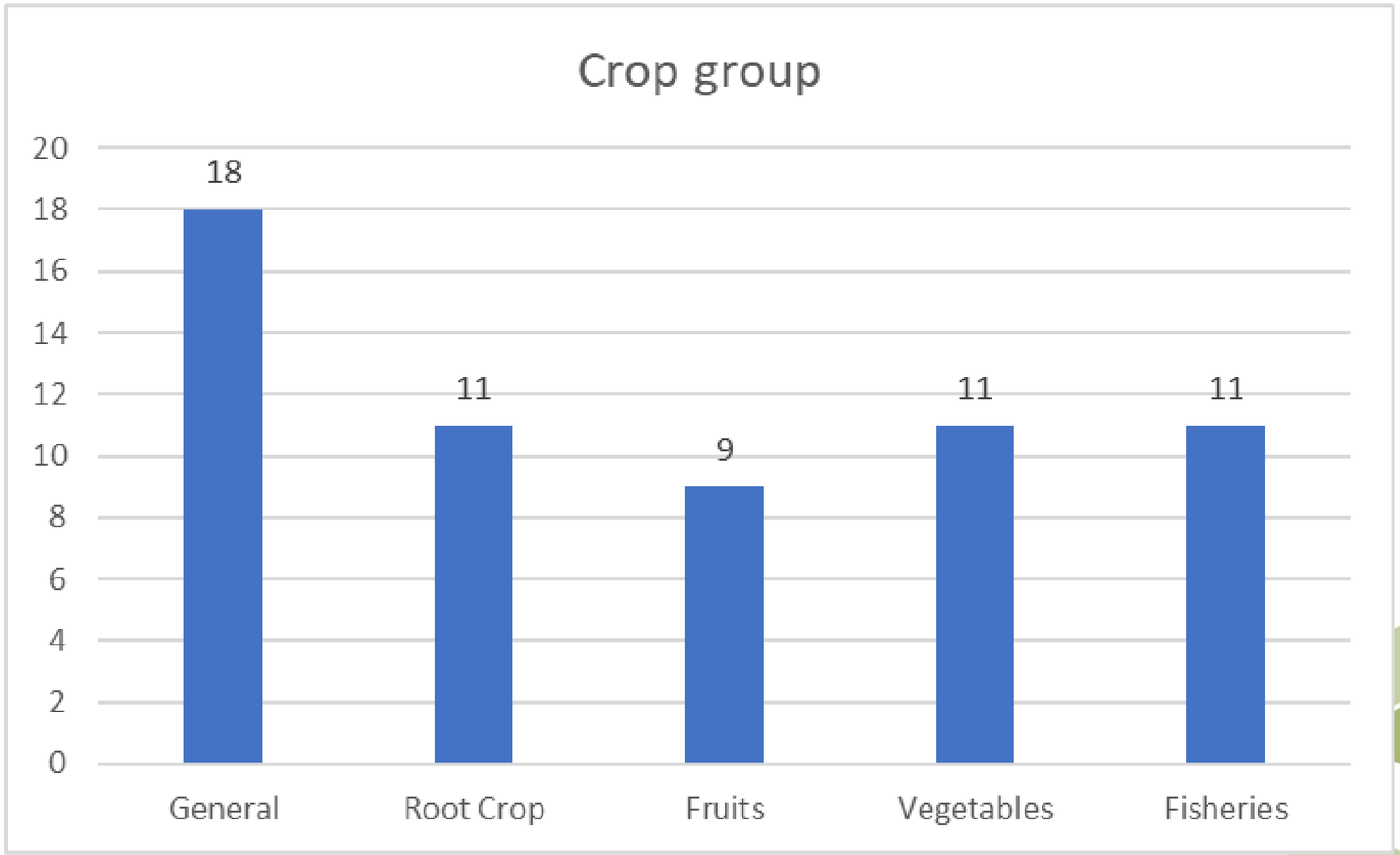
Contribute to food insecurity, malnutrition, and economic losses in these countries.

Key Findings

2. Resilience strategies employed by PICs to address food loss

Key resilience strategies employed by PICs are:

- Local knowledge and traditional practices
- Diversification of Food Sources and Livelihoods
- Sustainable Farming Practices



Key Findings

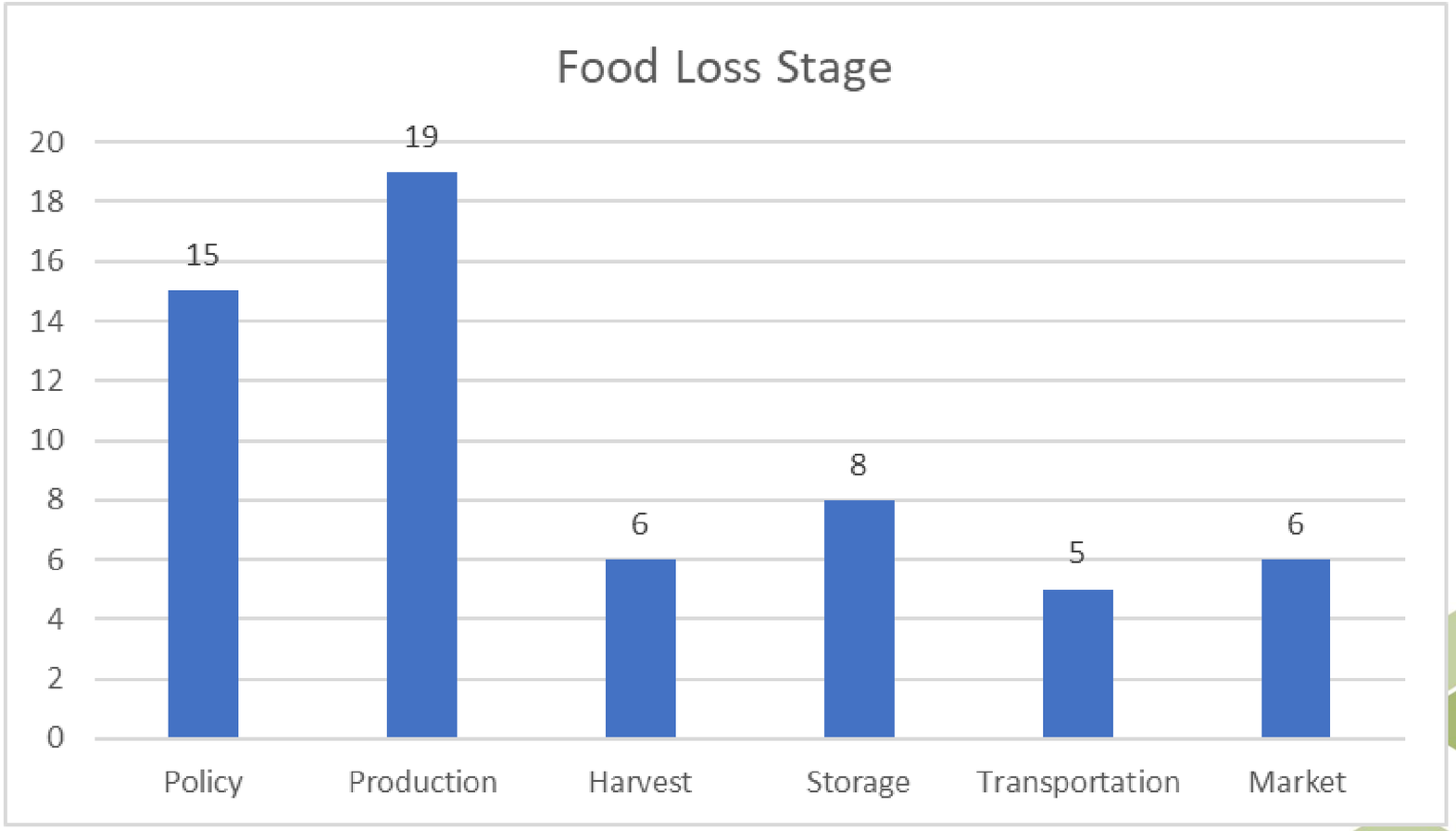
3. Policy and governance interventions to enhance food loss resilience

These are crucial for creating an enabling environment that supports food loss reduction and builds resilience in PICs

- Strengthening policy frameworks and regulatory measures.

- Developing climate change adaptation and disaster risk reduction plans

- Investing in infrastructure and technology



Implications

1. The findings highlight the need for targeted interventions to reduce food loss and enhance resilience in PICs

2. The scoping review provides policymakers with a comprehensive understanding of the drivers of food loss in PICs and the specific resilience strategies employed by local communities.

3. The scoping review identifies opportunities for further research to deepen our understanding of food loss and resilience in PICs.

Thank You

“

THERE IS FOOD FOR EVERYONE ON THIS PLANET, BUT NOT EVERYONE EATS

CARLO PETRINI

A Baseline study of the presence of the radioactive isotope ^{137}Cs in imported Milk

Pacific Adventist University

Papua New Guinea

Presenter

Nelson Barau

Presentation Outline

1. Introduction

- 1.1 General Background
- 1.2 Problem statement and significance
- 1.3 Research questions and aim (s)

2. Experimental Procedure

- 2.1 Sampling collections
- 2.2 Sampling preparations
- 2.3 Radiation Instrument Technique
- 2.4 Data analysis

3. Results

- 3.1 Cs^{137} presence in imported milk

4. Discussion

5. Conclusion

1. Introduction

1.1 General Background

The motivation that lead to this study is the Fukushima Disaster in Japan and the rapid social and economic transformations and climate change, which effect are particularly harmful to Pacific Islands with the growing industrial development globally.

Disaster in Fukushima Nuclear Reactors is been a threat to Japan (Tsumune, Tsubono, Aoyama, & Hirose, 2011) but it has become an international concern for environmental safety in terrestrial environments especially in agriculture and food security.

Terrestrial and agricultural environment in the Pacific countries is no exception to this scenario, but there is no scientific prove to validate whether the Pacific Island countries is at risk or not? This leads to the focus of this study in imported dairy product especially fresh imported milk.

In the past decade, Cs^{137} has been extensively studied worldwide, which is related to the focus of the current study in the fresh imported milk.

Past studies

Scott, H. (2004)

"Harold Knapp and the Geography of Normal Controversy: Radionuclide in the Historical Environment"

David, D., Thomas, B. K., Whicker, F. W. (1992)

"Contaminant Transport through Agroecosystems: Assessing Relative Importance of Environmental, Physiological, and Management Factors"

Khan, B., Straub. C. P & Jones. I. R. (1962)

"Radionuclides in Milk of Cows consuming stored Feed and of Cow Pasture"

Goel, P. K. (2016)

"Water Pollution: Causes, Effects and Control"

Akhtar, A. (2001)

"Arsenic in Drinking Water and Pregnancy Outcomes"

1.2 Problem statement and significance

- Extensive studies have been done on ^{137}Cs worldwide but evidences of this element in the fresh imported milk is yet to be known in the Tropical Pacific Island countries.

- It is vitally important to know ^{137}Cs presence because increasing contamination level can be a threat to dairy product nutrition and population health who feed on.

1.3 Research Questions and aim

Is there any presence of the artificial radionuclide ^{137}Cs in selected imported fresh milk?

What are the energy and specific activity (activity concentration) levels?

Is this artificial radionuclide a hazard to the population at the levels detected?

Are the specific activity levels higher or lower than the permissible level (307 Bq/L) stipulated in the WHO regulations?

Aims: **To identify the artificial radioactive isotope ^{137}Cs and investigate its activity concentrations in four different imported fresh milk samples.**

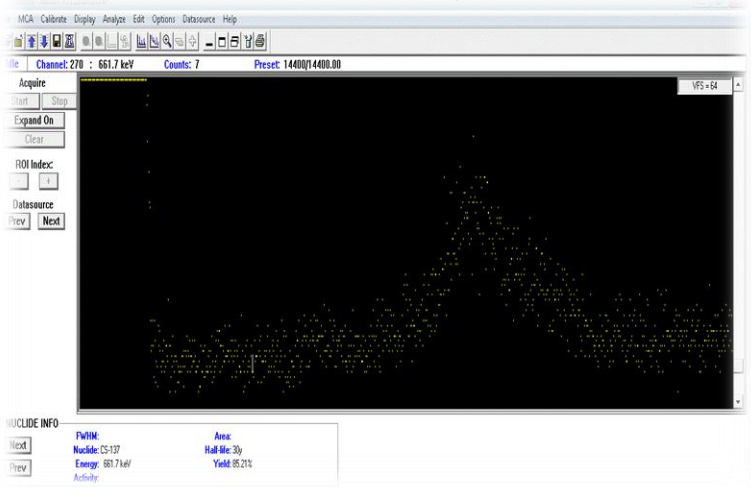
2. Experimental procedure

Sampling collection process

Sampling preparations

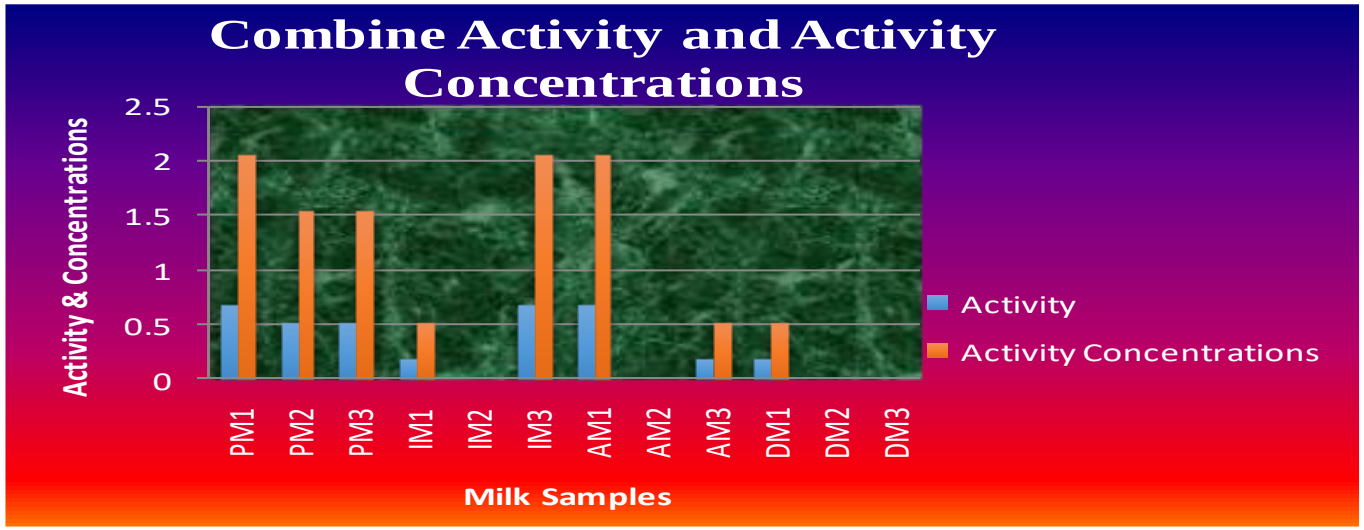
Sodium iodide scintillation/
Radiation Instrument Technique

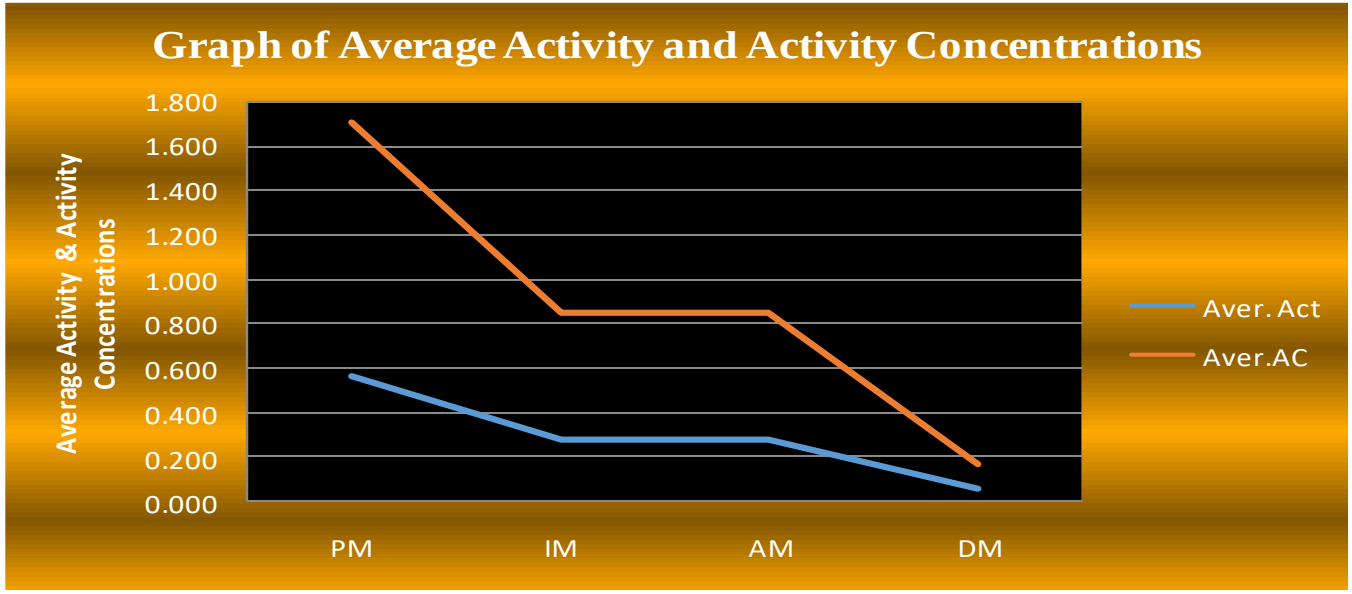
Data Analysis



3. Results

3.1 Cs^{137} distribution in fresh imported milk





4. Discussion

The evidences from this study shows that there are presence of ^{137}Cs in fresh imported milk as shown in the table below. It is also evident in this study that biophysical and environmental factors also affects ^{137}Cs concentration.

Tab. 1. Concentrations level of Cesium-137 in 12 different fresh milk samples.

Activity Concentrations of Cs- 137				
Milk Samples	Sample 1 (Bq/L)	Sample 2 (Bq/L)	Sample 3 (Bq/L)	Total (Bq/L)
Pauls Milk	2.045 ± 0.09	1.533 ± 0.12	1.533 ± 0.12	5.111 ± 0.33
Indomilk	0.512 ± 0.36	-	2.045 ± 0.09	2.557 ± 0.45
Anchor Milk	2.045 ± 0.09	-	0.512 ± 0.36	2.557 ± 0.45
Daisy Milk	0.512 ± 0.36	-	-	0.512 ± 0.36
Total	5.114 ± 0.9	1.533 ± 0.12	4.09 ± 0.57	10.737 ± 1.59

5. Conclusion and Future Direction

- ^{137}Cs is present in the fresh imported milk and range from 0.512 ± 0.36 to 2.05 ± 0.09 Bq/L.

- ^{137}Cs evidences were different in different samples, this was possibly related to variation in biophysical and environmental factors (e.g. different regions, type of soil, metrological factors, and type of feed and age of cow.

- Assumably, this contamination could possible be related to Fukushima Dai-ichi nuclear power plant accident (FDNPP) on 11 March 2011. However, it is not conclusive to affirm that ^{137}Cs presence is caused by FDNPP owing to lack of data prior FDNPP .

Thank You…

Development aid, subsistence activities (farming, fishing, hunting) and food policies

20th, 21th and 22th of June 2023

Port Vila, Vanuatu,

AID session

Axis 3 – Cooperation policies and the role of education in the formulation of public policies for family farming and fishing: what place for local knowledge?

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Foreign aid to agriculture in the SICTs of Oceania: what is the place of Family Farming?

- Oceania— traditional forms of subsistence agriculture (Family farming – FF) underpins food-secure communities (Thaman, 2008) and is the basis for food security of **over eight million people** in the region (Morgan, 2013; FAO, 2015)
- **But …..** The population of Oceania (not ANZ) now around **14.2 million**
- Pacific region — eroded and transformed by **economic, environmental and cultural** changes across large parts of SICTs (Weber, 2012; Campbell, 2014; Thaman, 2014; Adelman et al., 2015)
- Foreign aid — donor assistance (bilateral and multilateral/grants and loans)
- "Family farm" — definition varies across countries and contexts.
- Oceania — **78% of population are FF** holding **2% of land**
  - Different development strategies/different views of agriculture and FF
  - These are (very) smallholders with very narrow market access
  - Diversity between the islands...narrow export sectors
  - Strong connections with the ocean and rivers (lagoon gardens, place of fishing activities, rivers etc.)

→How have donor aid policies in agriculture articulated with these issues?

→Presentations: 1. geo-politics 2. regional 3. national

FALAH AID 1

- **What is the importance of agriculture in donor development aid strategies?**
- **What form/type of agriculture is supported by donors? Where, by whom and how?**
- Method: using quantitative data conduct a discourse analysis (Stronge et al. 2019) of five donor websites and other grey literature
- Question: What are existing donor approaches to agriculture and food security in SICTs?

This presentation: Pacific Aid and Geopolitics (Charles and Nichole)

→ **What is the place of the agricultural sector in donor development aid?**
→ **Identify specific geo-political interests that underpin funded aid projects**
→ **SICTs/donor relations given geopolitical situation.**

FALAH AID 2

Second presentation: Séverine Bouard (speaker)—

Focus on Agriculture, Forestry and Fishing (AFF) sector in Donor Aid to SICTs of Melanesia

→ Which sectors and countries are favored according to donors?
Are there differentiated strategies for AFF depending on the donor or recipient?
→ Are these strategies the same as for other sectors?
→ Is there any specificity within the agricultural sector?

- Method: Using quantitative data conduct a discourse analysis (Stronge et al. 2019) of five donor websites and other grey literature for five Melanesian SICTs
- Question: **What form of agriculture is promoted? Where, by whom and how?**

FALAH AID 3

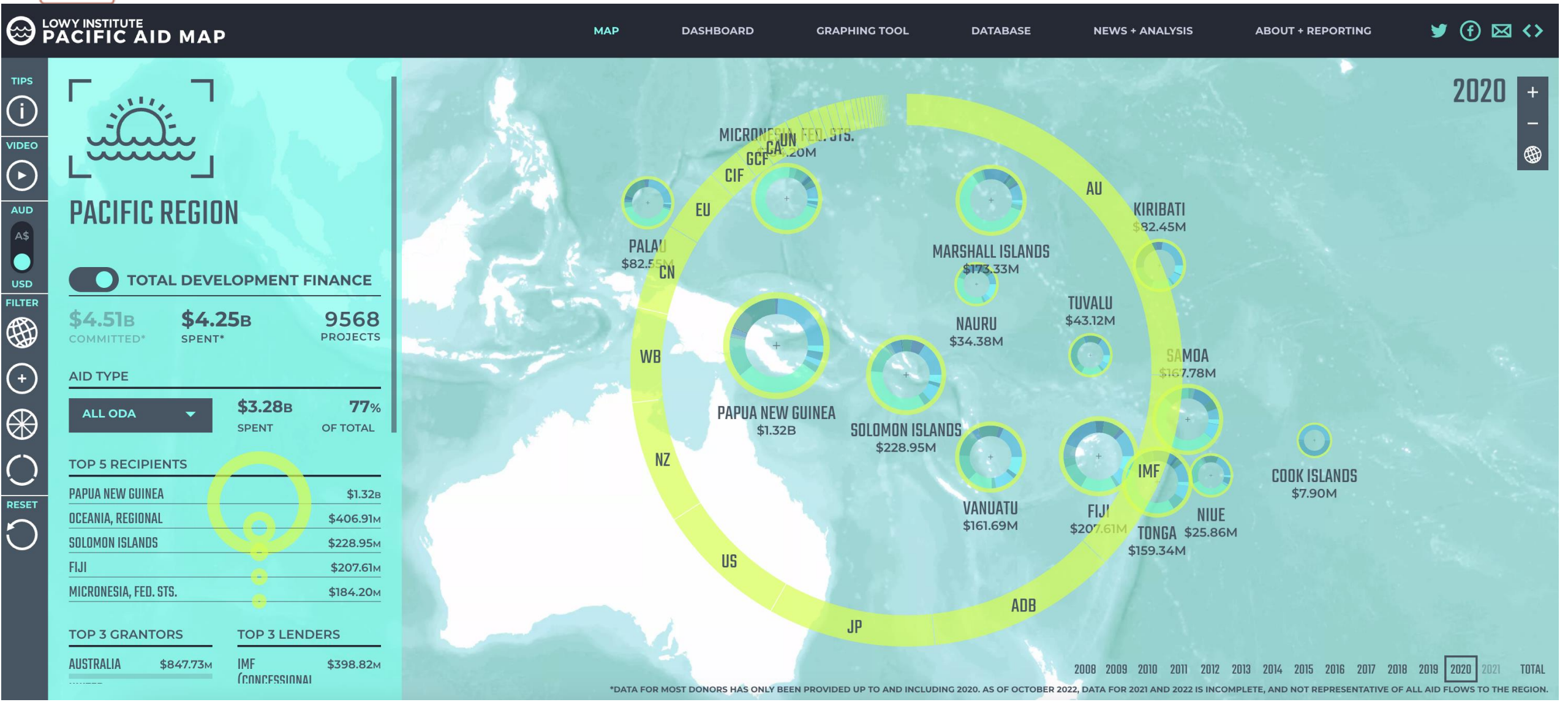
Third presentation: Jonas Brouillon (speaker)

→ Exploration of the national position for each aid recipient SICT.

- discourse analysis of five donor websites and grey literature to determine what approaches to agriculture and food security
- Method: Using quantitative data conduct a discourse analysis (Stronge et al. 2019) of five donor websites and other grey literature for five Melanesian SICTs
- Question: **What is the form of donor support for agricultural aid projects within each SICT?**
- And ….what conclusions may we draw about China's entry into the world of major donors of aid to the Pacific SICTs?

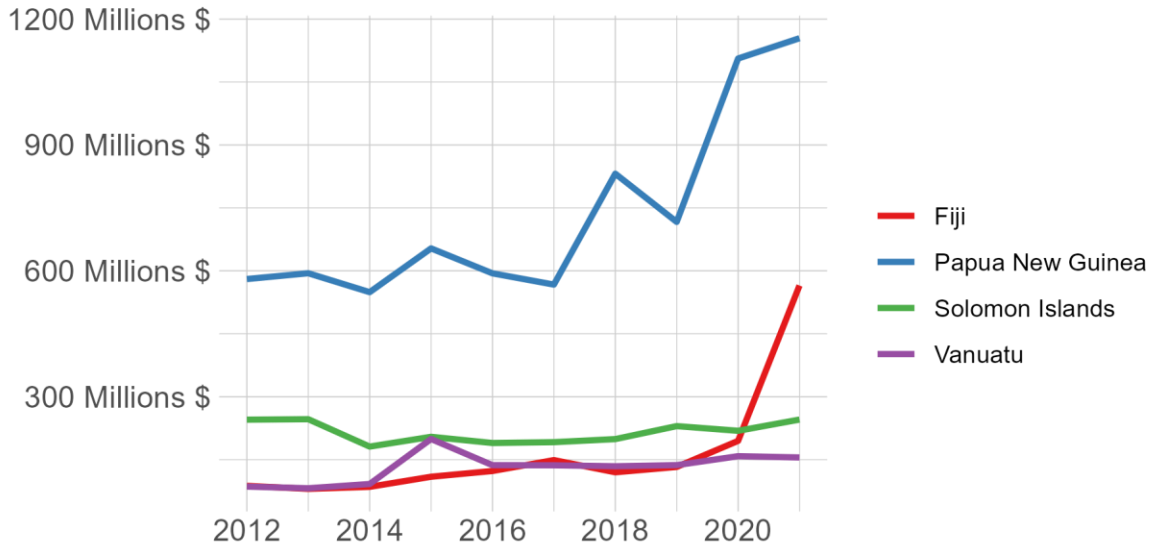

FEDERATED STATES OF
MICRONESIA
KIRIBATI
NAURU
SOLOMON ISLANDS
TUVALU
SAMOA
VANUATU
PAPUA NEW
GUINEA
FIJI
TONGA
COOK
ISLANDS (U.S.)
FRENCH
POLYNESIA
(FR.)
NEW CALEDONIA (FR.)
CORAL SEA
AUSTRALIA
SOUTH PACIFIC OCEAN
NEW ZEALAND
TASMANIAN SEA
INDIAN OCEAN
OCEANIA

Lowy Institute—Pacific Aid Map 2020 (donors/recipients)



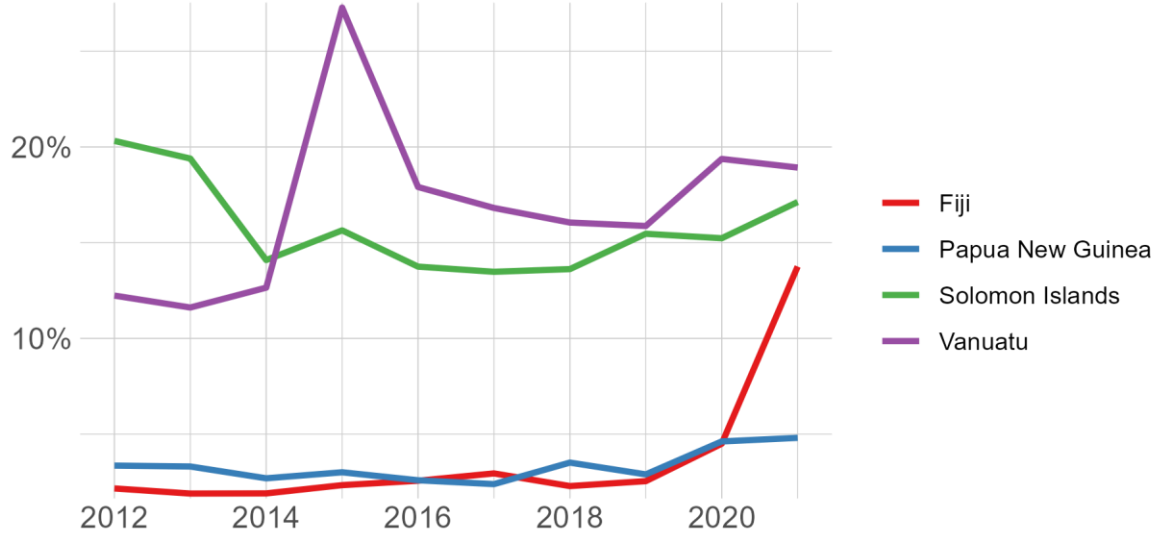
4.25bn spent in region (2020), but 2.64% of global aid spend ($161bn) in that year.

Official development assistance in 4 PICTS



Source : OECD (2023) CRS1 dataset

Total official development assistance per recipient (USD constant 2015)

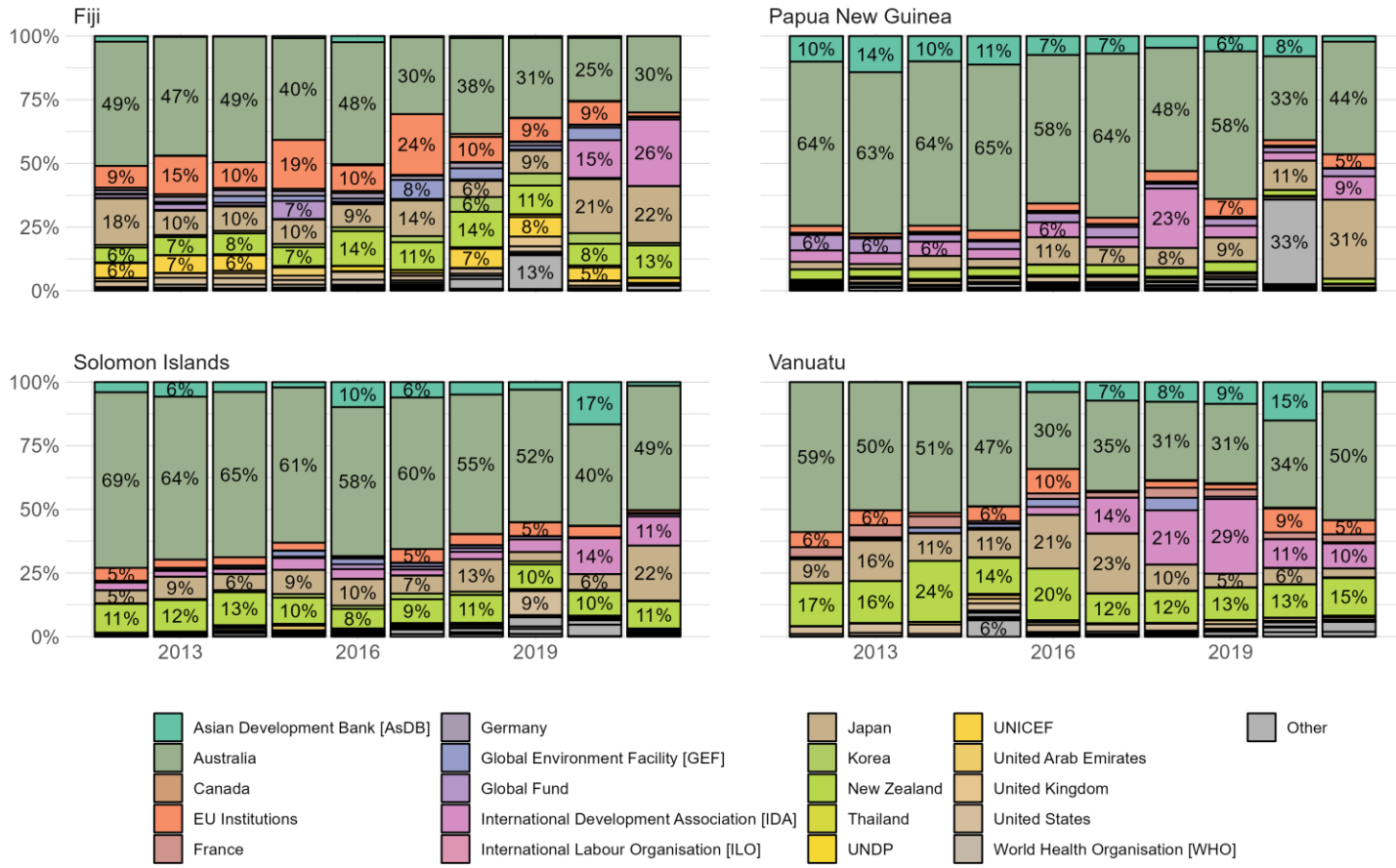


Source : OECD (2023) CRS1 dataset & WorldBank (2023)

Total official development assistance per recipient in % of GDP

Who gives what?: ODA total per donor for each country

- **Australia is the main donor in all the countries (>50%)**
- **NZ & Japan Aid represent from 10 to 20 % in all countries**
- **Asian Development Bank is almost 10% in PNG & Vanuatu**
- **International Development Association have an important place in last years for Vanuatu (from 10 to 20%)**
- **European Institutions are important only in Fiji (from 10 to 20%)**



Source : OECD (2023) CRS1 dataset

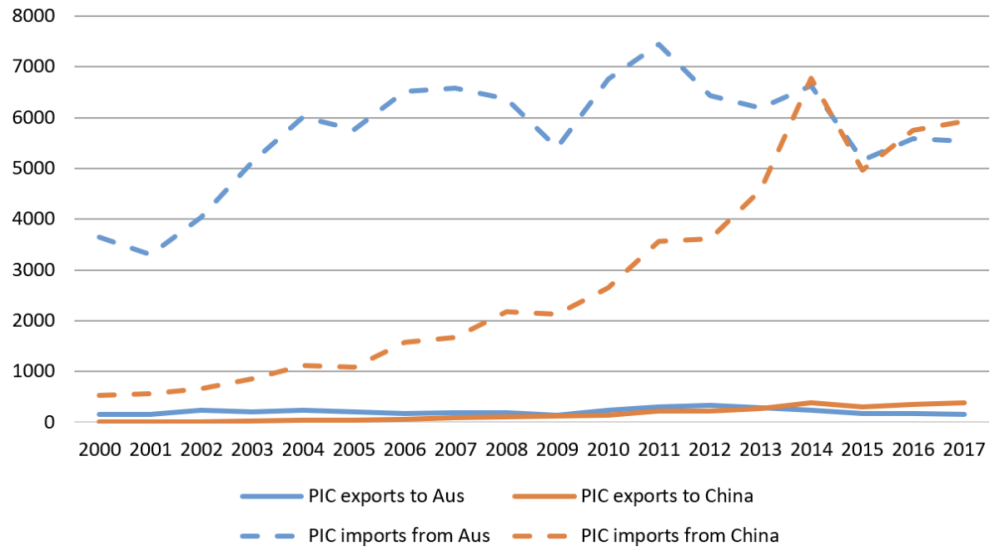
ODA in Oceania (Grants and Loans) 9568 projects
Main Donors to Region 1. Australia 2. US 3. NZ

2020	ODA received	GDP/capita	% of all Pacific aid	Top three donors	Main donor commercial interest
Fiji	208 m	2 854	4.89%	Australia Japan NZ	Geopolitics Tourism Agriculture
PNG	1,320 m	6 152	31%	Australia Japan EU	Minerals (gold and copper) Gas
Solomon Islands	229 m	2 295	5.38%	Australia NZ World Bank	Security Minerals
Vanuatu	162 m	3 223	3.81%	Australia New Zealand EU	Development Climate Tourism

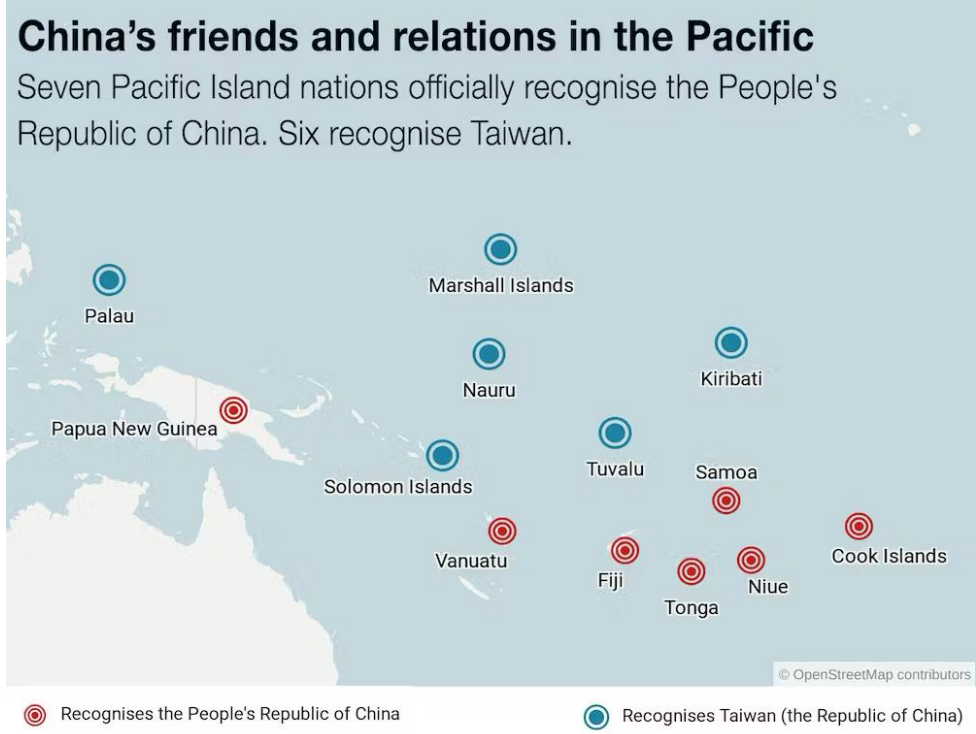
New Caledonia GDP/capita — $37,448 highest is Oceania by far (after Aus/NZ)

And what of China? What is China spending as part of the Belt and Road Initiative?

Figure 1: PIC exports and imports to Australia and China 2000–2017, excluding PNG (US$m)

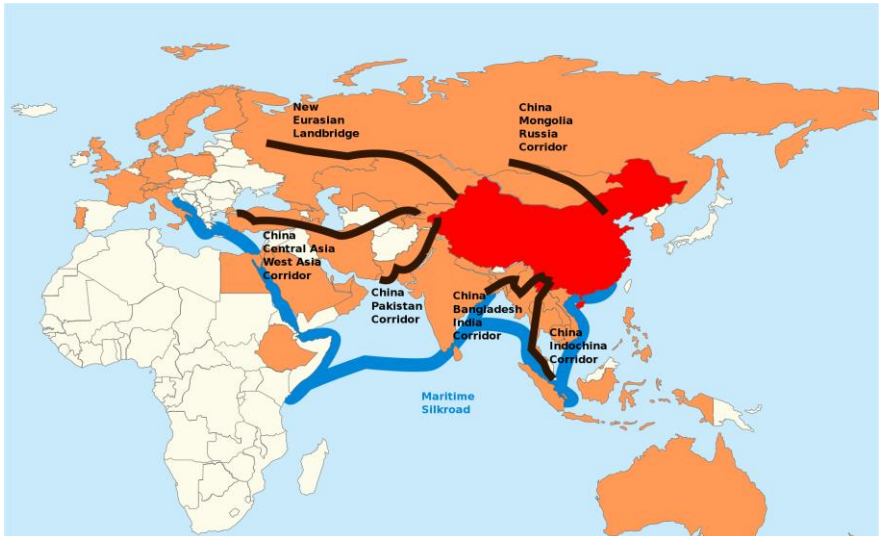


In 2018
Taiwan had
six Pacific friends



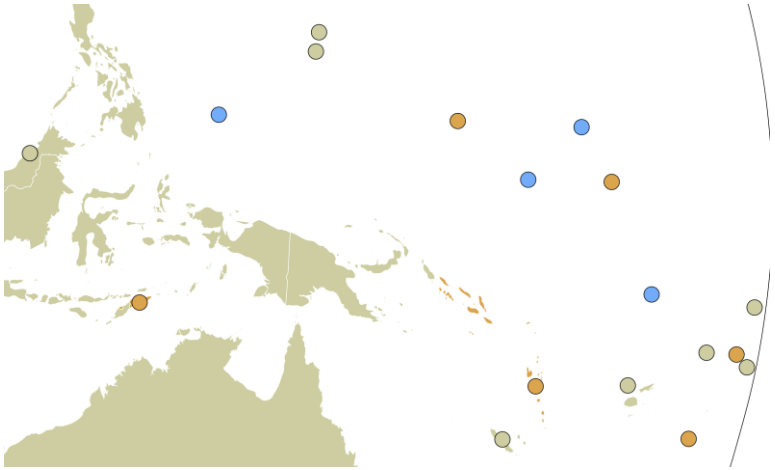
Then a switch in 2019

Increased trade with china



One Belt One Road

2023
Blue = 4 states now recognize Taiwan — Marshall Islands, Nauru, Palau, Tuvalu

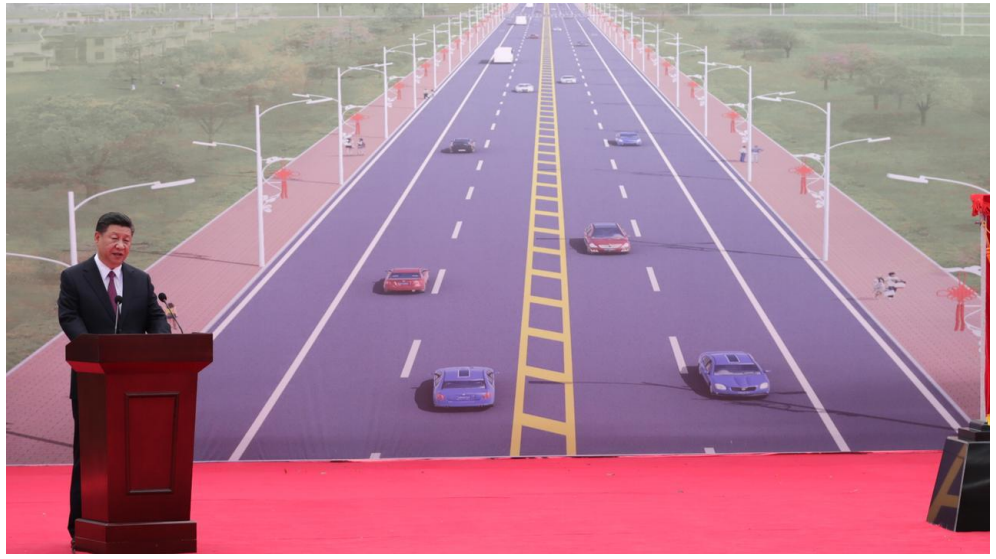


Chinese Aid and Trade important (for SICTs)

Large scale projects
Stadia, highways, roads linked to big events

- APEC (PNG) Nov 2018
- Pacific Games November 2023 (Honiara, SI)

China — big visible projects



Naval base ?

Opportun
ities
for SICTs
to
Leverage
donors

What is given?: Donor aid and the "Production sector " in ODA to four SICTs (OECD: 2023)

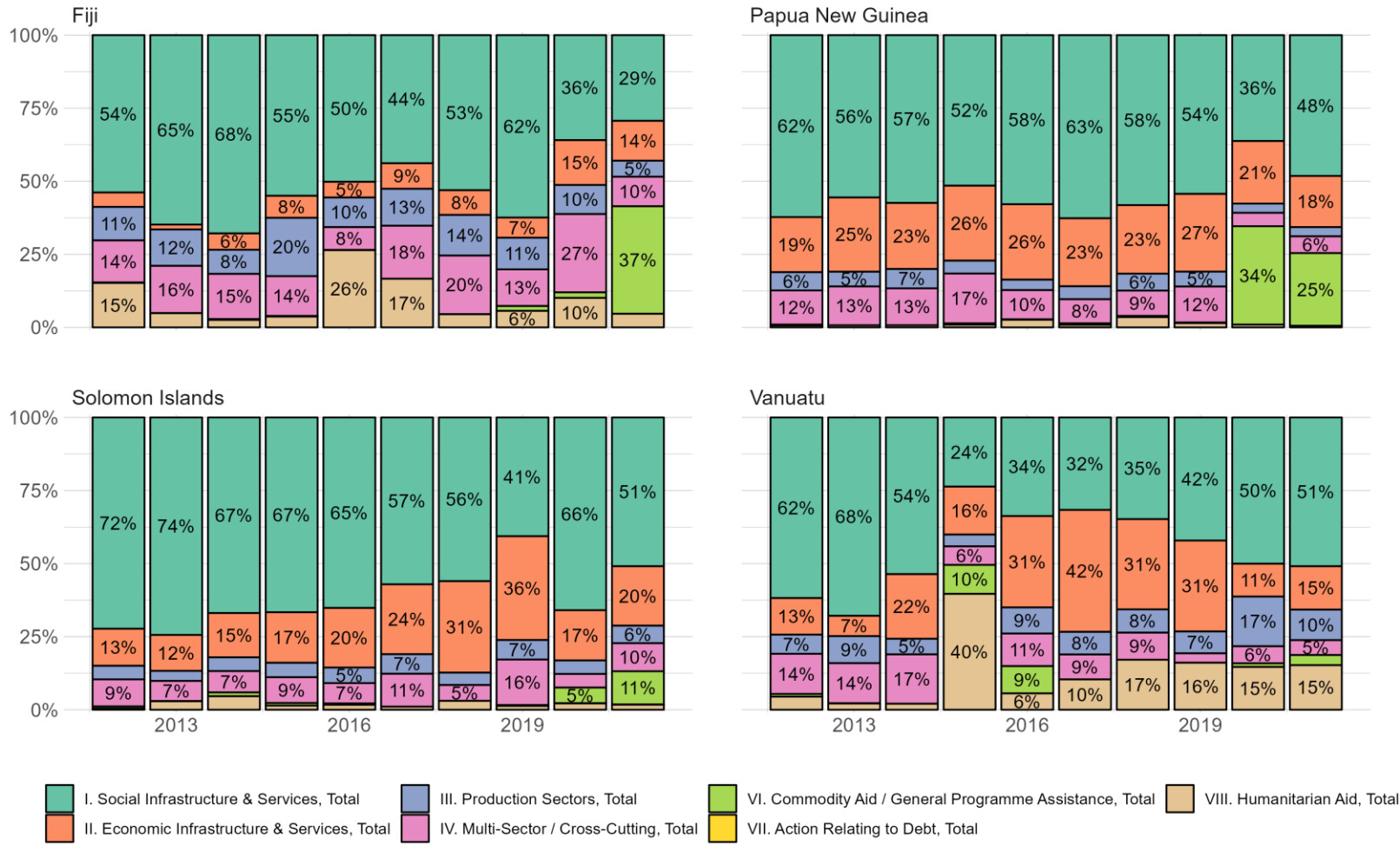
- The purpose codes classification of OECD **permit an analysis of details in the composition of ODA**
- ODA "to others" (so NC not considered)

- **Social infrastructure and services** have received the largest share of aid —30- 50 %, with sporadic exceptions

- The second most allocated sector is **Economic Infrastructure & Services** sector —15-25% of ODA allocated

- **III. Production Sectors (total)**

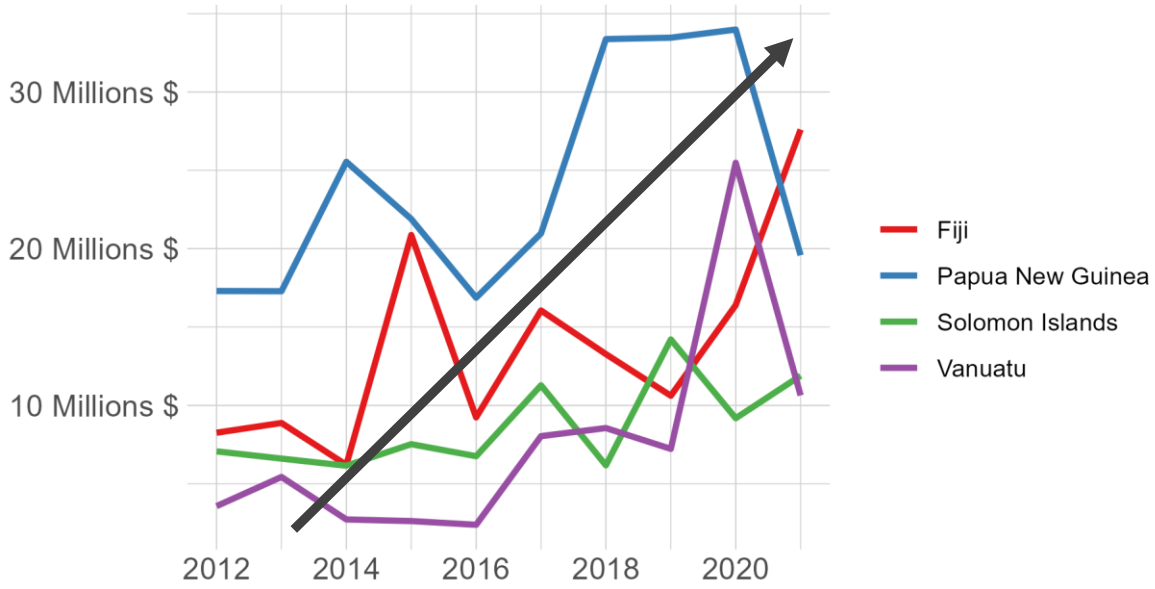
- Fiji's profile differs from PNG, Van and SI —lower share allocated to social services and infrastructure sectors/higher share to the production sector

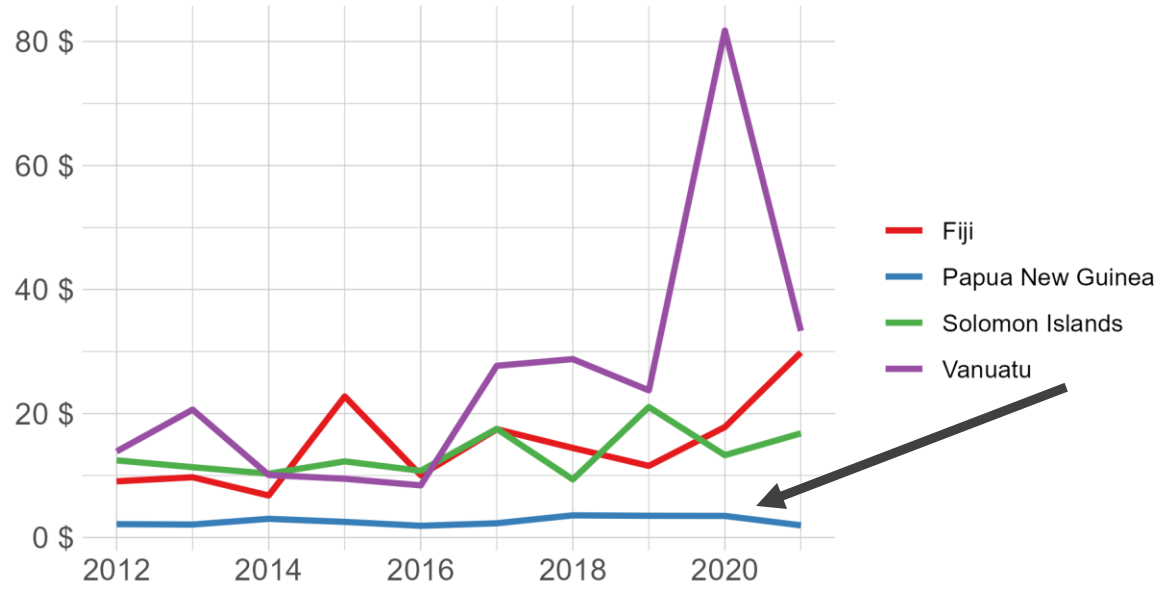


Source : OECD (2023) CRS1 dataset

ODA in Agriculture, Forestry & Fishing
How much goes to Agriculture?

- Within **III.Production** agriculture sector coded as “III.1. Agriculture, Forestry, Fishing”
- **Trend — Increased allocation to this sector (since 2012)**
- Very low per capita ODA in PNG (largest ODA recipient (8.5 to 9 m)/largest population — no other pop <1m)





Donor Aid to Agriculture, Forestry & Fishing in SICTs

Pacific aid driven by **geopolitical** not trade issues.
Interest are in extractive resources—minerals, oil, fish
US re-engaging: New (2023) embassies—Honiara and Port Vila

Current ODA spend:

1. Maintaining social services (health and education)
2. Climate change, resilience
3. Agricultural development a very small part of overall ODA/development strategy

Prevailing orthodoxy in agriculture:

1. Export agricultural development
2. Concentration on niche products (cocoa)
3. Encourage food security (for balance of payments)

Feb 2023 Honiara, Point Cruz

March 2022 Honiara

Donor Aid to Agriculture, Forestry & Fishing in SICTs

So does any of this ODA to agriculture actually go to family farming?

Madammes et monsiers, je presente a vous…..

Prof. Severine Bouard!!!!

Development aid, subsistence activities (farming, fishing, hunting) and food policies

20th, 21th and 22th of June 2023

Vanuatu, Port Vila

Understanding international aid to agriculture, forestry and fishing in Melanesia through donor planning and aid flows

Séverine Bouard (IAC), Jonas Brouillon (IAC), Séverine Blaise (UNC), Charles Hawksley (University of Wollongong), Nichole Georgeou (University of Western Sydney), Jonas Brouillon (IAC), Nidhi Whali (Western Sydney University)

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

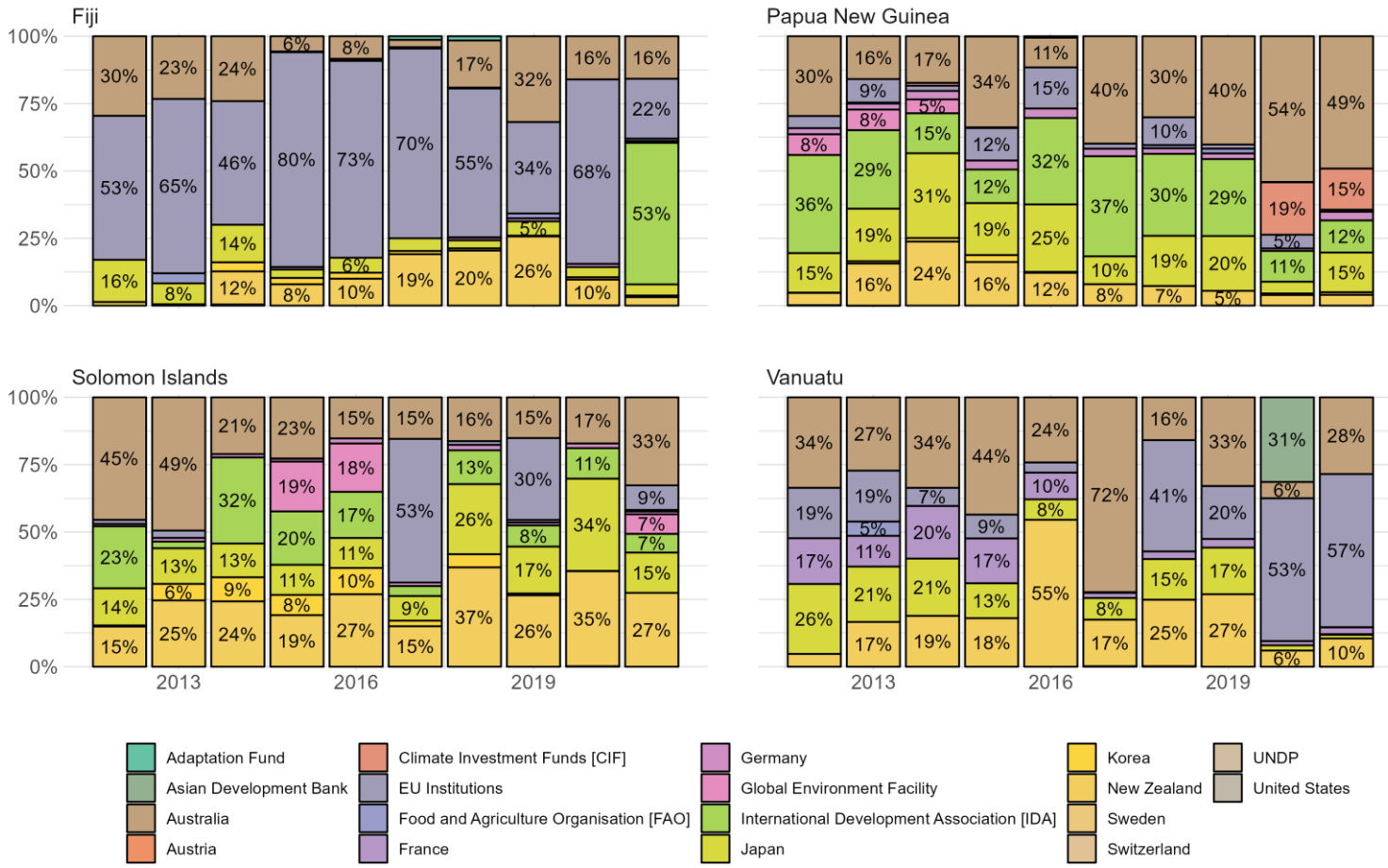
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Methods and datasets

- Use of the OECD "DAC CRS" table — these provide data on development aid by sector, donor and recipient
    - At beginning of research, attempts to exploit Lowy Institute database but too many questions about the origin and quality of some data
- China is absent from the OECD's ODA database (and thus absent in our analysis)
- We have chosen to focus on spending classified as already effective, and not spending promises, according to the Lowy Institute dashboard
- Most Chinese ODA in the Agriculture sector is classified as “commitment” and not “spent”, so the absence of China is not a real bias if we consider only spending

Who gives what?: Donor ODA in Agriculture, Forestry & Fishing: disbursements per donor

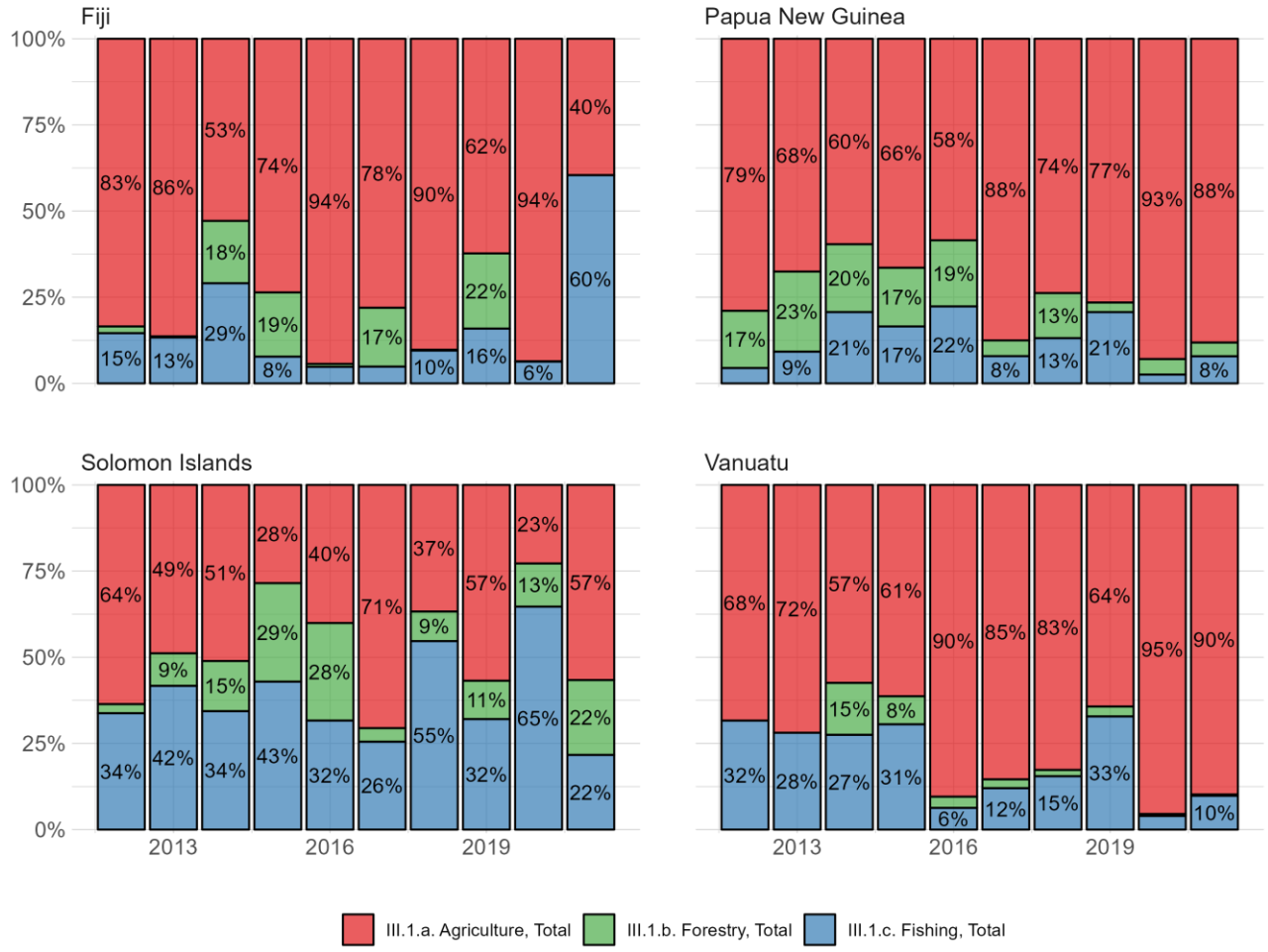
- **Australian aid**—significant part of ODA in each recipient country (>20%), higher level for PNG, SI and Vanuatu (>30%)
- **Fiji** — EU institutions main ODA to the AFF sector (from 50 to 80%)
- **Vanuatu** — significant (>10%) French presence in national ODA (language/history)
- **International Development Association** (IDA) (WB group) has strong presence in PNG and even stronger in SI: https://ida.worldbank.org/en/home
- **Japan** is more present in PNG, Solomon Islands and Vanuatu (from 10 to 30%)
- **New Zealand's** part is significant in the 4 countries with fluctuations (from 10 to 40%)



Source : OECD (2023) CRS1 datas

Remember— ODA in Agriculture, Forestry & Fishing : disbursement repartition per sector

- 3 components in this sector: Agriculture, Forestry and Fishing
- Agriculture is generally the most allocated sector between the three sector categories
- Fishing in SI sometimes equal or superior to the Agriculture sector



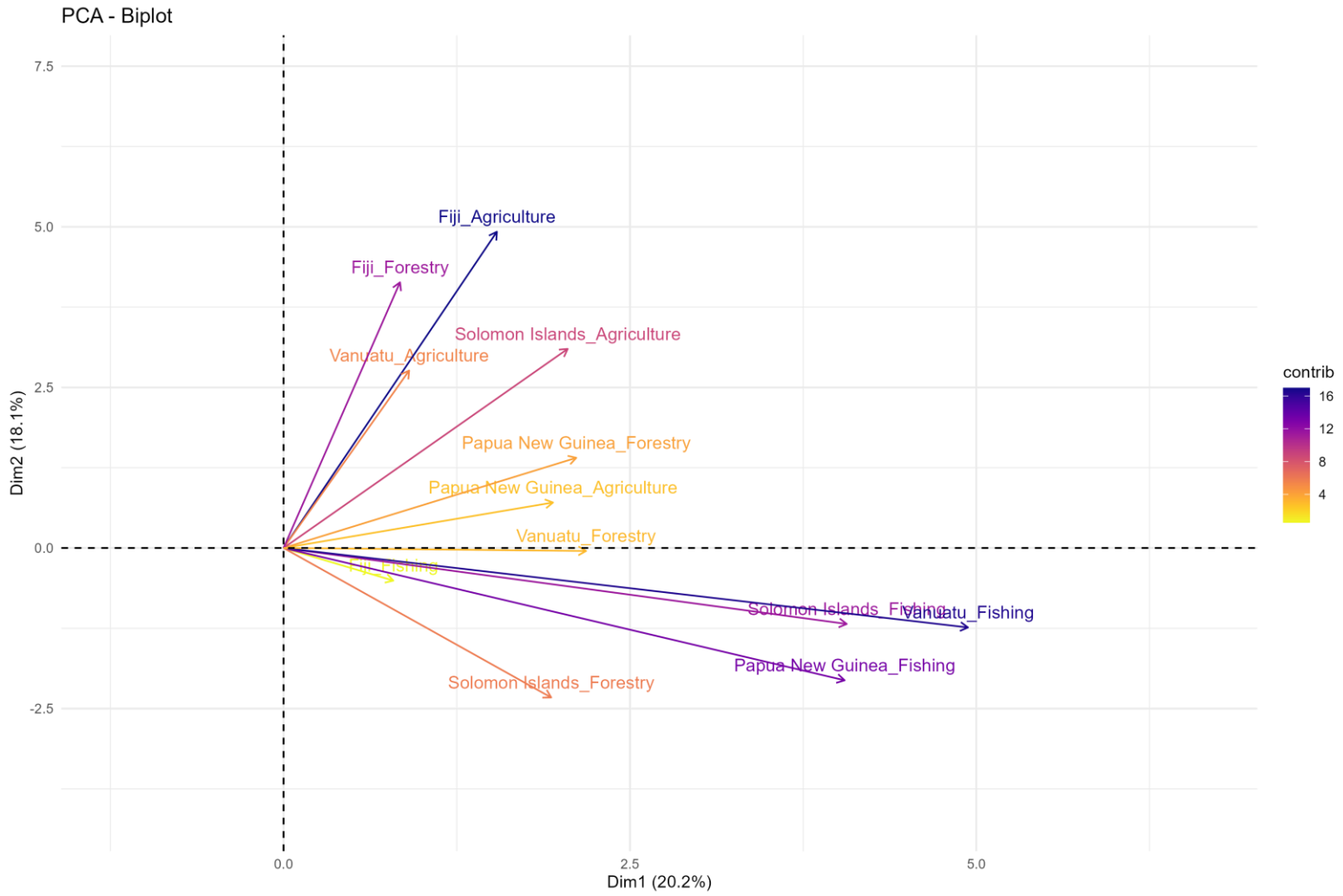
Source : OECD (2023) CRS1 dataset

ODA in Agriculture, Forestry & Fishing : disbursement repartition per donor, PCA approach

PCA on agriculture ODA during the 2012-2022 period :

-Dimension 1 Agriculture ODA in Solomons islands & PNG, Forestry ODA in PNG, Solomon Islands and Vanuatu.

-Dimension 2 contrast with Agriculture ODA in Fiji/Vanuatu & Forestry ODA in Fiji vs Fishing ODA



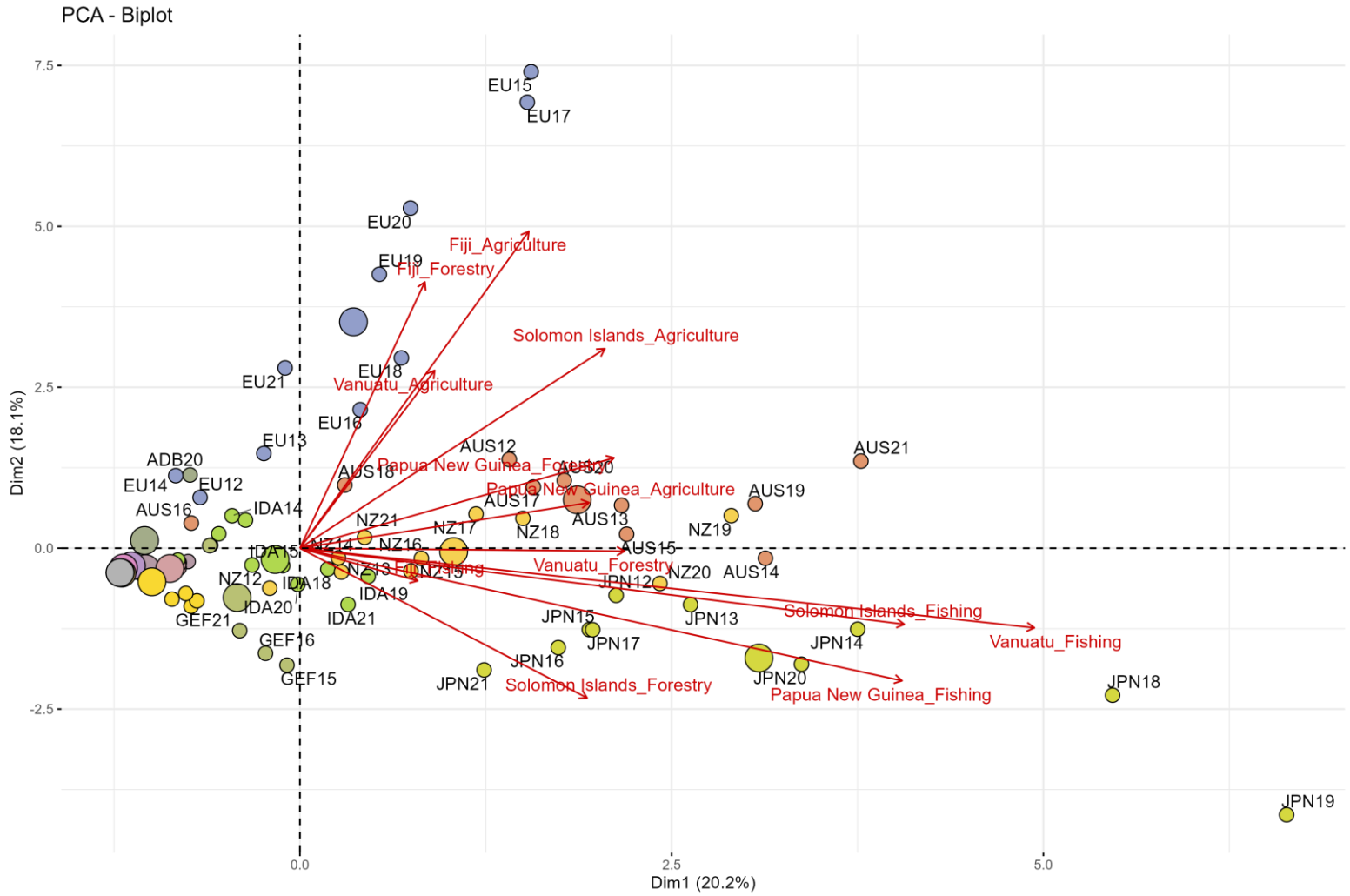
ODA in Agriculture, Forestry & Fishing : disbursement repartition per donor, PCA approach

PCA on agriculture ODA during the 2012-2022 period :

-Dimension 1 Agriculture ODA in Solomons islands & PNG, Forestry ODA in PNG, Solomon Islands and Vanuatu **(Australia & NZ).**

-Dimension 2 opposition between Agriculture ODA in Fiji/Vanuatu & Forestry ODA in Fiji **(EU institutions)** vs Fishing ODA **(Japan)**

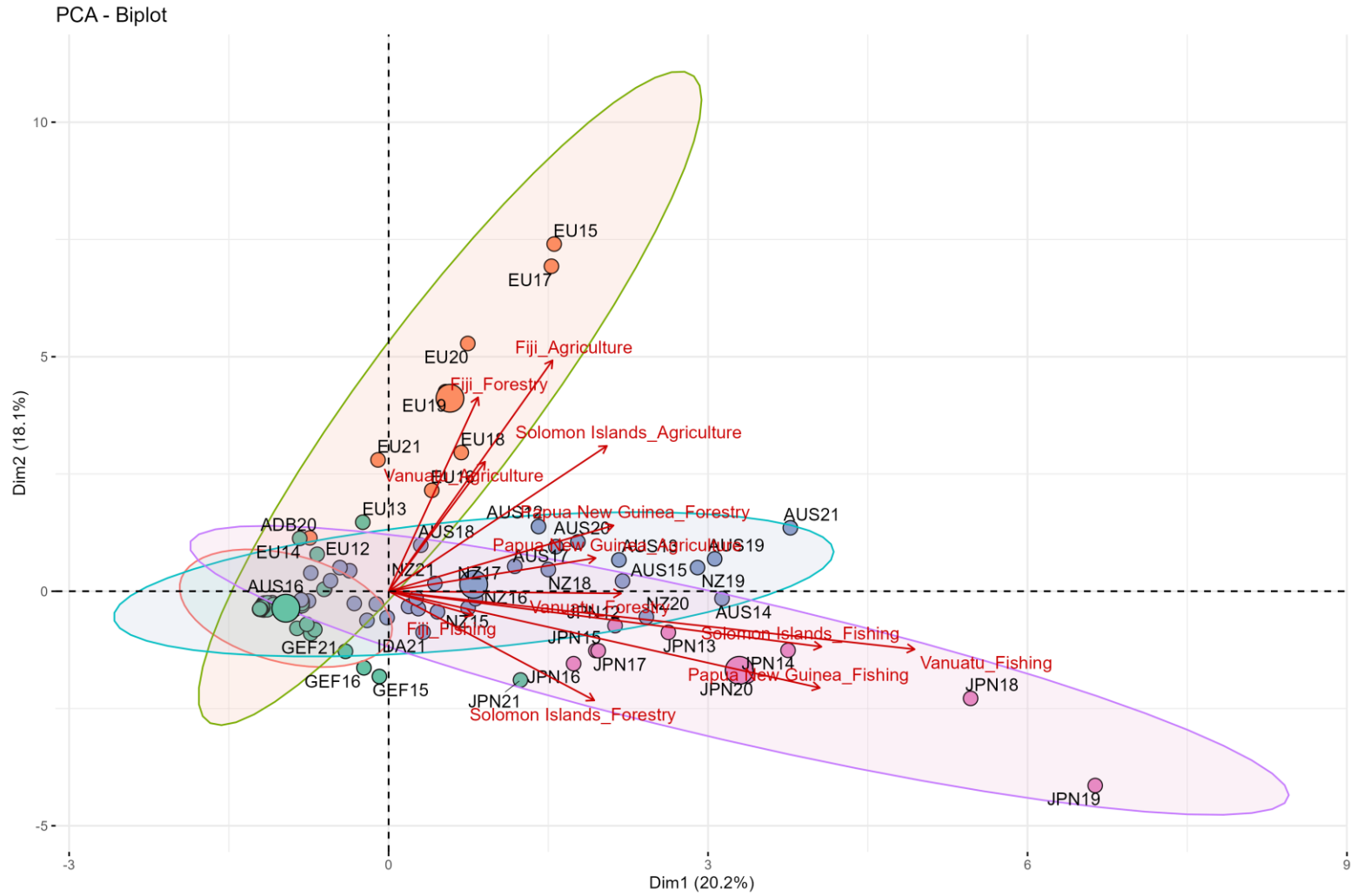
-Others individuals : ODA not significant, except for IDA in some years (Agriculture ODA in Solomons islands & PNG)



ODA in Agriculture, Forestry & Fishing : disbursement repartition per donor, PCA approach

Strategies clearly differ between donors

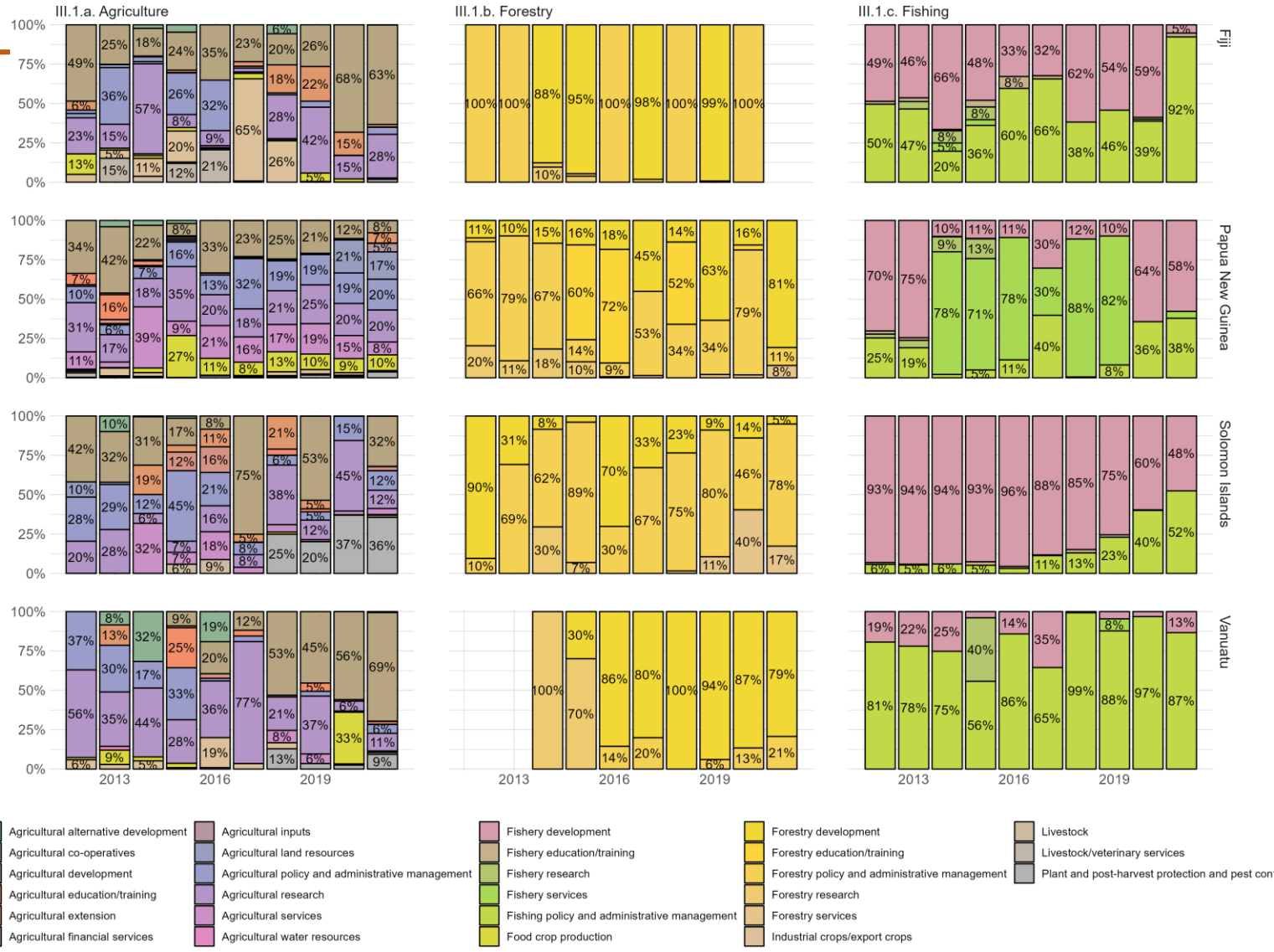
- Spatial division of the Pacific
- Sector specialization



ODA in Agriculture, Forestry & Fishing: different strategies of intervention

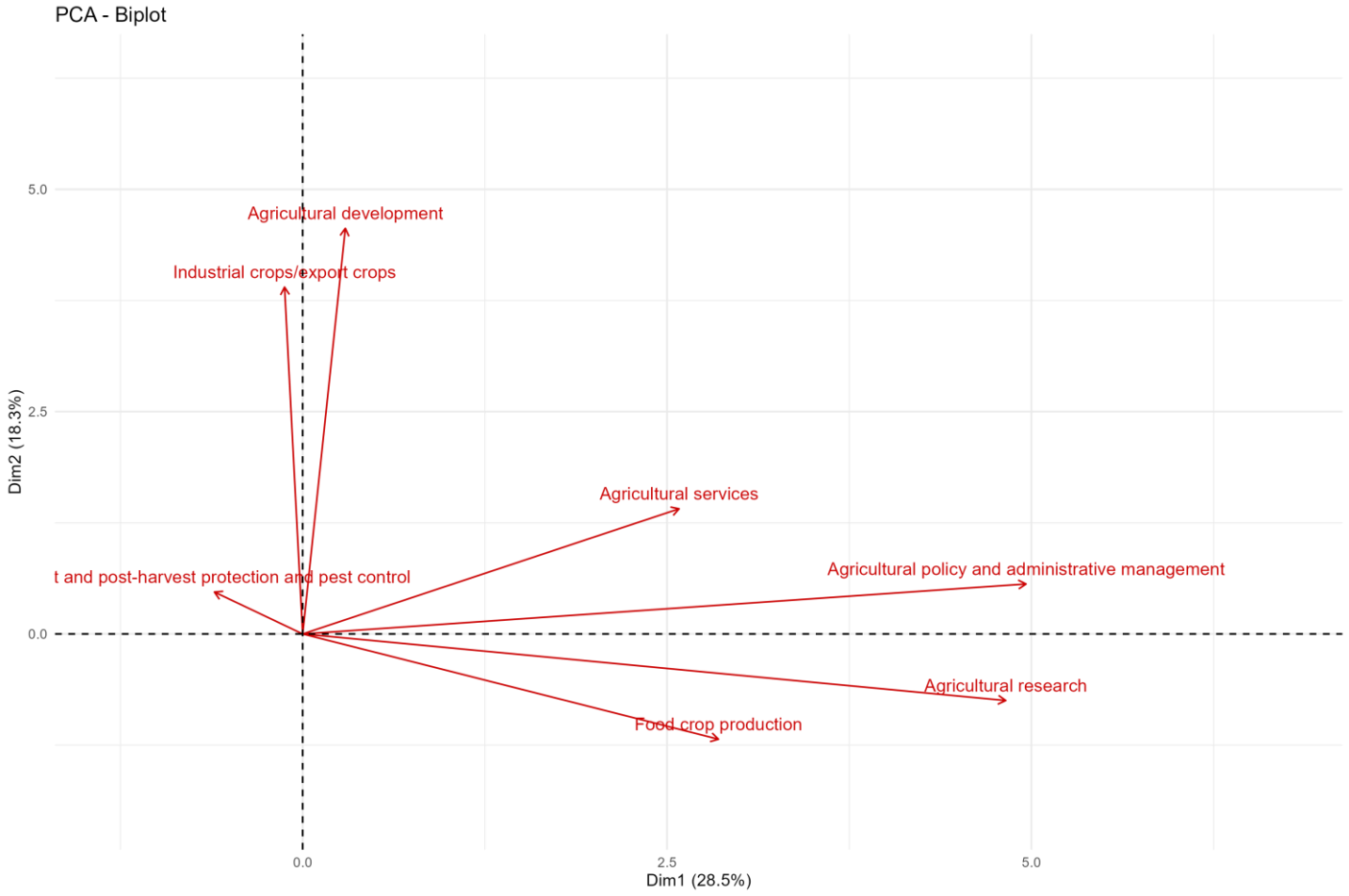
In the agriculture sector, the most allocated sub sectors seems to be:

- “Agricultural development” from 20 to 65% some years in Fiji, SI & PNG
- “Agricultural research” is particularly important in Vanuatu (from 30 to 77 %) and is also one of the most allocated in the other countries (from 15 to 35%)
- “Agricultural policy and administrative management” from 10 to 35%
- “Industrial crops/export crops” is particularly important in Fiji during the 2015-2018 period
- “Plant and post-harvest protection and pest control” is particulary important in PNG during the 2018-2022 period (>20%)



Source : OECD (2023) CRS1 dataset

Different strategies of intervention : PCA approach



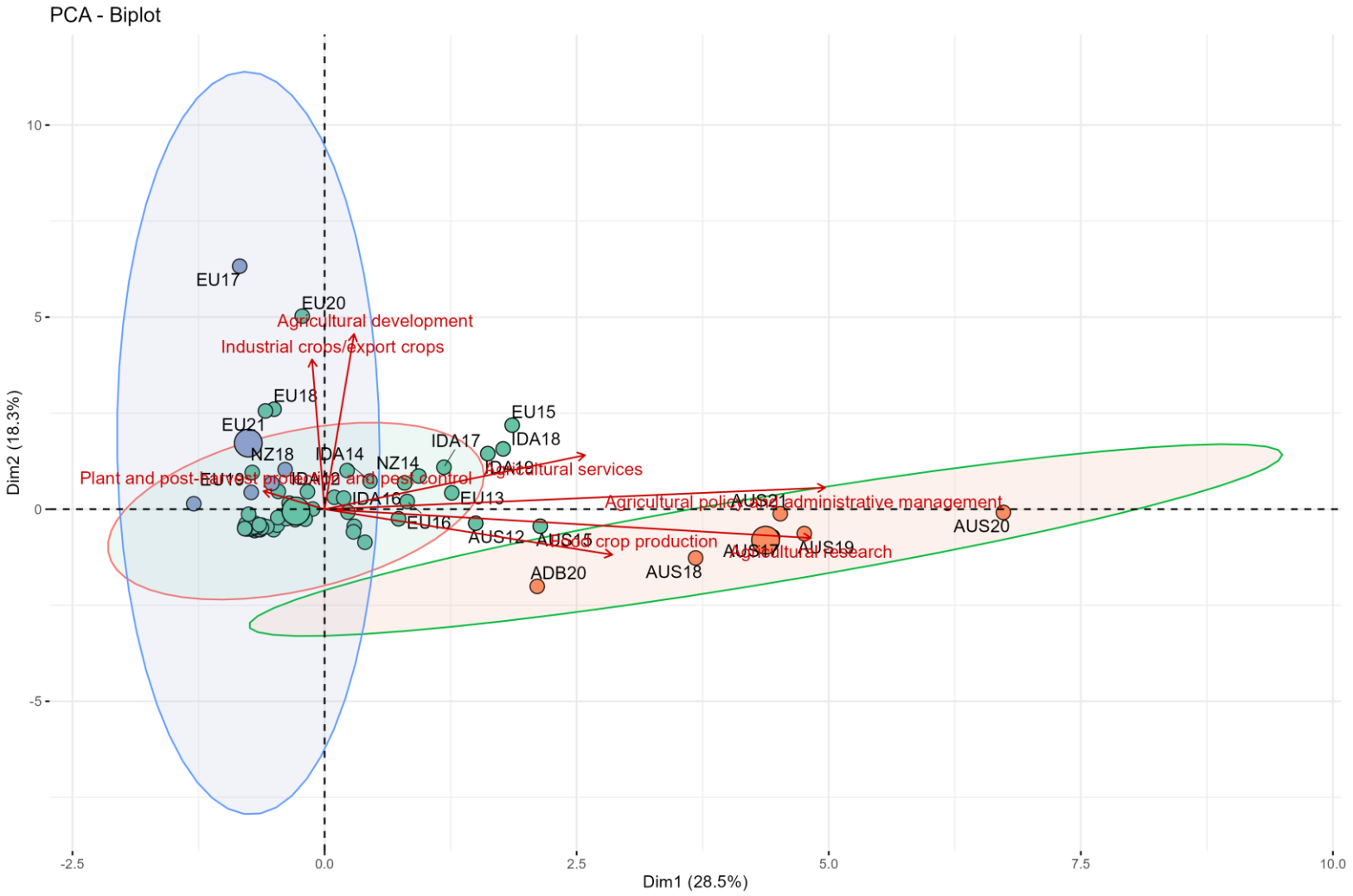
Different strategies of intervention : PCA approach

« Agricultural development » and « industrial crops/export crops » seems to be more financed by EU institutions.

«Agricultural services » and « Agricultural policy and administrative management » seems to be more financed by IDA and EU

« Plant and post-harvested pest control » seems to be the more financed by NZ

« Agricultural research » and « Food crop production » seems to be more financed by Australia



Discussion and conclusion

→Different strategies between donors in terms of volume of aid (and according to the period)

→Spatial division of Oceania between donors

→Specialisation in the strategies of intervention between Australia, NZ & Europe:

- → AU (ACIAR, etc.): research and administration support orientation, support to farmer's organisation
- → EU: production and export orientation
- → NZ: pest-control orientation

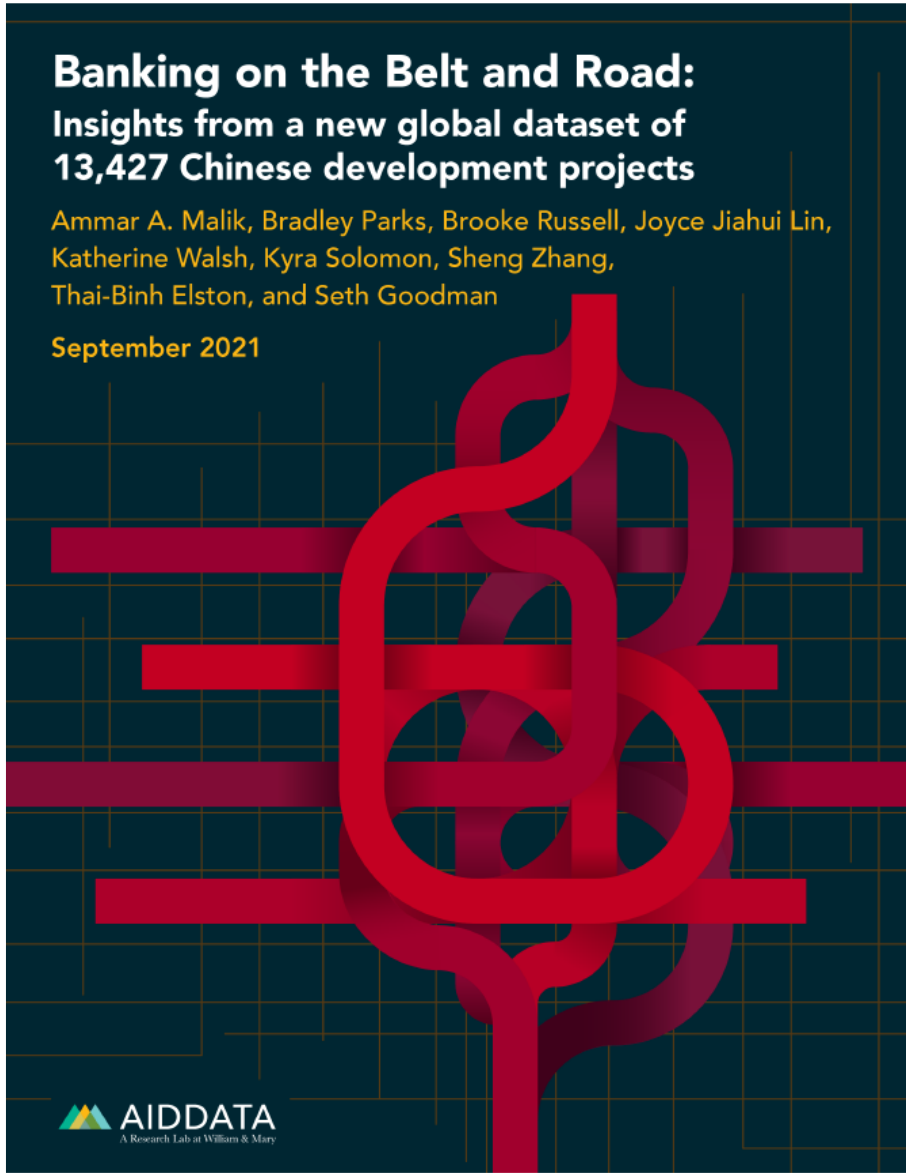
The case of China's Foreign Aid

→ Few data: not included in existing global reporting systems, such as OECD's Creditors Reporting System (CRS) and the International Aid Transparency Initiative (IATI).
→ Questions of transparency and reliability

→ Two sources:
1) Lowy Institute Pacific Aid Database
2) Aid data developed the Tracking Underreported Financial Flows (TUFF 2.0) in collaboration with an international network of researchers

China's Belt and Road Initiative: focusing on infrastructure development

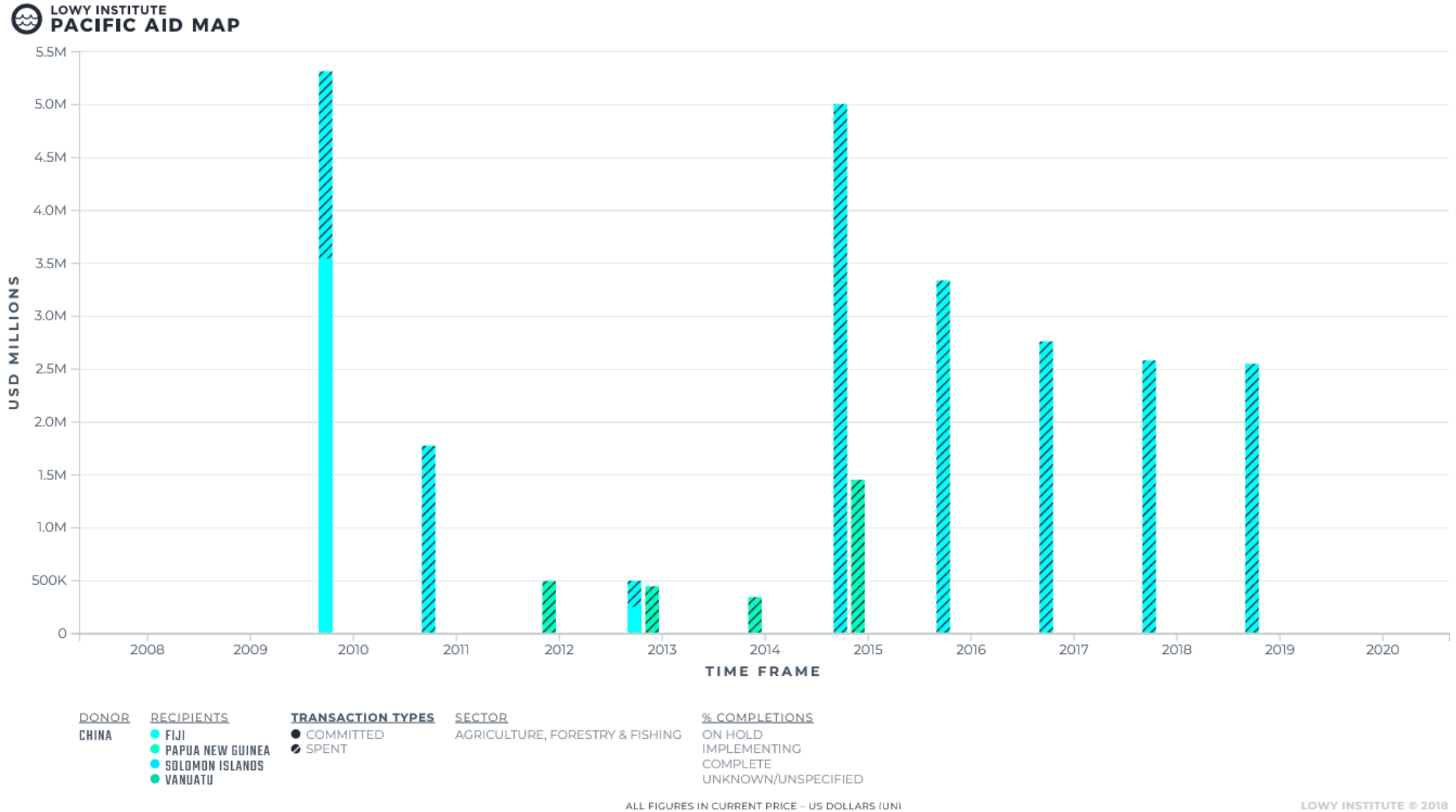
Oceania represent 1% of total official finance and 2% of total ODA on the period 2000-2017



The case of China's Foreign Aid to AFF

→Lowy Pacific Aid Database

→Total of 16 projects

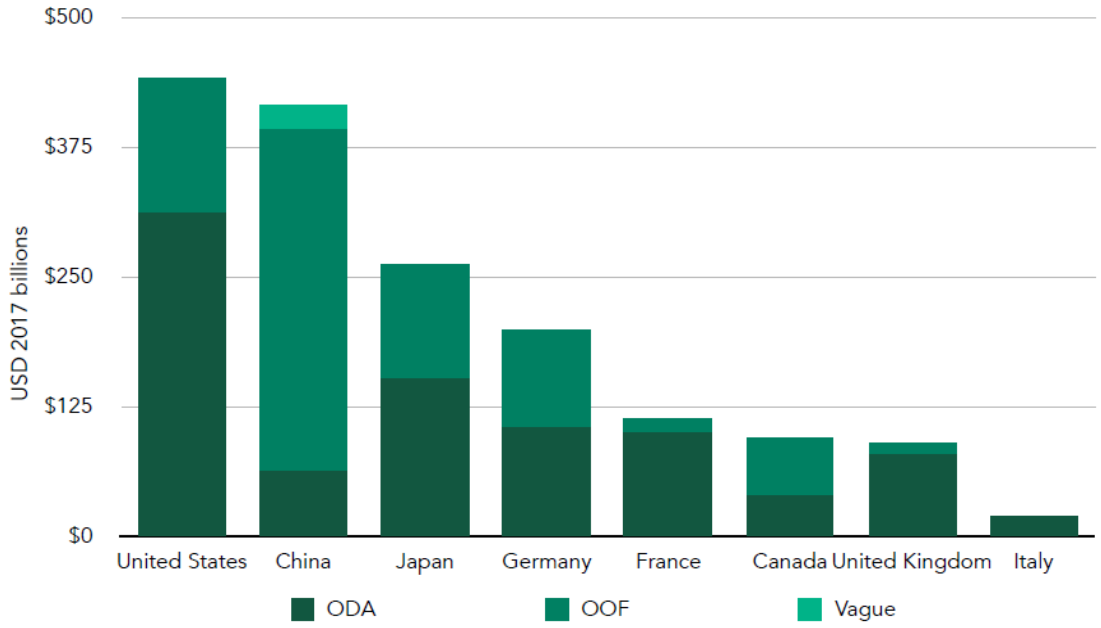


The case of China's Foreign Aid

→ AidData database:

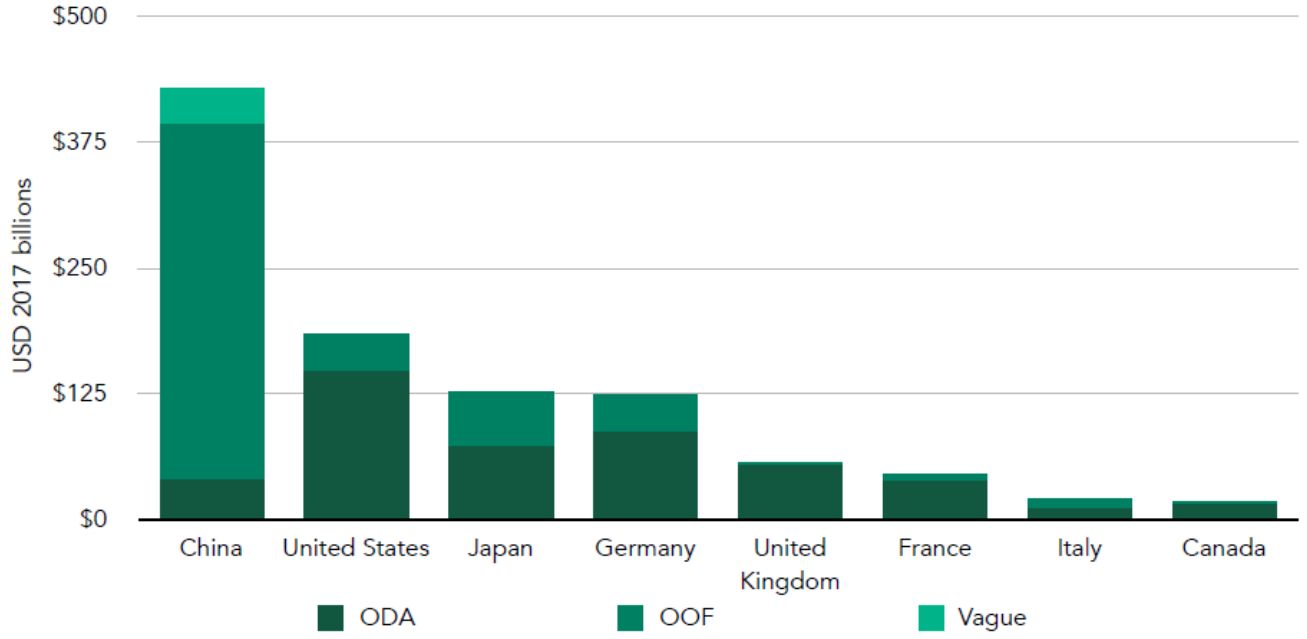
A small share of ODA compared to OOF in development finance

Figure 1: International development finance from China and the G7, 2000-2012



Source: OECD-DAC and AidData.

Figure 2: International development finance from China and the G7, 2013-2017



Source: OECD-DAC and AidData.

The case of China's Foreign Aid

Figure A-8: Chinese ODA commitments by sector, 2000-2017

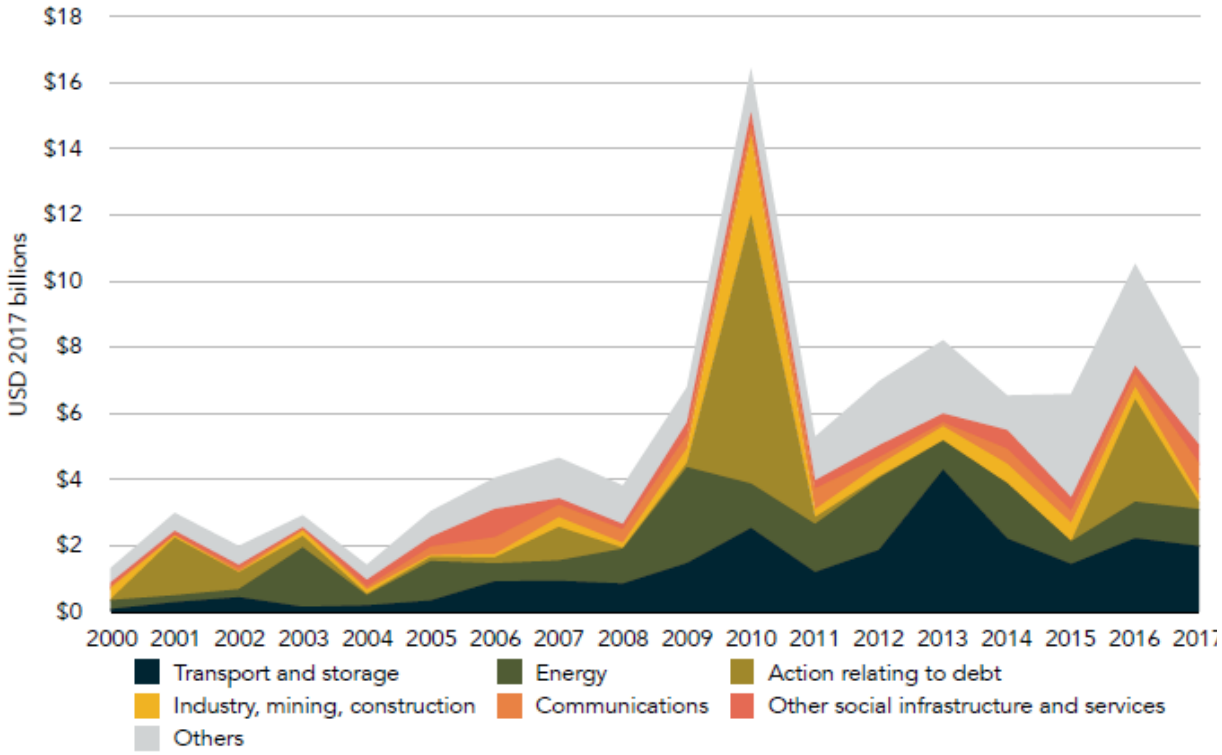
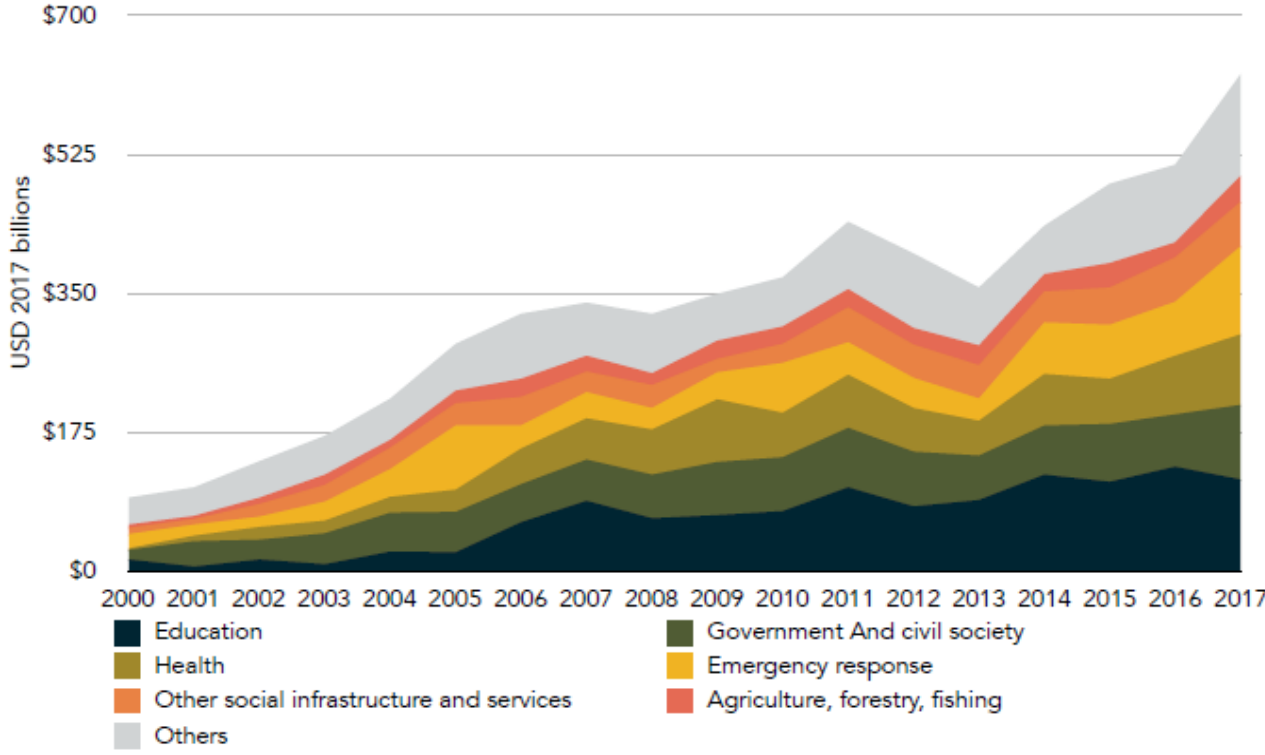


Figure A-11: Sectoral allocation of Chinese government grants by project count, 2000-2017



China’s ODA-like finance to agriculture in Oceania

Recipient	Completion Year	Title
Fiji		Chinese Government provides grant for Phase 2 of **Juncao Mushroom Technical Cooperation Project** (Linked to Project ID#49135)
Fiji	2016	Chinese Government provides FJD 10 million grant for Phase 1 of **Rice Revitalization Project** (Linked to Project ID#65824 and #65031)
Fiji	2015	Provincial Government of Hubei donates tractors and farming equipment to Fiji's Navuso Agriculture Vocational Institute
Fiji	2015	Chinese Government donates **rice machines, tractors, and bulldozers** worth $5 million (Linked to Project ID#49129)
Fiji	2016	Chinese Government provides RMB 8.2 million grant for Phase 1 of Juncao Mushroom Technical Cooperation Project (Linked to Project ID#65032)
Fiji	2016	Chinese Government provides RMB 25 million grant for Vanua Levu Rice Industry Development Project (Linked to Project ID#49129 and #65824)
Fiji		Chinese Government provides grant — via Trust Fund — for dredging works on Ba, Nawaka and Nadi Rivers (Linked to #67034)
Fiji	2010	Chinese Government **donates 1,175 tons of fertilizer** to Fiji
Fiji	2011	Chinese Government grants **multi-purpose cargo vessel** worth USD 3.54 million to Fiji
Fiji		Chinese Government provides grant — via Trust Fund — for **dredging works** on Ba River and Nadi River (Linked to Project ID#67034)

China's ODA-like finance to agriculture in Oceania

Recipient	Completion Year	Title
Papua New Guinea		China Funds the Eastern Highlands **Mushroom and Dry Rice Project** in PNG
Papua New Guinea		China Eximbank signs MoU for $330 million loan for Papua New Guinea-China **Integrated Agriculture Park**
Papua New Guinea		Chinese Government grants K4 million for the Fourth Phase of the **Mt. Hagen Agriculture Technical Cooperation Project** in PNG (linked to #39344, #39378, #39383, and #69380)
Papua New Guinea		China grants $338,328.21 for the Third Phase of the **Mt. Hagen Agriculture Technical Cooperation Project** in PNG (linked to #39344, #39378, #63990, and #69380)
Papua New Guinea		China grants RMB 10 million for the Second Phase of the Mt. Hagen Rice Project in PNG (linked to #39344, #39383, #63990, #69380, and #64516)
Papua New Guinea		Chinese team to provide **agriculture training** at PNG college
Papua New Guinea		China grants 1.211 million USD for the First Phase of the Mt. Hagen Rice Project in PNG (linked to #39378, #39383, #63990, and #69380)
Papua New Guinea		Chinese Ministry of Commerce grants K22 million for Mt. Hagen Rice Project (umbrella to #39344, #39378, #39383, #63990, and #63991)
Papua New Guinea		Chinese government pledges 65.4m concessional loan to implement **Agriculture Development Plan**
Papua New Guinea	2008	Chinese Government provides $3.6 million grant — via ETCA — for Lae **Fishery Processing and Cold Storage Plant Construction** Project
Papua New Guinea		China grants 1.5 million kina for the Kandep Agriculture Station and Wheat Technical Cooperation Project in PNG

China's ODA-like finance to agriculture in Oceania

Recipient	Completion Year	Title
Vanuatu	2017	Chinese government provides **Rice Training Program** at Vanuatu Agriculture College
Vanuatu	2009	Chinese Government provides RMB 40 million grant for **Fish Processing Facilities Project** (Linked to Project ID#63854 and #73689)
Vanuatu	2009	Chinese Government provides $2.7. million grant for **Oil Palm Technical Cooperation Project**
Vanuatu		China grants Rice and Vegetable project in Vanuatu
Vanuatu	2006	Chinese Government provides VUV 693,069,000 grant — via ETCA — for provision of **12 tractors** (Linked to Project ID#66388)
Vanuatu		China grants Vanuatu 830 thousand USD for rural development

→Total of 27 projects in 3 countries

→No agricultural project in Solomon Islands!

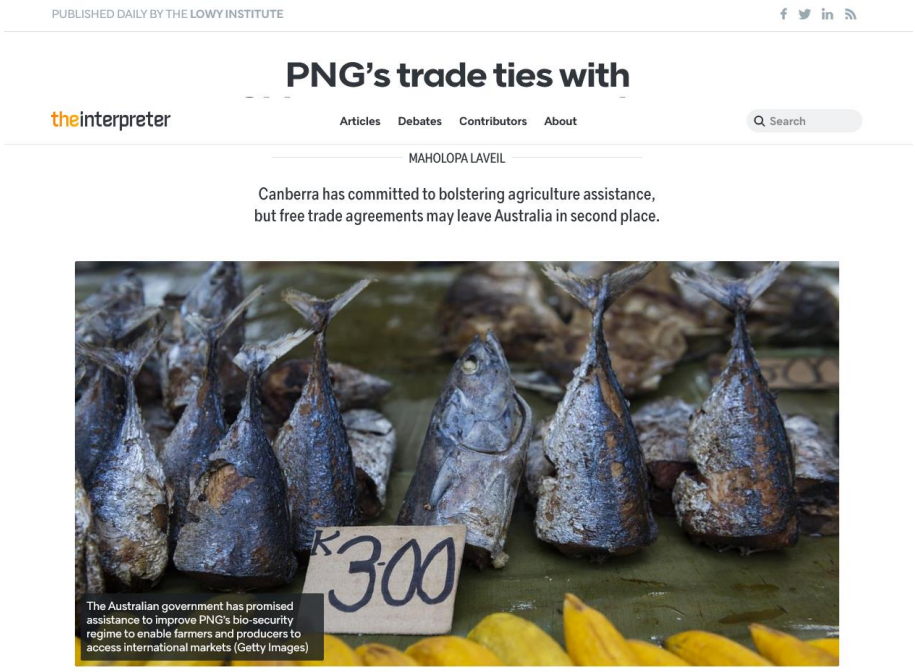
The case of China's Foreign Aid

→ China uses other strategies including: Chinese state owned companies based in the Pacific, trade agreements

→ At the national level, all theses strategies shape the trajectories of development policies of Oceanian countries

→ **At the local level, they create new constraints and opportunities for Family Farmers**

→ FALAH surveys will probably help us to understand how these constraints and opportunities reshape family farmers' strategies?



Development aid, subsistence activities (farming, fishing, hunting) and food policies

20th, 21th and 22th of June 2023

National University of Vanuatu, Port Vila

Foreign aid to agricultural projects in four SICT's of Oceania: what place for family farming?

Jonas Brouillon (IAC), Séverine Bouard (IAC), Séverine Blaise (UNC), Charles Hawksley (University of Wollongong), Nichole Georgeou (University of Western Sydney), Nidhi Whali (Western Sydney University)

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Research Question

Is foreign aid addressing the challenges of family farming in the Pacific?

How much? What logic?

Stronge *et al.* (2020) explains the strategies of the main donors: NZ, AU, UN FAO, UN IFAD, Asian Development Bank → from donor websites and grey literature

Stronge, D., Scheyvens, R., & Banks, G. (2020). Donor approaches to food security in the Pacific : Sustainable development goal 2 and the need for more inclusive agricultural development. *Asia Pacific Viewpoint*, *61*(1), 102-117. https://doi.org/10.1111/apv.12248

Methodological question: how to trace FF in development aid?

Research Question - Methods

Datasets used : OECD CRS datasets per project

Construction of the hypothesis on the "market-centric approach" addressed by Stronge et al.

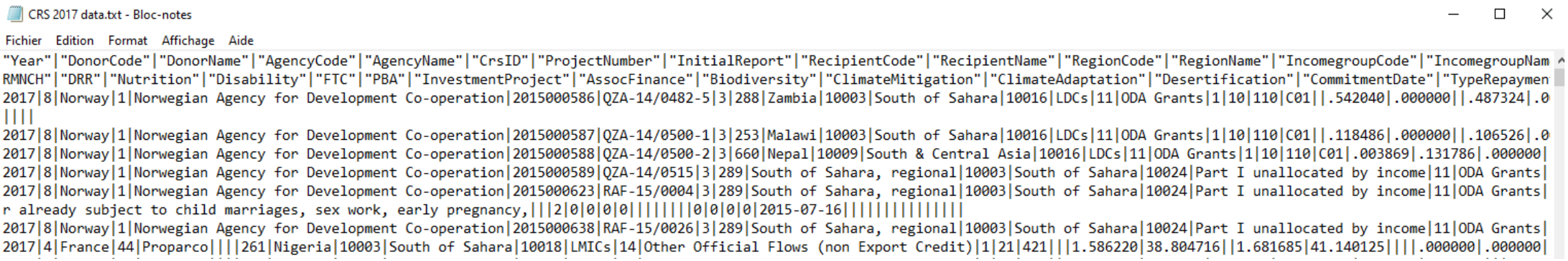
Testing two complementary textual analysis methods

Kasper Welbers, Wouter Van Atteveldt & Kenneth Benoit (2017) Text Analysis in R, Communication Methods and Measures, 11:4, 245-265, DOI 10.1080/19312458.2017.1387238

Silge et al., (2016). tidytext: Text Mining and Analysis Using Tidy Data Principles in R. Journal of Open Source Software, 1(3), 37, doi:10.21105/joss.00037

Objective of the presentation: explore the Official Development Aid (ODA) per detailed projects

OECD provide data in .txt format to explore the Creditor Report System (CRS)


CRS 2017 data.txt - Bloc-notes

Fichier Edition Format Affichage Aide

```
"Year"|"DonorCode"|"DonorName"|"AgencyCode"|"AgencyName"|"CrsID"|"ProjectNumber"|"InitialReport"|"RecipientCode"|"RecipientName"|"RegionCode"|"RegionName"|"IncomegroupCode"|"IncomegroupNam
RMNCH"|"DRR"|"Nutrition"|"Disability"|"FTC"|"PBA"|"InvestmentProject"|"AssocFinance"|"Biodiversity"|"ClimateMitigation"|"ClimateAdaptation"|"Desertification"|"CommitmentDate"|"TypeRepaymen
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000586|QZA-14/0482-5|3|288|Zambia|10003|South of Sahara|10016|LDCs|11|ODA Grants|1|10|110|C01||.542040|.000000||.487324|.0
||||
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000587|QZA-14/0500-1|3|253|Malawi|10003|South of Sahara|10016|LDCs|11|ODA Grants|1|10|110|C01||.118486|.000000||.106526|.0
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000588|QZA-14/0500-2|3|660|Nepal|10009|South & Central Asia|10016|LDCs|11|ODA Grants|1|10|110|C01|.003869|.131786|.000000|
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000589|QZA-14/0515|3|289|South of Sahara, regional|10003|South of Sahara|10024|Part I unallocated by income|11|ODA Grants|
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000623|RAF-15/0004|3|289|South of Sahara, regional|10003|South of Sahara|10024|Part I unallocated by income|11|ODA Grants|
r already subject to child marriages, sex work, early pregnancy,|||2|0|0|0|0|||||||0|0|0|0|2015-07-16|||||||||||||||
2017|8|Norway|1|Norwegian Agency for Development Co-operation|2015000638|RAF-15/0026|3|289|South of Sahara, regional|10003|South of Sahara|10024|Part I unallocated by income|11|ODA Grants|
2017|4|France|44|Proparco||||261|Nigeria|10003|South of Sahara|10018|LMICs|14|Other Official Flows (non Export Credit)|1|21|421|||1.586220|38.804716||1.681685|41.140125||||.000000|.000000|
```

The databases from 2012 to 2021 were downloaded and merged

2.2Go of data (!) with 2 706 234 rows and 94 columns

Explore the agriculture projects for Fiji, PNG, Vanuatu and Solomon Islands

Data reduced to:

- 26 375 rows for projects with these 4 PICTS as recipients
- 2 239 rows for projects coded as « III.1 Agriculture, Forestry , Fishing »

Column	N = 2,239	Column	N = 2,239
Year	2016 (2012, 2021)		
DonorName		**ShortDescription**	
Asian Development Bank	80 (3.6%)	TC AGGREGATED ACTIVITIES	494 (22%)
Australia	666 (30%)	Other	1,745 (78%)
EU Institutions	135 (6.0%)	**LongDescription**	
International Development Association	214 (9.6%)	TC AGGREGATED ACTIVITIES	494 (24%)
Japan	598 (27%)	Other	1,538 (76%)
Korea	96 (4.3%)	Unknown	207
New Zealand	192 (8.6%)	**USD_Commitment**	0.40 (0.00, 70.2)
Other	434 (12%)	Unknown	174
RecipientName		**USD_Disbursement**	0.28 (0.00, 20)
Fiji	502 (22%)	Unknown	145
Papua New Guinea	896 (40%)	**USD_Received**	0.13 (0.00, 3.82)
Solomon Islands	507 (23%)	Unknown	1,425
Vanuatu	334 (15%)	**USD_Commitment_Defl**	0.39 (0.00, 70.07)
FlowName		Unknown	174
ODA Grants	1,908 (85%)	**USD_Disbursement_Defl**	0.28 (0.00, 20)
ODA Loans	259 (12%)	Unknown	145
Other	72 (3.2%)	**USD_Received_Defl**	0.13 (0.00, 4.02)
SectorName		Unknown	1,425
III.1.a. Agriculture	1,341 (60%)		
III.1.b. Forestry	299 (13%)		
III.1.c. Fishing	599 (27%)		

Explore the agriculture projects for Fiji, PNG, Vanuatu and Solomon Islands

For each project, the data provide us the project's title, and a column named « Long description » with a detailed description of the project

ProjectTitle	LongDescription
IMPROVEMENT OF KEY SERVICES TO AGRICULTURE	Annual Action Program covered by the Multi annual Indicati...
IMPROVEMENT OF KEY SERVICES TO AGRICULTURE UNDER ...	Contribution Agreement with ITC
CONTRIBUTION AGREEMENT WITH SPC FOR THE IMPROVE...	The Overall Objective of the Improvement of Key Services to...
CANE VARIETY RESEARCH AND QUALITY SEEDCANE AVAILA...	2) Cane variety
Responsible Management and Maintenance of forest resour...	Responsible Management and Maintenance of forest resour...
Grants to Australia National University	The Papua New Guniea Agriculture Development initiative p...

The Overall Objective of the Improvement of Key Services to Agriculture is to help cushion the economic and social impact of the sugar sector restructuring by supporting a diversified market-driven agriculture sectorThe Project Purpose (specific objectiv

How filter projects about family farming ?

As we focus on project's descriptions, we have to delete doubles by keeping only titles and descriptions, to have the number of « distinct » projects.

One bias: Projects aren't born equals ! Some donors provide longer descriptions than others, some projects have very short descriptions…

Overview of projects in the per project OECD dataset in the 'III.1. Agriculture, Forestry, Fishing' sector

DonorName	Number of distinct projects	Mean long description lenght (words number)
Australia	225	620
Other	119	285
EU Institutions	77	216
New Zealand	60	200
Korea	43	127
Japan	27	49
Asian Development Bank	21	223
International Development Association	20	412

Overview of projects in the per project OECD dataset in the 'III.1. Agriculture, Forestry, Fishing' sector

RecipientName	Number of distinct projects	Mean long description lenght (words number)
Papua New Guinea	279	313
Fiji	193	268
Solomon Islands	154	306
Vanuatu	123	355

How filter projects about family farming ?

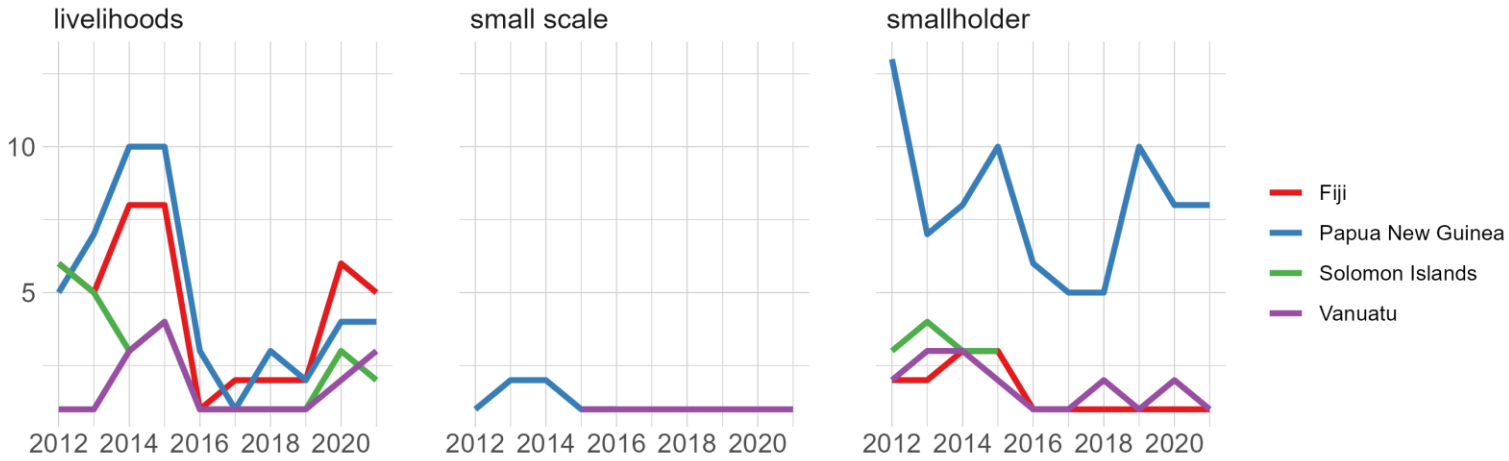
There is no explicit mention of « Family farming », so we will focus on projects which mention one of these words : « livelihoods », « smallholder » and « small scale ».
Now the data is reduced to 334 rows, for 150 distinct projects.

Distinct projects with mentions of family farming lexicon during the 2012-2021 period in the 'III.1. Agriculture, Forestry, Fishing' sector per recipient

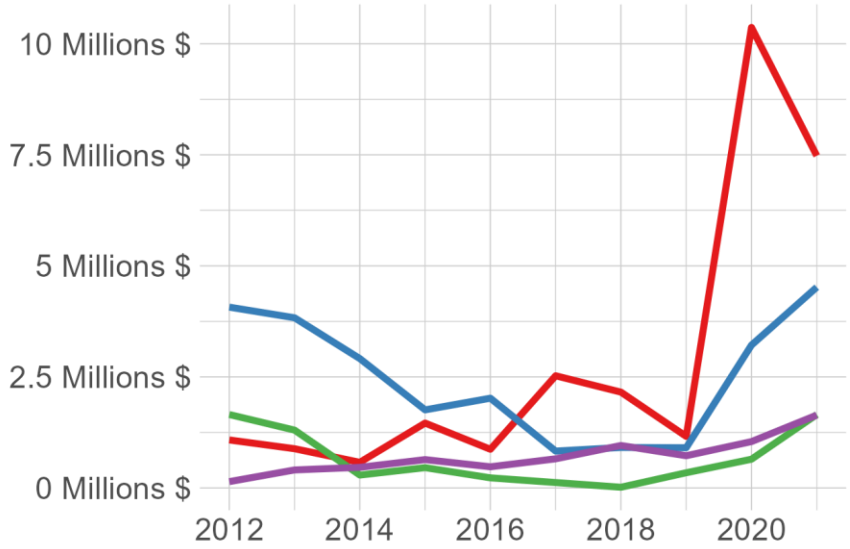
RecipientName	Number of distinct projects with 'livelihoods' mentions	Number of distinct projects with 'smallholder' mentions	Number of distinct projects with 'small scale' mentions
Fiji	25 (12% of the projects)	6 (3% of the projects)	
Papua New Guinea	26 (9% of the projects)	39 (14% of the projects)	3 (1% of the projects)
Solomon Islands	16 (10% of the projects)	7 (4% of the projects)	
Vanuatu	7 (6% of the projects)	9 (7% of the projects)	1 (1% of the projects)

How filter projects about family farming ?

There were more projects with *family farming* lexicon at the beginning and the end of the period.
Note that ‘smallholder’ is clearly a PNG-related vocabulary.
There is a big disbursement increase for Fiji at the end of the period, why ?



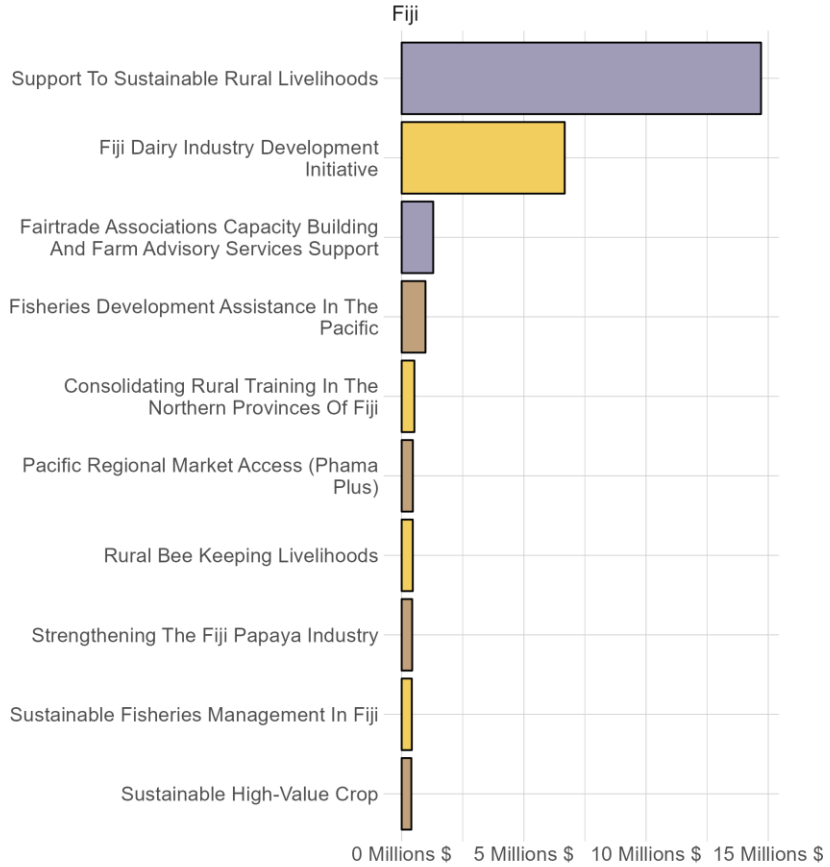
Source : OECD (2023) CRS data per project



Source : OECD (2023) CRS data per project

How filter projects about family farming ?

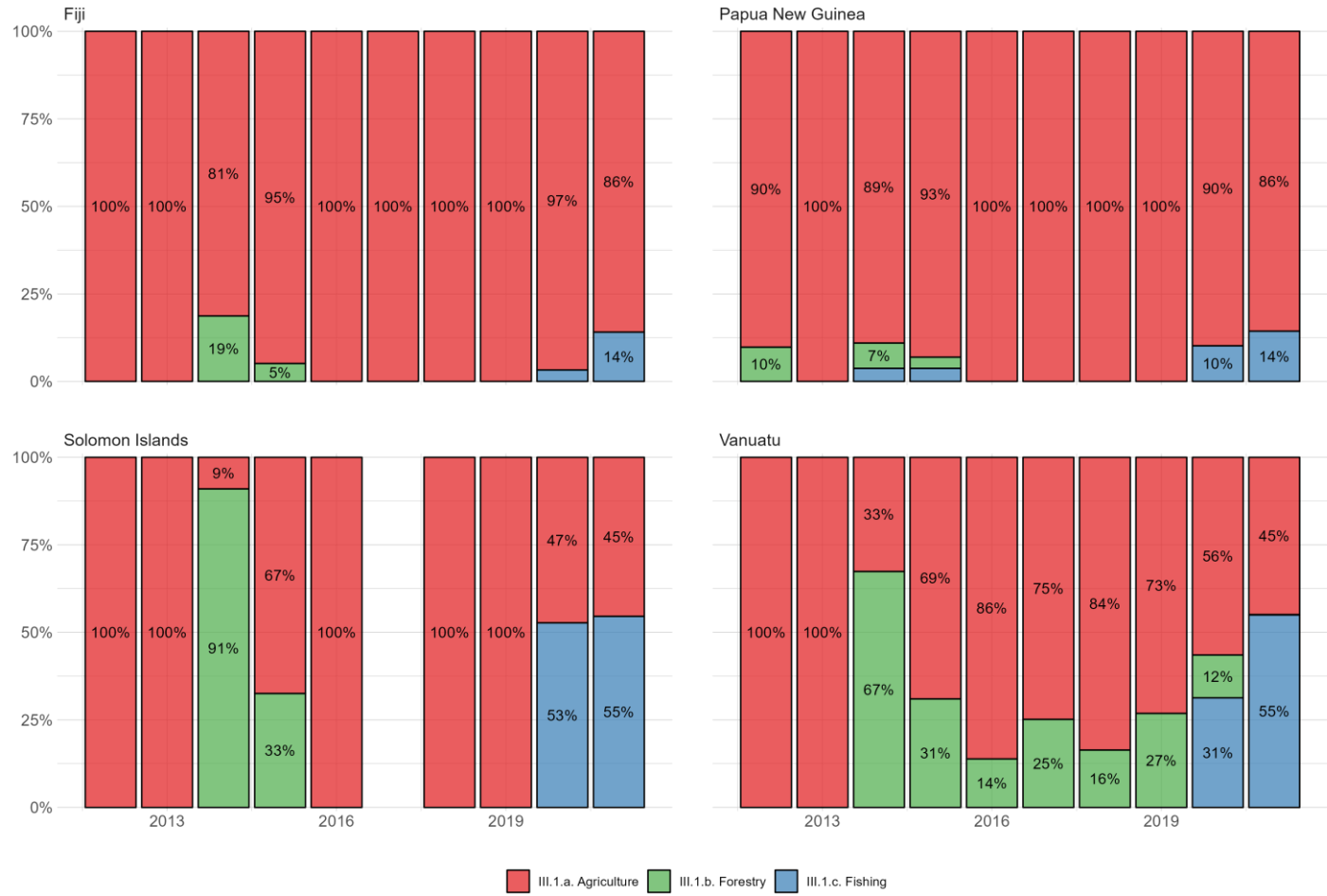
There were more projects with family farming lexicon at the beginning and the end of the period.
Note that smallholder is clearly a PNG related vocabulary.
There is a big disbursement increase for Fiji at the end of the period, why ?



Because of the « sustainable rural livelihoods » project which totals 15 millions USD (constant 2015) disbursement accross years

How filter projects about family farming ?

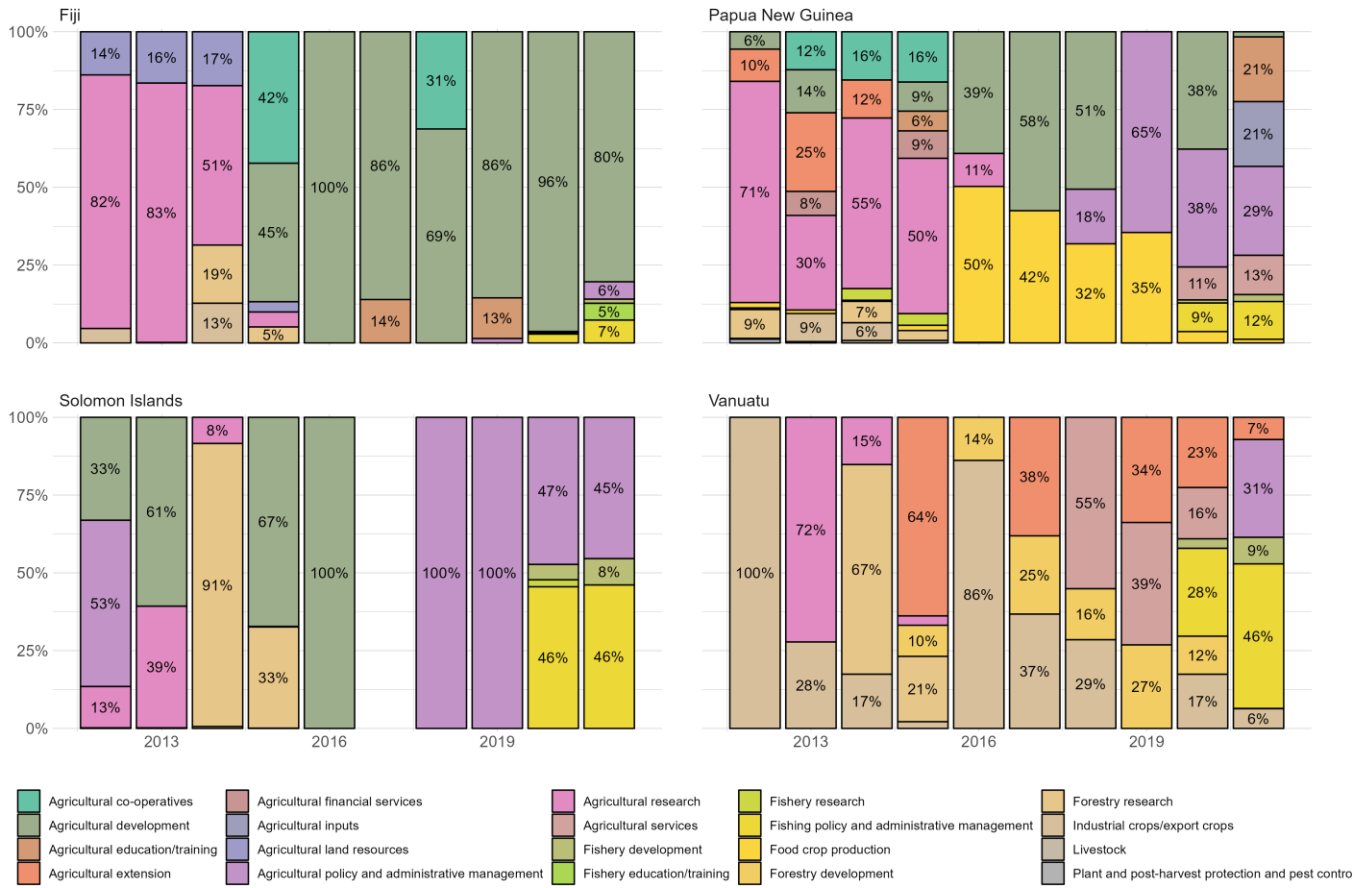
Most of the projects (and their disbursements) are related to the « Agriculture sector »



Source : OECD (2023) CRS data per project

How to filter projects about family farming ?

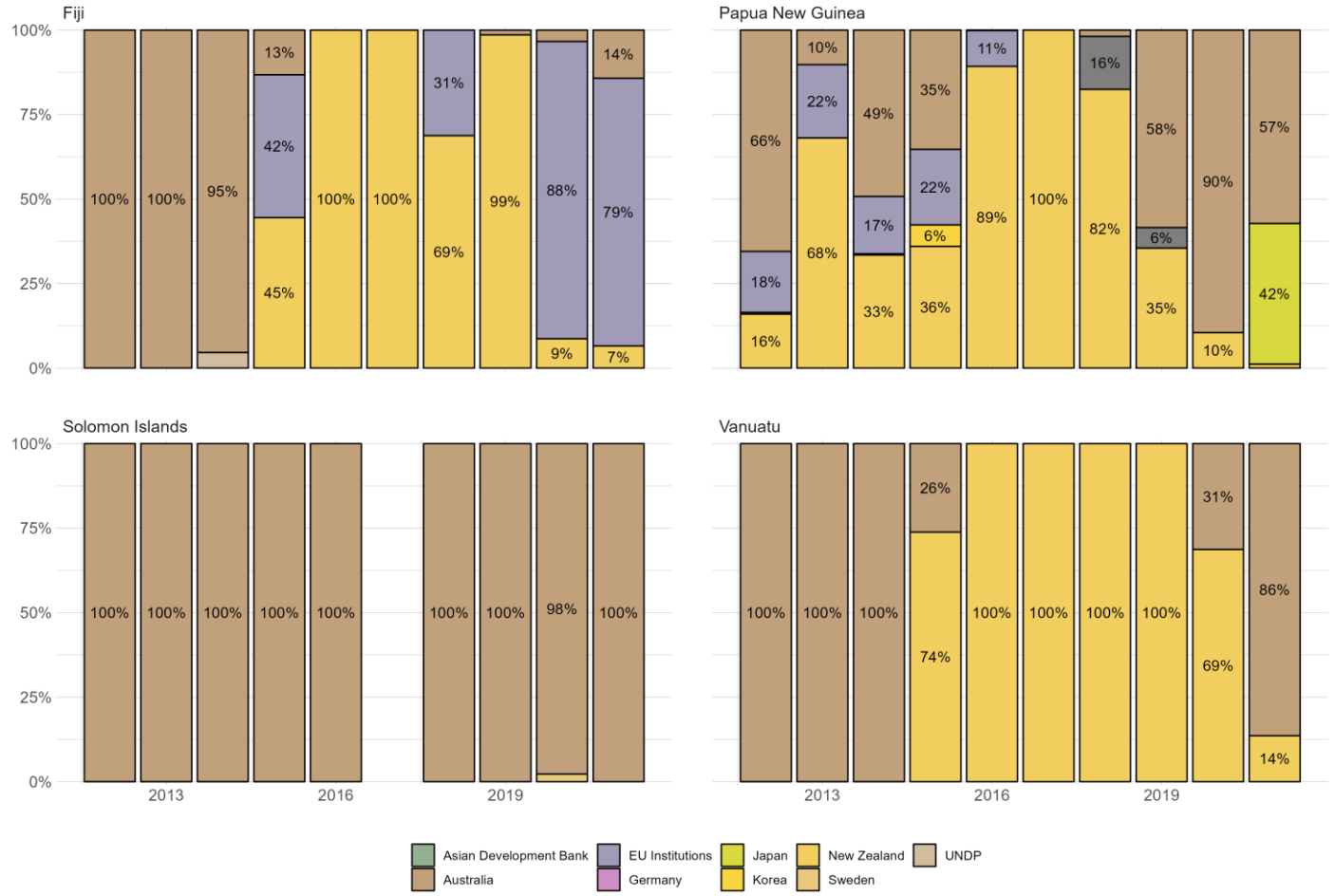
The sub-sectors concerned vary greatly from one country to another, and even within each country.
(To a lesser extent for Fiji, where most projects fall under the category "agricultural development »)



Source : OECD (2023) CRS data per project

How to filter projects about family farming ?

Most of the projects with family farming lexicon are financed by Australia, New Zealand, and EU institutions



Source : OECD (2023) CRS data per project

How to qualify these projects? The word count approach

One way to summarise these projects: use textual analysis
We again use the « Long description » column, and separate each word to count them per project.
To avoid grammar issues, word are « stemmed » : we only keep the part of a word responsible for its lexical meaning
« Stop words » (ex: « and », « are » etc…) are deleted, with the help of the « SnowballC » R package.

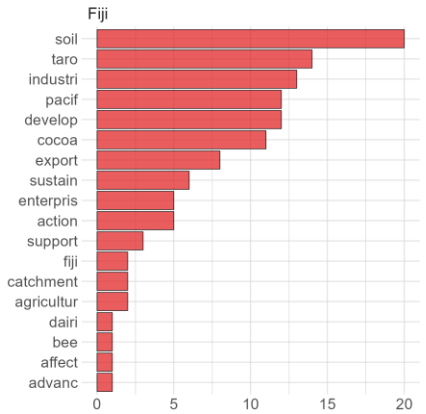
RecipientName	titre	word	stem
Fiji	developing cleaner export pathways for pacific agriculture c...	development	develop
Fiji	developing cleaner export pathways for pacific agriculture c...	introduction	introduct
Fiji	developing cleaner export pathways for pacific agriculture c...	varieties	varieti
Fiji	developing cleaner export pathways for pacific agriculture c...	resistant	resist
Fiji	developing cleaner export pathways for pacific agriculture c...	taro	taro
Fiji	developing cleaner export pathways for pacific agriculture c...	leaf	leaf
Fiji	developing cleaner export pathways for pacific agriculture c...	blight	blight
Fiji	developing cleaner export pathways for pacific agriculture c...	tlb	tlb
Fiji	developing cleaner export pathways for pacific agriculture c...	opportunity	opportun
Fiji	developing cleaner export pathways for pacific agriculture c...	improve	improv
Fiji	developing cleaner export pathways for pacific agriculture c...	rural	rural
Fiji	developing cleaner export pathways for pacific agriculture c...	livelihoods	livelihood
Fiji	developing cleaner export pathways for pacific agriculture c...	taro	taro
Fiji	developing cleaner export pathways for pacific agriculture c...	exports	export

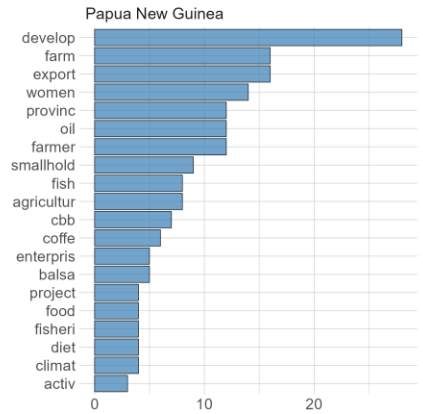
To avoid the overweight of projects with longer descriptions, we only keep the most frequent word for each project description.
We sum the frequency per recipient/donor of each top word, to have the most frequent words of these projects.

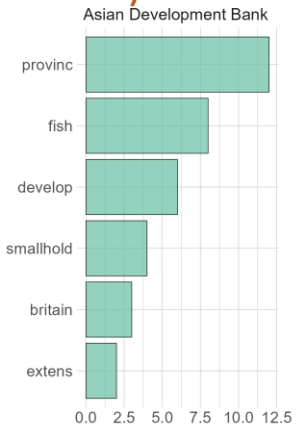
How to qualify these projects ? The word count approach

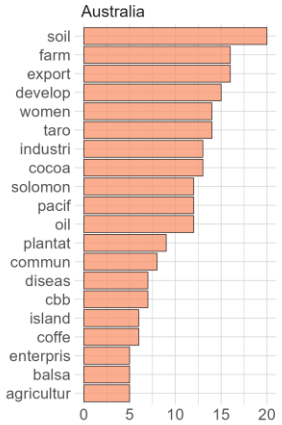
The most frequent words fall into 3 categories :

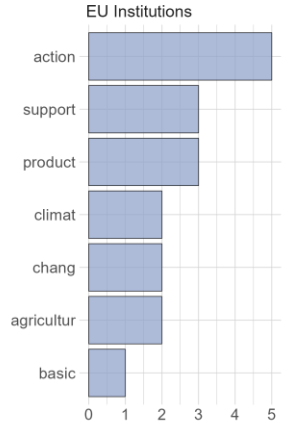
- Development vocabulary (develop, improv, support..)
- Market oriented vocabulary (enterprise, export, industri)
- Focus on specific products of the country (soil, coffee, taro, oil, cocoa…)

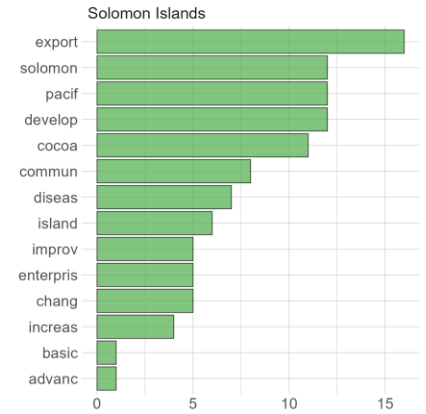


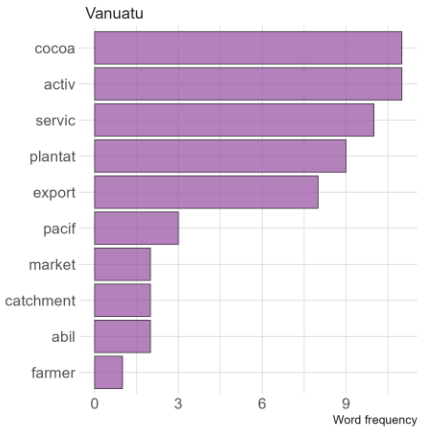


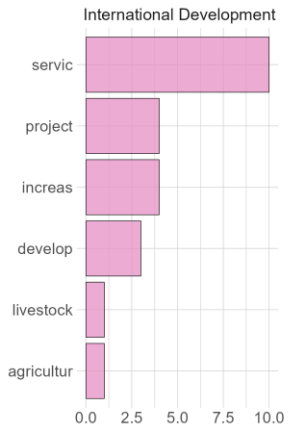


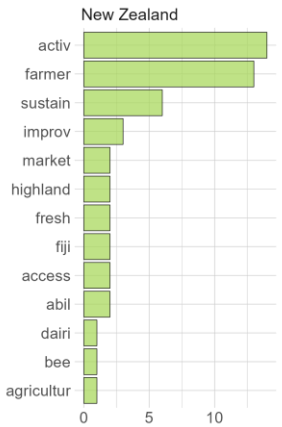








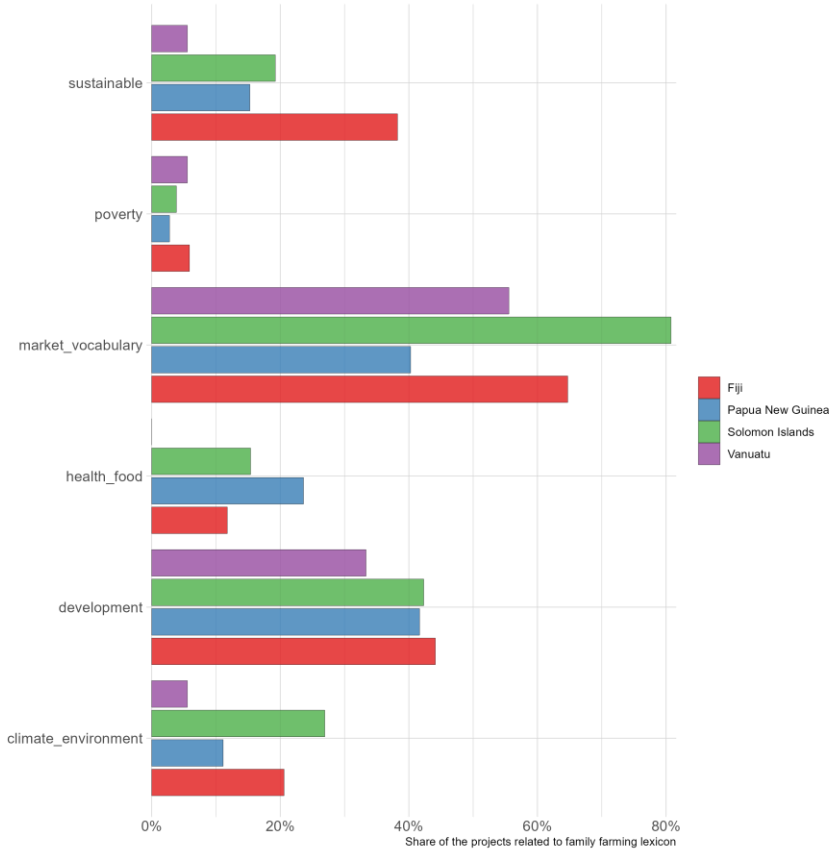




Word frequency

How to qualify these projects ? The word count approach

We measure the % of distincts projects which mention « market oriented » vocabulary (business,export,enterprise or market) and compare these with other words.
More than 40 % of the projects with « family farming lexicon » are still *market oriented.*



How to qualify these projects ? The bigram approach

Another way to qualify these projects with textual analysis: **the bigram approach.**
Bigram is the association between 2 words, this permits us to contextualize them.
Once again, words are stemmed to avoid grammar issues.
Bigram frequency per project is counted, and per donor/recipient.
After that, we keep only bigrams which are **shared by more than one** donor/recipient.

DonorName	titre	word1	word2	stem1	stem2
Australia	developing cleaner export pathways for pacific agriculture c...	main	exporter	main	export
Australia	developing cleaner export pathways for pacific agriculture c...	pacific	island	pacif	island
Australia	developing cleaner export pathways for pacific agriculture c...	island	countries	island	countri
Australia	developing cleaner export pathways for pacific agriculture c...	countries	pics	countri	pic
Australia	developing cleaner export pathways for pacific agriculture c...	amounts	samoa	amount	samoa
Australia	developing cleaner export pathways for pacific agriculture c...	taro	production	taro	product
Australia	developing cleaner export pathways for pacific agriculture c...	production	base	product	base
Australia	developing cleaner export pathways for pacific agriculture c...	varieties	resistant	varieti	resist
Australia	developing cleaner export pathways for pacific agriculture c...	taro	leaf	taro	leaf
Australia	developing cleaner export pathways for pacific agriculture c...	leaf	blight	leaf	blight

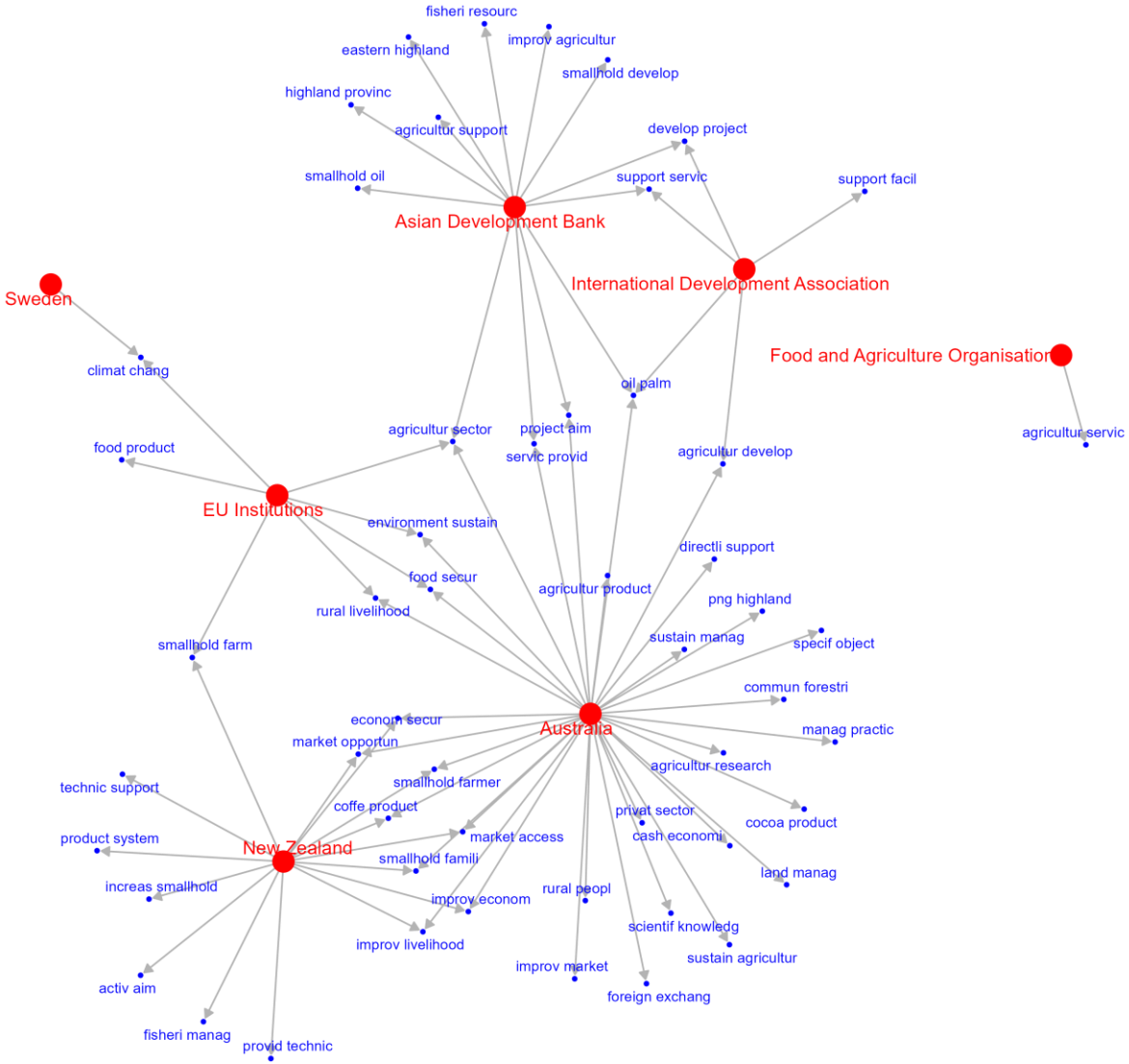
How qualify these projects ? The bigram approach

Market oriented vocabulary seems to be most shared by Australia and New Zealand.

EU projects seems to most use « sustainable » vocabulary.

International institutions & Asian Development Bank most use classic « development » vocabulary.

Projects are not weighted by their funding ! More projects don’t signify more funding !



Concerning China’s Pacific Aid....

According to the AidData dataset for China and the available descriptions, there is no mention of these terms in any one these "family farming lexicon" in the project's descriptions...

completion_year	title	recipient	amount_constant_usd2017
	Chinese Government provides grant for Phase 2 of Juncao Mushroom Technical Cooperation Project (Linked to Project ID#49135)	Fiji	
2016	Chinese Government provides FJD 10 million grant for Phase 1 of Rice Revitalization Project (Linked to Project ID#65824 and #65031)	Fiji	4 708 448 $
2015	Provincial Government of Hubei donates tractors and farming equipment to Fiji's Navuso Agriculture Vocational Institute	Fiji	
2015	Chinese Government donates rice machines, tractors, and bulldozers worth $5 million (Linked to Project ID#49129)	Fiji	4 915 761 $
2016	Chinese Government provides RMB 8.2 million grant for Phase 1 of Juncao Mushroom Technical Cooperation Project (Linked to Project ID#65032)	Fiji	1 282 602 $
2016	Chinese Government provides RMB 25 million grant for Vanua Levu Rice Industry Development Project (Linked to Project ID#49129 and #65824)	Fiji	4 036 157 $
	Chinese Government provides grant — via Trust Fund — for dredging works on Ba, Nawaka and Nadi Rivers (Linked to #67034)	Fiji	955 228 $
2010	Chinese Government donates 1,175 tons of fertilizer to Fiji	Fiji	
2011	Chinese Government grants multi-purpose cargo vessel worth USD 3.54 million to Fiji	Fiji	632 073 $
	Chinese Government provides grant — via Trust Fund — for dredging works on Ba River and Nadi River (Linked to Project ID#67034)	Fiji	18 088 188 $
	China Funds the Eastern Highlands Mushroom and Dry Rice Project in PNG	Papua New Guinea	
	China Eximbank signs MoU for $330 million loan for Papua New Guinea-	Papua New	

Discussion & conclusion

- Validation of Stronge & al.'s results on the agricultural sector and confirmation of the differences between donors
- Is there a specific position of the EU with more "sustainable vocabulary" ? A kick analysis on the agroecological transition → no mention
- No clear definition of FF → **No development aid really focused on family farming** and its specificities in the Pacific (i.e. market-oriented, specialization of production, and export production)—use of FF lexical registers but no action strategy specifically adapted to FF
- Argumentative registers that adapt to the paradigms of the moment (year of the FF 2014, decade FF 2019-2029) + FF sectoral so backed by vulnerability / covid etc.

→ *To what extent does the difficulty in defining FF limit the possibilities of promoting its preservation?*

Need to check (in the field) whether there are adjustments in development aid policies or only in aid discourse, to rebalance and complete this textual analysis.

Ontong Java atolls:
Connecting food security with ecological disturbance

David Lopez Cornelio

Faculty of Agriculture, Fisheries and Forestry

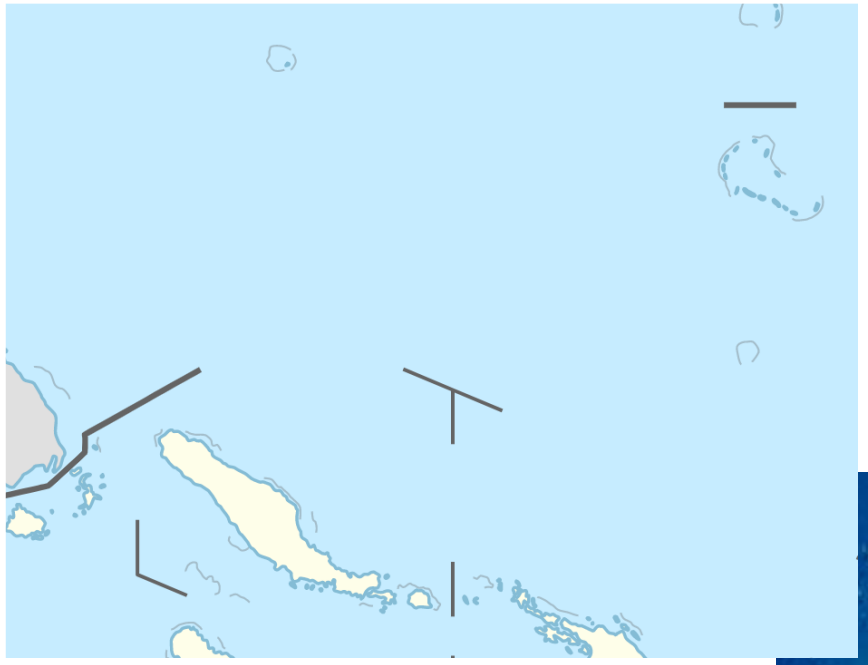
Solomon Islands National University June 2023

ABSTRACT

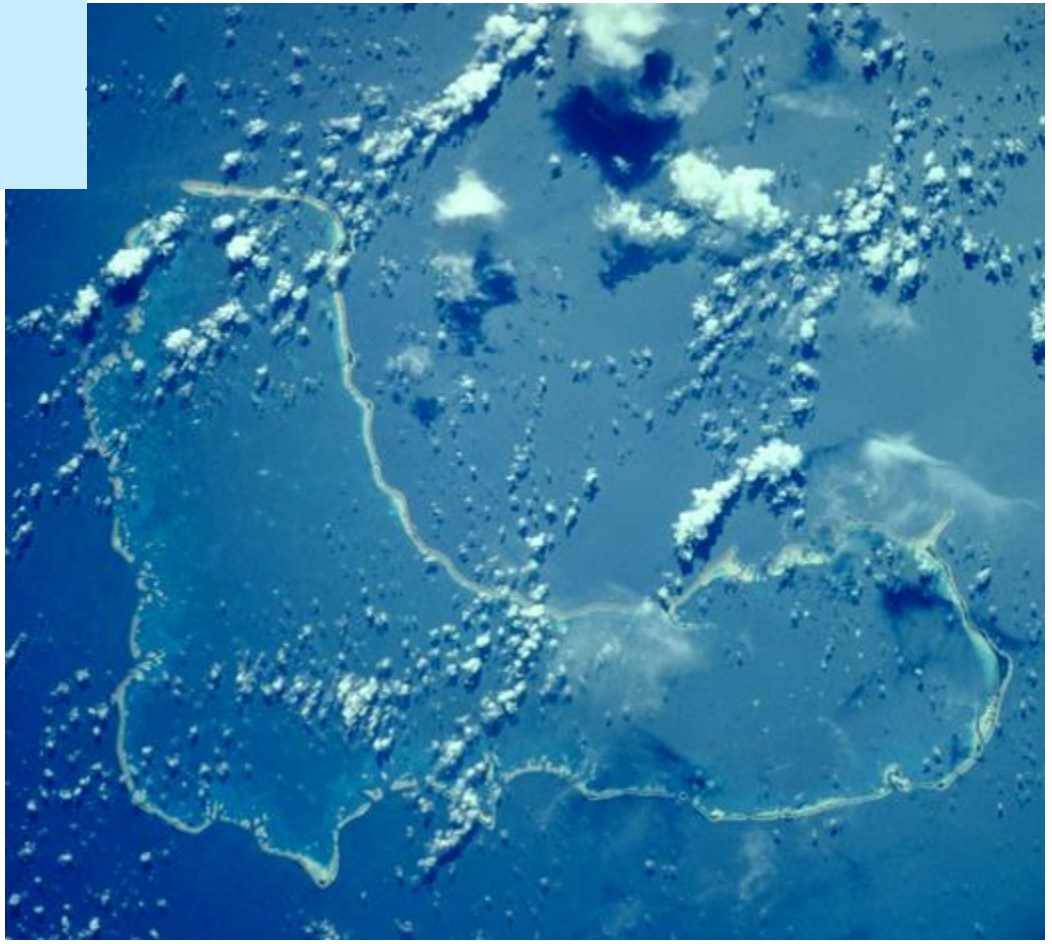
The Atoll of Ontong Java, the worlds' largest, were subject to large land cover changes driven by the demand of copra since a German trading station was established in 1895 (Anonymous, 1895). Locals move from coconut orchards to *bêche-de-mer* fishing grounds in cycles that depend on the prices for the first and on the declarations of 'closed seasons' for the second. The organization of the activities, and of land distribution, food and income redistribution follow ancestral systems that readapt to the demands of the local population, traders and government officials. Currently the resilience of the atolls to sea level rise and the decline of fresh water sources are discussed at international forums, alongside the sustainability of traditional cropping in the atolls and the ultimate necessity to relocate the population in the future to higher grounds. The paper focuses on the role of the seabirds as environmental indicators and soil improvers, and on the effects triggered by the replacement of their habitat (native trees) with coconut plantations. The atoll land use and environmental patterns are compared to the ones at two other distant islands in the Pacific with well recorded data in order to elucidate possible causative factors of cyclic degradation, and possible outcomes in the long term under situations of human intervention and no intervention. Current customary arrangements to conserve some of the islets seem to be successful, and recent experience with taro seedlings (germinated rhizomes) imported from Temotu province intercropped with *Leucaena leucocephala* trees highlights the potential of native solutions to local problems; however there are significant evidences that soil degradation in the atoll is related to land cover conversions and concomitant loss of habitat for wildlife.

Contents

1. INTRODUCTION
   Location, geography, society, demography, physical vulnerability
2. Ecosystems involved
3. LAND COVER CHANGES
   Taro swamps, Coconut trees, *Pisonia sp.* forests and canoe trees
4. Seabirds populations
5. Hypothesis, objectives
6. CASE 2: Rapa Nui
7. CASE 3: Chincha islands
8. Preliminary conclusions
9. Recommendations



One of the largest atolls on earth.



- A massive, submerged seafloor platform north of the Solomon Islands, bit larger than Alaska.
- 122 islands. Most of the island lies at 1.7 - 2.1 masl.
- Highest elevation 13 m
- Population 500 (1930) to 2085 (2006)

Housing from coconut and *pandanas* trees illuminated by solar power.
Most of the forest >> coconut plantation (651 ha)

- There are wealthy and poor joint families, and island and village property
(: https://www.jstor.org/stable/40327342)

Chief Willy born in 1937

One nurse

One teacher

- Sarah Abora has spent her entire life on Ontong Java. She remembers a time when there was nothing but bush where her village stands today.

Lord Howe extinct birds

Falling copra prices resulted in the Area Council declaring 1987 and 1988 both **open years** for bêche-de-mer. However, 1989, 1991 and 1993 were all closed years.

Earnings from copra more widely distributed than those from bêche-de-mer, but not equally shared between men and women.

doi:10.1111/j.1467-9493.2010.00385.x

DOI: 10.1111/j.1467-9493.2010.00385.x

Rising seas consumed 40 homes and a cemetery. Cyclones are becoming more frequent and stronger

Geografisk Tidsskrift-Danish Journal of Geography 109(1) Kjeld Rasmussen, Wilhelm May, Thomas Birk

Henua
Aiku island started to split

The home of Moses Paoa on Luaniua island, the largest with a permanent population of 2,000. Houses walls: coconut leaf mats, roof : Pandanus leaves

Patron Laliana's experimental taro garden failed due to soil salinization.

agricultural land - at 15 m from shoreline

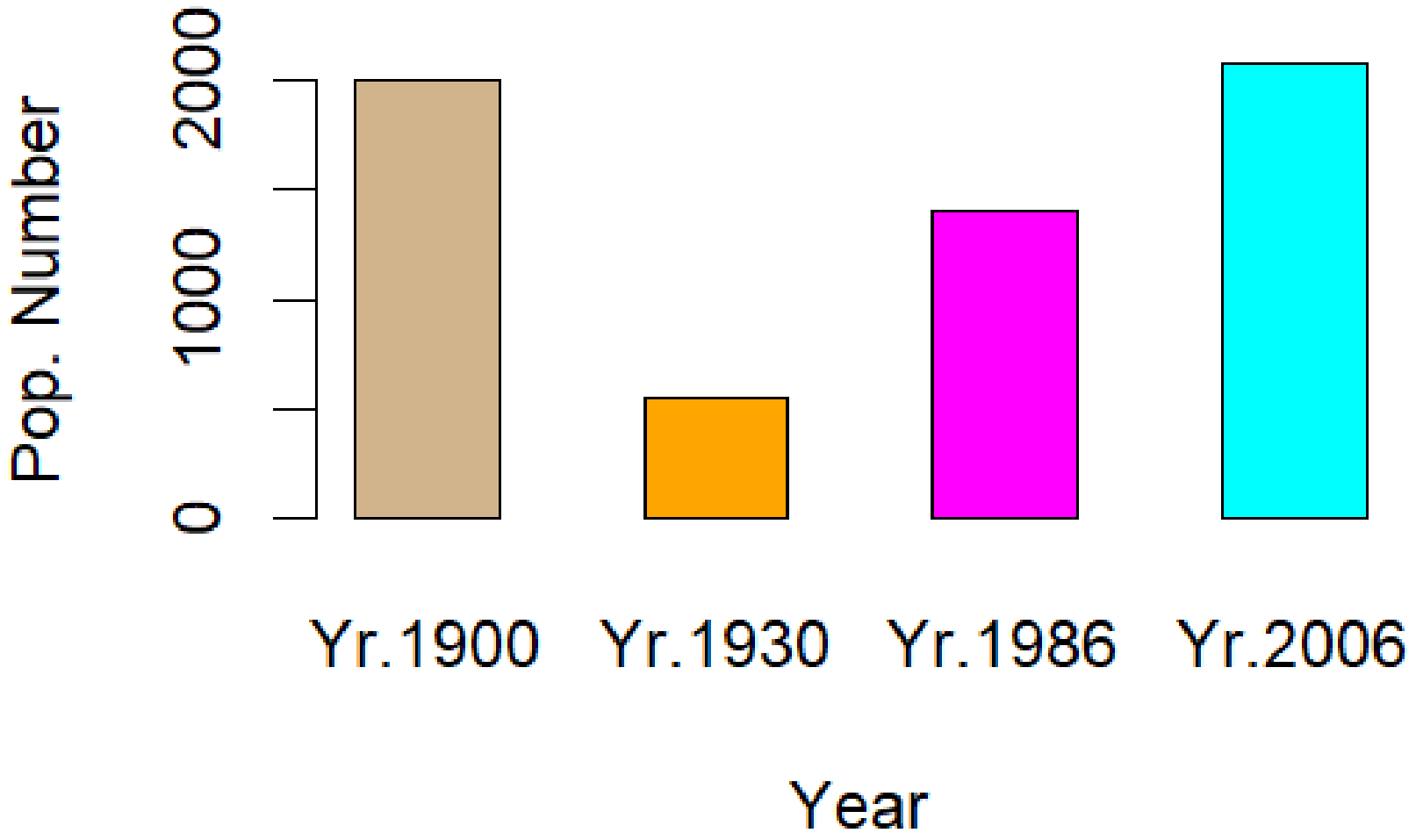
Swamp taro (*Cyrtosperma merkusii* - kakake) : before 3-5 tubers filled the bag, today 7-10.

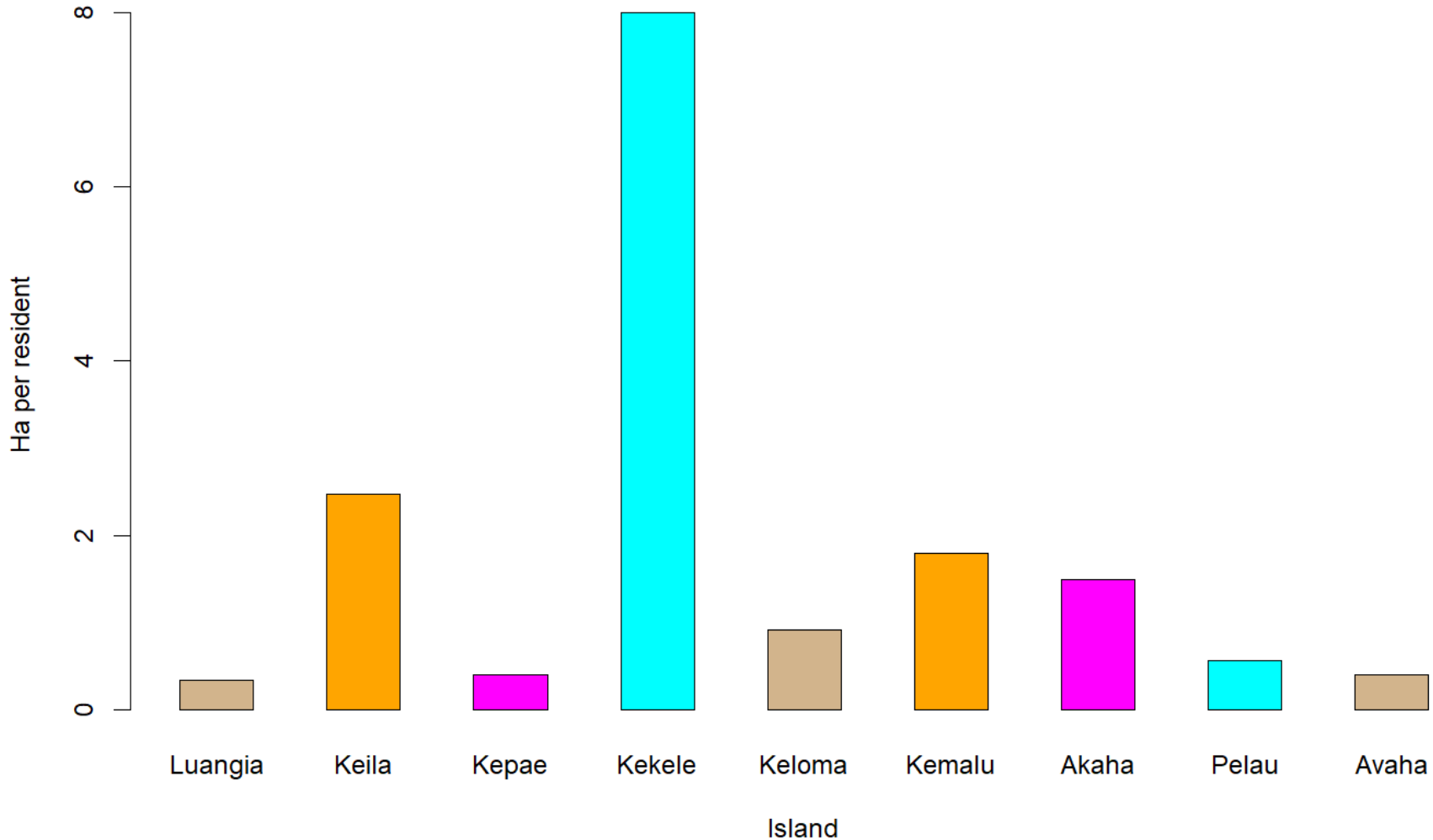
page 140 sinu global env. Awareness

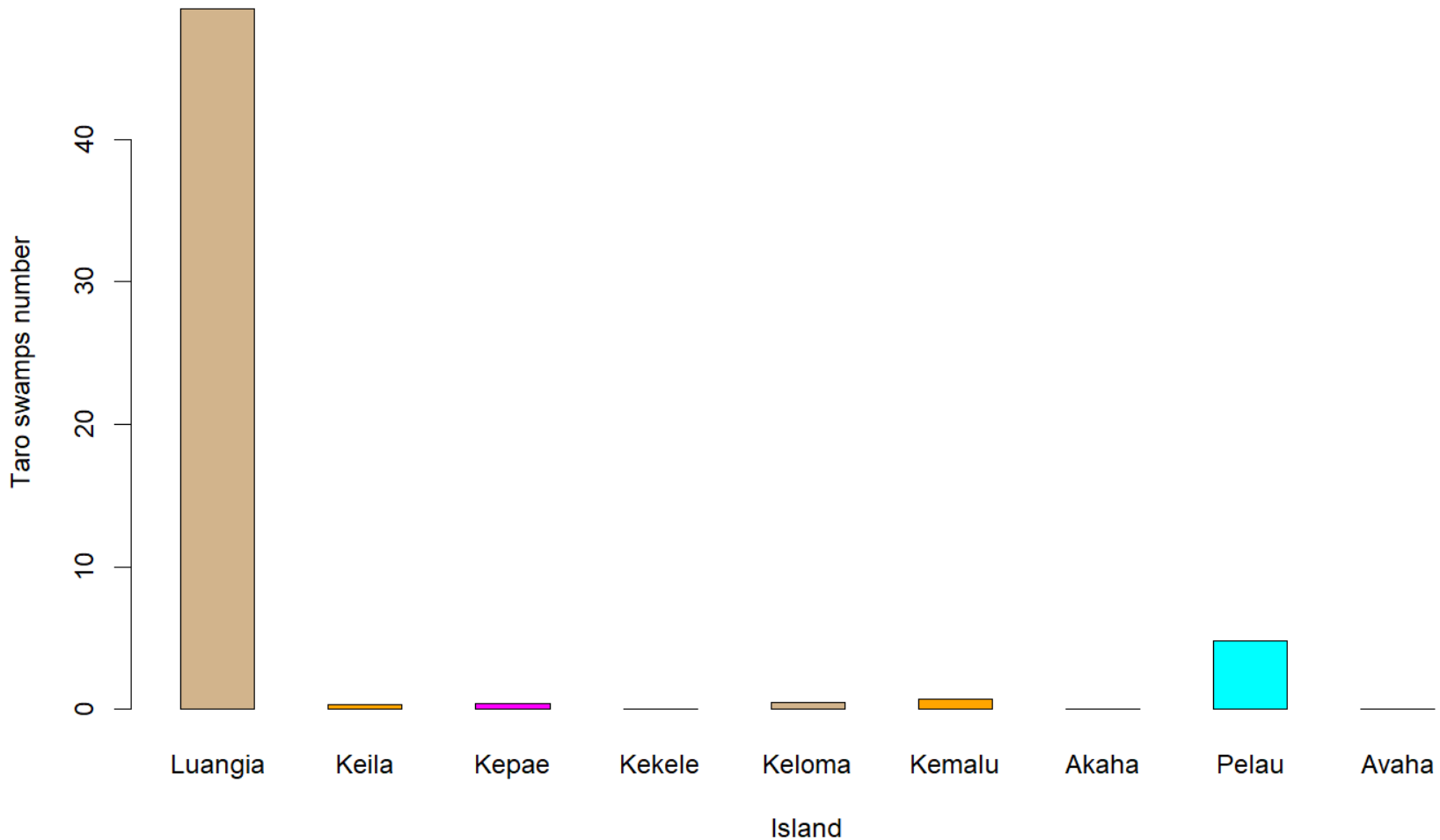
Taro (*Colocasia esculenta*) production is still controlled by women
doi:10.1111/j.1467-9493.2010.00385.x

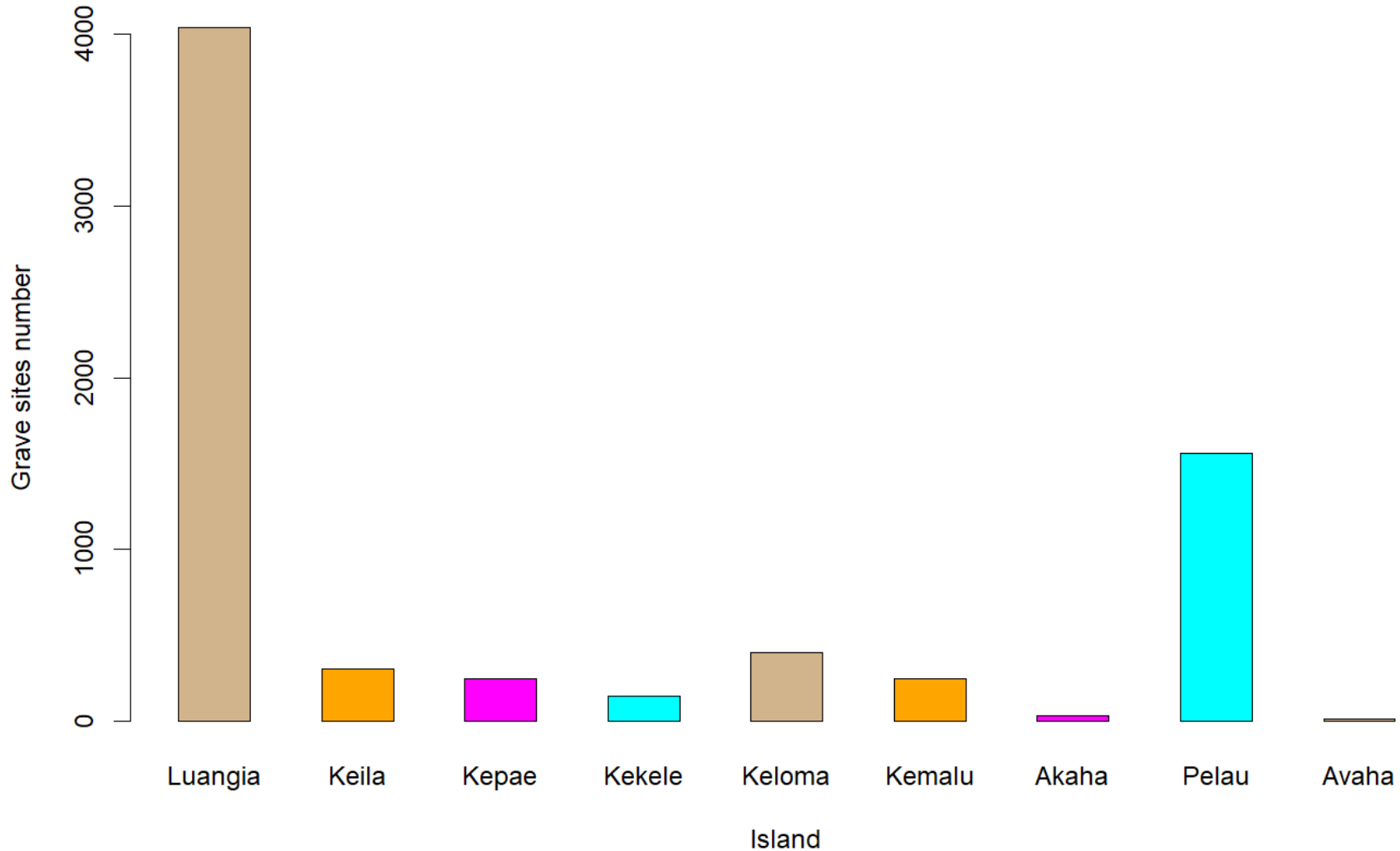
Swamp taro is harvested pre-maturely (takes 6-7 years to mature).

1986: Sweet potato largely abandoned due to declining yields, a shortage of suitable land as the expanding villages covered areas previously cultivated, and an increasing rat population (Bayliss-Smith et al. 2010).


Pop. Number
0
1000
2000
Yr.1900
Yr.1930
Yr.1986
Yr.2006
Year


Ha per resident
0
2
4
6
8
Luangia
Keila
Kepae
Kekele
Keloma
Kemalu
Akaha
Pelau
Avaha
Island

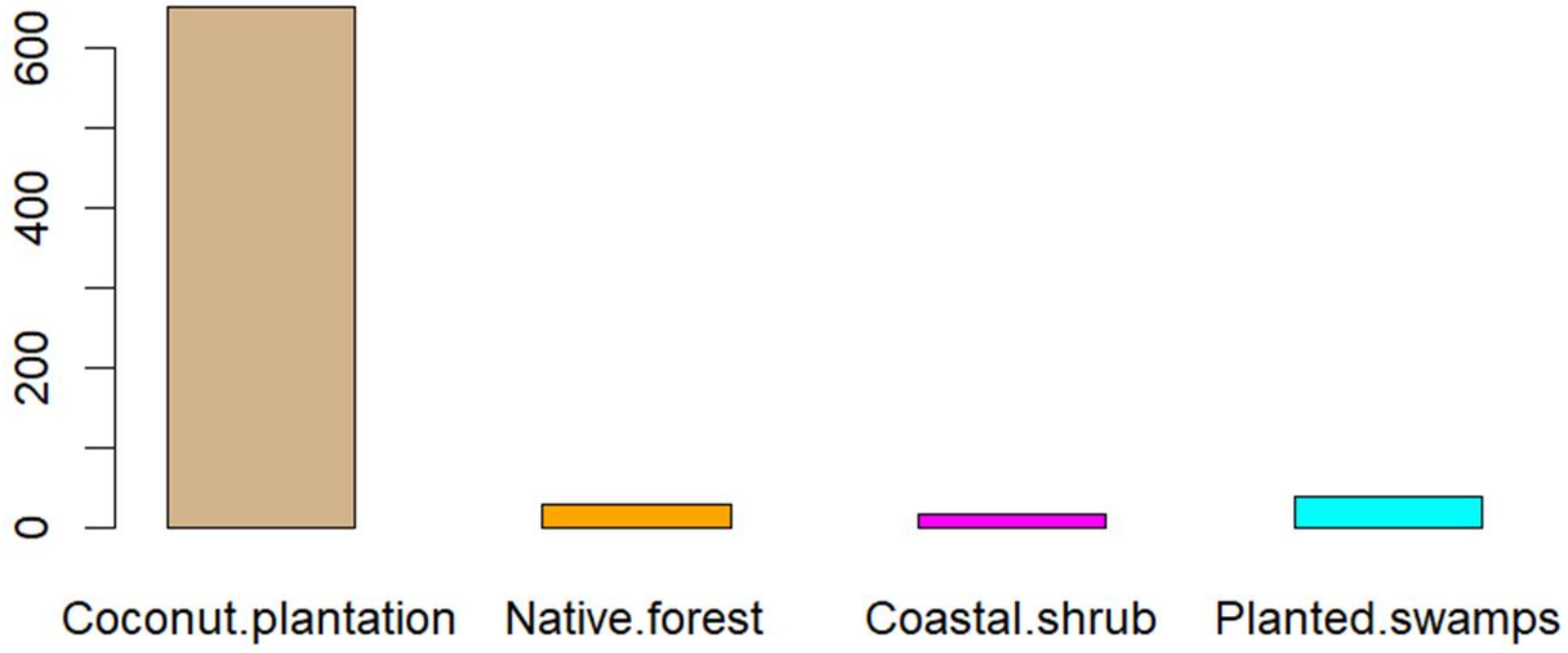

Taro swamps number
0
10
20
30
40
Luangia
Keila
Kepae
Kekele
Keloma
Kemalu
Akaha
Pelau
Avaha
Island


Grave sites number
0
1000
2000
3000
4000
Luangia
Keila
Kepae
Kekele
Keloma
Kemalu
Akaha
Pelau
Avaha
Island

ONTONG JAVA

Main land cover types (ha)

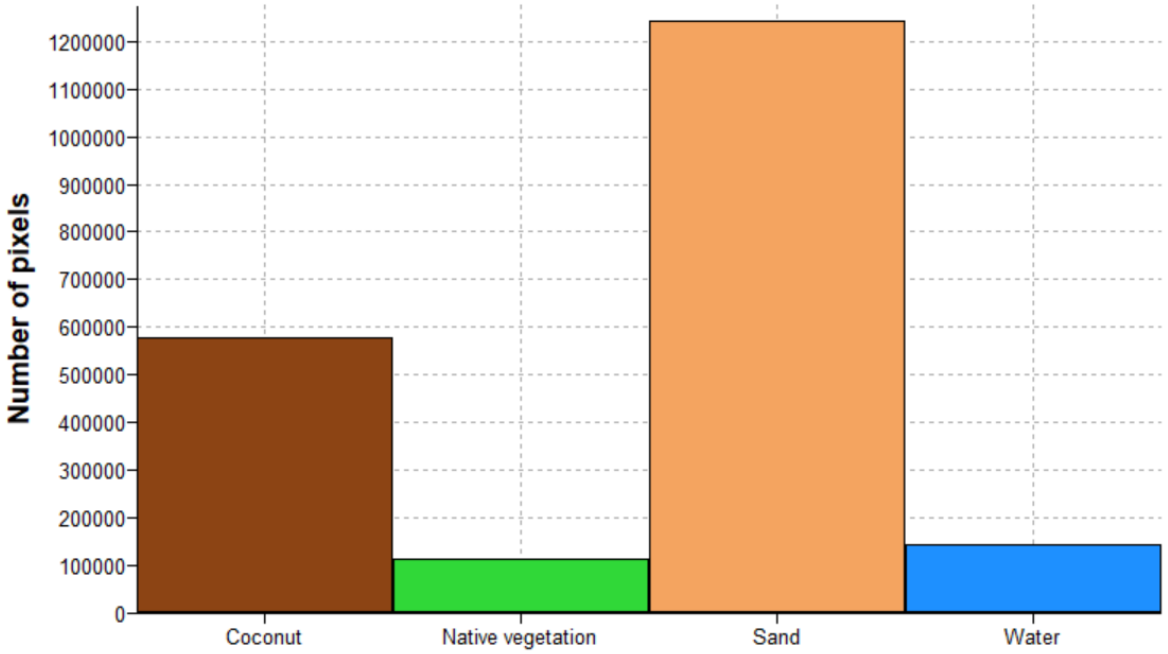
```
barplot(landcover5m, beside=TRUE, col=mycols)
title(xlab="ha", ylab="land cover type")
```

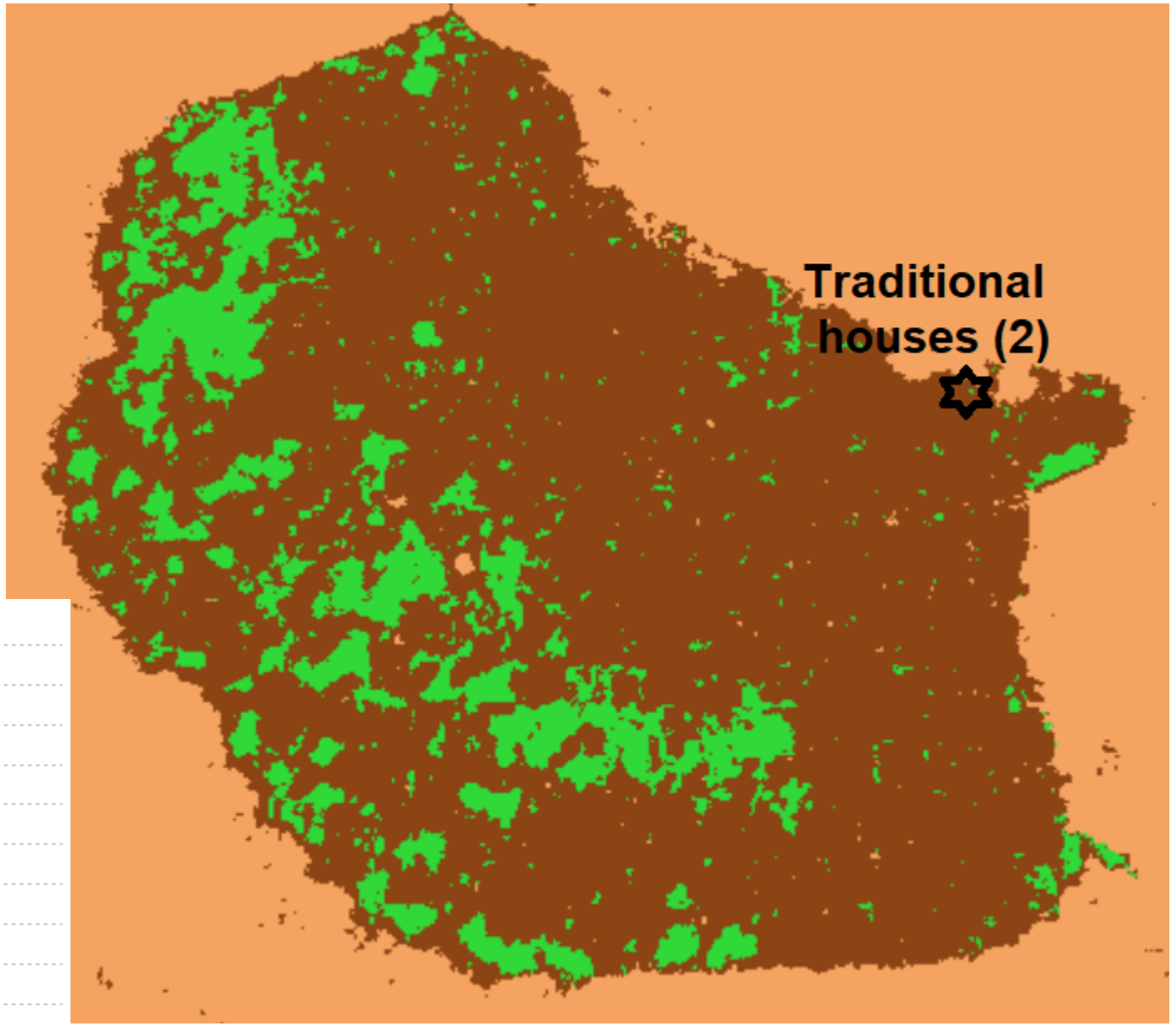


Luangia island

Inset showing Coconut trees planted in disorganized rows and widespread signs of bare land

Keloma island land cover





Pisonia grandis- *Nyctaginaceae*

anti-fungal, anti-oxidant, anti-microbial, anti-inflammatory, anti-diabetic, diuretic, analgesic and wound healing properties.

ISSN 0975-6299 Vol 3/Issue 1/Jan – Mar 2012

Sticky seeds ensures the dispersal between islands by attaching them to birds

Pisonia grandis forest on coraline substrate produce rich peat-like acidic humus overlaying phosphate rock
(Fosberg 1957)

ability to reproduce by vegetative suckering, rooting of both attached and detached branches, and by seed dispersal and germination

doi:10.3390/f6051557

up to 30 m tall and trunk up to 70 cm in diameter,


• Young leaves Edible
• Medicinal (anti-inflammatory)
• Fodder (pigs)
• Occasional firewood
• Light construction, canoes
• Roosting and nesting site
• Green manure

White tern (*Gygis alba*) on a pisonia tree. Image credit: B. Navez/Wikimedia

On some islands, when the *pisonia* trees bear heavily, hundreds of birds can be killed in a season, only to end up becoming fertilizer for the trees themselves.

noddies, red-footed boobies, and frigatebirds.

Pisonia grandis is highly adapted to seabird colonies in association with seabirds and mycorrhizal fungi.

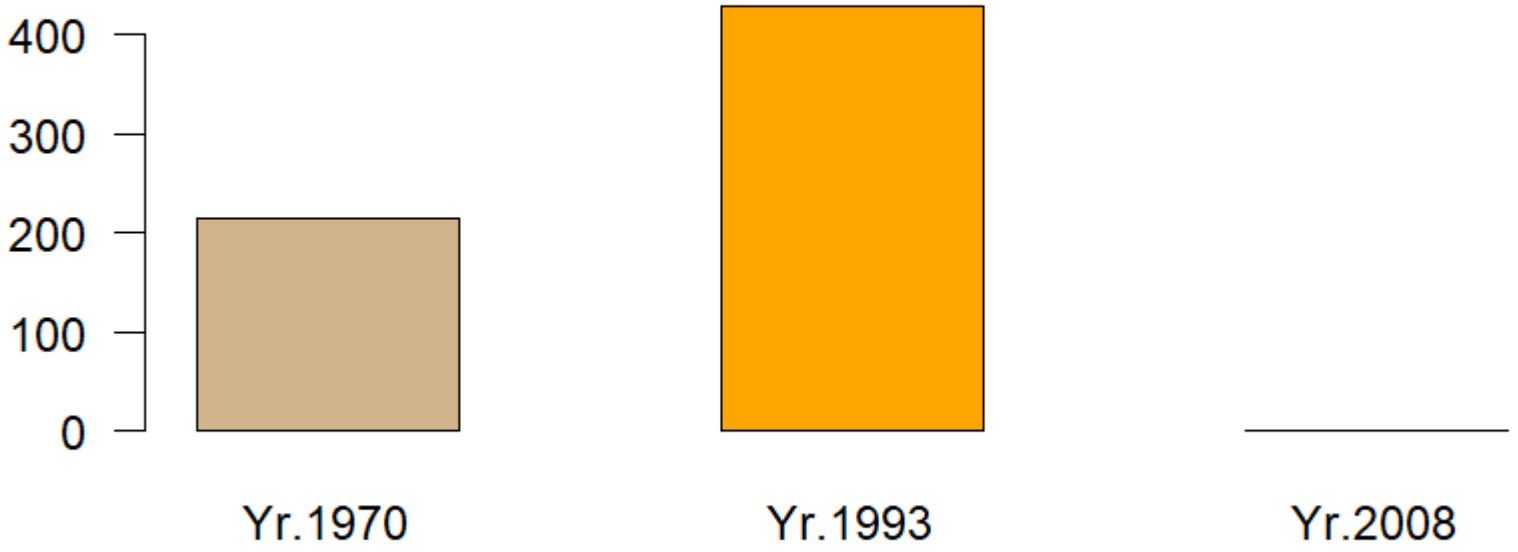
https://seedsofborneo.com/wp-content/uploads/2018/12/Walker-1991-Pisonia-Islands-of-the-Great-Barrier-Reef.pdf

0.7kg /m2 / year guano deposition under *Pisonia* trees (Allaway, Ashford, 1984)

Plant production was significantly **lower** on Non-bird islands than on Bird islands

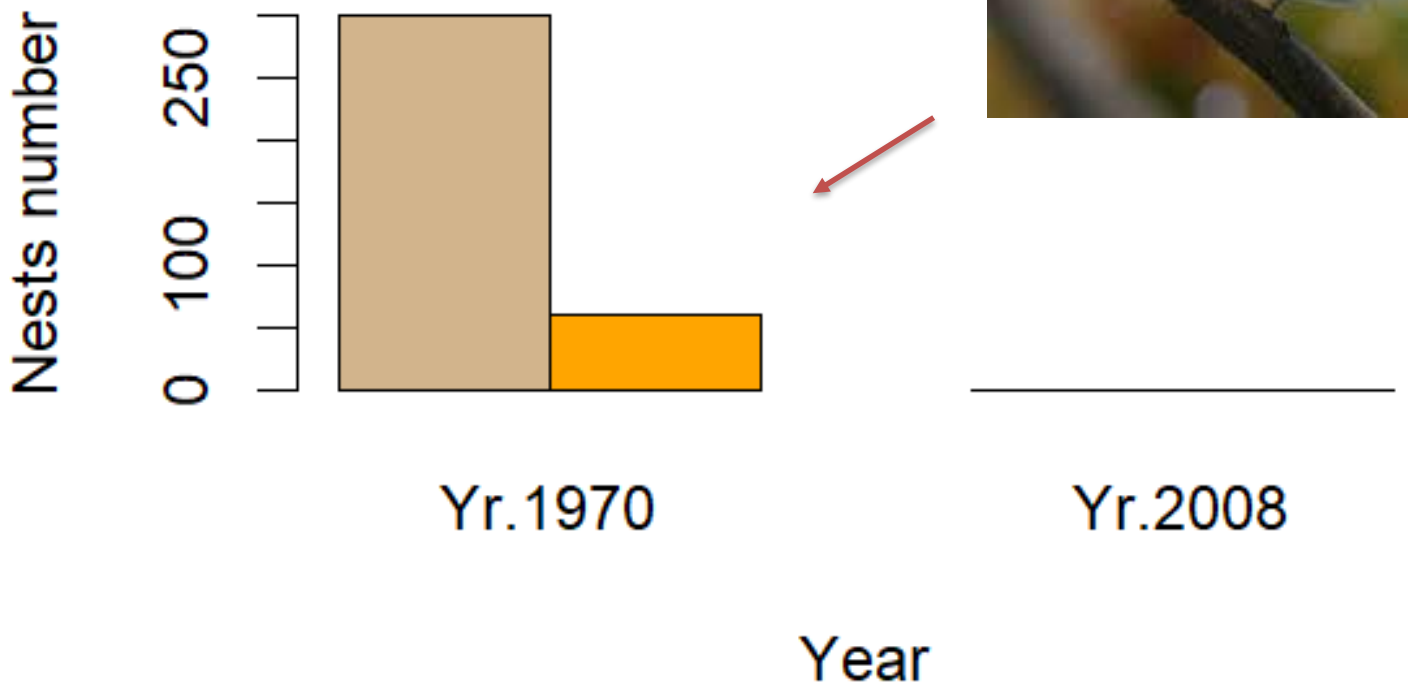
(https://www.sciencedirect.com/science/article/abs/pii/S01401963040013)4X

Black Noddy nests – Henguailoko I. (27ha)



Black and White Noddy nests – Keuamau I.) (1.44ha)

barplot(Birds2m, beside=TRUE, col=mycols)
title(xlab="Year", ylab="Nests number")



HYPOTHESIS :

- The conversion of *Pisonia sp.* forests, a key seabirds habitat, into extensive Coconut plantations triggered soil erosion and degradation in the atoll.
- The role of the natural vegetation and of the seabird populations are under scored in assistance and food security and climate change adaptation programs.
- Lessons from the past have relevance today.

OBJECTIVES:

- To quantify changes of seabirds densities in the islands in relation to changes in the forest cover.
- To re-think the programs of assistance, development and conservation driven by the threats of sea level rise.

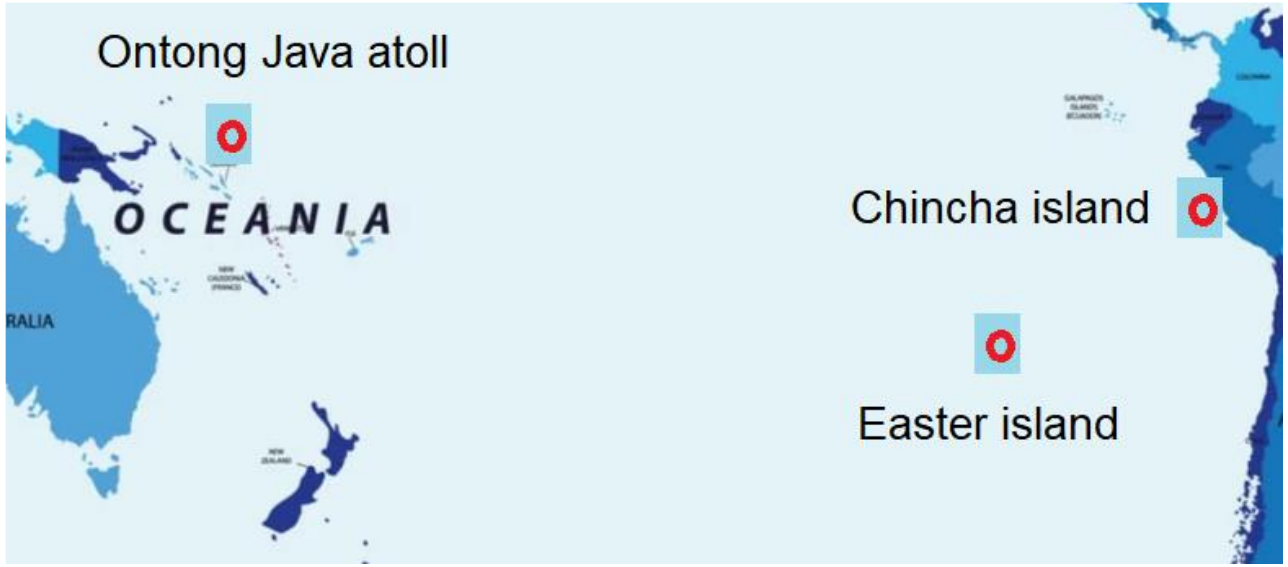
Food security and ecological disturbance

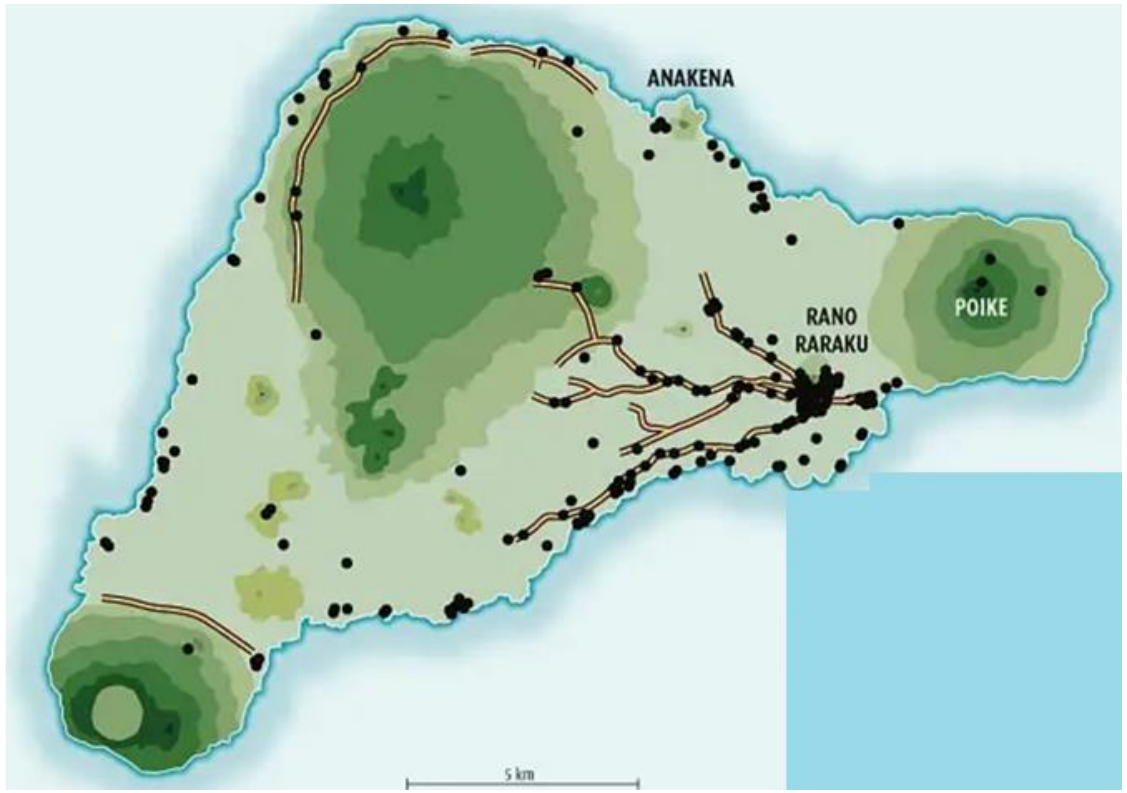
3 Cases in the Pacific at different scales:

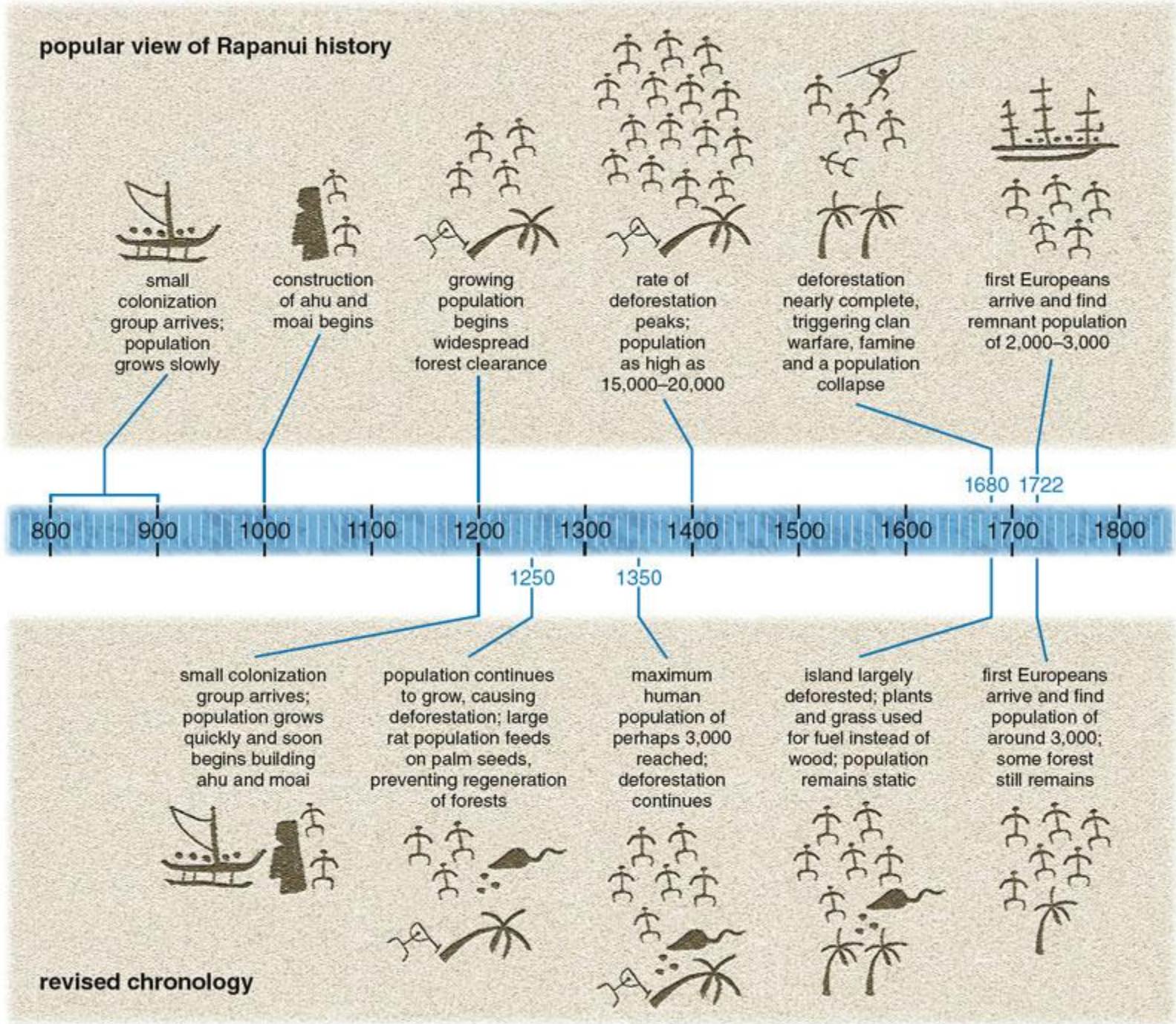
1) Rapa Nui Island: deforestation and social tension
2) Peru Guano islands and overfishing
3) Ontong Java recorded numbers: Taro, Copra and seabirds

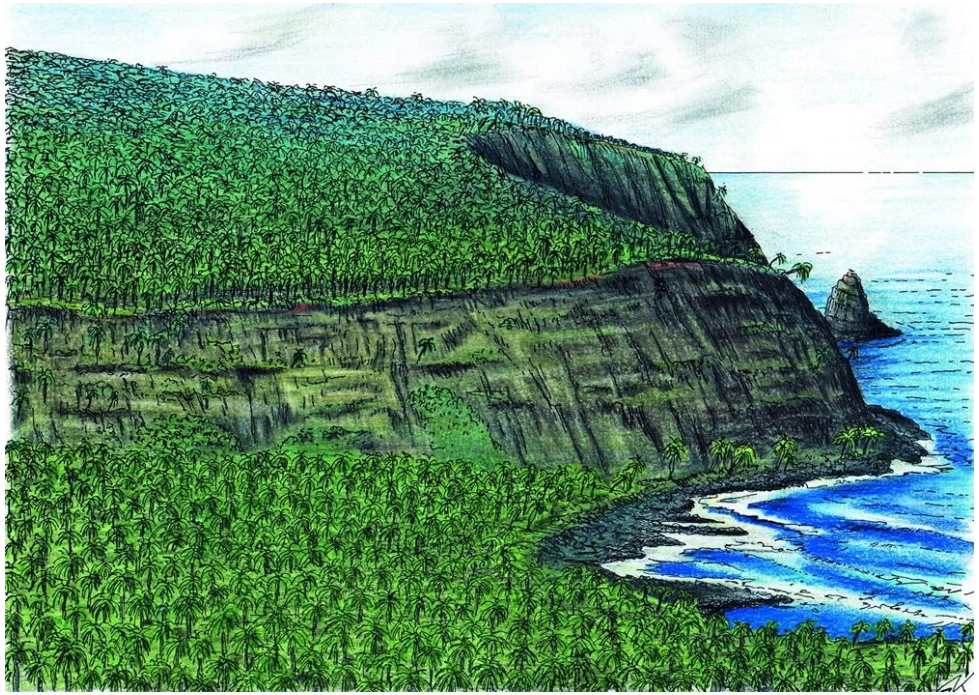
Parameter	Ontong Java	Rapa Nui	Chincha
Location	5° 15' 60.00"S 159° 20' 59.99"E	27° 6' 51.9" S 109° 25' 30.9''W	13° 38' 6"S 76° 23' 51"W
Area (km^2)	1,500	163.6	0.92 km2 (92ha)
Elevation (masl)	13	507	34
Settlement period	2000 years ago	AD 700 and 800	1500 years
Population	2085 (2006)	10,000 - 2000 (1722)	400 - 500
Main crops	Taro, coconut	S.potato, taro, yam, gourd, sugarcane, banana	none
Seabirds species number	12 seabirds, 12 shorebirds 8 land birds	51, seabirds now only on islets	16
Livestock	Pigs	Chicken	none
Coastal erosion	YES	YES	YES
Climate change	YES	VERY PROBABLE	YES
Yields decline	YES	YES	(_)
Firewood crisis	YES	YES	(_)
Land cover conversion	YES	YES	(_)
Commun. impact/response	High living cost, Migration	Famine, war. Today a National Park	Attracts seasonal workers

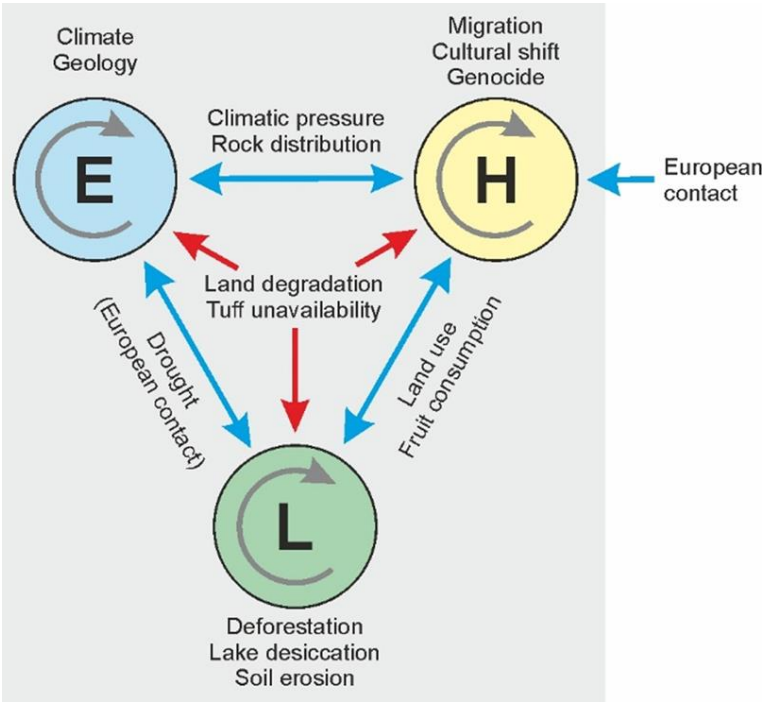
https://www.navegar-es-preciso.com/news/islas-chincha-insulas-guaneras-peruanas-por-excelencia/


Ontong Java atoll
OCEANIA
RALIA
Chincha island
Easter island


ANAKENA
RANO
RARAKU
POIKE
5 km

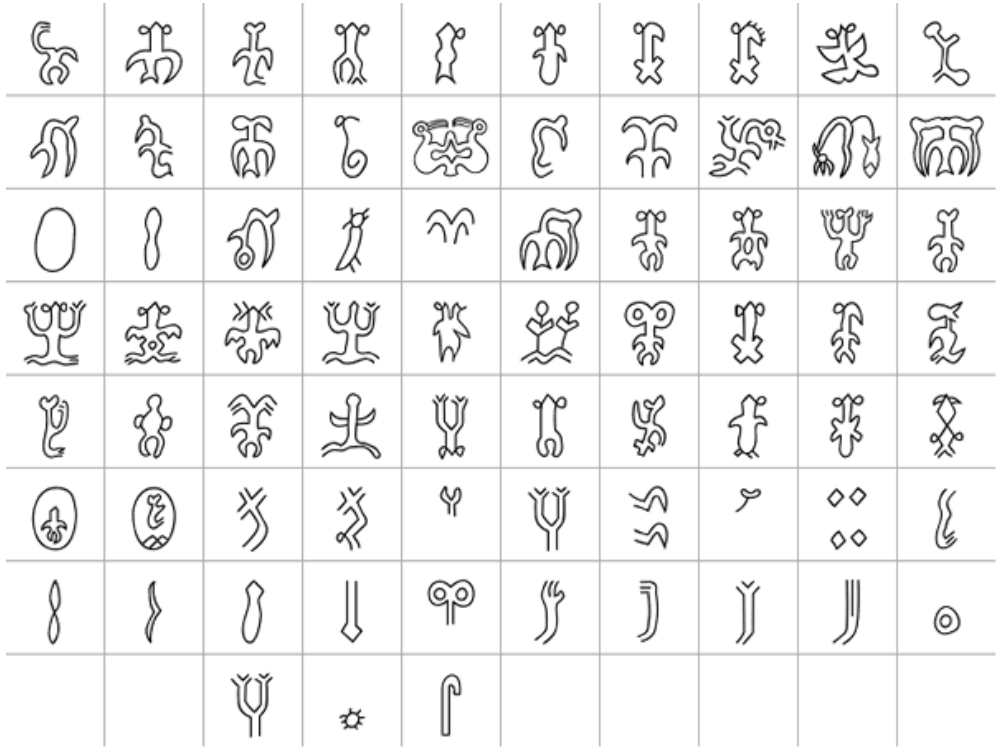

popular view of Rapanui history
small colonization group arrives; population grows slowly
construction of ahu and moai begins
growing population begins widespread forest clearance
rate of deforestation peaks; population as high as 15,000–20,000
deforestation nearly complete, triggering clan warfare, famine and a population collapse
first Europeans arrive and find remnant population of 2,000–3,000
1680
1722
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1250
1350
small colonization group arrives; population grows quickly and soon begins building ahu and moai
population continues to grow, causing deforestation; large rat population feeds on palm seeds, preventing regeneration of forests
maximum human population of perhaps 3,000 reached; deforestation continues
island largely deforested; plants and grass used for fuel instead of wood; population remains static
first Europeans arrive and find population of around 3,000; some forest still remains
revised chronology





Chilean wine palm *(Jubea chilensis)*

https://www.mywaste.ie/news/the-ecocide-of-easter-island/



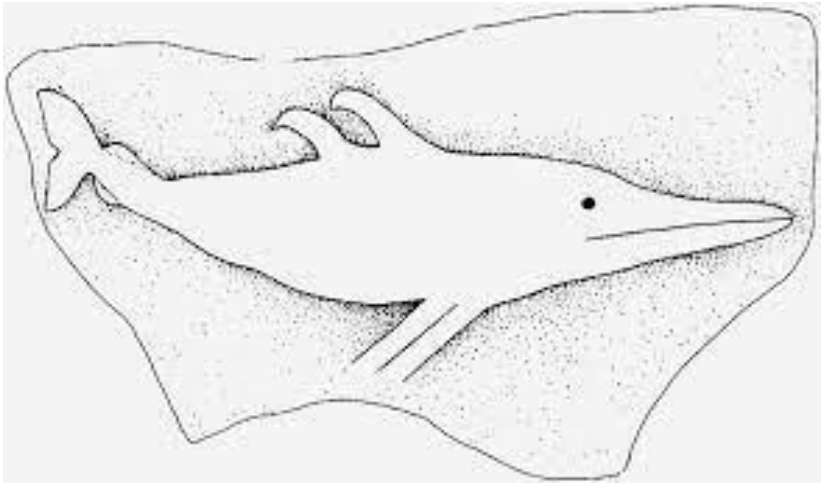
>> rat populations can double every six weeks

Collapse of the indigenous Rapa Nui population on Easter Island may have been triggered by changes in the Earth's climate BEFORE the arrival or European settlers in 1722, study shows.

- “**We also discovered that agricultural crops consumed must have been planted in soils that were deliberately managed and manipulated to provide better yields**,” Catrine Jarman, University of Bristol
- Rock mulch gardens and planting enclosures
- banana, taro, and sweet potato

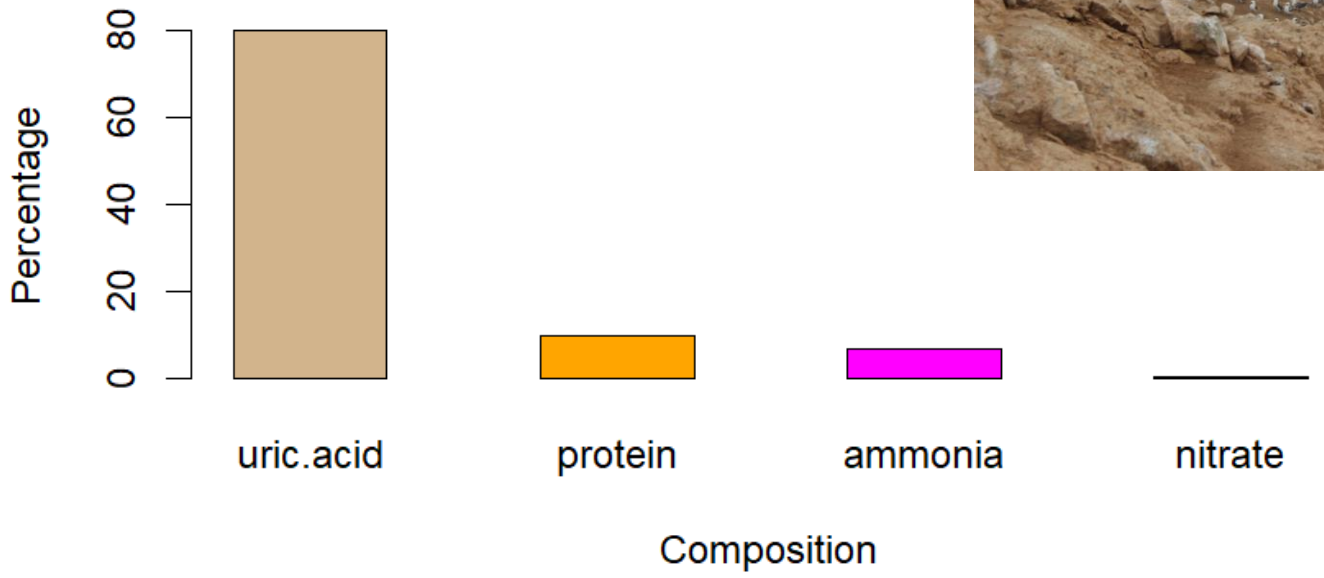
  https://modernfarmer.com/2019/12/are-the-famed-easter-island-statues-all-about-farming/
- They added fertilizers

- With all of the palms gone, the islanders could no longer make these canoes, so they could no longer eat dolphins. By the year 1500, dolphin meat had disappeared from the islanders' diet.
- With the palms of Easter Island gone, sea birds stopped visiting the island. Now, the only real things left to eat were rats and the small amount of crops that could be grown in the poor soil.



Much of N, K is leached with rainfall (Heatwole et al., 1981) > P tends to be retained in the island (cf. Fosberg, 1961)

https://www.int-res.com/articles/meps/19/m019p297.pdf



Seabirds guano as fertilizer

- 15.7 kg per year per bird
- 180 kg/m^2. 2g / m^2 / day Birds require 10 tons of fish to produce 1 ton of Guano

Guano management–Inca era.

- Exploited over 1,500 years, maybe as long as 5,000 years.
- Islands portions assigned to each province, use of landmarks
- **Quantities were rationed**
- Penal code established to outlaw disturbance
- **Access forbidden during breeding season**
- Integrated system to support its transportation across the empire

Map of the Inca Empire (grey), distribution of guano birds (black delineated line), principal guano deposits (black dots) along the western coast of South America.

II. Chincha Islands 1866.

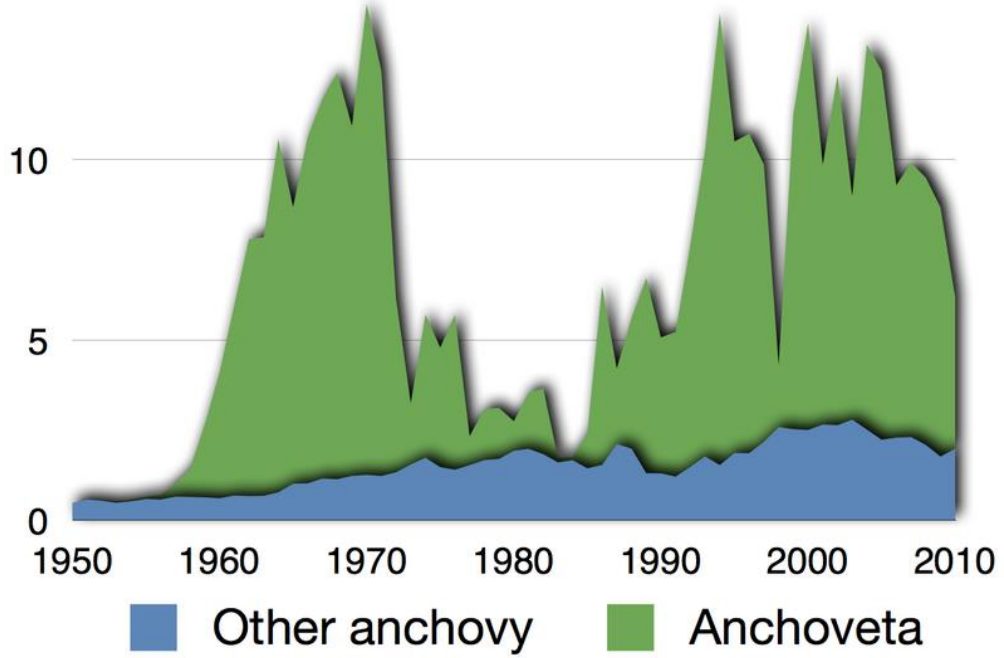
Guano management – Republican era

- 1851 and 1872: $167 per kilogram. ten million tons of guano exported, equivalent to $13.6 billion USD (almost 60% of the government's revenue)

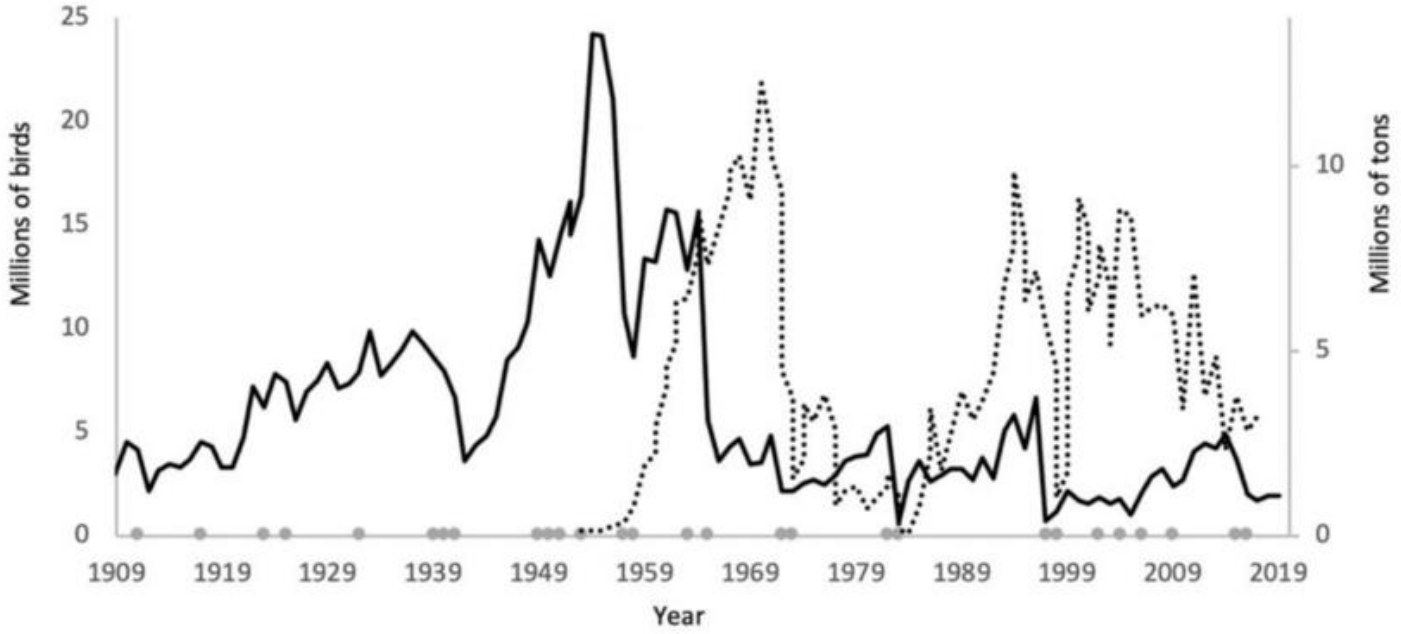
https://www.perunorth.com/news/2017/8/21/guano-white-gold
https://www.evolutiontreksperu.com/peru/tourist-attraction/las-ballestas/
https://www.nationalgeographic.com/science/article/140926-pacific-island-guano-national-monument-history

Early 20th century: guano supply of guano almost depleted

- With protective measures from 1909: Population of seabirds rose from few hundred thousand to over 30 million in 1957.
- Gradually replaced by synthetic fertilizers. Today harvests every 7-8 years, 21,000 tons per year (to cater 23,000 small farms). 20% is exported https://www.audubon.org/news/holy-crap-trip-worlds-largest-guano-producing-islands



Engraulis ringens



The 3 cases show that:

- Land and marine biological resources (BR) are interdependent.
- Biological resources are not unlimited.
- Ancient effective management techniques are today in decline.
- If rates of harvests exceed the regeneration capacity : resource depletion.
- Depletion of the resource affects other species and geochemical cycles → land degradation → conflict/migration/hunger.

Recommendations

- Discuss at the males house, the church and the school the problem of agriculture in the islands, the lack of firewood and the increasing dependence on processed foods.
- Discuss the potential of the communities to drive and improve their future by themselves.
- Start a community plan of reforestation with native trees and shrubs.
- Increase the number of small islands and areas under strict protection.
- Discuss the progress and the problems encountered with the time at the church, the males house, and the school. Propose simple, accessible solutions.

FALAH
Family farming, lifestyle & health

FALAH – 1st Scientific Conference

21st June 2023

Holiday Inn Hotel, Port Vila

Pacific Climate, Local Knowledge And Adaptation Strategies

How to combine scientific climate knowledge, and local knowledge to think about resilience in the Pacific ?

Catherine Sabinot, Moirah Matou, Sunny Seuseu, Albert Willy, Gilbert David,
Pierre Metsan, Alexandre Peltier, Jean-Brice Herrenschmidt, Fleur Vallet, Christophe Menkes

1 – From climate change issues in the Pacific to VAN-KIRAP and CLIPSSA projects

On the front line of climate change, the South Pacific island States and territories are at the forefront of the fight against climate change because of their high exposure and vulnerability to the region's diverse weather patterns.

As part of their climate change adaptation plans, Pacific island territories express their need

* (1) to acquire general knowledge about the future climate, particularly for managing their water and food resources

* (2) to build their adaptation strategies into consider local knowledge and resources.

→ **2 APPLIED RESEARCH PROJECTS > CLIPSSA and VAN-KIRAP**

1 QUESTION > How can we bring together institutional actors, scientists and technical agents to co-construct a research-action that wishes to include local populations, technical agents and elected officials?

1 – From climate change issues in the Pacific to VAN-KIRAP and CLIPSSA projects

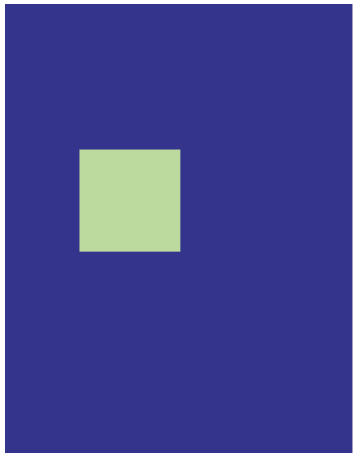
WHAT DO WE KNOW ABOUT CLIMATE CHANGE TODAY?

About expected effects of climate change ?

Rising temperatures, more frequent and intense droughts, rising sea levels and coastal erosion, salinization of freshwater lenses, ocean acidification and marine and atmospheric heat waves …..

Vanuatu Islands

Global climate models over Vanuatu (100 km)



The available climate information is too broad scale and uncertain in the South Pacific Convergence Zone which future dictates the climate in the region.

There are too few high-resolution projections, making it impossible to quantify trends in cyclones and rainfall in the region, and future droughts and large-scale heat waves….

1 – From climate change issues in the Pacific to VAN-KIRAP and CLIPSSA projects

WHAT DO WE KNOW ABOUT THE STRENGTHS AND VULNERABILITIES OF OUR ISLANDS' POPULATIONS?

Pacific islanders

Have a lifestyle dependent on the environment (agriculture, fishing, hunting)

Are use to cope with environmental hazards

Develop local, adjusted ecological knowledge and know-how

- To adapt to climate variability
- To ensure sustainability of communities and society-environment relationships

New knowledge

New places and new times for learning

➔ **Transformation of knowledge and expertise in line with social, cultural, economic and political transformations.**

➔ **Evolution of the means of access to knowledge as well as the actors involved in the transmission of knowledge**

2 – VAN-KIRAP

Vanuatu Klaemet blong redy, adapt mo protekt project

PROE
Programme régional océanien de l'environnement

Van-KIRAP Principal Objective

To support climate ***resilient development*** in Vanuatu through the development, communication and application of Climate Information Services

*The Project will build the technical capacity in Vanuatu to harness and manage climate data; develop and deliver practical Climate Information Services (**CIS**) tools and resources; support enhanced coordination and dissemination of tailored information; enhance CIS information and technology infrastructure; and support the application of relevant CIS through real-time development processes.*

PROE
Programme régional océanien de l'environnement

Van-KIRAP Project

APPROVED PROJECT SNAPSHOT:

- GCF Grant Amount: $USD 18,106,905 million
- Co-financing: USD $2,389,780 million
- VMGD to directly manage: $USD 5.9 million

- Implementing/Accredited Entity (AE): SPREP
- Executing Entity (EEs): Ministry of Climate Change (VMGD) & SPREP (joint)
- Approved Delivery Partners – CSIRO, BoM, APCC
- Additional Delivery Partners as needed

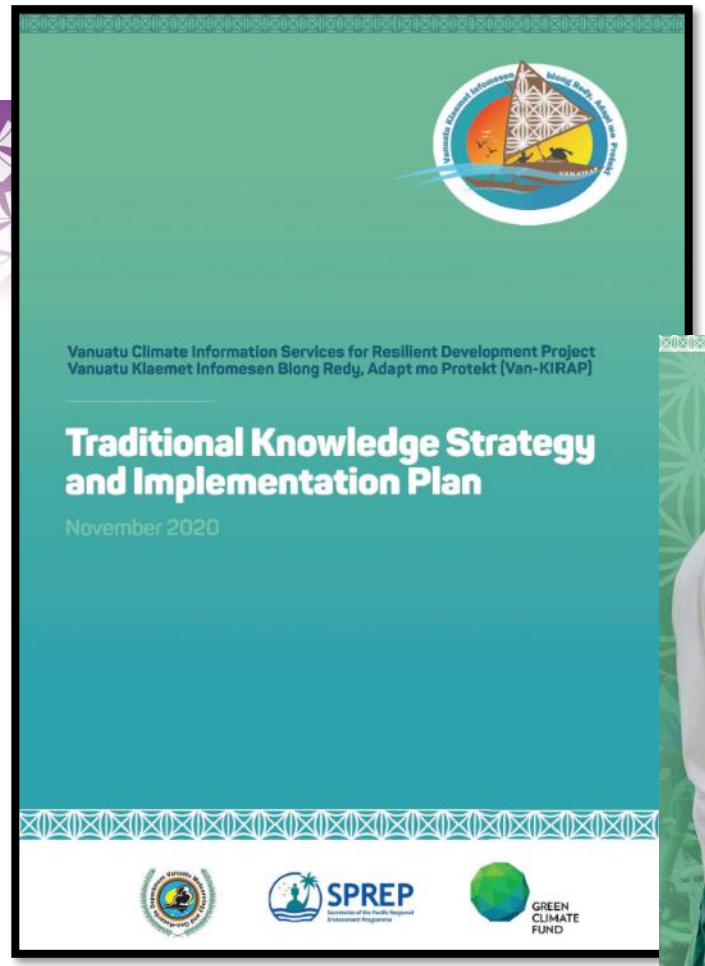
- Duration: 4 years and 3 months (current end date – December 2023)
- Key Sectors: Infrastructure, Agriculture, Fisheries; Tourism, Water. Communities

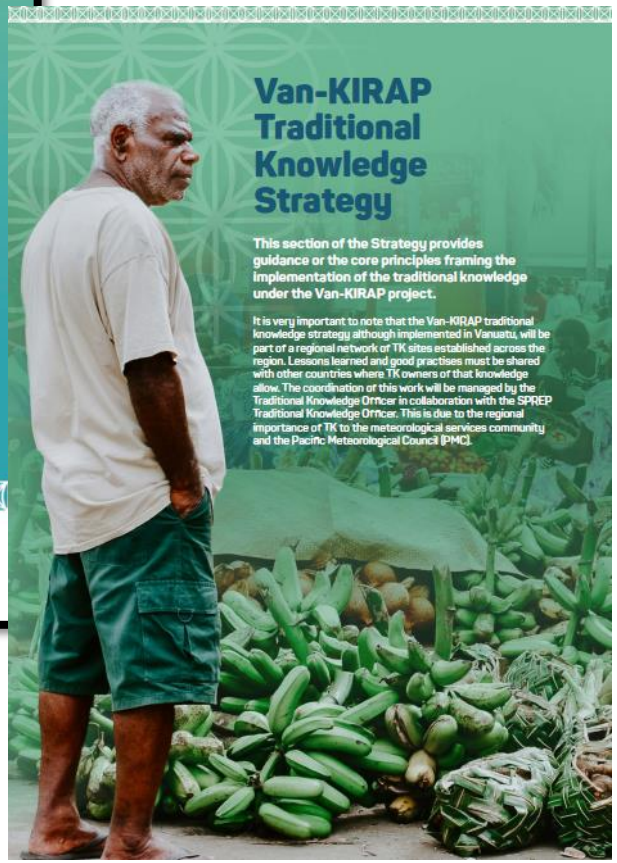
https://www.nab.vu/project/vanuatu-klaemet-blong-redy-adapt-mo-protekt-van-kirap-project

2 – VAN-KIRAP

PROE
Programme régional océanien de l'environnement

TK for Weather and Climate Development over time





https://www.nab.vu/document/vankirap-traditional-knowledge-strategy-and-implementation-plan

3 – CLIPSSA

Institut de Recherche pour le Développement FRANCE
French National Research Institute for Sustainable Development

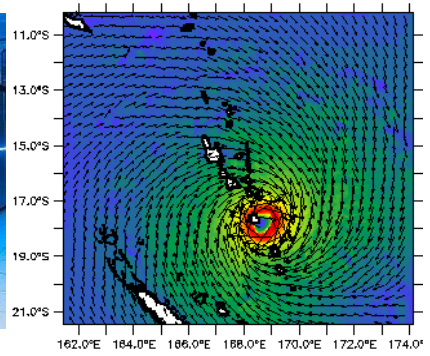
METEO FRANCE

AFD AGENCE FRANÇAISE DE DÉVELOPPEMENT

AUF VANUATU

CTRAVARTC

CLIPSSA
PACIFIC CLIMATE, LOCAL KNOWLEDGE AND ADAPTATION STRATEGIES



An applied research project

that serves sectoral public policies for adaptation to climate change **by combining climate sciences and human sciences**

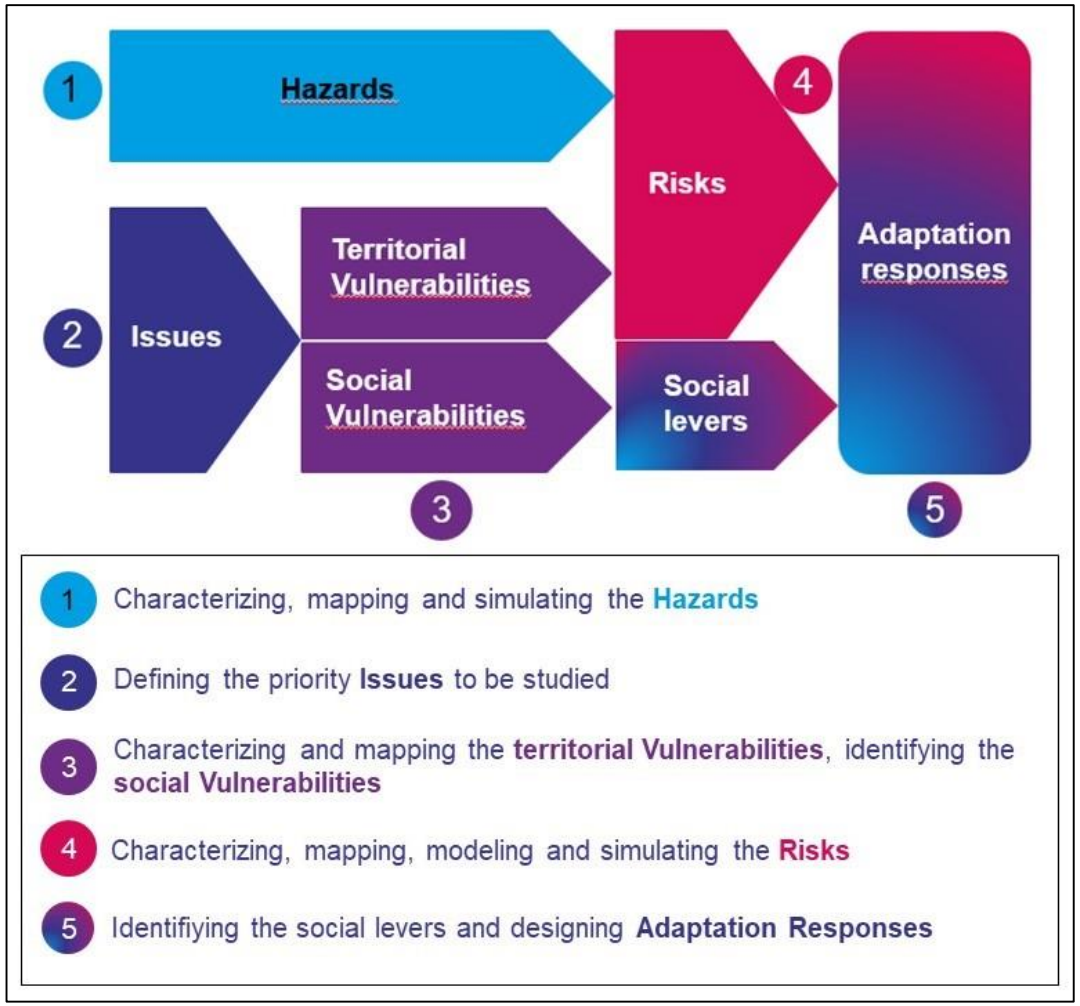
Where ? French Polynesia – New Caledonia – Wallis and Futuna – Vanuatu

3 – CLIPSSA

CLIPSSA
PACIFIC CLIMATE, LOCAL KNOWLEDGE AND ADAPTATION STRATEGIES

Working logic

The CLIPSSA project is based on a simple framework that links **Hazards**, **Issues** and **Vulnerabilities** to simulate the **Risks** we need to adapt to.



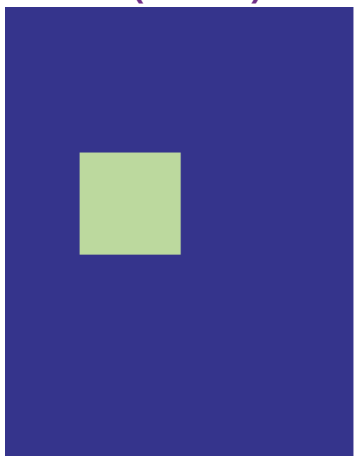
3 – CLIPSSA

CLIPSSA
CLIMAT DU PACIFIQUE, SAVOIRS LOCAUX ET STRATÉGIES D'ADAPTATION

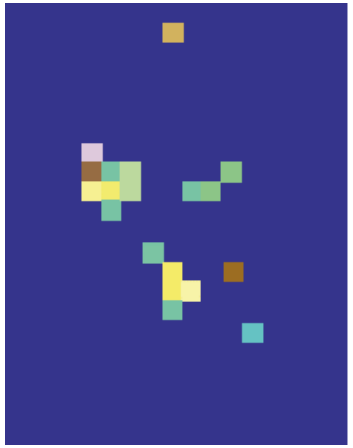
4 objectives

Vanuatu Islands

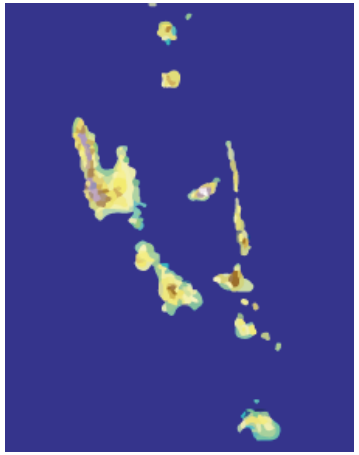
Global climate models over Vanuatu (100 km)



Regional climate models over Vanuatu (20km)



High resolution climate models over Vanuatu (2.5km)



Simulation GIEC → **Simulations CLIPSSA**

1. Provide climate projections to identify hazards in the South Pacific
by producing simulations of the next 100 years at 20 km and 2 km on the islands

2. Characterize issues and vulnerabilities
in particular by identifying how populations know and learn to adapt to extreme events

→

3. Characterizing impact risks and potentials
by analyzing the impact of future climate on agriculture(CLIPSSA 1)

→

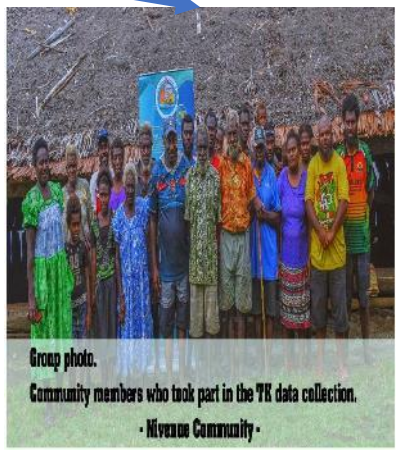
4. Produce operational adaptation solutions

- by making research results accessible
- by promoting or consolidating adaptation strategies that contribute to national and regional adaptation plans.

4 –VanKirap products: from interviews to online products knowledge on climate previsions

Vanuatu Traditional Knowledge

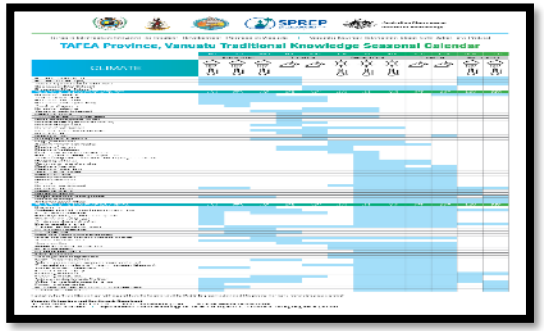
VanKIRAP Traditional Knowledge Process

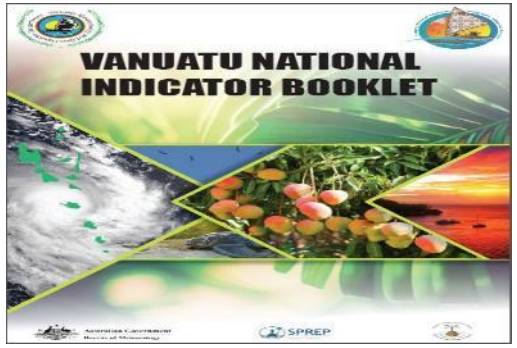


4 –VanKirap products: from interviews to online products knowledge on climate previsions

VanKIRAP TK Products and services

- Vanuatu National TK Indicator Booklet
- TK Indicators Climate Relationships Guide
- 6 x Provincial TK calendars
- Community TK calendars (Epi, Santo)
- Climate Watch App (Citizen Science) – 20 TK Indicators and indicator guides





https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-sanma-province

https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-penama-province

https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-shefa-province

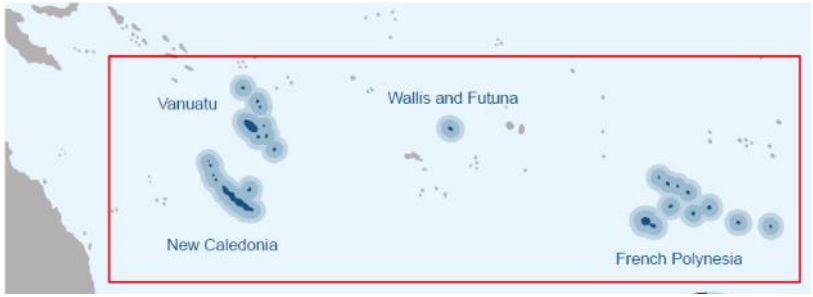
https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-malampa-province

https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-torba-province

https://www.nab.vu/document/van-kirap-traditional-knowledge-calendars-sanma-province

5 – CLIPSSA > From consultations between policy makers to the choice of sectors and study sites

Consultations are conducted to allow Island States and territories:



- to choose the common focused subjects that could be studied within the framework of the National and Governmental Policies
- to identify the existing relevant data
- to identify all the different expertise that should be mobilized (intermediate bodies, local stakeholders, public services...)
- To identify places/islands where issues are big for stakeholders and that could considered as pilot sites

AGRICULTURAL SECTORS

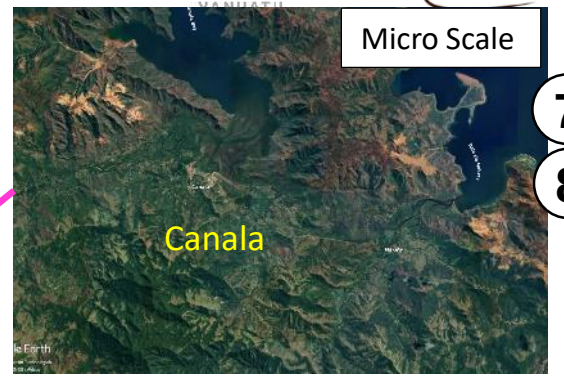
FRESH WATER ACCESS

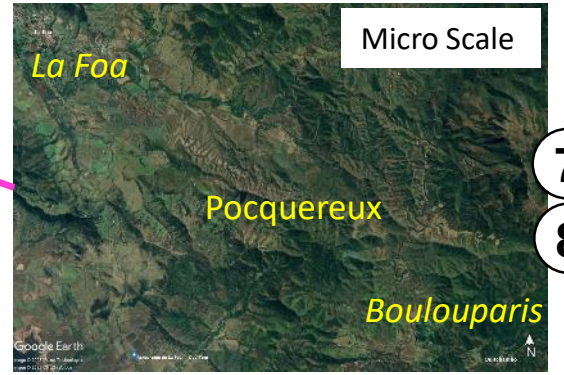
5 – CLIPSSA > From consultations between policy makers to the choice of sectors and study sites

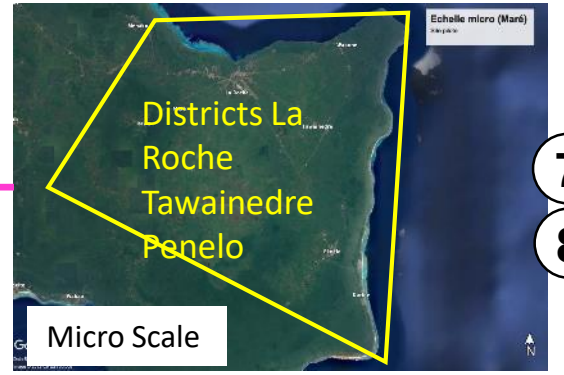
Consultations are conducted to allow Island States and territories

AGRICULTURAL SECTORS

FRESH WATER ACCESS







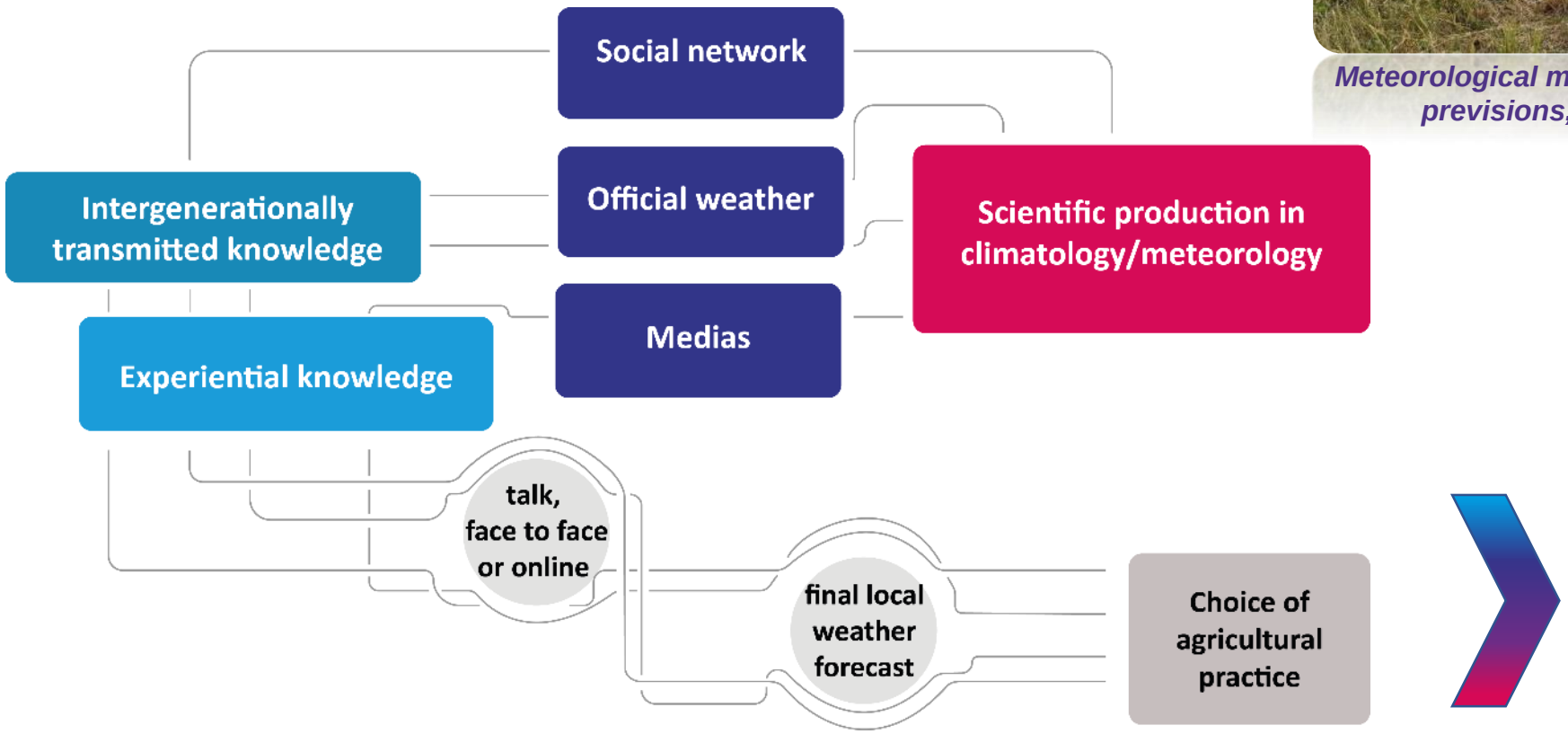
- To identify places/islands

Example of New-Caledonia

5 – CLIPSSA > From scientific Knowledge to local Knowledge and agricultural practice

Meteorological monitoring and previsions, Canala, 2020

Field where some protective plants are grown, New-Caledonia, 2022.



Itineraries of creation and appropriation of local knowledge regarding weather forecasts

Realisation : Merlaud, Sabinot, Bussone, 2023

6 – Conclusions

- Bring together institutional actors, scientists and technical agents to co-construct a research-action is essential to see the results of our research mobilized by policymakers as well as local people.
- Consultation process at high and local level as well as field surveys with policymakers and inhabitants, punctuated by regular feedback are complementary ways to develop a research-action project.
- Next steps to go further:
  - Expand traditional knowledge project to other provinces and new communities
  - Publish methodology and preliminary findings so the science community can take note
  - Continue collaboration between CLIPSSA and VanKIRAP in Vanuatu including MoCCA and VMGD

Pacific Climate, Local Knowledge And Adaptation Strategies

How to combine scientific climate knowledge, and local knowledge to think about resilience in the Pacific ?

Catherine Sabinot, Moirah Matou, Sunny Seuseu, Albert Willy, Gilbert David, Pierre Metsan, Alexandre Peltier, Jean-Brice Herrenschmidt, Fleur Vallet, Christophe Menkes

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Family farming, lifestyle & health




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French National Research Institute for Sustainable Development

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AFD AGENCE FRANÇAISE DE DÉVELOPPEMENT

GREEN CLIMATE FUND

SPREP Secretariat of the Pacific Regional Environment Programme

Knowledge exchange and education for sustainable agriculture, food and health

20th, 21th and 22th of June 2023

National University of Vanuatu, Port Vila

Mapping the social dimension of farmer's knowledge in the Pacific: lessons from the experimentation of a methodology for designing social networks of knowledge

Séverine Bouard (IAC), Jonas Brouillon (IAC), Julien Drouin (IAC), George Curry (Univ. Curtin), Myrtille Lacoste (Independant Consultant)

Disclaimer: the views expressed in this presentation are purely those of the author and may not in any circumstances be regarded as stating an official position of the Research Executive Agency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 873185

Context and research question: why knowledge networks?

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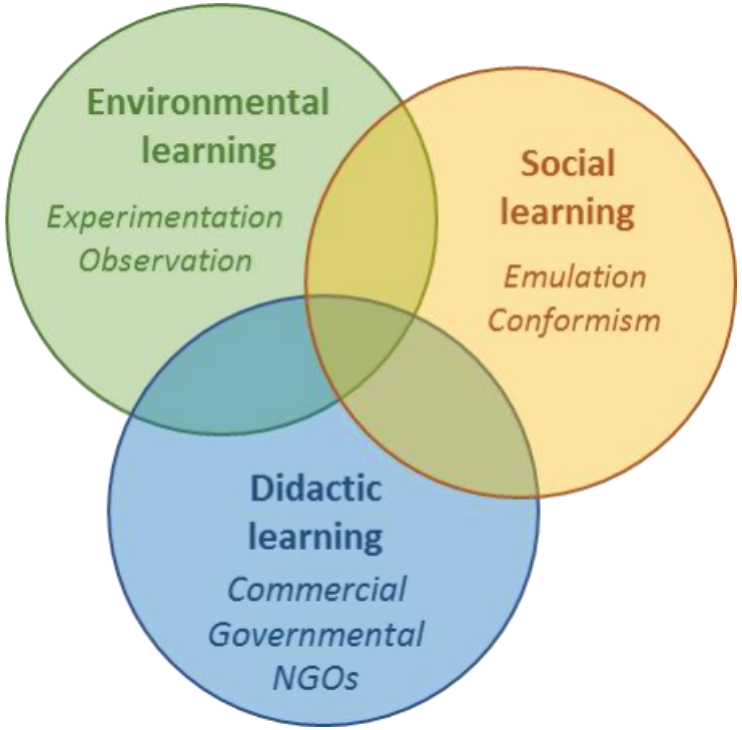
Context and research question: the diversity of farmers's learning modes



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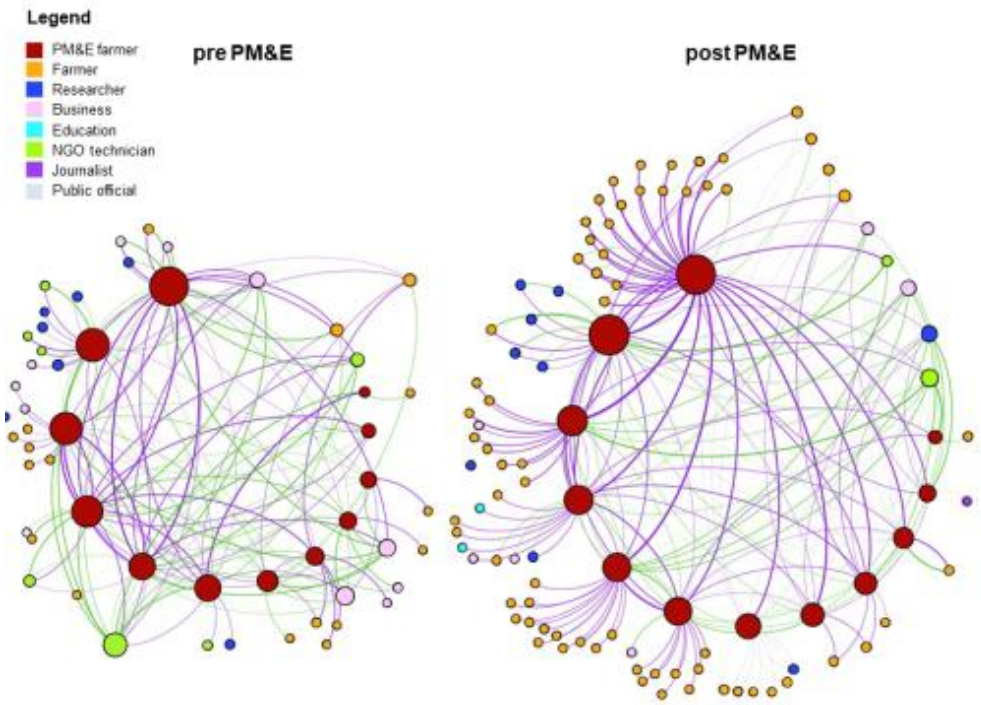
Context and research question: looking for gaps in knowledges through social network analysis



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Knowledge networks in Pacific subsistence agriculture

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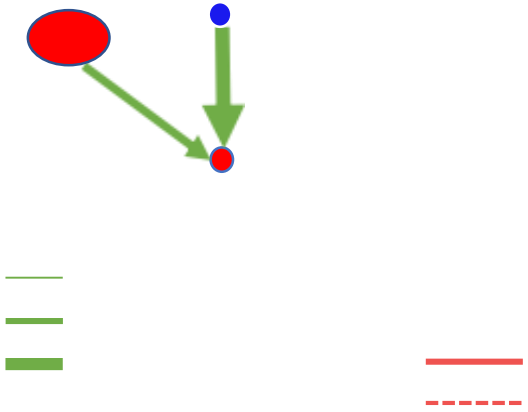
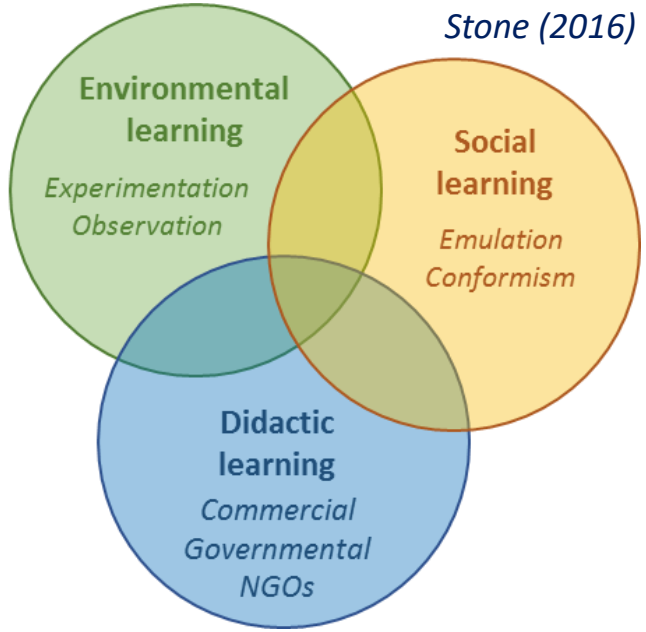
What is a social network analysis connected to knowledges in agriculture ?



Stone (2016)



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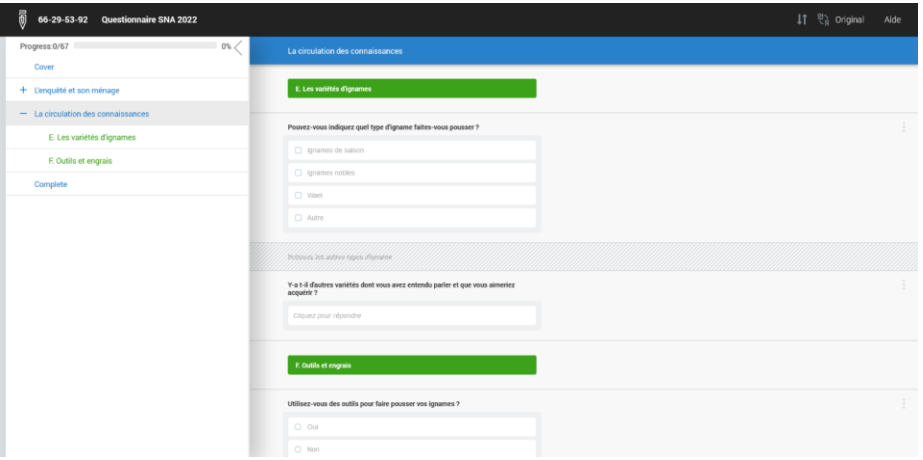
Methods, fieldwork and datasets: Maré, East Coast and Wallis & Futuna



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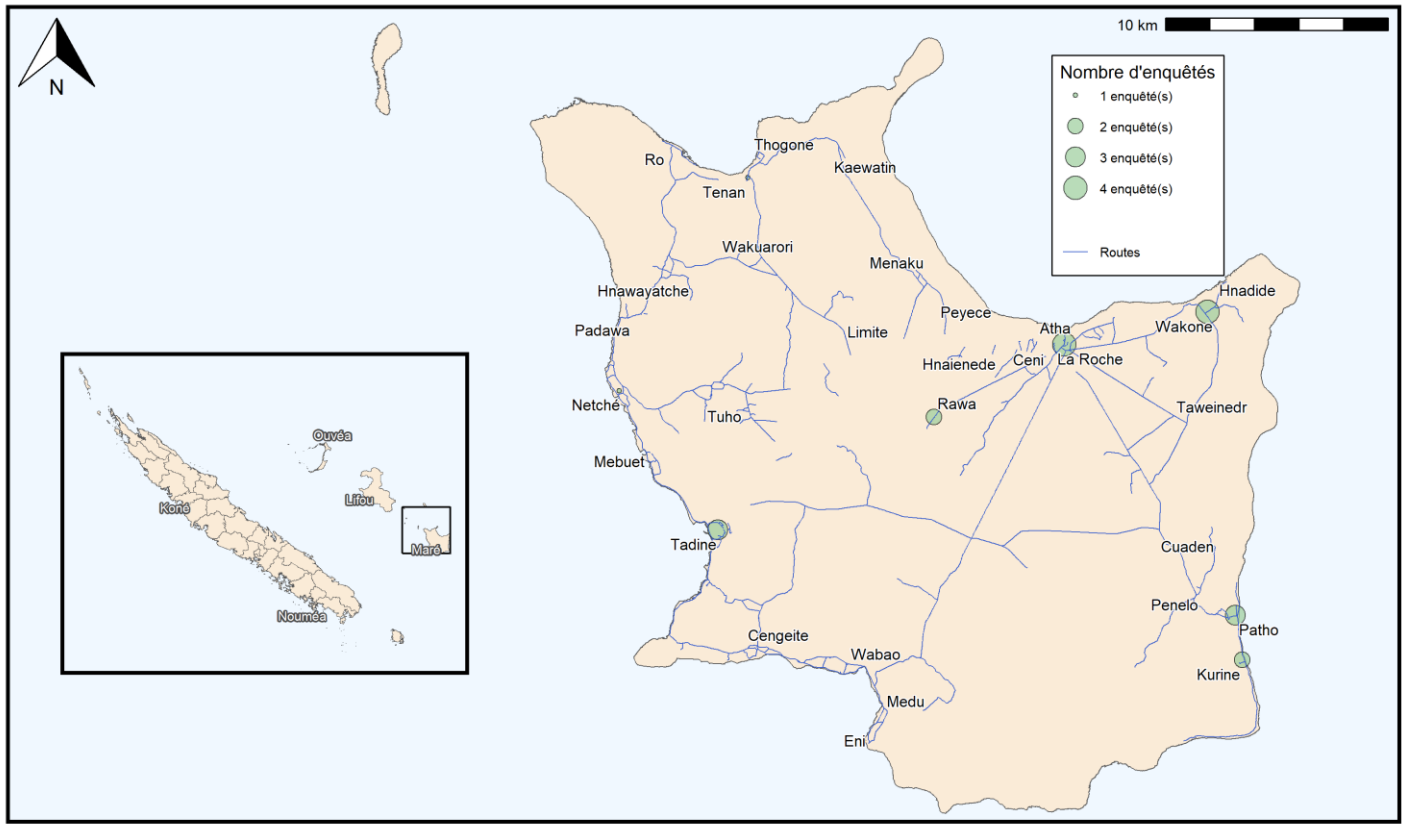
First case study: Yams in Maré



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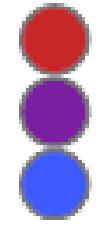
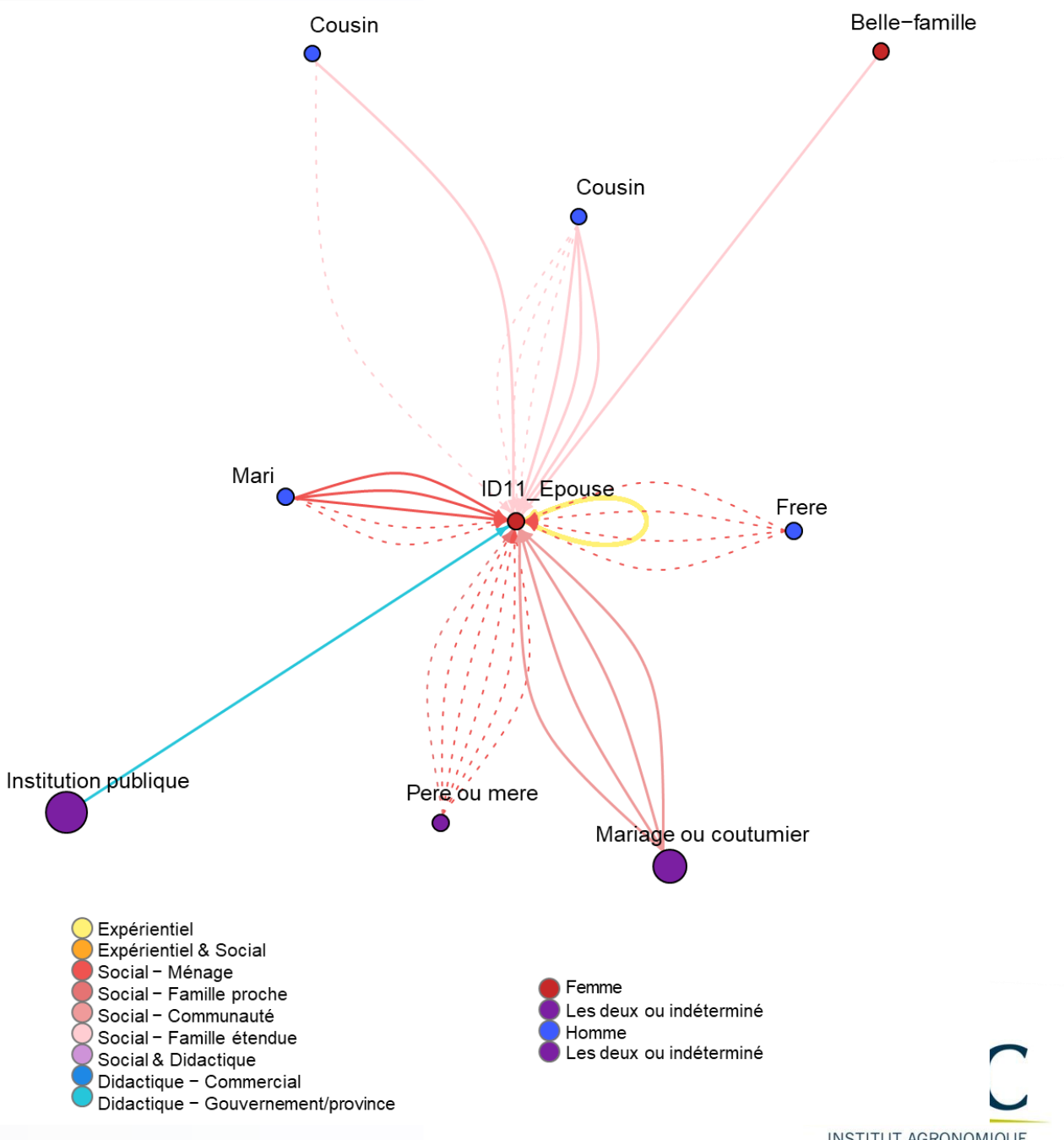
How to read a social network graphic?





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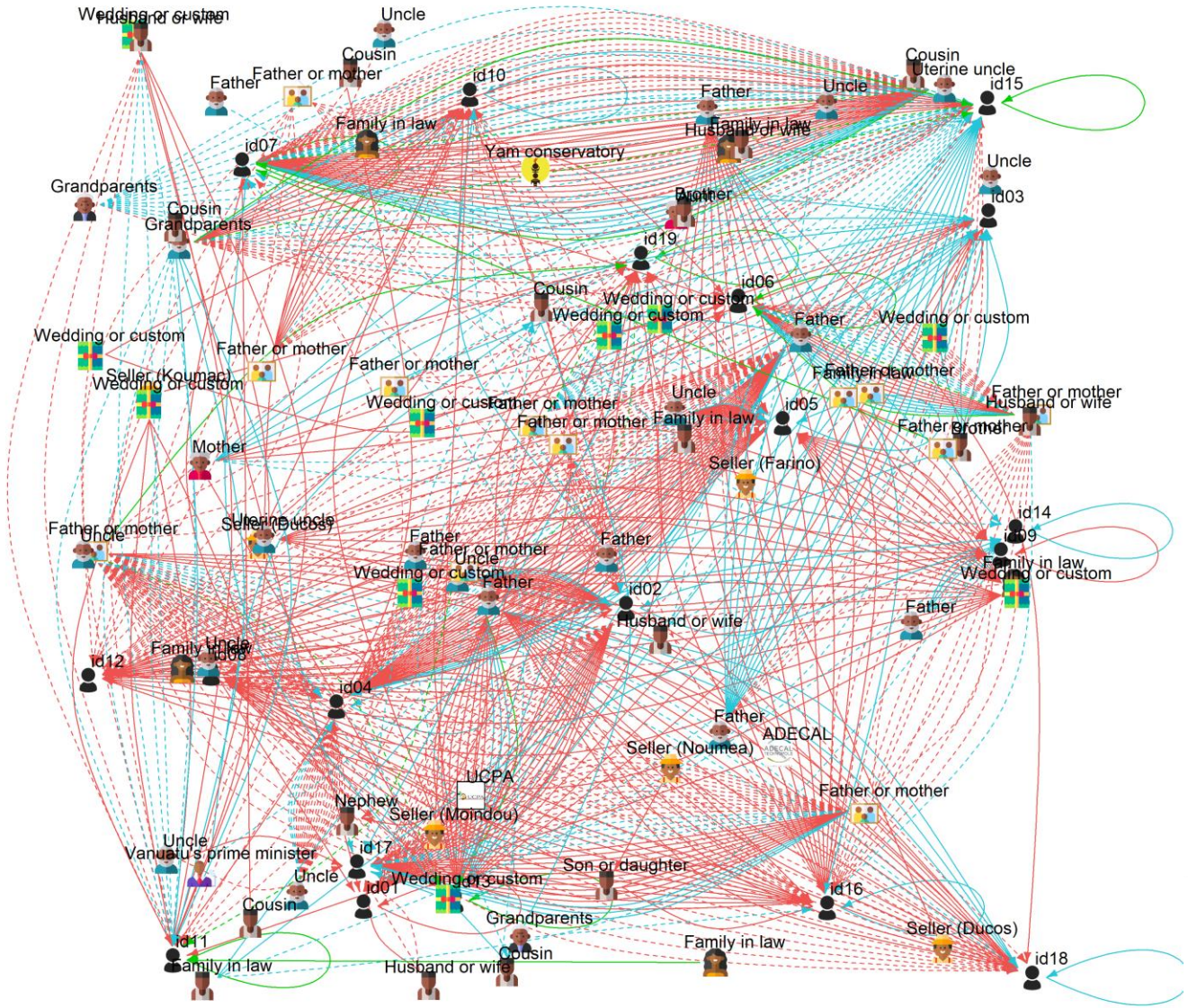
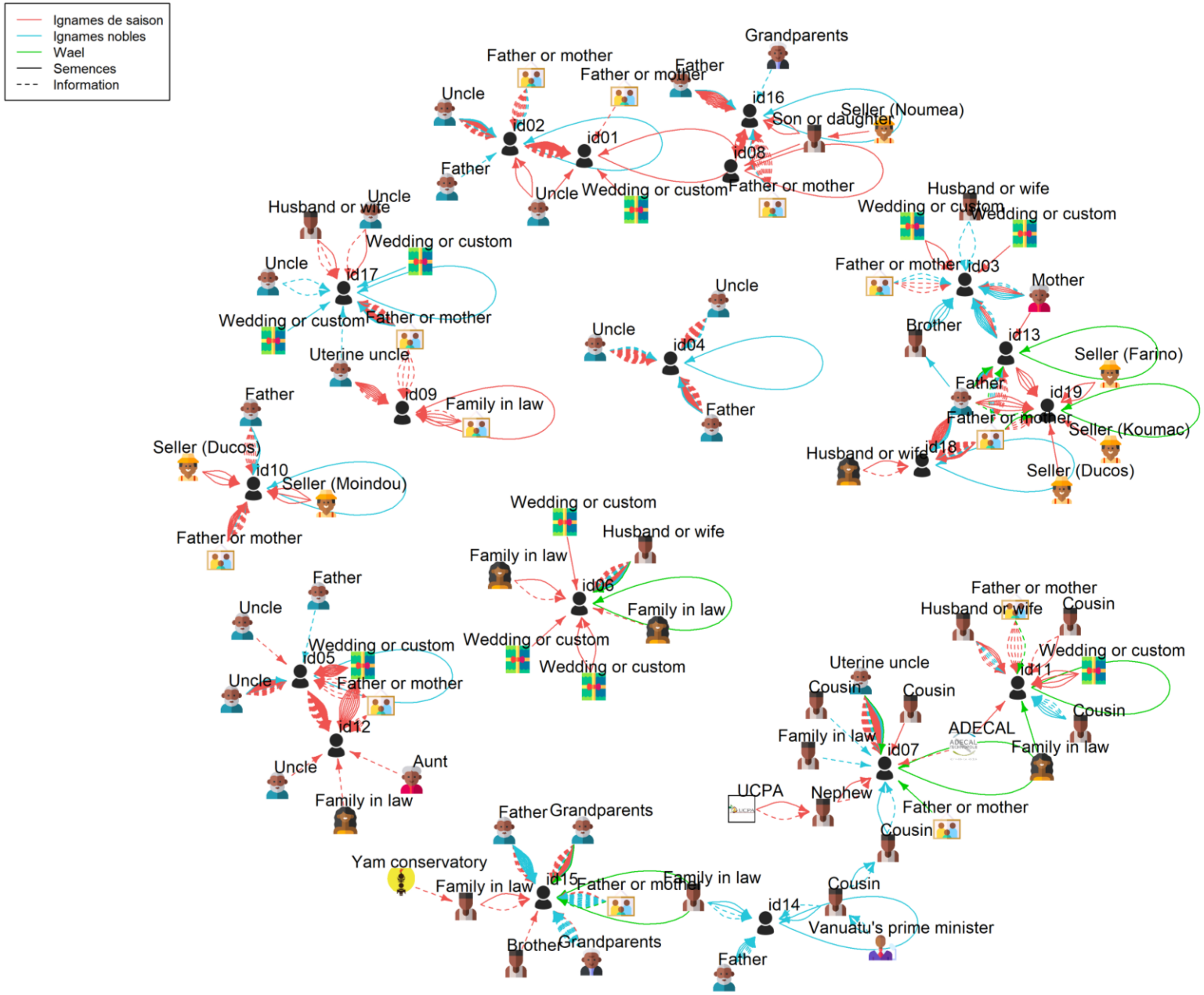
Social networks and flows of yams seeds in Maré (desaggregated version)



Social networks and flows of yams seeds in Maré (agreggated version)



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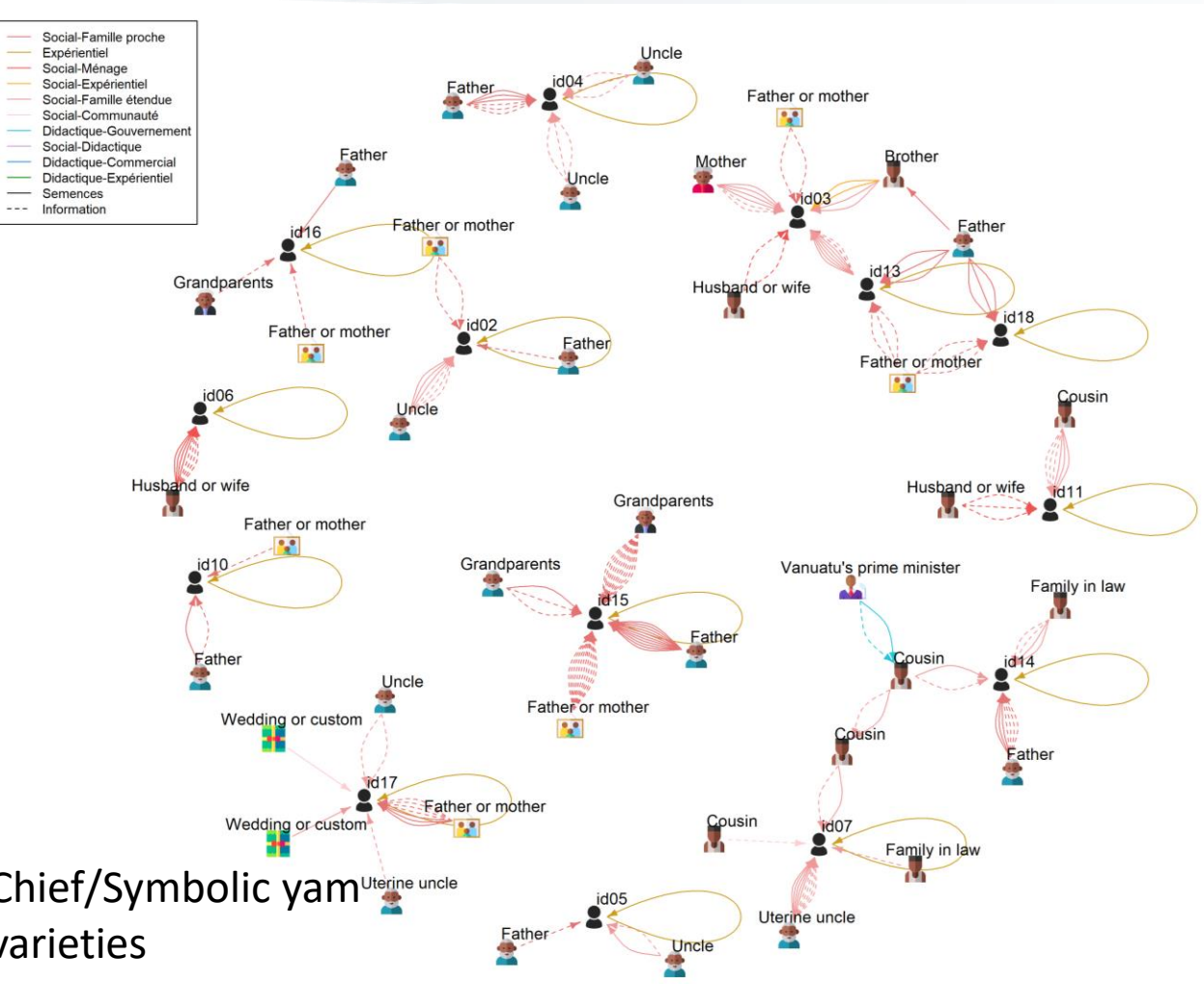
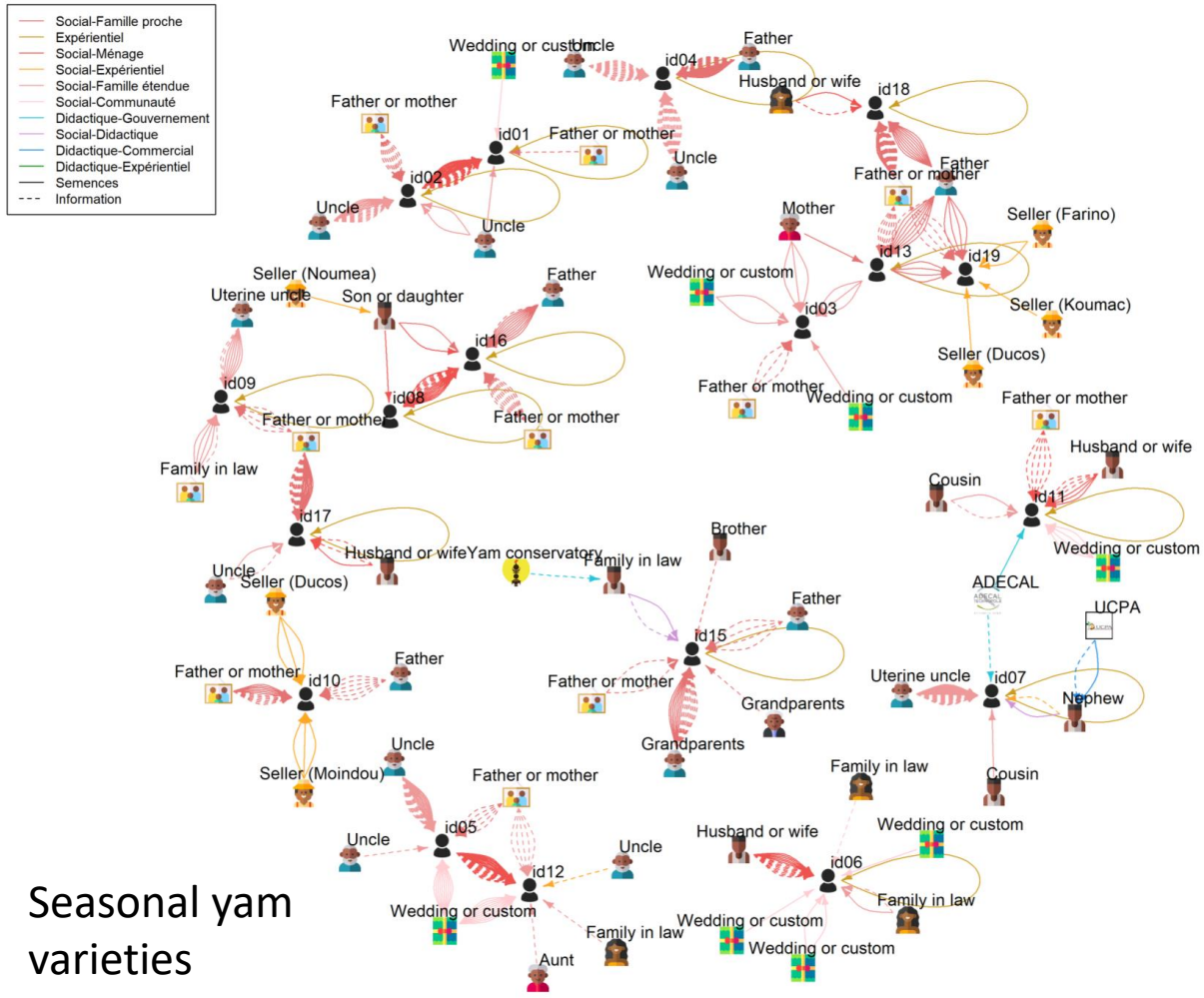
Social networks and flows of yams seeds in Maré: comparison of networks between seasonal and symbolic yam varieties

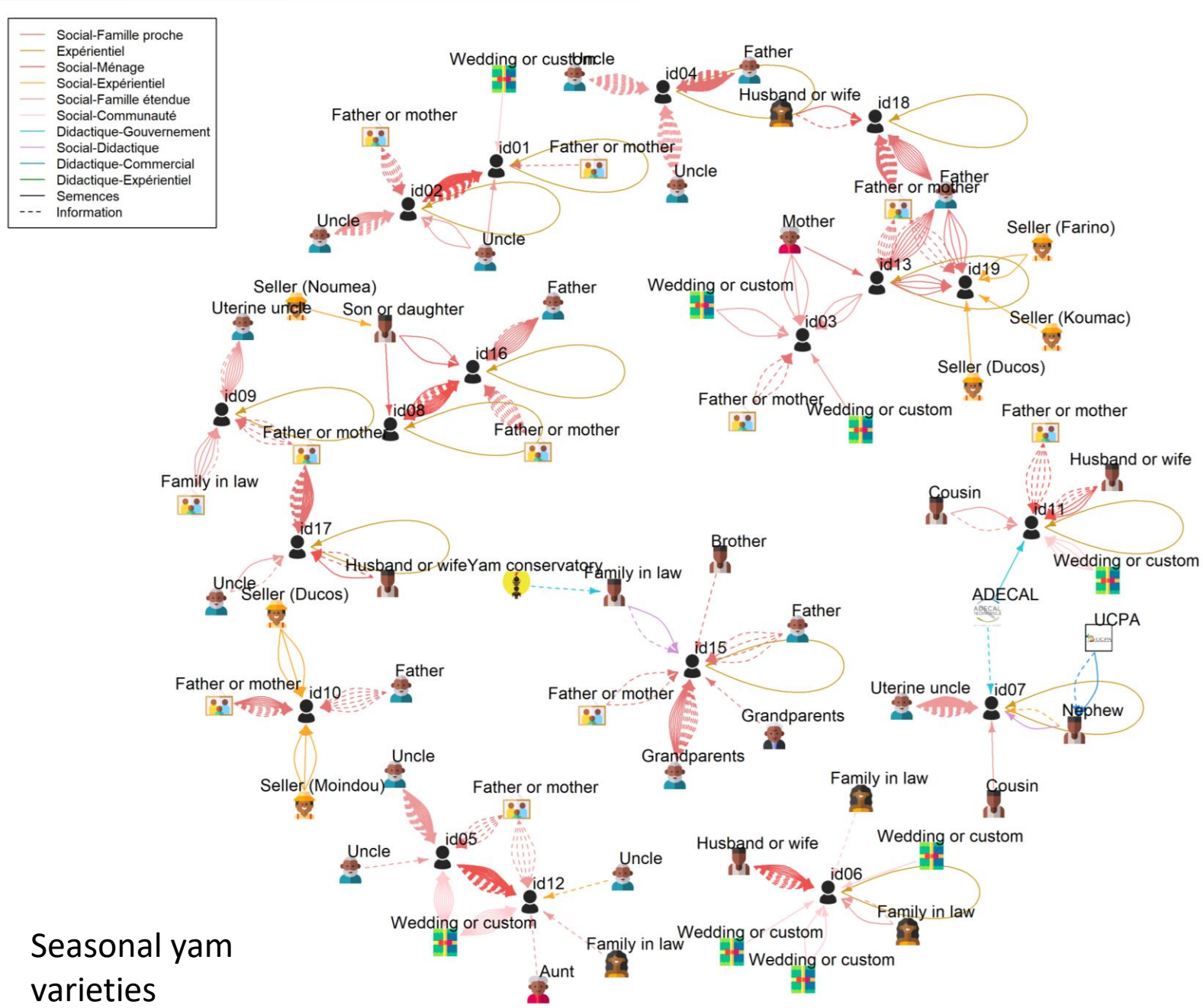


Chief/Symbolic yam varieties



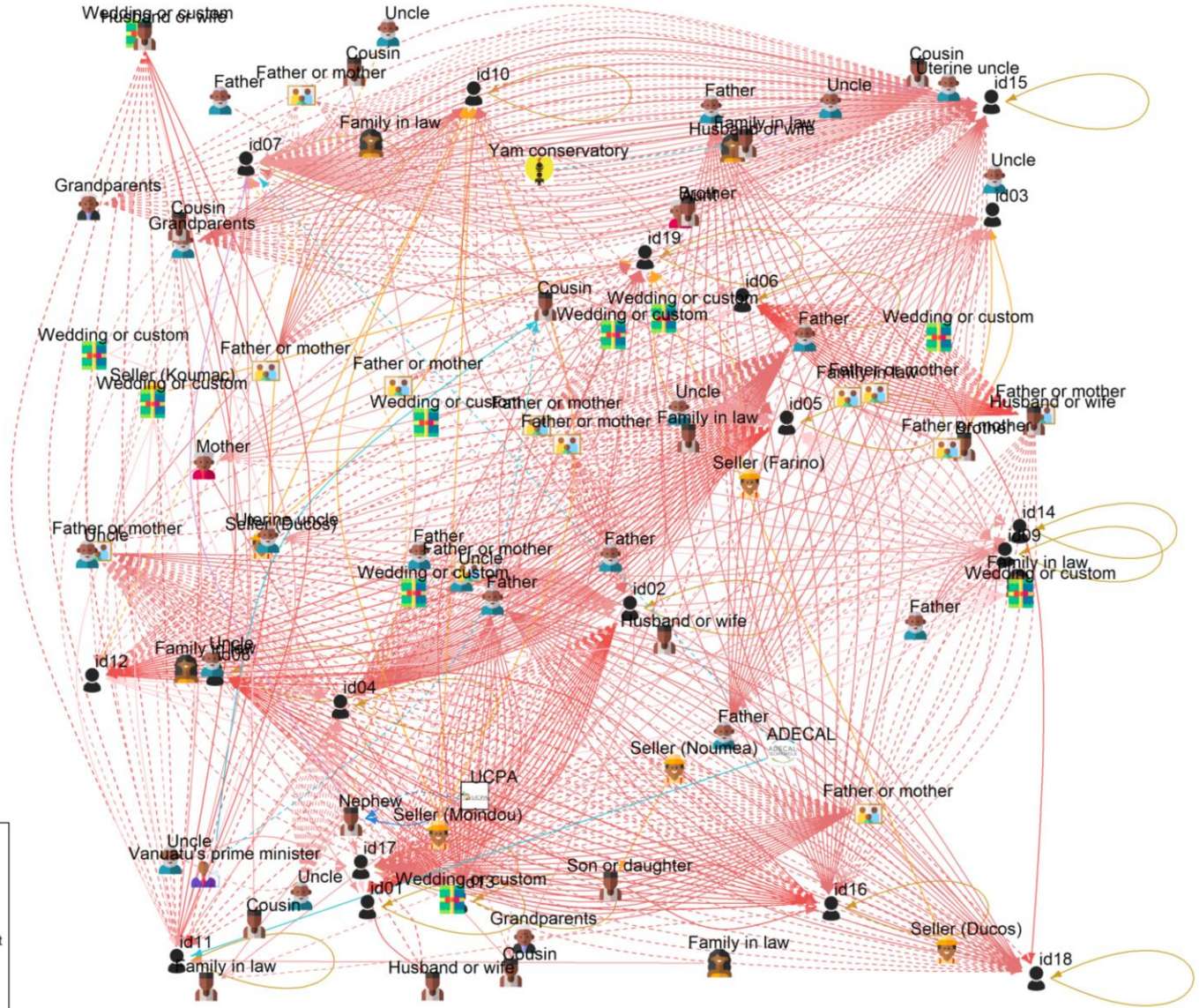
Seasonal yam varieties

Social networks and flows of yams seeds in Maré (condensed version)



Seasonal yam varieties

Social networks and learning modes associatied to flows of yams seeds in Maré (desaggregated version)



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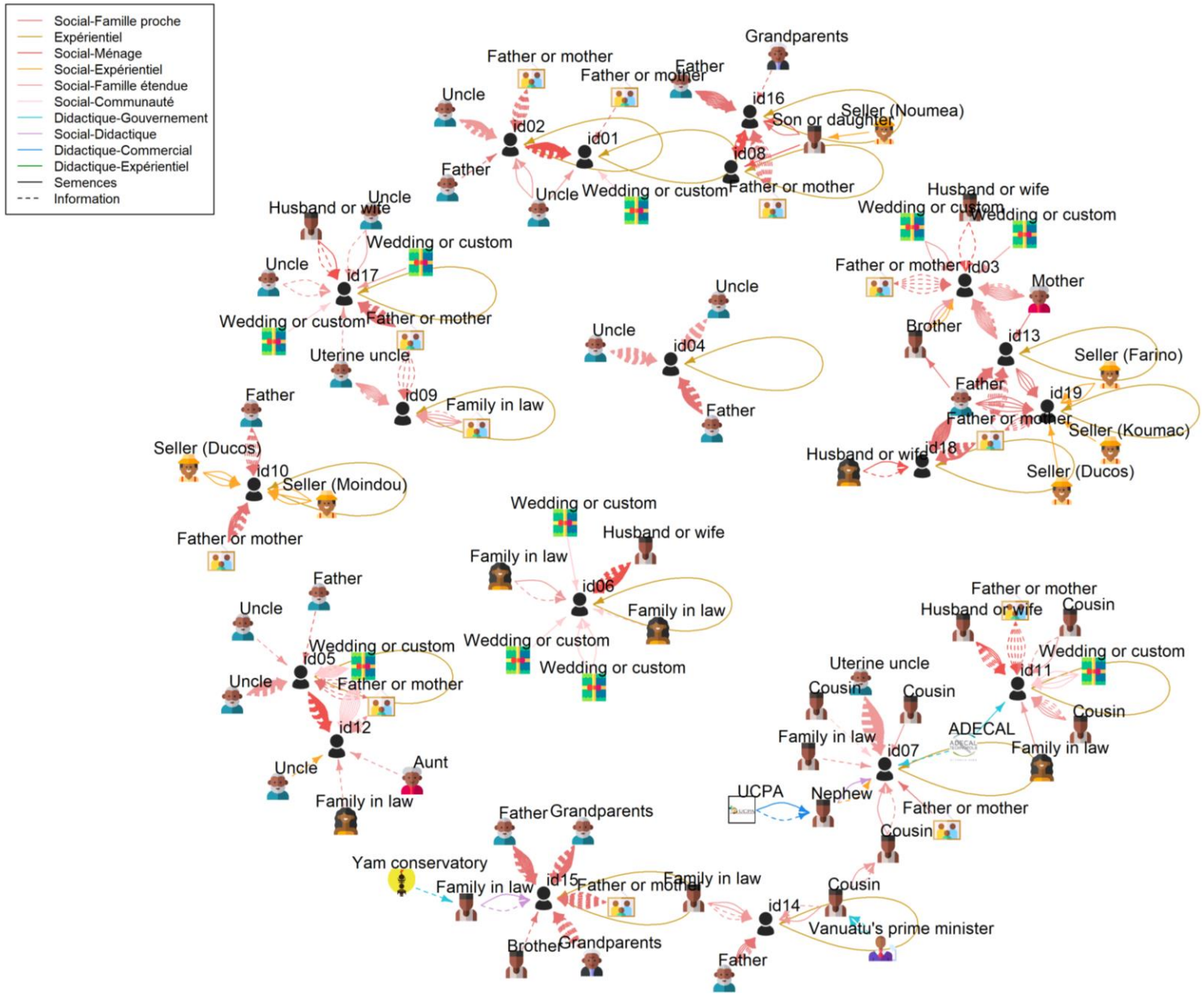
Social networks and learning modes in flows of yams seeds in Maré (aggregated)



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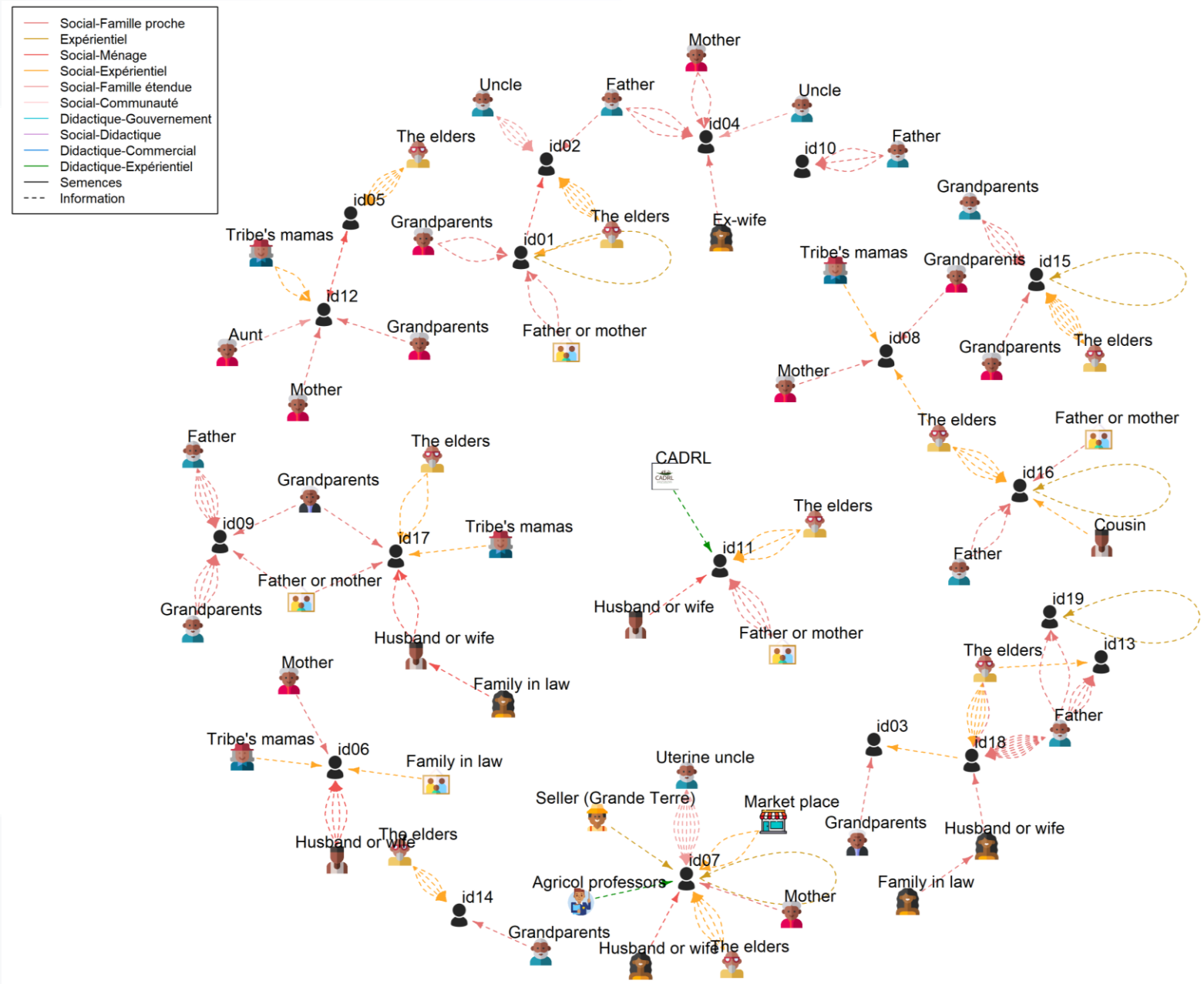
Social networks and learning modes associated to tools and advice on farming practices in Maré



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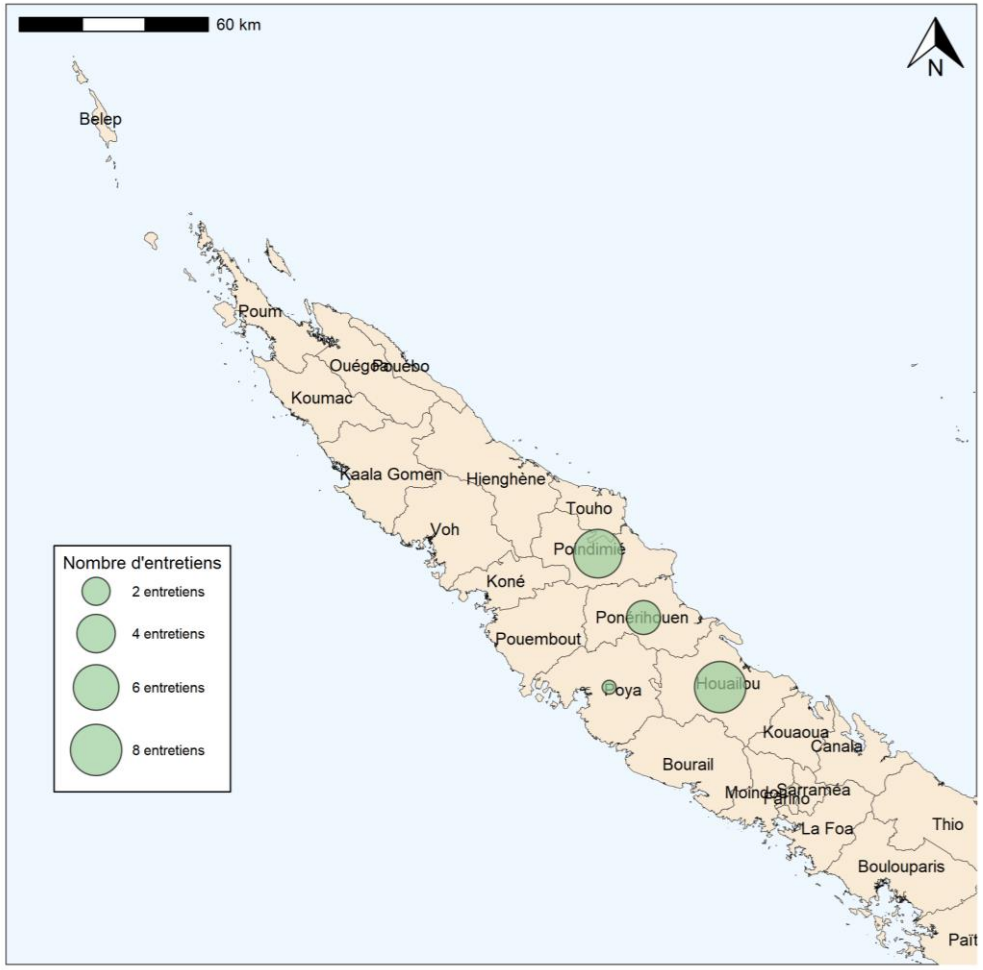
The second case study: agroforestry on the East Coast on New Caledonia



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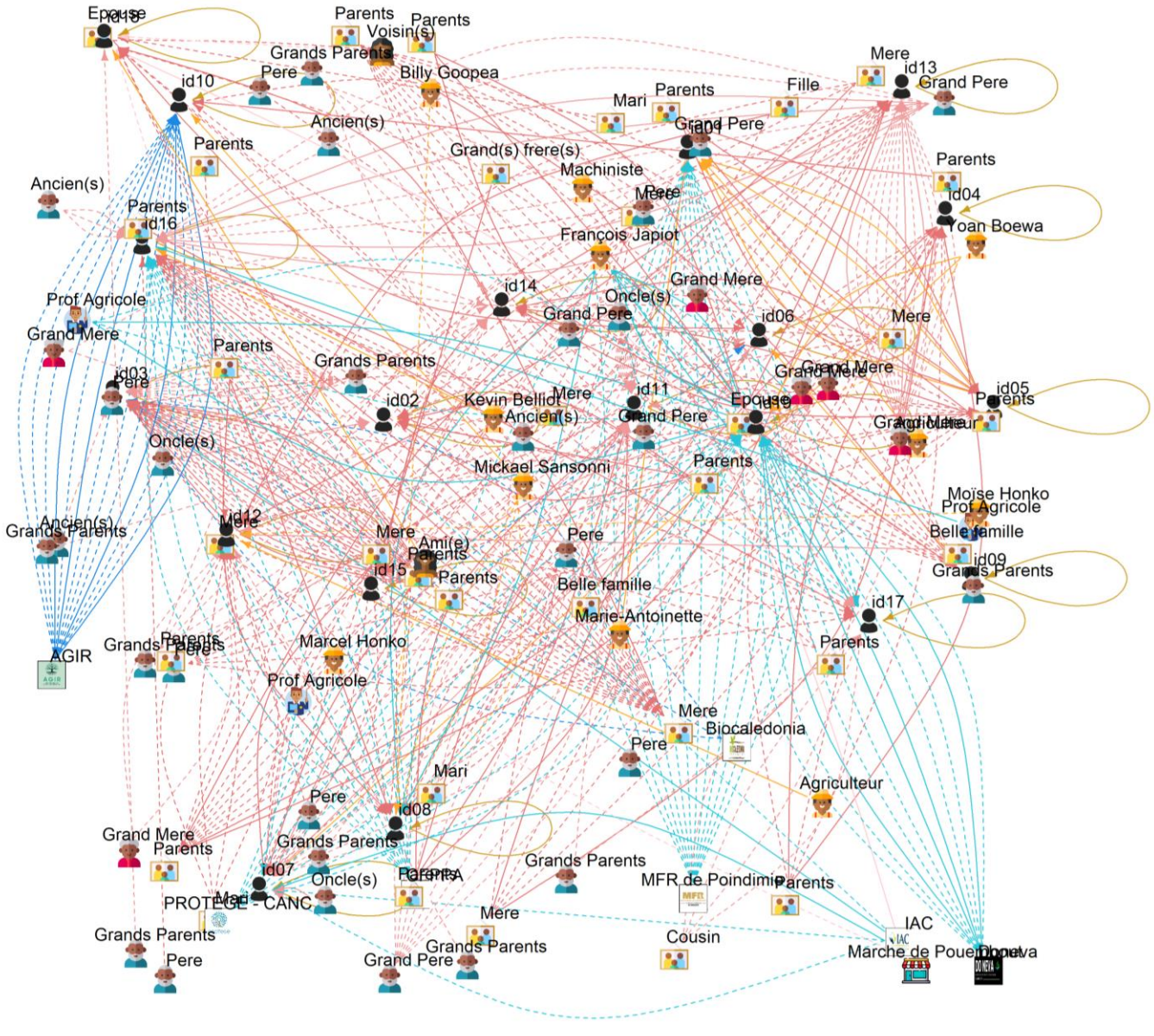
Social networks and learning modes of agroforestry farmers



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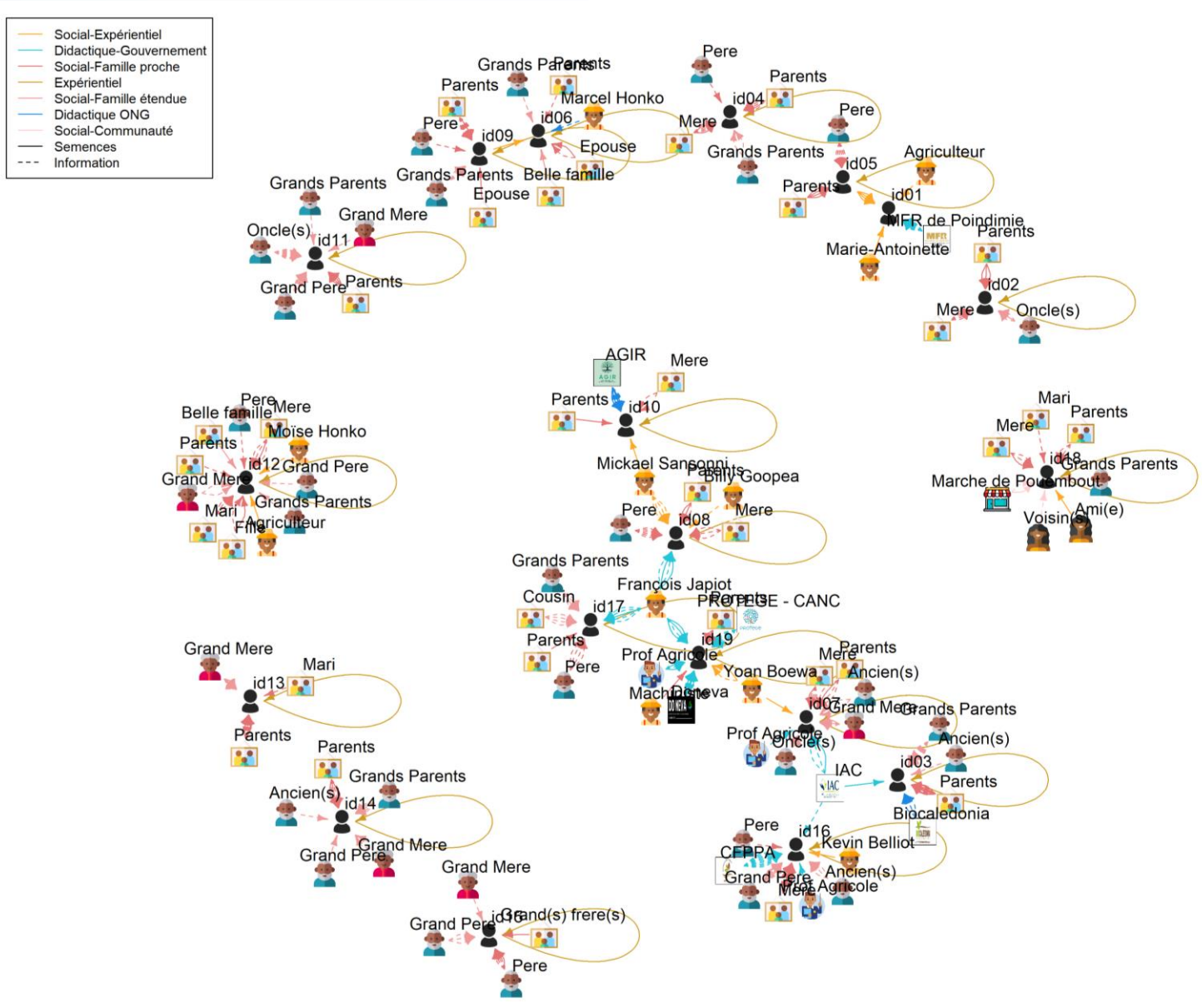
Social networks and learning modes of agroforestry farmers



The last case study: market gardening in Wallis and Futuna

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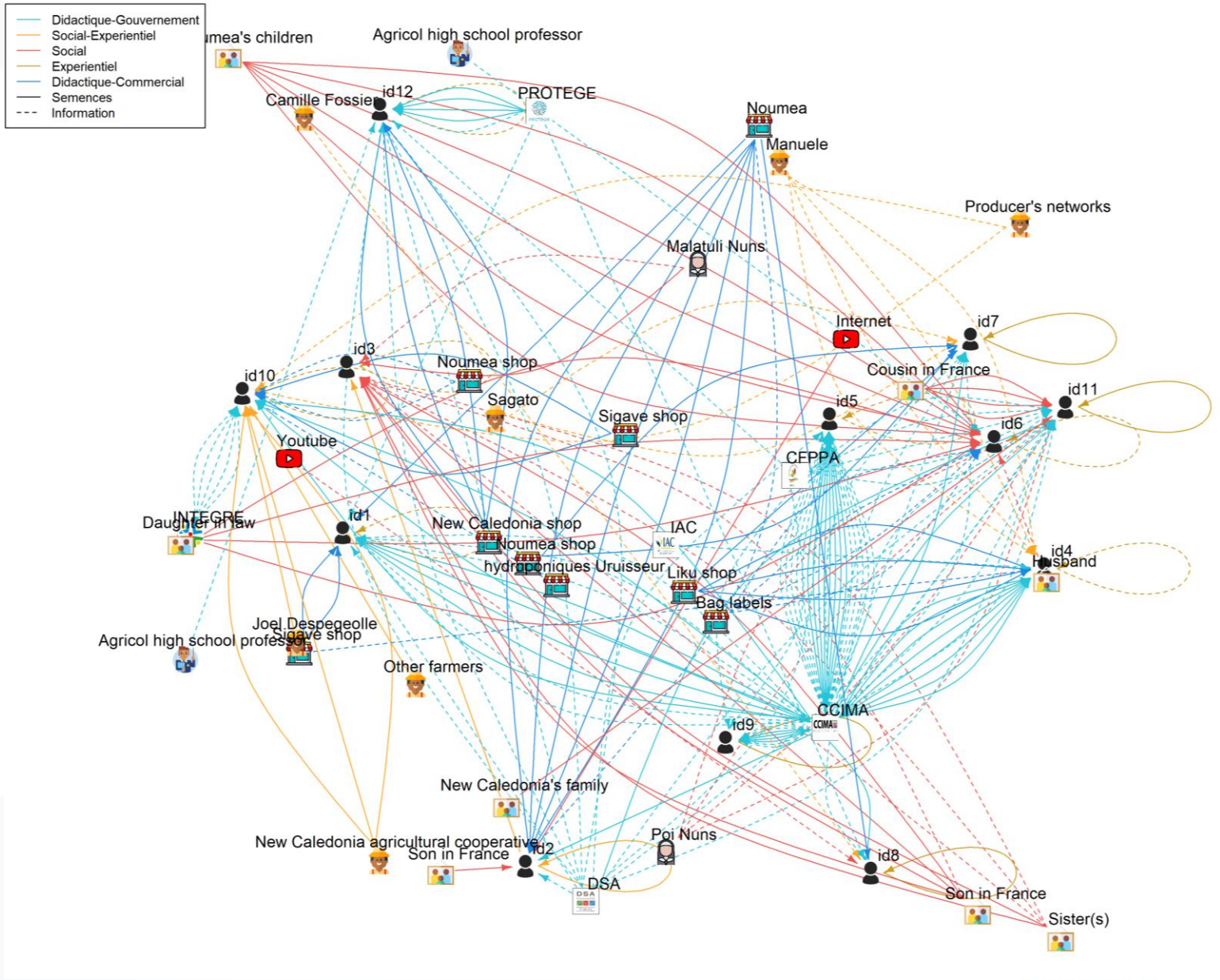
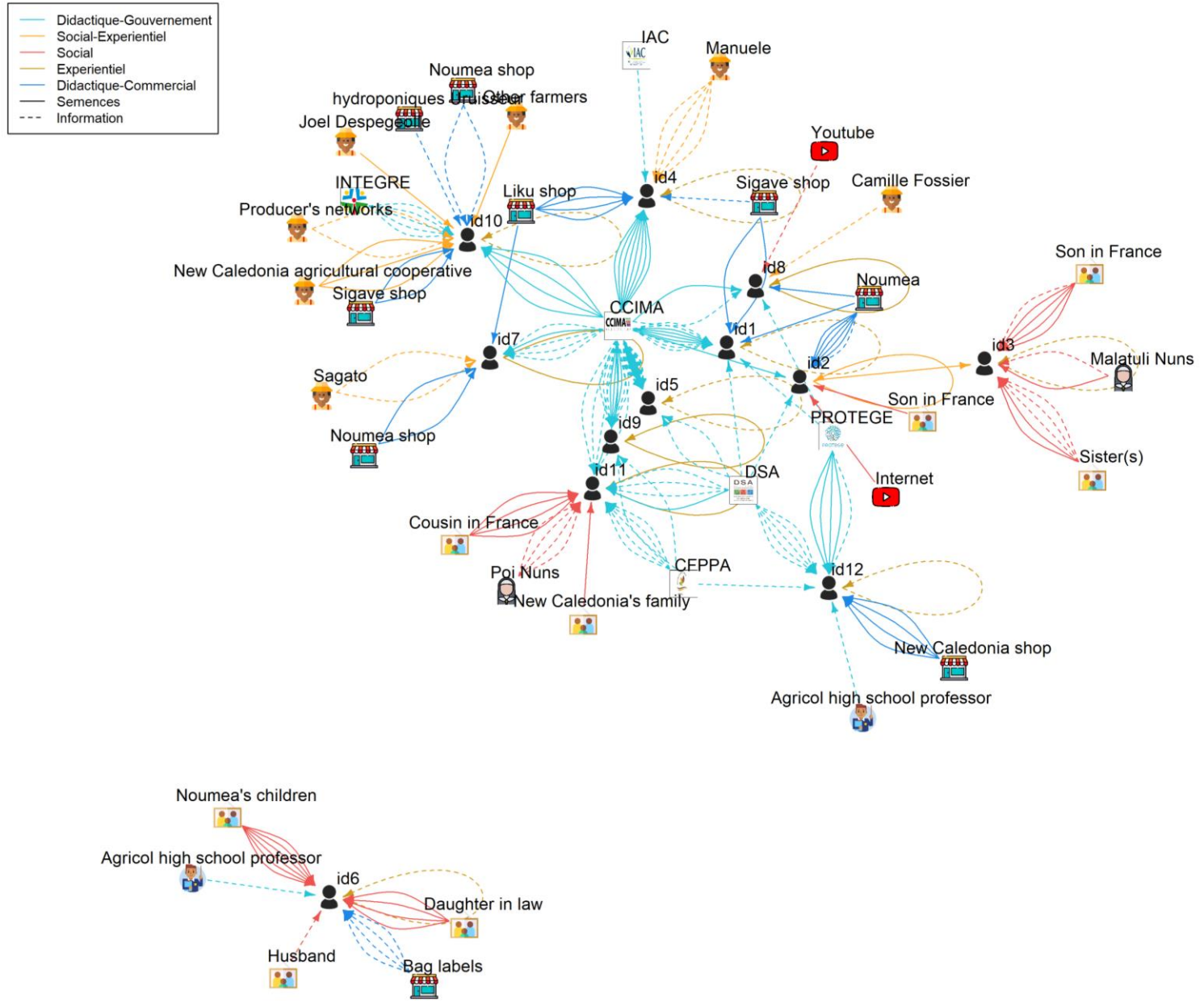
Social networks and learning modes associated to market gardening seeds in W&F



Social networks and learning modes associated to market gardening seeds in W&F



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To conclude

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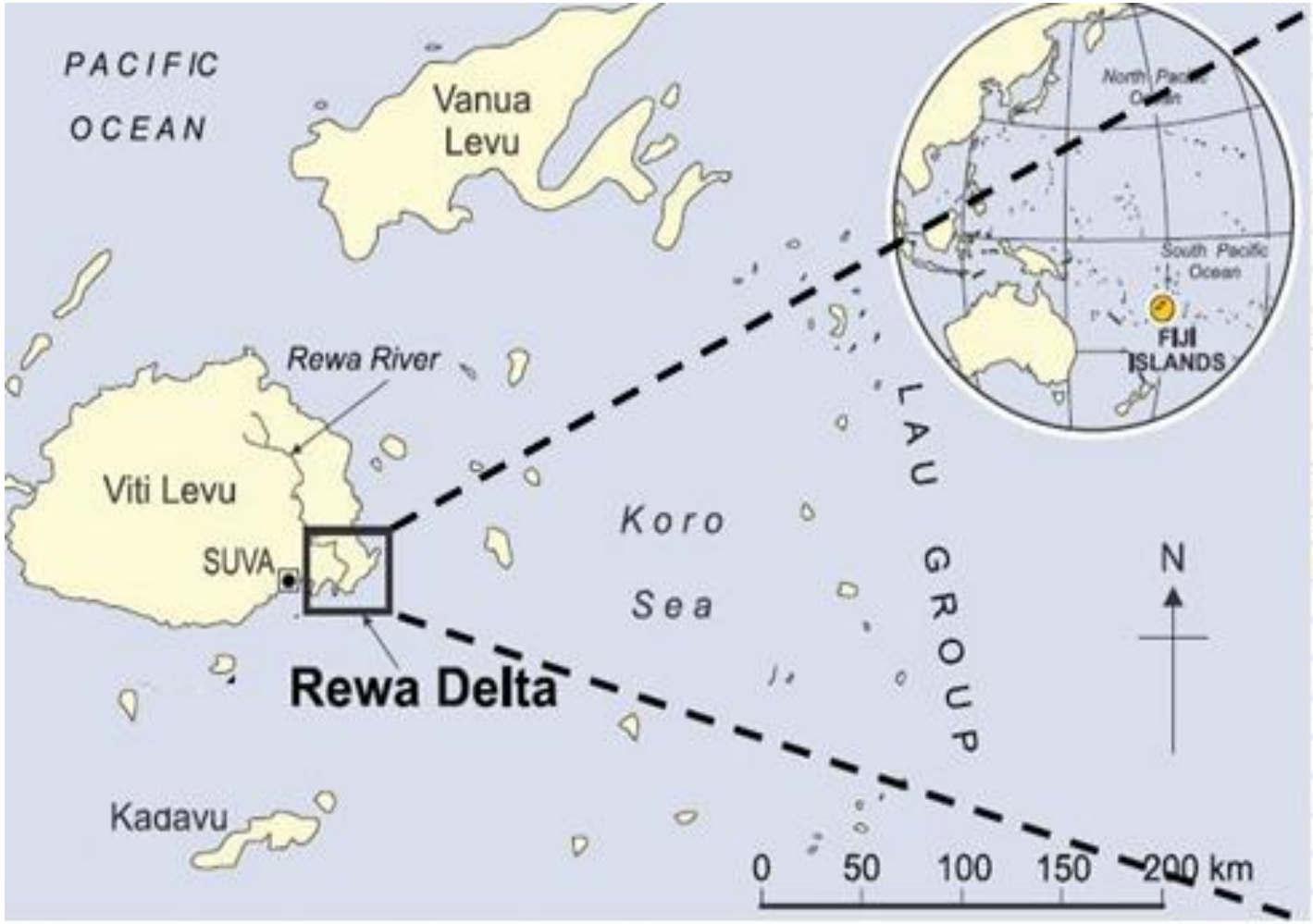
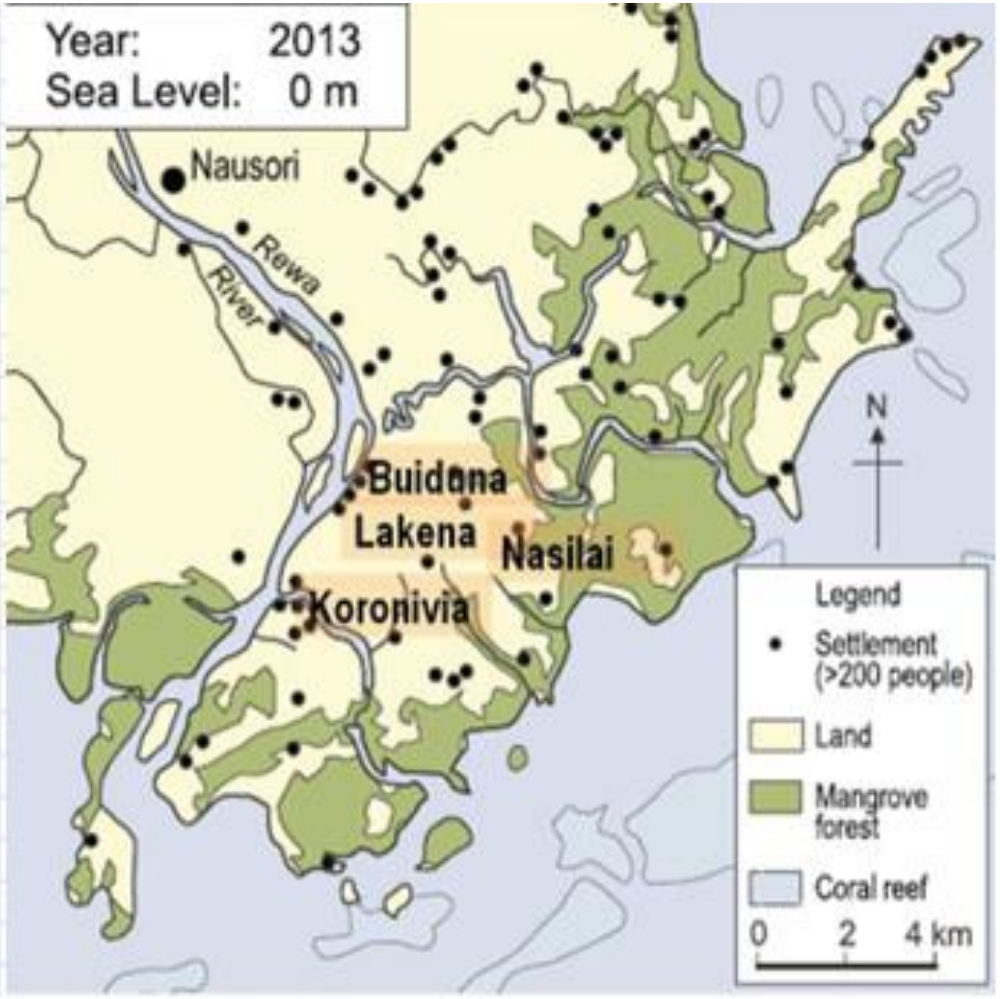
Farmers' perceptions on changing weather and climate, and impacts on rice production in the Rewa Delta

Jyoti M Prasad, Hilda Waqa-Sakiti, Viliamu Iese and Morgan Wairiu

Pacific Centre for Environment and (PACE-SD), Faculty of Science, Technology and Environment, The University of the South Pacific, Suva, Fiji

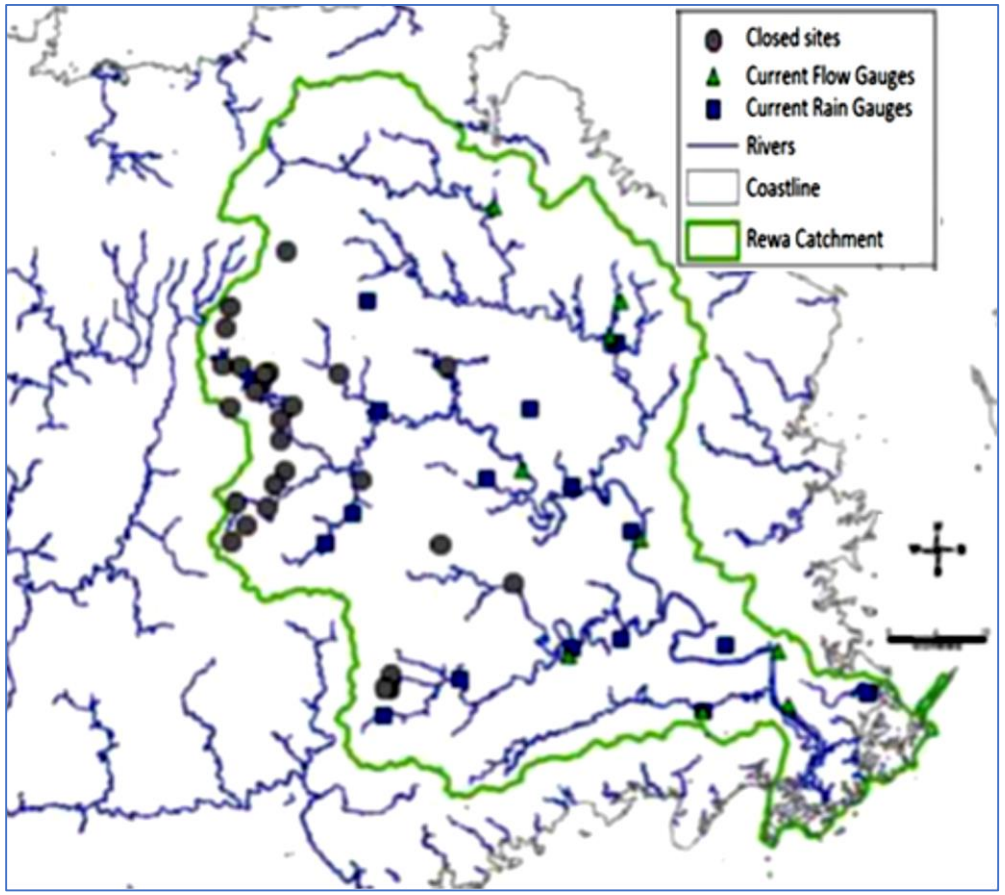
Study Area - Rewa Delta





Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Why study Rewa Delta

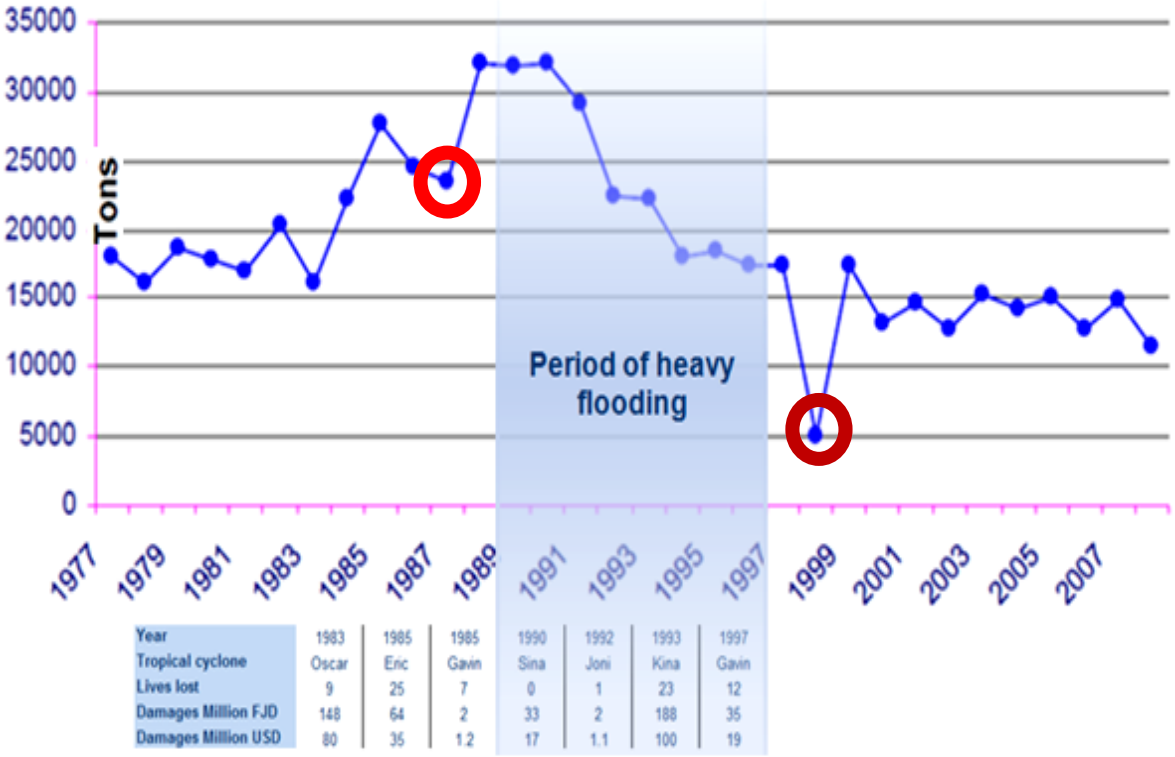


Rewa Delta water catchment area (Pacific Community, 2012)

- Rewa Delta was initially selected to be the hub of rice production in Fiji as Rice requires ample water to grow.
- The Rewa Delta is well resourced in terms of water as it falls in the wet zone of Viti Levu Island.
- Its water resource is mostly derived from surface water run-off and drained by the Rewa River
- The five provinces of Naitasiri, Tailevu, Namosi, Serua and Rewa of the Rewa Delta are dependent on the Rewa catchment system as all the major rivers and the tributaries run through these provinces.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Impact of flood on rice production in Fiji



Year	1983	1985	1985	1990	1992	1993	1997
Tropical cyclone	Oscar	Eric	Gavin	Sina	Joni	Kina	Gavin
Lives lost	9	25	7	0	1	23	12
Damages Million FJD	148	64	2	33	2	188	35
Damages Million USD	80	35	1.2	17	1.1	100	19

Adapted from Puran, 2011

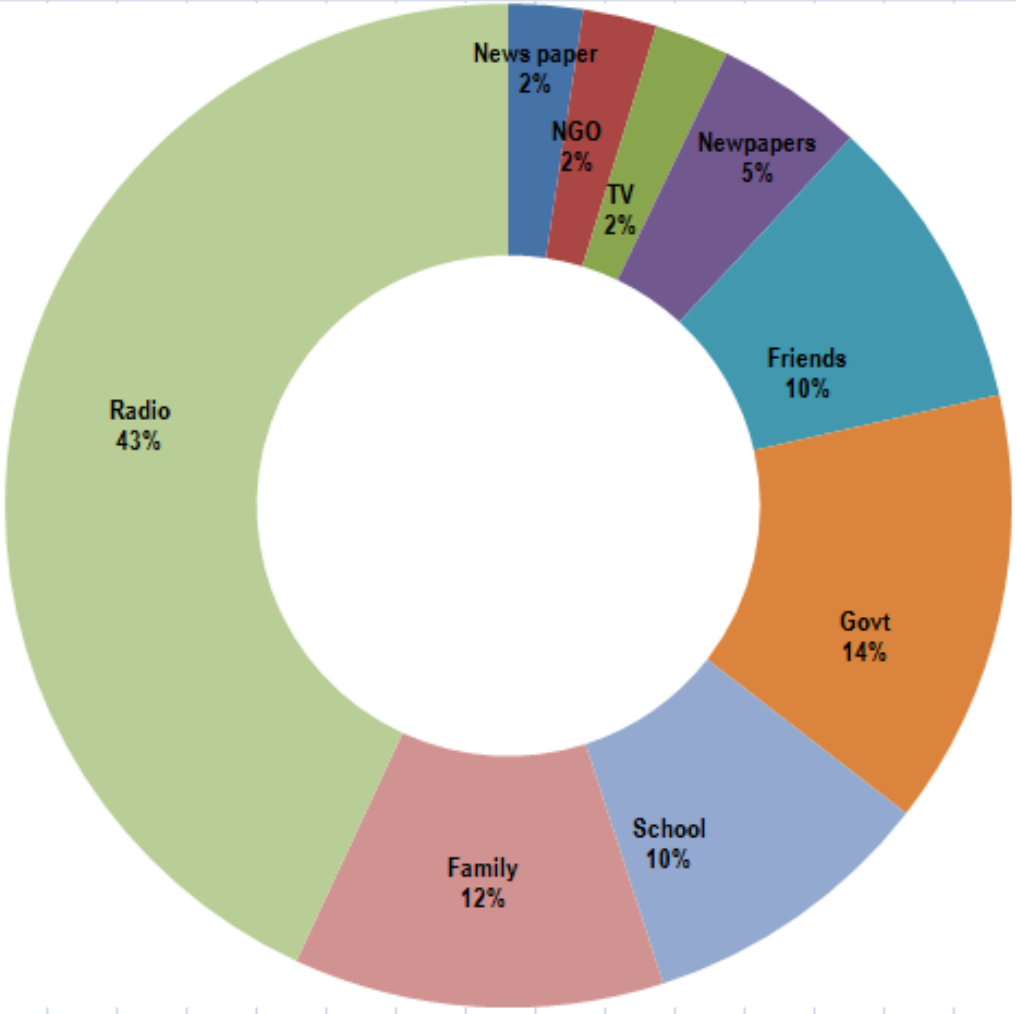
1987 military coup

2000 civilian coup

- Seven major floods caused devastating effects in Fiji between 1983 and 2000 - farms were largely under flood water with most crops destroyed.
- Being one of the biggest river systems in Fiji, people residing within the Rewa Delta often face the dangers posed by floods from Rewa River.
- Farmers seemed to have been relying on the favorable weather patterns and seasons and largely practiced rain fed farming.
- **The decline in rice production from the 1990s indicates a clear relationship between climate-change induced extreme weather conditions causing floods and decline in rice production.**

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Medium of information for farmers on climate change



- Radio the most important medium by which the farmers received information and is a very powerful & effective tool to disseminate useful information and knowledge related to agriculture
- Farmers also received information by word of mouth from relatives, friends, farmers and from children who learnt it at school.
- Most farmers understood the basic climate change issues through information from awareness campaigns by government and through other media.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

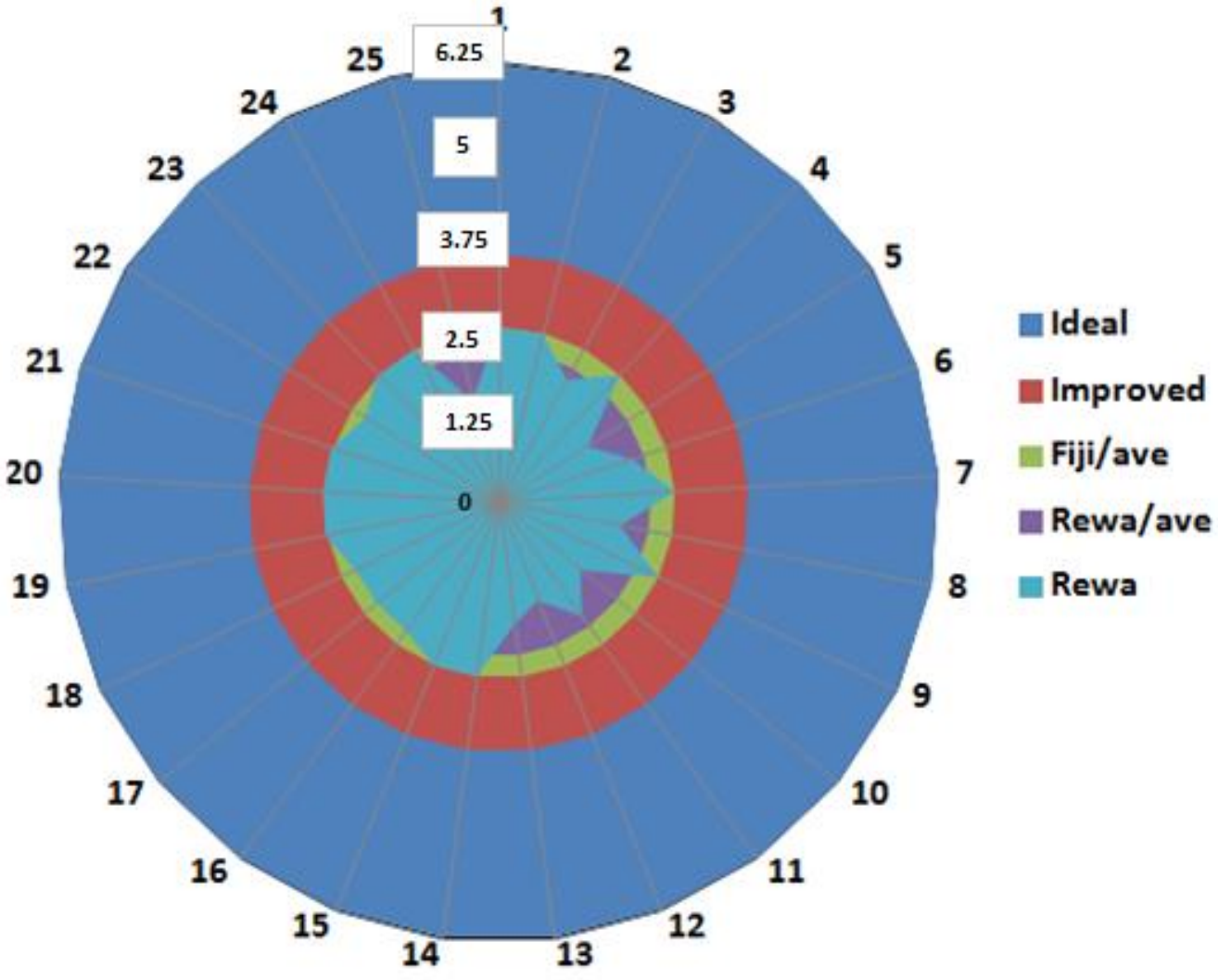
Farmers concerns on climate change impacts

Climate change Impact	Extremely concerned	Very concerned	Moderately concerned	Little concerned	Not concerned
Flooding	13	12			
Heavy rains	13	9	3		
Sea level rise	10	13	2		
Pests	10	10	5		
Declining food security	10	10	5		
Drought	9	16			
Cyclones	8	17			
Temperature increases	8	11	6		
Declining freshwater (quantity/quality)	7	12	6		
Coastal erosion	7	10	2	6	
CO2 level	6	17			2
Storm surges	6	6	10	3	
More sickness and disease	5	18	2		
Invasive plant and animal species	5	11	7	2	
Riverbank erosion	5	10	9	1	
Decreasing biodiversity	5	10	8	1	1
Reef decline/degradation	5	5	13		2
Declining agricultural food resources	4	20	1		
Decreasing quality of life	3	18	4		
Inundation	1	6	11	5	2
	140	**241**	**94**	**18**	**7**

- Sea level rises due to storm surges and floods.
- Sea water also comes with flood waters making the water salty which has a devastating effect on rice growth and yield. Rice plants become stunted from salt impact.
- Farmer perceptions correlates with the actual events as Heavy rain and flooding is always a great concern due to effective dissemination of information.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Rice yield survey and benchmark data



Ideal	Ton/Hectare
Ideal/ target	6.10
Improved	3.56
Fiji/ave	2.50
Rewa/ave	2.19

Fiji with ideal target of around 6 tons per hectare and aiming to achieve 3.5 tons per hectare with improved varieties.

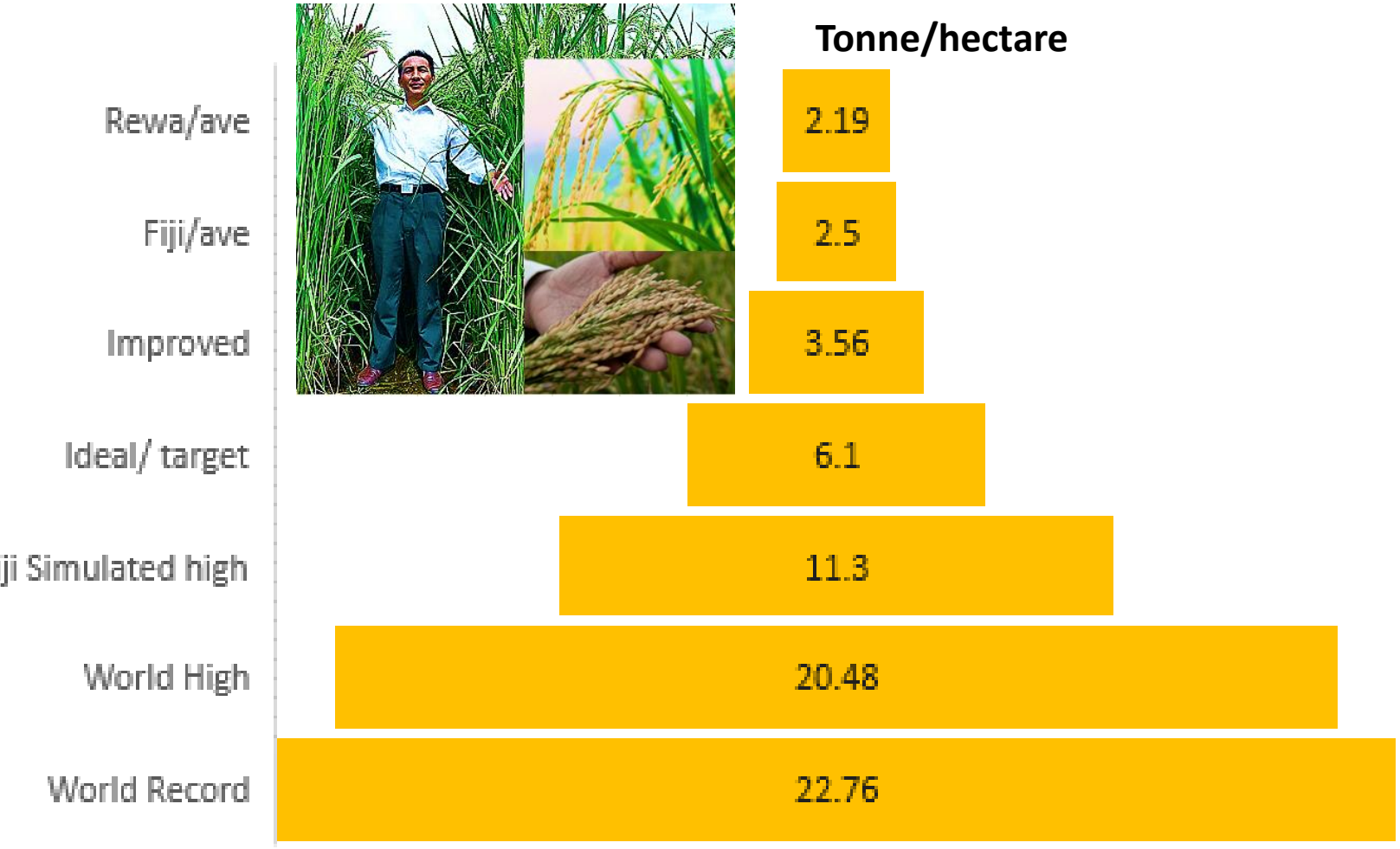
Yield in Rewa Delta is around 2.5 tons per hectare.

Farmers mostly grew rice for home consumption – Family farming not so concerned about getting higher yields.

Food security and livelihoods is main concern.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Fiji Vs the World Benchmark



- Fiji lagging far behind the world production benchmark.
- Farmer perception to change from home consumption to achieving higher yields.
- Improved varieties needed to suit weather conditions, government policies, and agricultural practices needed.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

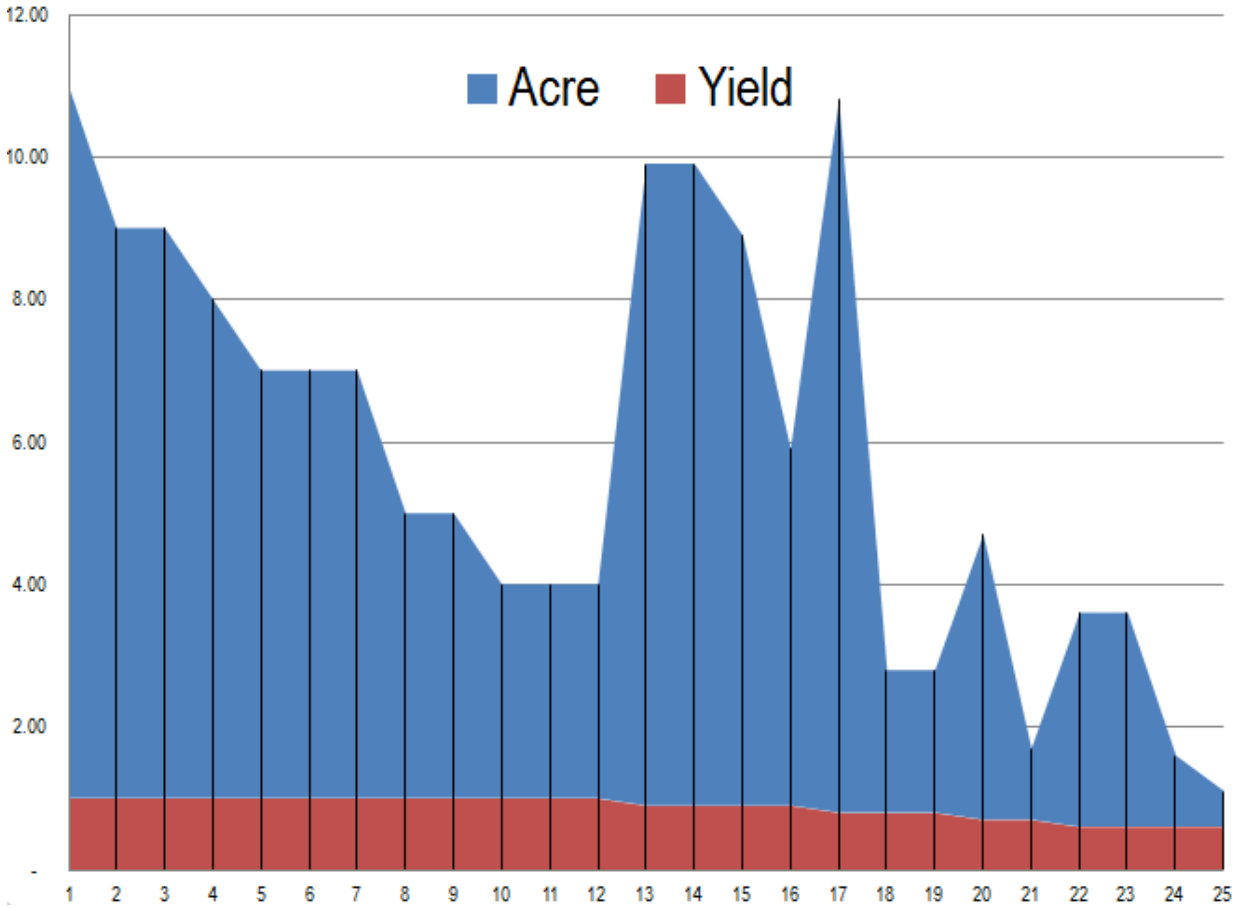
Factors affecting rice production and yield

Factors	Effect	Ave Impact	Rank	Ranking logic
Seedling preparation	High	9.60	1	Preparatory challenges
Weeds		9.00	2	
Unfavorable prep conditions		8.64	3	
Drought		8.48	4	Field related challenges
Unfavorable temperature		7.64	5	
Pest and diseases		5.40	6	
Soil fertility		4.24	7	
Increased natural hazards		3.96	8	Plant growth and survival challenges
Tropical Cyclone		3.76	9	
Heavy rainfall		2.68	10	
Salt water intrusion	Low	2.60	11	

- Preparatory challenges - seedling preparation, clearing weeds, and unfavorable preparatory conditions as the highest difficulty.
- The field related challenges ranked next and plant growth/survival challenges ranked the lowest.
- Stakeholders need to assist during preparatory stages to increase yield.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

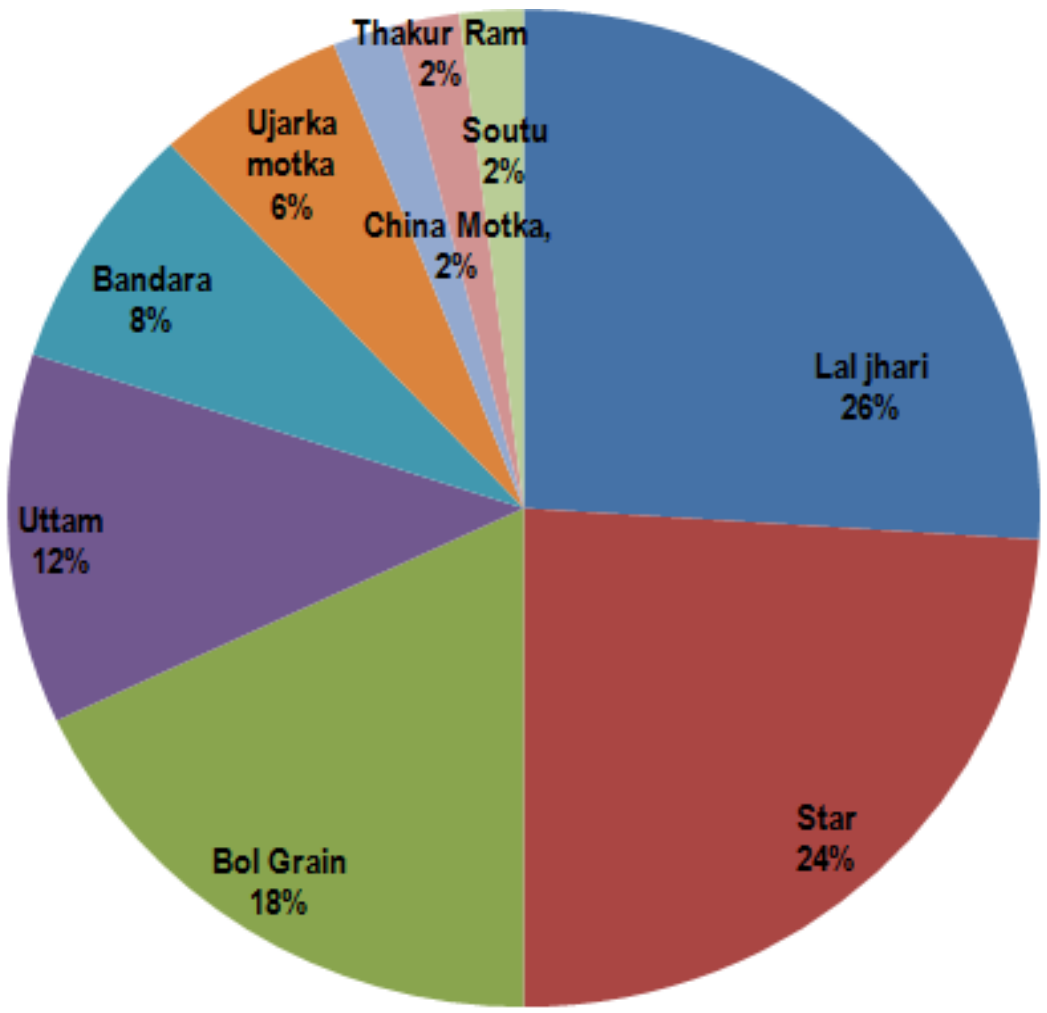
Land size and yield



- Family farming practiced for personal consumption and small scale selling.
- Yield between farmers with larger land and smaller land sizes does not differ significantly.
- Farmers practicing crop diversification and planting cash crops.
- Increasing yield is not a priority.
- Perception that Rice is easily affected by changing weather conditions needs to be addressed.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

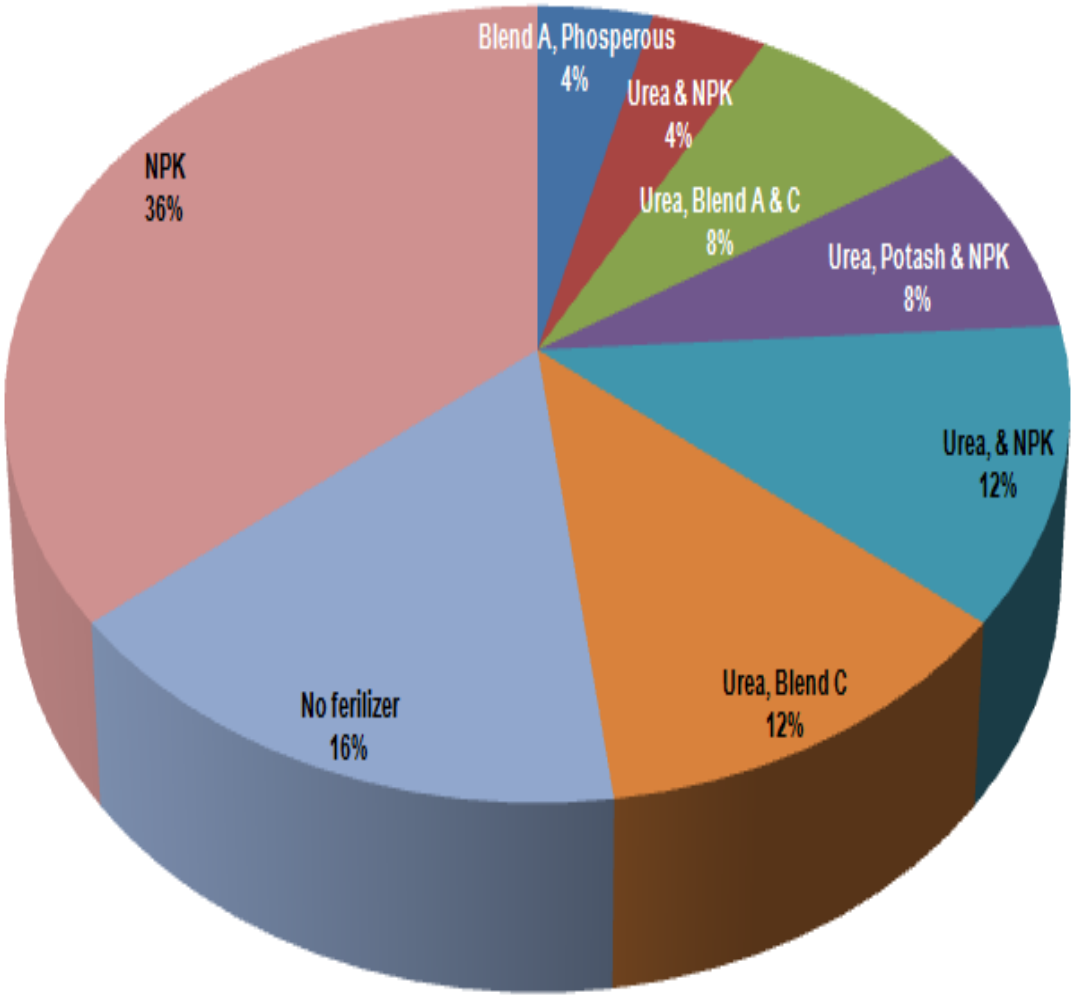
Rice varieties grown by farmers



- Lal Jhari (red variety) was largely grown for home consumption as most rice farmers felt that the Lal Jhari variety had more health benefits.
- Star and Bol Grain varieties are improved varieties with better yield (small scale
- Others are traditional varieties (rain fed) not requiring fertilizer or pesticides.
- **Farmers well informed about the varieties and have good reason to make the variety choices.**

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Fertilizer consumption (farmers surveyed in Rewa Delta)



- Unavailability of appropriate fertilizers
- Combination of fertilizers used based on farmer perception and cost.
- Many farmers were unsure which fertilizer was good and better suited to the soil type
- 16% of farmers who did not to use any fertilizer planted traditional varieties and practiced rainfed farming.
- **Soil analysis for fertilizer application needed.**

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Scientific Research Gaps

1. More research is needed to understand and develop strategies to enhance the resilience of rice farming systems in the face of climate change impacts.
2. Focus on developing and promoting rice varieties suitable for changing weather conditions in the Pacific Islands, considering local contexts, government policies, and agricultural practices.
3. Determine appropriate fertilizer types and application methods to optimize rice production while considering specific soil types and nutrient requirements in the Pacific Islands.
4. Explore innovative approaches to improve the dissemination of climate change information to farmers, considering the local context and the use of new media platforms.
5. Investigate factors influencing farmers' decision-making processes regarding farming practices, rice varieties, fertilizer use, and water management.
6. Empower farmers with accurate information to make informed decisions on climate change adaptation and sustainable farming practices.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Scientific Research Gaps – continued

7. Develop sustainable water management strategies for rice farming in the Pacific Islands, considering water use efficiency, alternative irrigation methods, and potential impacts of sea-level rise and saltwater intrusion.
8. Implement integrated pest management strategies tailored to rice farming in the Pacific Islands, including pest-resistant rice varieties, effective monitoring systems, and eco-friendly pest control methods.
9. Enhance knowledge exchange and capacity-building initiatives for farmers, including training programs, farmer-to-farmer sharing, and farmer networks to disseminate best practices and climate change adaptation strategies.
10. Assess the socio-economic impacts of climate change on rice farming communities in the Pacific Islands, including income, food security, and livelihoods.
11. Evaluate existing policies, programs, and institutions supporting rice farming and climate change adaptation in the Pacific Islands to identify areas for improvement and develop targeted interventions.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Finally - What did we learn – 10 points

1. Extreme weather conditions like floods and heavy rains impact farming in the region.
2. Farmers' concerns about climate change vary based on information dissemination.
3. Radio is the primary medium for climate change and agricultural information.
4. Assistance during preparatory stages can encourage farming.
5. Food security and livelihoods are major concerns for farmers.
6. Crop yield is not related to land size.
7. Traditional crop varieties are grown for home consumption.
8. Challenges exist in fertilizer application and knowledge about suitable fertilizers.
9. Community welfare and family farming are significant in Pacific Islands.
10. Higher yields require changing farmer perceptions, improved practices, information access, and government support.

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

Prasad, J. M. (2019). The impact of changing weather patterns and climate on rice production in the Rewa Delta. USP Aquatic Repository. Retrieved from http://uspaquatic.library.usp.ac.fj/gsdl/collect/usplibr1/index/assoc/HASH4b12.dir/doc.pdf

1st Family fArming Lifestyle and Health (FALAH) conference, Vanuatu, Port Vila, 20-22 June 2023

FATTY ACIDS, MINERALS AND TRACE ELEMENT ANALYSIS OF INDIGENOUS *TERMINALIA KAERNBACHII* (*OKARI)* FROM KAIRURU ISLAND, EAST SEPIK PROVINCE, PNG

By

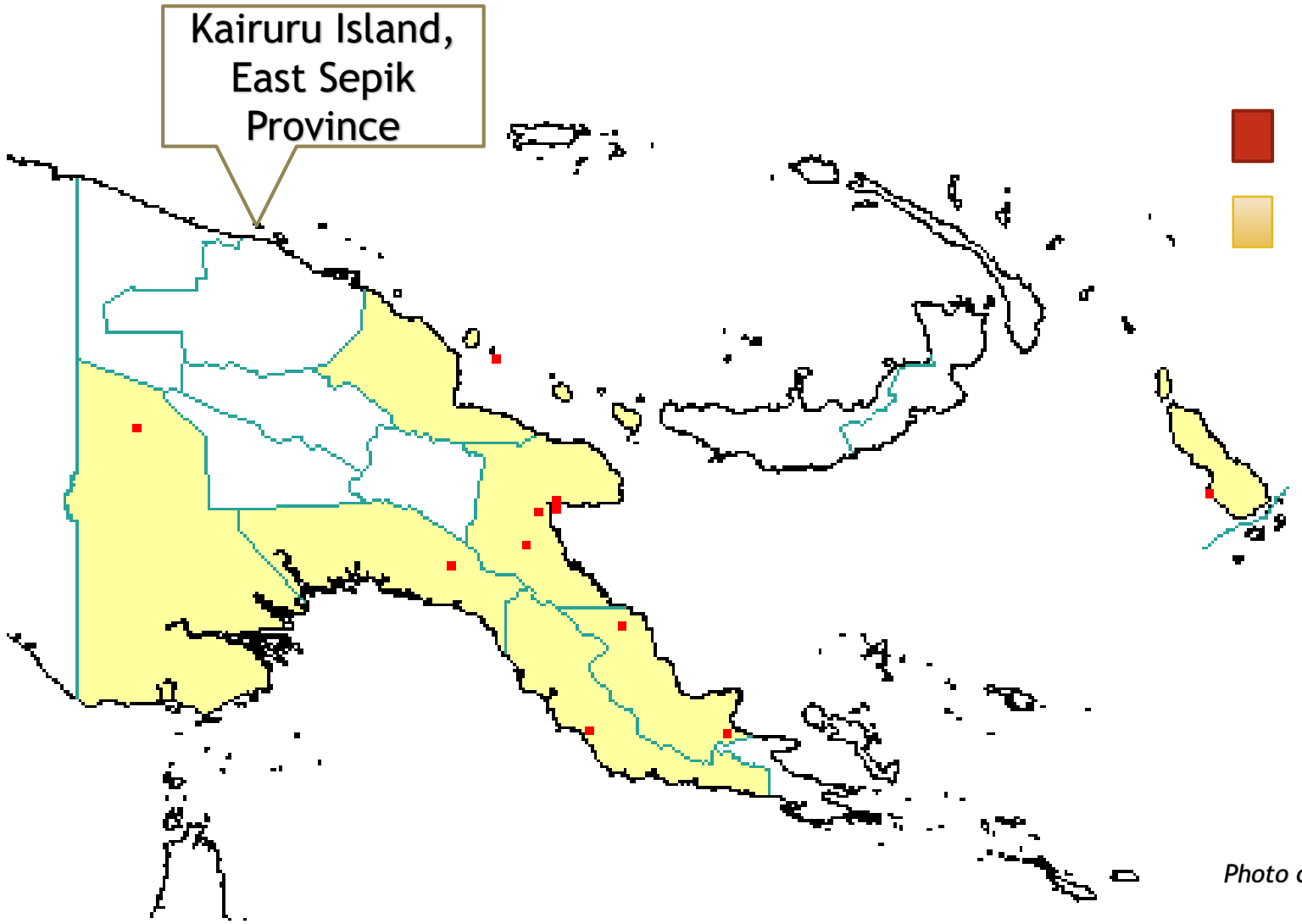
Ronald Aknonero*, Steven Ani, Matthew Pok, Samson Hege, Stewart W Wossa †, Peter Brooks

Introduction…

- Indigenous Nut found in East Asia (Malaysia, Indonesia, New Guinea and Solomon Islands.
- Grows up to 30-40 m at an elevation of 1000 meters (Martin *et al*..,1987) but does fruit well at <1300 meters (French, 2006).
- Large Nut kernals up to 7-8 cm long, 3-4 cm wide and weighs 1.5-10 grams each (Wickens, 1995).
- Nut contains 50% of Non-drying oil and a source of vegetable butter (Wickens,1995).
- Tree is used for building materials

Nb: pictures courtesy of Centre for Agriculture and Biosciences International (CABI)

Distribution of Okari in PNG:



Evidence of Okari Tree

Provinces containing Okari Tree

Photo courtesy of Plants of PNG

Methods: Lab Analysis

- Oil Yield Calculations

  - Husking of the nut from its kernel, Nut pre-weighed, oven roasted at 30ºC, final weight calculations, crude oil extract (soxhlet in n-hexane) and oil yield calculation.

- Fatty Acid Methyl Esters (FAMES)

  - Soxhlet Evaporator

  - Rotary Evaporator

  - Gas Chromatography-Mass Spectrometry (GC-MS)

- Trace Element and Mineral Analysis

  -Induced Coupled Plasma-Varian ProVista (ICP)

- Dietary Reference Index Calculations

@basadoenplantas 2017

Results: (a) FAMES

Table 1: FA composition of Okari (*Terminalia kaernbachii*) from Kairuru Island

FA	C16:1	C16:0	C18:2	C18:1 Cis	C18:1 Trans	C18:0	C20:1	C20:0
%	0.38	42.94	21.22	28.19	0.37	6.32	0.05	0.54

Table 2: % SFA, MUFA and PUFA in Okari (*Terminalia kaernbachii*) oils from Kairuru Island

Types of FA	*% in Okari (Terminalia kaernbachii)* from Kairuru Island
SFA	49.80
MUFA	28.98
PUFA	21.22
Total	100.00

Results: (b)Trace Elements and Minerals:

Table 3: Trace elements in *Okari (Terminalia kaernbachii)* from Kairuru Island

Minerals and Trace Elements	C Wt. %	N Wt. %	Ca Wt %	K Wt. %	Mg Wt. %	P Wt. %	S Wt. %	Al mg/ kg	B mg/ kg	Cu mg/ kg	Fe mg/ kg	Mn mg/ kg	Na mg/ kg	
%	44.9	3.2	0.41	2.2	0.4	0.98	0.21	< 0.1 %						
mg/kg	> 1000 mg/kg							18.6	55.5	31.9	42.6	21.8	384.2	8(

Table 4: Trace elements *Okari (Terminalia kaernbachii) from Kairuru Island in ppm*

	Trace Elements												
	Minerals					Essential Trace				Probably essential		Other	
	Ca	Mg	P	K	Na	Cu	Fe	Mn	Zn	Al	B	C	N
ppm	4141.1	3809.7	9762.8	21779.5	384.2	31.9	42.6	21.8	80	18.6	55.5	449400	31890

Discussion: (a) FAMES

- The oil analysis of Okari (*Terminalia kaernbachii)* produced 58.8% oil yield.
- C16:1 palmitoleic acid (0.38%), **C16:0 Palmitic acid (42.94 %)**, C18:2 Linoleic acid (21.22 %), C18:1 cis Oleic acid (28.19 %), C18:1 trans Elaidic acid (0.37 %), C18:0 Stearic acid (6.32 %), C20:1 Eicosenoic acid (0.05 %).
- Palmitic acid (C16:1) dominates the Okari oil with 42.94 %
- SFA (49.8 %), MUFA (28.98 %) and PUFA (21.22 %) = 100%
- SFA more predominant in the oil with 49.8 %

Discussion: (b) DRI Calculation Examples

- With reference to WHO/FAO (2008) total maximum fat intake level in Adults in grams:
- MUFA = (%E x 100)/ % in sample

  = (2%E x 100)/28.98%

  = 200/28.98

  = 6.9 g of Oil
- Maximum Wt. of Okari (dry meal) = *6.9g* x *1/% oil yield*

  = 6.9g x 1/58.8/100

  = 6.9g x 100/58.8

  = 11.74g/day
- This applies also to the Minerals composition in the dry nut meal.

Discussion: (c) Trace Element and Minerals

Table 4: Trace elements *Okari (Terminalia kaernbachii) from Kairuru Island in ppm*

	Trace Elements													
	Minerals					Essential Trace				Probably essential		Other		
	Ca	Mg	P	K	Na	Cu	Fe	Mn	Zn	Al	B	C	N	S
ppm	4141.1	3809.7	9762.8	21779.5	384.2	31.9	42.6	21.8	80	18.6	55.5	449400	31890	2051

The most abundant elements based on the analysis (excluding carbon) were Nitrogen (31890 ppm) followed by Potassium (21779.5 ppm) in *Okari (Terminalia kaernbachii)* from Kairuru Island.

Table 5: Recommendation for total maximum FA intake levels in ADULTS (WHO/FAO 2008- Fat Imtake)

FA % composition of Okari				
Fatty Acids	%			
C16:1	0.3803		FA	%
C16:0	42.943		Total SFA	49.80
C18:2	21.218		Total MUFA	28.98
C18:1 cis	28.189		Total PUFA	21.22
C18:1 trans	0.368		Total	100.00
C18:0	6.316		n-6 PUFA	21.2
C20:1	0.0461		n3 PUFA	
C20:0	0.5392		TFA	0.37
Deity recommendation for total maximum fat and Fatty Acid intake for ADULTS			Maximum Gram of Okari Oil to meet Dietary recommendation for total maximum fat and Fatty Acid intake for ADULTS	
Total Fat	35%E	35		
SFA	10%E	10		
MUFA	*		Total SFA	20.1
Total PUFA	11%E	11	Total MUFA	6.9
n-6 PUFA	9%E	9	Total PUFA	51.8
n-3 PUFA	2%E	2	n-6 PUFA	42.4
TFA	1%E	1	n3 PUFA	
Subtotal	33%E	33	TFA <	271.8
* = Total Fat –Subtotal	2%E	2		

Table 6: Application of DRIs for Minerals and Trace elements to Okari

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes (mg/day). Okari (meal) = DRIs of Okari (meal) in kg = (DRIs/amount of element in Okari)								
				Minerals				
Reference	GR 2000	Okari (kg)	NC 2012	Okari (kg)	NC 2012	Okari (kg)	NC 2012	Okari (kg)
Dietary reference Value (DRV)	Ca		P		K		Mg	
Children								
< 6 months	210	0.051						
6-11 months	450	0.109	420	0.043	1100	0.051	80	0.021
age 1-2			470	0.048	1400	0.064	85	0.022
age 1-3	500	0.121						
age 2-5			470	0.048	1800	0.083	120	0.031
age 4-6								
age 4-8	700	0.169						
age 6-9			540	0.055	2000	0.092	200	0.052
age 7-10								
Men								
age 9-13	1200	0.290	700	0.072	3300	0.152	280	0.073
age 11-14								
age 15-17								
age 14-18	1200	0.290	700	0.072	3500	0.161	350	0.092
age 19-50	1000	0.241	600	0.061	3500	0.161	350	0.092
age 50-70	1100	0.266	600	0.061	3500	0.161	350	0.092
aged > 70	1200	0.290	600	0.061	3500	0.161	350	0.092
Women								
age 9-13	1100	0.266	700	0.072	2900	0.133	280	0.073
age 11-14								
age 15-17								
age 14-18	1100	0.266	700	0.072	3100	0.142	280	0.073
age 19-50	1000	0.241	600	0.061	3100	0.142	280	0.073
age 50-70	1100	0.266	600	0.061	3100	0.142	280	0.073
aged > 70	1200	0.290	600	0.061	3100	0.142	280	0.073
Pregnant women	1000	0.241	700	0.072	3100	0.142	280	0.073
Lactating women	1000	0.241	900	0.092	3100	0.142	280	0.073

Table 7: Application of DRIs for Trace elements in Okari

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes (mg/day). Okari (kg): DRIs of Okari (meal) in kg= (DRIs/Average element in Okari in mg/kg)								
	Trace Elements							
Reference	NC 2012		NC 2013		NC 2012		EFSA 2013	
Dietary reference Value (DRV)	Fe mg/day	Okari (kg/day)	Zn mg/day	Okari (kg/day)	Cu mg/day	Okari (kg/day)	Mn mg/day	Okari (kg/day)
Children								
< 6 months								
6-11 months	8	0.188	5	0.063	0.3	0.009	0.5	0.023
age 1-2	8	0.188	5	0.063	0.3	0.009		
age 1-3							0.5	0.023
age 2-5	8	0.188	6	0.075	0.4	0.013		0.000
age 4-6							1	0.046
age 4-8								
age 6-9	9	0.211	7	0.088	0.5	0.016		
age 7-10							1.5	0.069
Men								
age 9-13	11	0.258	11	0.138	0.7	0.022		
age 11-14							2	0.092
age 15-17							3	0.137
age 14-18	11	0.258	12	0.151	0.9	0.028		
age 19-50	9	0.211	9	0.113	0.9	0.028	3	0.137
age 50-70	9	0.211	9	0.113	0.9	0.028	3	0.137
aged > 70	9	0.211	9	0.113	0.9	0.028	3	0.137
Women								
age 9-13	11	0.258	8	0.101	0.7	0.022		
age 11-14							2	0.092
age 15-17							3	0.137
age 14-18	15	0.352	9	0.113	0.9	0.028		
age 19-50	15	0.352	7	0.088	0.9	0.028	3	0.137
age 50-70	9	0.211	7	0.088	0.9	0.028	3	0.137
aged > 70	9	0.211	7	0.088	0.9	0.028	3	0.137
Pregnant women	5	0.117	9	0.113	1	0.031	3	0.137
Lactating women	15	0.352	11	0.138	1.3	0.041	3	0.137

Conclusion:

- The Okari (*Terminalia kaernbachii)* analyzed in this study is a good source of palmitic acid and is rich in dietary minerals and trace elements, particularly Ca, Mg, P, K, Na, P and N when compared to WHO/FAO (2008) recommendations.
- The positive FFA and mineral profile of Okari may be due to good growing conditions for the crop.
- It would be beneficial to recommend more widespread consumption of Okari nut for nutritional purposes.
- Address Food Security Issues

Future Studies:

- Ethnological documentation of indigenous varieties
- Amino acids (proteins) profiling of the Okari nut
- Phytochemicals in the flowers, leaves and fruit extracts
- Hybrid trees for commercial aspects
- “Comparison to Galip (*canarium indicum*), okari is bigger in terms of the size and length and should be the next opportunity for commercialization” by Bang, 2018.

PAPUA NEW GUINEA Post-Courier
The heartbeat of PNG
Menu

NARI: Okari next on commercial radar

by PCADMINPNG
AUGUST 3, 2018

BY MATTHEW VARI

With galip nut taking the limelight after its commercial launch last week, another humble nut we take for granted, the okari, will also go down a similar path to commercialisation.

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End…

- THANK YOU FALAH COMMUNITIES

1st FALAH conference, Port Vila, Vanuatu

20st to 22th of June 2023

Indigenous knowledges, practices and resilience during the COVID-19 pandemic in university students: the case of New Caledonia and Vanautu

Olivier GALY (UNC), Isaake Tuikalepa (UNC), Waixen Waikata (UNC), Akila Nedjar Guerre (UNC), Louis Lagarde (UNC), Dotte Anne-Laure (UNC), Jean François Loisel (UNC), Amelle Aoudia (UNC), Vaimoe Albanese (UNC), Frank Thomas (USP), Yane Meltetineath (MOET-UNC), Catherine Sabinot (IRD), Séverine Bouard (IAC), Arno Pascht (KULA), Christophe Serra-Mallol (UTJ2), Pierre Metsan (MOET), Adeline Mweleul (MOET), Felicity Rogers (MOET), Floriane Lawac (VARTC), Juliane Kaoh (VARTC), Patrick Rory (UNV), Ben Boulekouran (UNV), Ariane Naliupis (UNV), Annette Theophile (UNV)

Context and research questions

The Knowledge, Indigenous Practices and Resilience in the Pacific Islands (SPAR-Pacific) project focuses specifically on family perceptions and practices among New Caledonian and Vanuatu students and their families in 2022/2023 in the Post COVID-19 Pandemic context.

Objective 1: Measure the existence and activation of traditional knowledge and practices among New Caledonian and Ni-Vanuatu students

Objective 2: To appreciate the associated perceptions and intangible aspects of youth

Objective 3: Understand the modes of development, expression, and transmission after the COVID-19 pandemic in relation to the socio-economic and natural environment of young people

Context and research questions

Indigenous knowledge and practices constitute *"a set of knowledge shared by a human group, which is transmitted and transformed, in connection with the ecology of this group. This knowledge covers :*

languages, literatures, arts, crafts, rituals, games, gastronomy, medicine, management of natural resources (fauna, flora, soil, water), architecture, artifacts, orientation in space, etc.

They are both a way of seeing the world and a way of living it. »

United Nations Permanent Forum on Indigenous Issues

Context and research questions

1. Hunting
2. Fishing
3. Gathering
4. Cultivation of the field or garden
5. Raising animals for food
6. Food preparation
7. Food preservation
8. Management of diseases and injuries
9. Interpretation of phenomena
10. The creation of clothing
11. Making traditional tools
12. The construction of shelters
13. The manufacture of instruments
14. The orientation and the displacement
15. The understanding of a language
16. The practice of an vernaculary language

Context and research questions

WP2	2.1 Gather and summarize knowledge on cropping practices, consumption, innovation and the dynamics of family farming 2.2 Improve understanding of how family farming functions through ecological, economic, sociological and spatial dimensions and how it adapts to the environment
WP3	3.1 Examine the effects of family farming on lifestyle and its impact on the health and well-being 3.2 Explore diet and physical activity in families practicing family farming 3.3 Analyze inter-generational benefit on family farming lifestyle
WP4	**4.1 Compare traditional family farming practices, its adaptation to the environment and identify best practices to disseminate** 4.2 Examine the role of school in promoting food education, physical activity, and changing dietary habits **4.3 Share new knowledge to develop sustainable intervention strategies that can help people from other regions** **4.4 Accumulate, cross and share traditional and scientific knowledge on small-scale farming and eating habits to establish production and consumption strategies adapted to the socio-cultural context.**

Protocol

Mixed methods

<u>Quantitative approach</u> : survey

<u>Qualitative approach</u> : individual interviews

Indigenous knowledge, practices and resilience in the Pacific Islands

AIM OF THE SPAR PACIFIC PROJECT

Study of
indigenous perceptions and practices among New Caledonian and Ni-Vanuatu students and their families in 2023.

PROJECT
OBJECTIVES

Objective 1 : To
measure the existence and activation of traditional knowledge and practices
among New Caledonian and Ni-Vanuatu students

Protocol

Interdisciplinary study using Mixed methods

Quantitative approach : questionnaire

Qualitative approach : individual interviews

1. MY PRACTICES FROM FAMILY (INDIGENOUS) KNOWLEDGE

2. MY PERCEPTIONS ON FAMILY (INDIGENOUS) KNOWLEDGE and COVID-19
    1. SPATIAL DIMENSION
    2. SOCIAL DIMENSION
    3. TEMPORAL DIMENSION
    4. LIFESTYLE INFORMATION
    5. LINGUISTICS

3. LAW, KNOWLEDGE AND PRACTICES IN MY OPINION

4. KNOWLEDGE, INFORMATION AND TRANSMISSION IN MY OPINION

1. MAKING CONTACT

2. ACTIVITY PRACTICES *(What family activities are you currently engaged in (farming, horticulture, fishing, animal husbandry, hunting, gathering, giving and trading, handicrafts...), if you live with your family or in close proximity? And if you live alone?)*

3. MODALITIES AND CONDITIONS OF ACQUISITION OF PRACTICES *(Did you learn by observing (elders, peers...)? Who taught you these techniques (parents, grandparents, uncles, aunties, outside of family, school, other...)?) At what time?)*

4. TRANSMISSION AND SPREAD/DISSEMINATION OF KNOWLEDGE AND PRACTICES *(How do you pass on these practices? To whom? (relatives, tribe, peers of your generation, youth, children). Do you share your knowledge/practices with other people from different communities? In what way? orally, in writing or online? orally (discussion with family, relatives). In writing (books, journals, magazines, theses...). Online (social networks, website, blog, article), in which formats: video, comments on social networks (which networks)?*

Fields of research

Interdisciplinary study using Mixed methods

Quantitative approach : questionnaire

- Transmission
- Frequency
- Perception

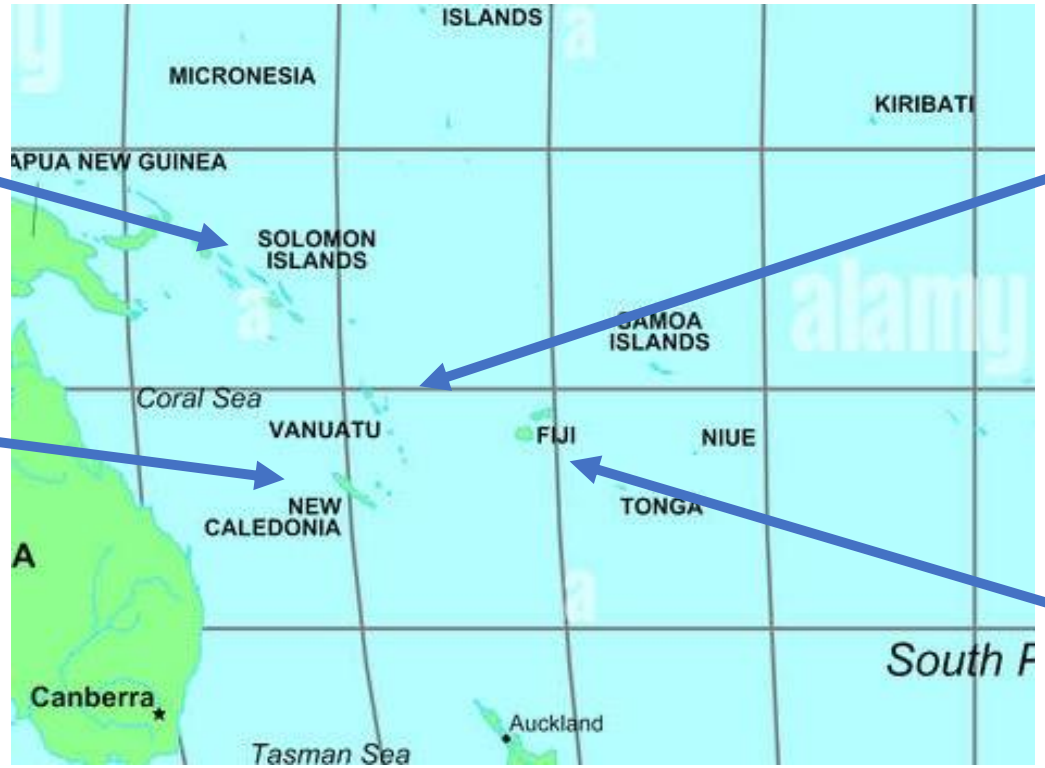
Qualitative approach : individual interviews

Explore ways that traditional knowledges and practices are generated, their perception, mobilised and ttansmitted,etc.

Honiara
n (Qt) = 600
n (Ql) = 30

Nouville
n (Qt) = 482
n (Ql) = 20

Baco
n (Qt) = 44
n (Ql) = 10



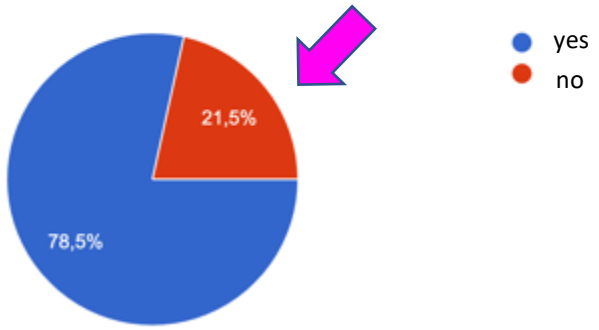
Port-Vila
n (Qt) = 323
n (Ql) = 30

Laucala
n (Qt) = 600
n (Ql) = 30

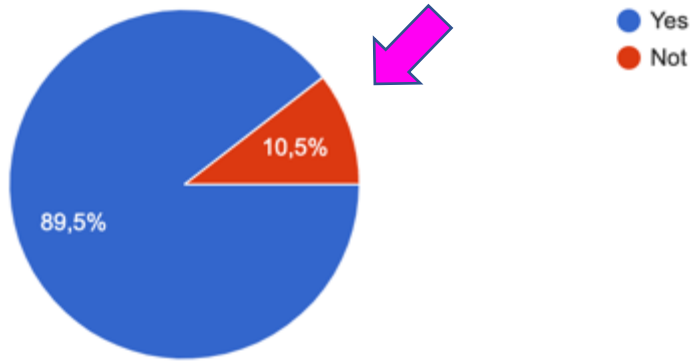
Preliminary results New Caledonia & Vanuatu

New Caledonia

Do you feel that you are the custodian (guardian etc.) of family knowledge and practices (traditional practices)?

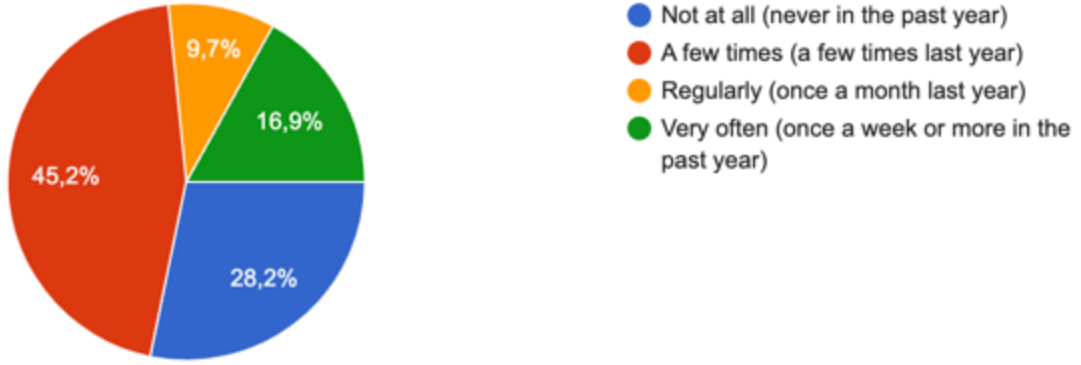


Vanuatu (english)



Regarding hunting (for example, pigs, bats, bush chickens, pigeons, other), would you say that you practice it?

10.7% NC vs 26.6% VAN (regularly +often)



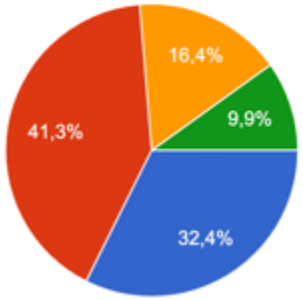
Preliminary results New Caledonia & Vanuatu

New Caledonia

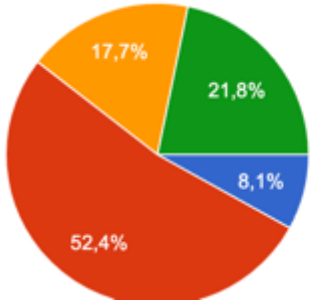
Vanuatu (english)

Regarding fishing (e.g. net, gun, line, shellfish collection, crabs, etc.), would you say that you practice it:

26.3% NC vs 39.5% VAN (regularly +often)



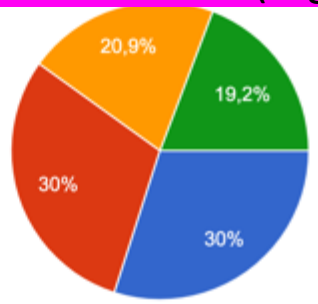
- Not at all (never in the past year)
- A few times (a few times last year)
- Regularly (once a month last year)
- Very often (once a week or more in the past year)



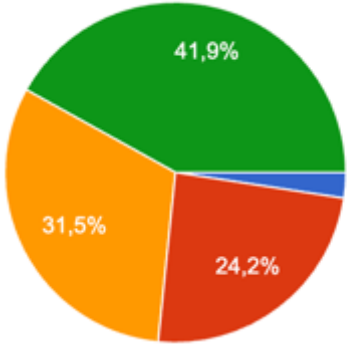
- Not at all (never in the past year)
- A few times (a few times last year)
- Regularly (once a month last year)
- Very often (once a week or more in the past year)

Regarding the cultivation of the field or garden (only taro; yam; sweet potato; cassava; banana, sugar cane, island cabbage), would you say that you practice it?

40.1% NC vs 73.4% VAN (regularly +often)



- Not at all (never in the past year)
- A few times (a few times last year)
- Regularly (once a month last year)
- Very often (once a week or more in the past year)



- Not at all (never in the past year)
- A few times (a few times last year)
- Regularly (once a month last year)
- Very often (once a week or more in the past year)

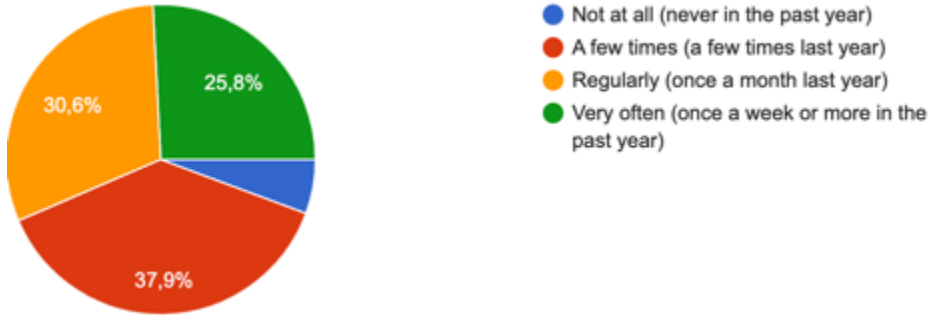
Preliminary results New Caledonia & Vanuatu

New Caledonia

Vanuatu (english)

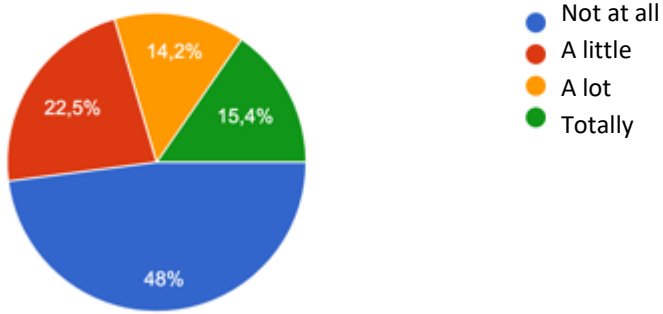
Regarding picking/gathering (harvesting fruit, mushrooms or wild yams, wood worm, others), would you say that you practice it ?

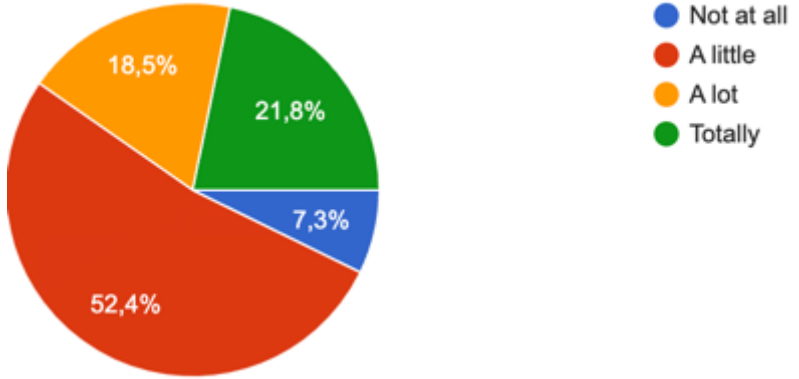
28.5% NC vs 56.5% VAN (regularly +often)



Regarding the breeding of animals for consumption, would you say that this is part of your family practices?

29.6% NC vs 40.3% VAN (regularly +often)





Preliminary results New Caledonia & Vanuatu

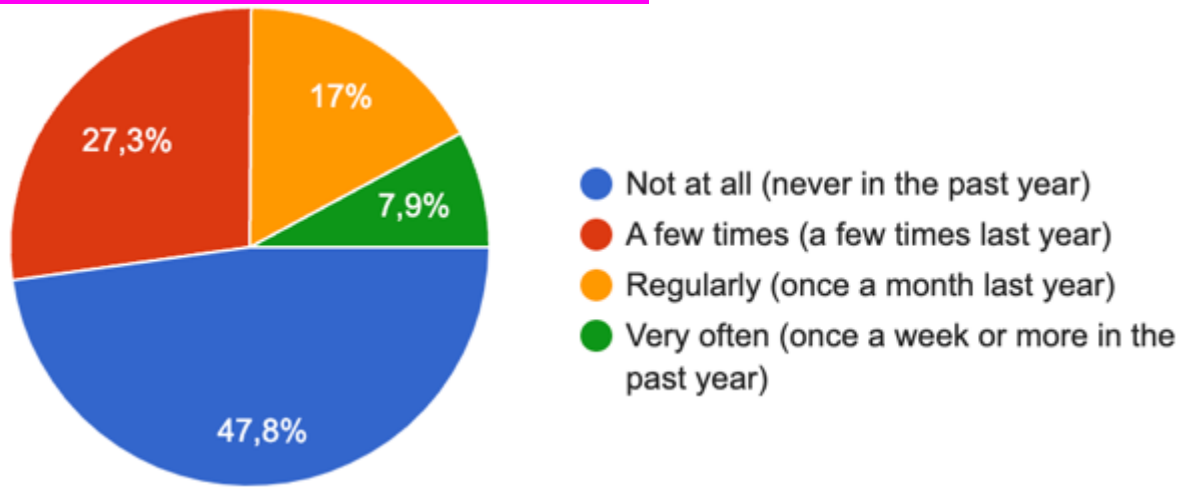
New Caledonia

Regarding food preparation, do you use products from family activities ?

59% NC vs 67.8% VAN (regularly +often)

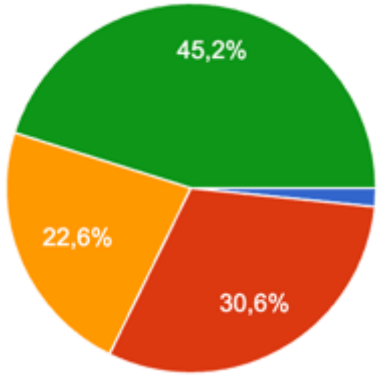
Regarding food preservation, would you say that you use traditional methods (smoking, drying, storage, baking for preservation, etc...) for products from family activities (field or garden cultivation, gathering, breeding, hunting, fishing) ?

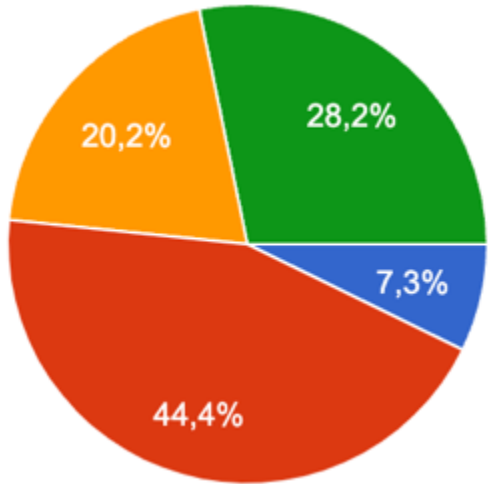
24.9% NC vs 48.4% VAN (regularly +often)



Vanuatu (english)

Regarding food preparation, do you use products from family activities ?

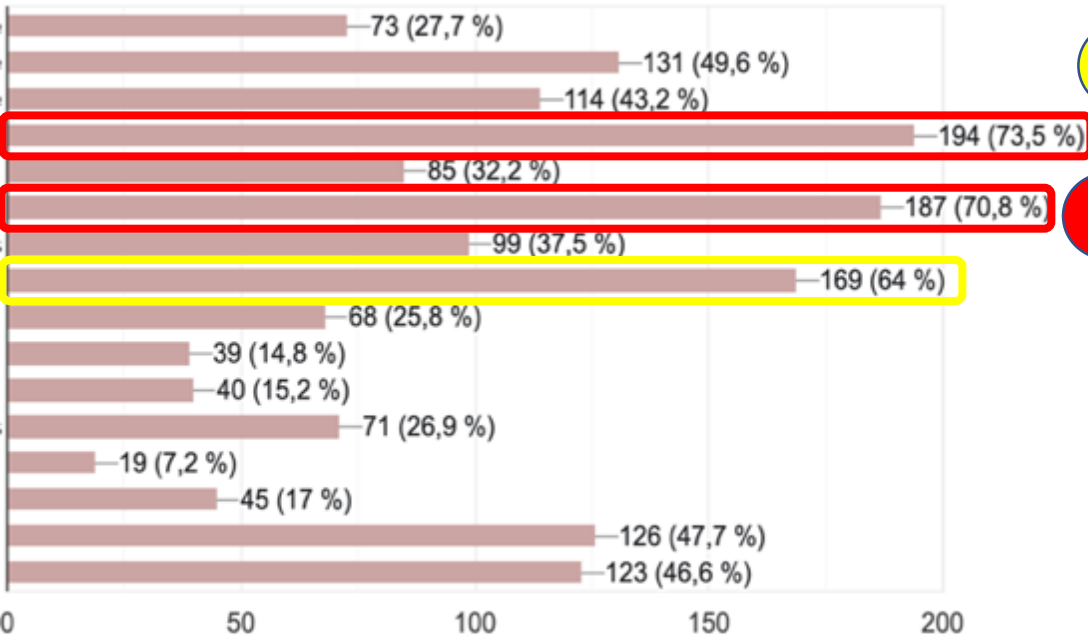




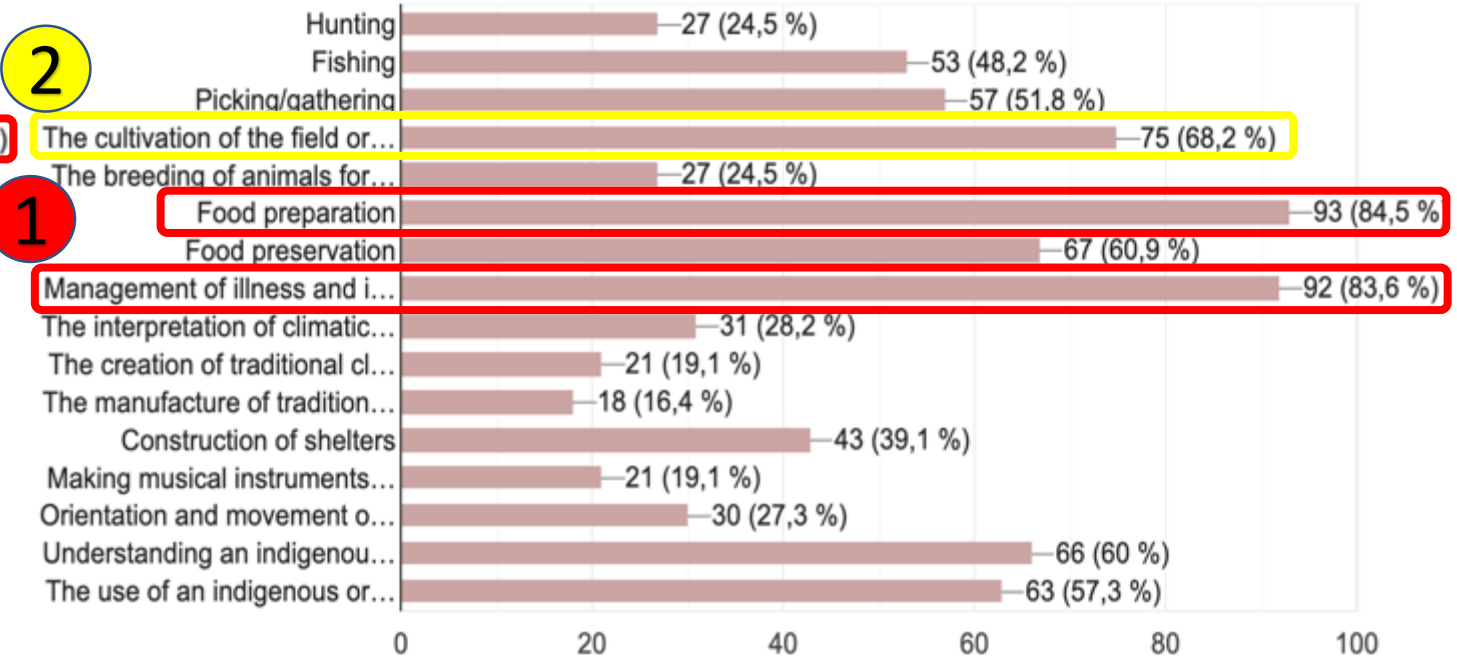
Preliminary results New Caledonia & Vanuatu

During the pandemic, do you think your traditional knowledge and practices have been useful to you in dealing with this pandemic ?

New Caledonia



Vanuatu (english)



2

1

Discussion & conclusions

These preliminary results from NEW CALEDONIA AND VANUATU revealed that**:**

1- geographical and socio-economic contexts have an impact on traditional practices in the Pacific region.

2- the usefulness of indigenous knowledge and practices in dealing with the COVID-19 pandemic

3- traditional family farming & food-related practices were found to be the most useful during the pandemic.

4- And while it appears that horticulture (field cultivation and gathering) is the most useful practice during this period for New Caledonian students, Ni-vanuatu students it is food preparation remains the main practices.

Other aspects aspects of this interdisciplinary study need to be analysed and could bring new informations on traditional knowledge and practices in post pandemic context :

1. MY PRACTICES FROM FAMILY (INDIGENOUS) KNOWLEDGE
2. MY PERCEPTIONS ON FAMILY (INDIGENOUS) KNOWLEDGE and COVID-19
   A. SPATIAL DIMENSION
   B. SOCIAL DIMENSION
   C. TEMPORAL DIMENSION
   D. LIFESTYLE INFORMATION
   E. LINGUISTICS

3. LAW, KNOWLEDGE AND PRACTICES IN MY OPINION
4. KNOWLEDGE, INFORMATION AND TRANSMISSION IN MY OPINION

NEXT STEPS

Mixed methods

Quantitative approach : questionnaire

- Transmission
- Frequency
- Perception

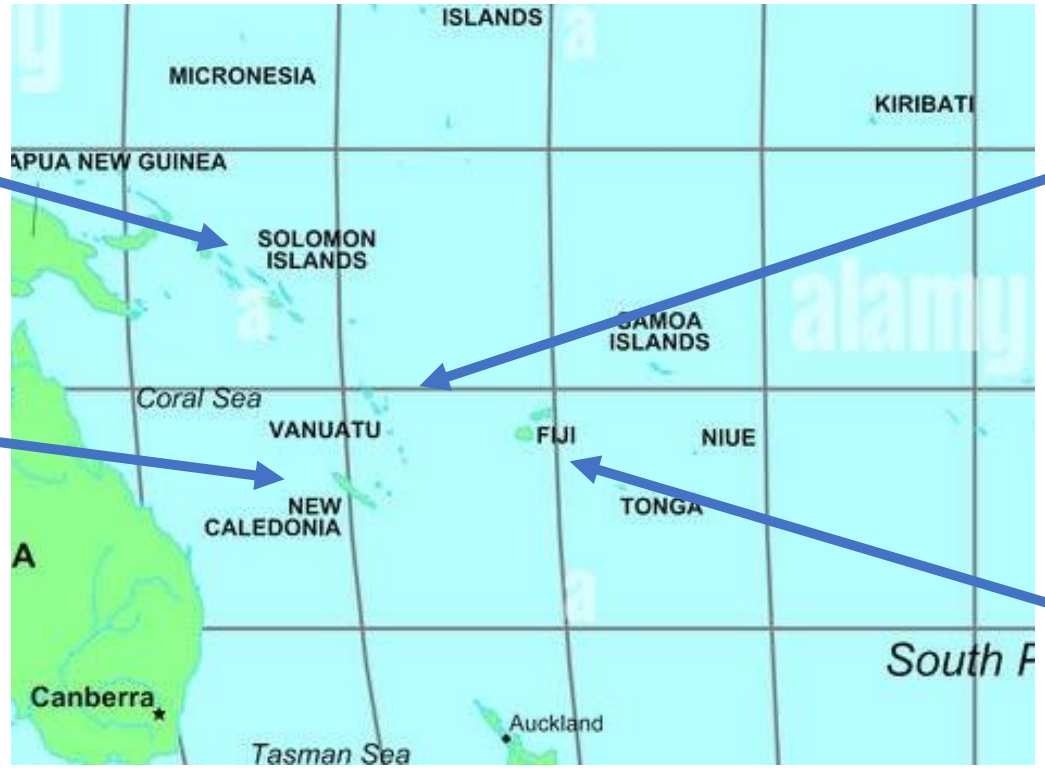
Qualitative approach : individual interviews

Explore ways that traditional knowledges and practices are generated, their perception, mobilised and ttansmitted,etc.

Honiara
n (Qt) = 600
n (Ql) = 30

Nouville
n (Qt) = 482
n (Ql) = 20

Baco
n (Qt) = 44
n (Ql) = 10



Port-Vila
n (Qt) = 600
n (Ql) = 30

Laucala
n (Qt) = 600
n (Ql) = 30

NEXT STEPS

July 2023

- 14 campuses, 12 member countries.
- 20,000 + students this semester (52% studying at **Laucala)**.
- USP FALAH team members predominantly based at **Laucala**.

NEXT STEPS

Mixed methods

Goroka ?

Quantitative approach : questionnaire

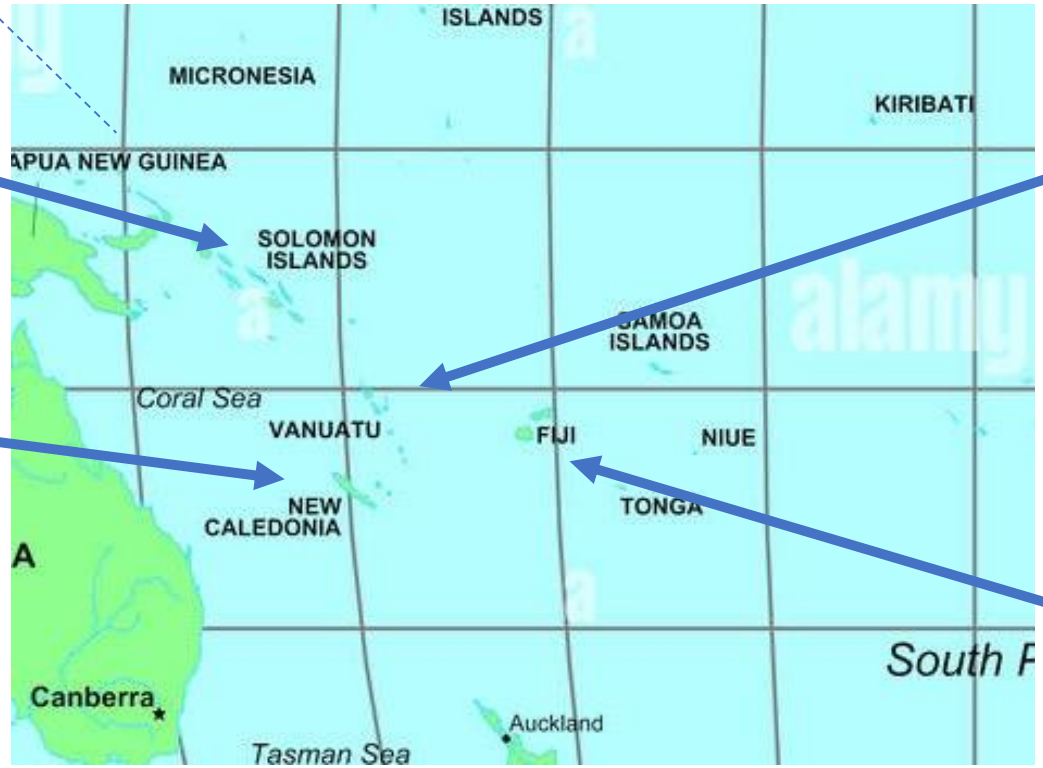
- Transmission
- Frequency
- Perception

Qualitative approach : individual interviews

Explore ways that traditional knowledges and practices are generated, their perception, mobilised and ttansmitted,etc.

Tonga ?

Honiara
n (Qt) = 600
n (Ql) = 30



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RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

UNIVERSITÉ de la NOUVELLE-CALÉDONIE

FALAH
Family farming, lifestyle & health

Thank you for your attention

FALAH

Agriculture familiale, mode de vie & santé

"Bougna" customary practices and representations

Fabrice Saiqë WACALIE
LIRE EA 7483

UNIVERSITÉ de la NOUVELLE-CALÉDONIE

Outline

1. Reseach framework
2. "Bougna" customary practices and representations
3. Other practises in the Pacific
4. Conclusion

1. Reseach framework

Main objectives & Research questions

MAIN OBJECTIVES:

"cooperation policies and the role of education in the formulation of public policies for family farming and fishing: what place for local knowledge?"

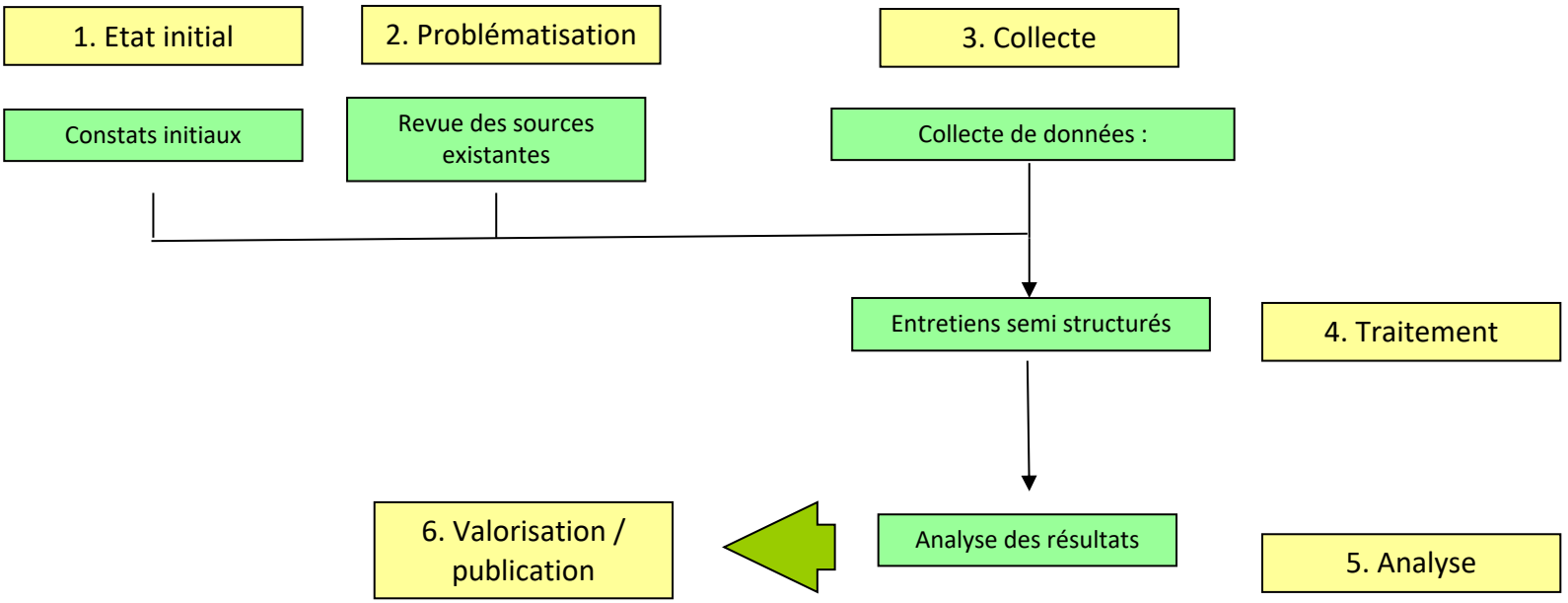
Examples of questions :

Which dish is representative of your culture?

How do you prepare it? When? During customary events? Which?

What does this dish represent in your culture? Etc.

QUALITATIVE APPROACH



Food culture (2019/2020):
3 interviews (2023) to test the questionnaire

2. « Bougna » customary practices and representations in kanak cultures

« Bougna »: social organisation

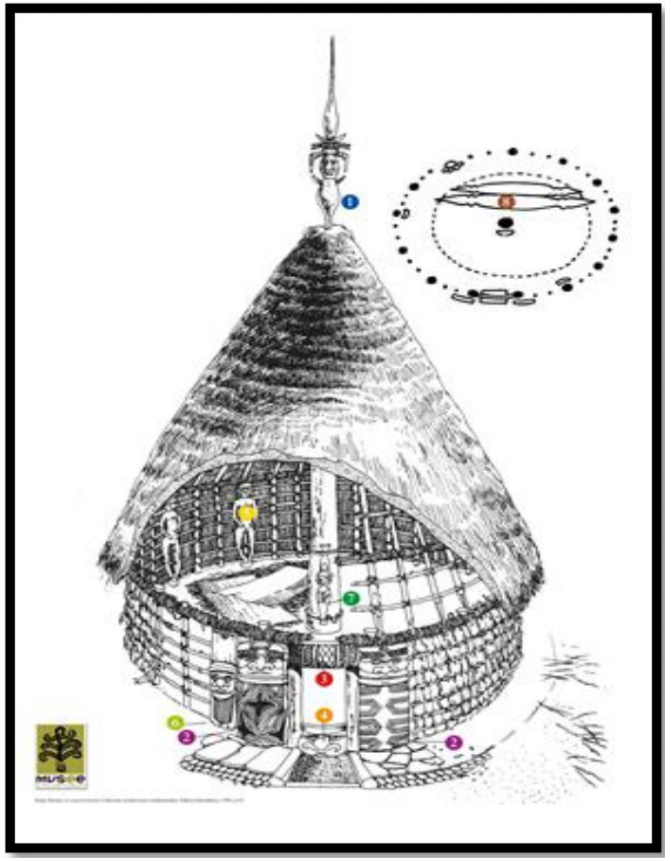
FIRST DATA

Credit: Havila College

« Bougna »: social organisation

FIRST DATA

the soft part (upper layer): symbol of woman (with taros & sweet potatoes), clan in Kanak culture



the hard part (underneath): symbol of man (with yams & meat), chef in Kanak culture

Customary practices: the *saitraji* of Lifou island

FIRST DATA

- Customary wedding
- Sa-itra-aji ‘cook-bougna-rat’
- Gather the clan togther to discuss the organization of a marriage

To learn more…:

- Nicolas, H. (2022)
- Ihage, W. (1992)

Customary practices: the *obunyâ* of Uvea island

FIRST DATA

- Customary wedding
- The young man (groom) arranges his yams in front of him, *obunyâ* (lit. ‘half of *bougna’*).
- The young woman (bride) then brings her share, *obunyâ*.
- The "bougna" is thus completed by the two parts. The social contract is sealed.

Credit: Y. Hnyeillitr

3. Other practices in the Pacific

Customary practices in the Pacific

OPPORTUNITIES

The *laplap* of Vanuatu

The *lovo* of Fidji

The *hāngī* of the Māori

The *umu* of Uvea

4. Conclusion

References

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Nicolas, H. (2022). 4. La cérémonie du bougna de rat, *itra aji*. Dans H. Nicolas, *La fabrique des époux à Lifou en Kanaky* (pp. 63-66). Paris: Karthala.

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THANK YOU VERY MUCH

AND *BON APPETIT !*

ENJOY YOUR MEAL !

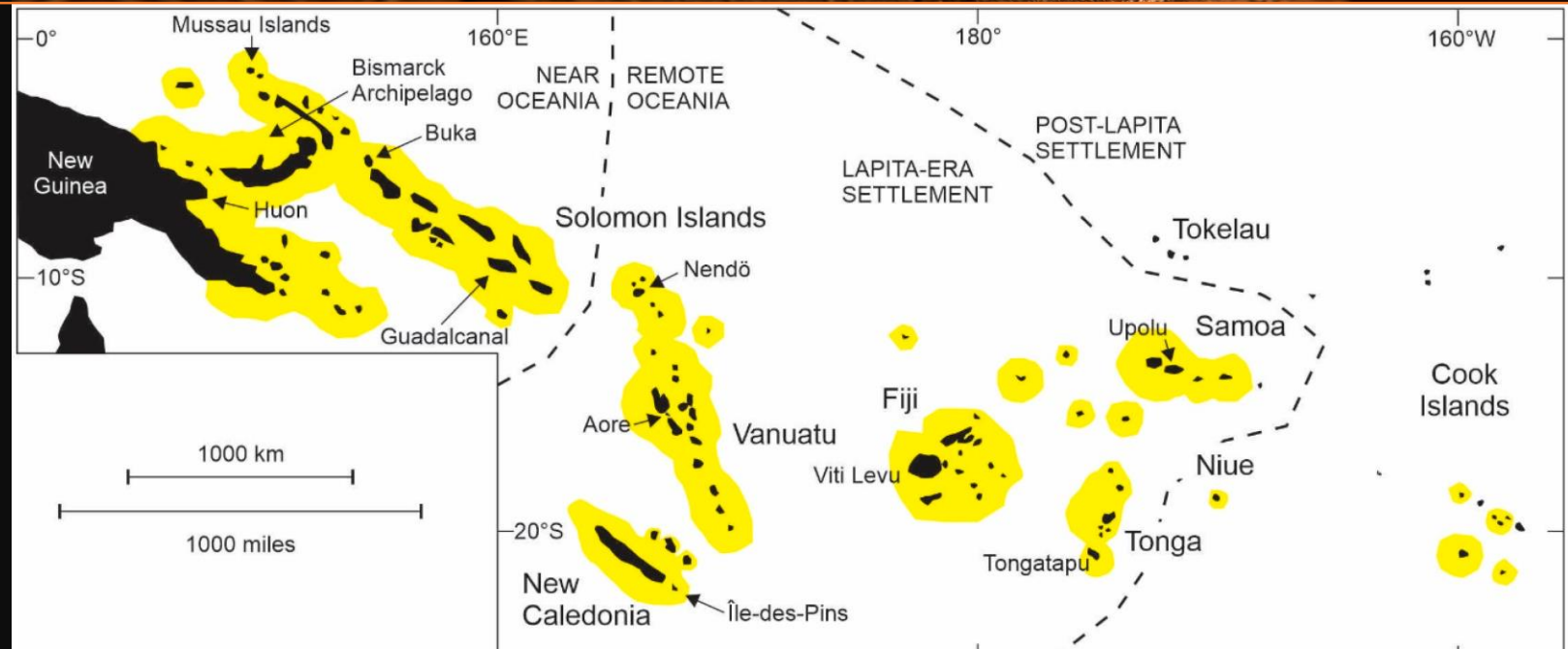
Human-Mollusk Interaction in Vanua Levu, Fiji: How the Past can Inform a Sustainable Future

Frank R. Thomas

University of the South Pacific

Laucala Campus, Fiji

Mollusk (shellfish) gathering becomes prominent with the Lapita expansion 3000 BP (Before Present)



Food resources – rich in protein and micro nutrients

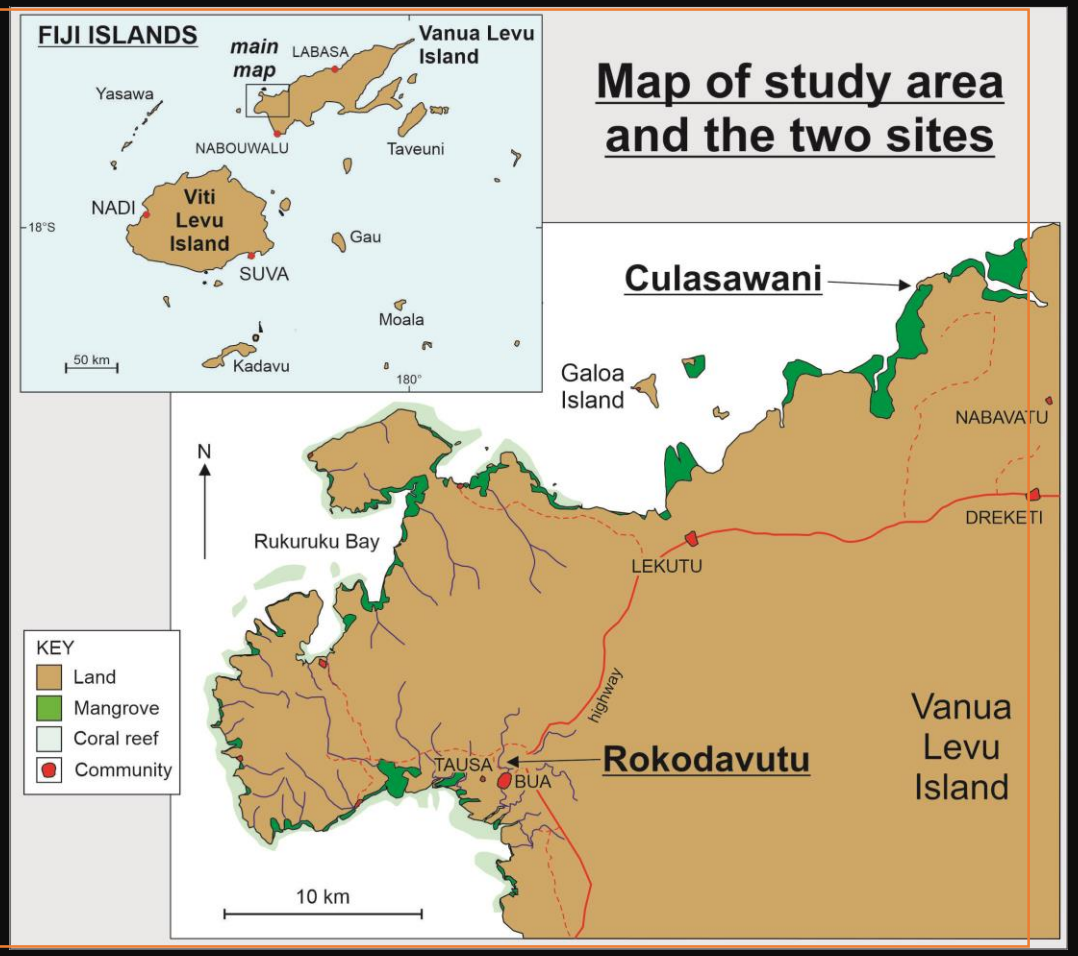
Bivalves

Gastropods

Shell tools and ornaments

Two ‘Extraordinary’ shell midden deposits on Western Vanua Levu, Fiji

2023 USP & Fiji Museum project



Rokodavutu

- 80 meters-long midden exposed along a bank of the Bua River
- Anadara, Gafrarium, and Pinctada species recovered thus far predominate in roughly equal proportion
- No associated charcoal or artifacts identified thus far
- Two radiocarbon dates on Anadara might suggest a Lapita or pre-Lapita human occupation

Culasawani ‘shell island’(8000 m2)

Examples of artificial islands (Langalanga/Tai Lagoons, Solomon Is. Nan Madol, Pohnpei

- Land reclamation also known elsewhere
- Culawasani appears unique to Fiji and other islands in Remote Oceania
- Hypothesized build up over centuries, perhaps the discarded remains of edible shellfish from stilt dwellings raised above the reef, characteristic of early Lapita habitation sites

- How can sustainable future human-environment interactions in rural tropical island contexts be informed and guided by analyses of shell middens?

Methods

- FIELDWORK: Communities' subsistence interaction with local environments will be described and key challenges identified
- The two middens will be comprehensively mapped, excavated, and sampled. Local residents' traditions relating to the middens and their associations will be collected, translated, and transcribed
- IN-FIELD SAMPLE ANALYSIS: The structure and composition of the middens will be analyzed to determine the main species/environments being accessed through time
- LABORATORY ANALYSIS: Midden chronologies will be determined from radiocarbon dates on Anadara shells. Shells will also be analyzed using oxygen-isotope and trace-element analyses to determine contemporaneous paleoclimate and paleo-ocean changes

Today’s observations…

Field and Analytical Methodology

- Targeted species
- Actual species taken
- Habitat
- Location
- Date and moon phase
- Age and sex of shellfish gatherer
- Search time
- Handling (processing) time
- Weight of species taken (for calculation of edible meat)
- General weather conditions insofar as they are relevant to gathering
- Time-motion record matched to the closest published tables
- Nutritional value of each species (some additional analyses may be required)

Explanatory Frameworks for sustainability:

Low human population densities and extractive limitations in the past(technology and absence of markets).

Optimal foraging decisions (derived from behavioral ecology), supported by actualistic studies, resulting in epiphenominal conservation (secondary phenomenon, where conservation is not the cause, but the consequence of a decision leading to conservation).

Conservation by design and customary marine tenure systems.

Links to sustainability

Paleoenvironmental reconstructions of the middens and their evolution during their periods of occupation will be enabled by their mapping, chronologies, changes in species composition through time, and paleoclimatic analyses

Reconstruction of the changing pattern of human-environment interactions will lead to an understanding of changing production, demand, and what traditionally constituted sustainability

Comparison of the past situations represented by the middens and modern uses of the same environments will allow insights into how contemporary human-environment interactions might become more (and less) sustainable in the future

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FALAH CONFERENCE

20th, 21ST and 22ND JUNE 2023

University of New Caledonia

Australia and Pacific youth (APY) project

Addressing health and climate challenges in Australia and the Pacific region through partnerships with schools and co-design with young people

Corinne Caillaud, Jai Howard

University of Sydney , Charles Perkins Centre

Olivier Galy

University of New Caledonia

Overview of the project

In the Pacific Islands, the prevalence of non-communicable diseases (NCDs) has been declared a crisis by Pacific Island leaders in 2011.

Not only adults but also **1.5 million adolescents across the Pacific Island states** are at risk of developing NCDs due to insufficient physical activity (PA) and poor-quality diets.

In fact, **76%** of adolescents in the Pacific Islands are affected by both low levels of PA and inadequate diet, primarily **low consumption of fruits and vegetables** and high intake of sugar sweetened beverages (2, 3).

2. Uddin R, et al. Clustering of lifestyle risk factors for non-communicable diseases in 304,779 adolescents from 89 countries: A global perspective. Prev Med. 2020;131:105955.

3. Aldwell K, et al. Tackling the Consumption of High Sugar Products among Children and Adolescents in the Pacific Islands: Implications for Future Research. Healthcare. 2018;6(3).

Overview of the project

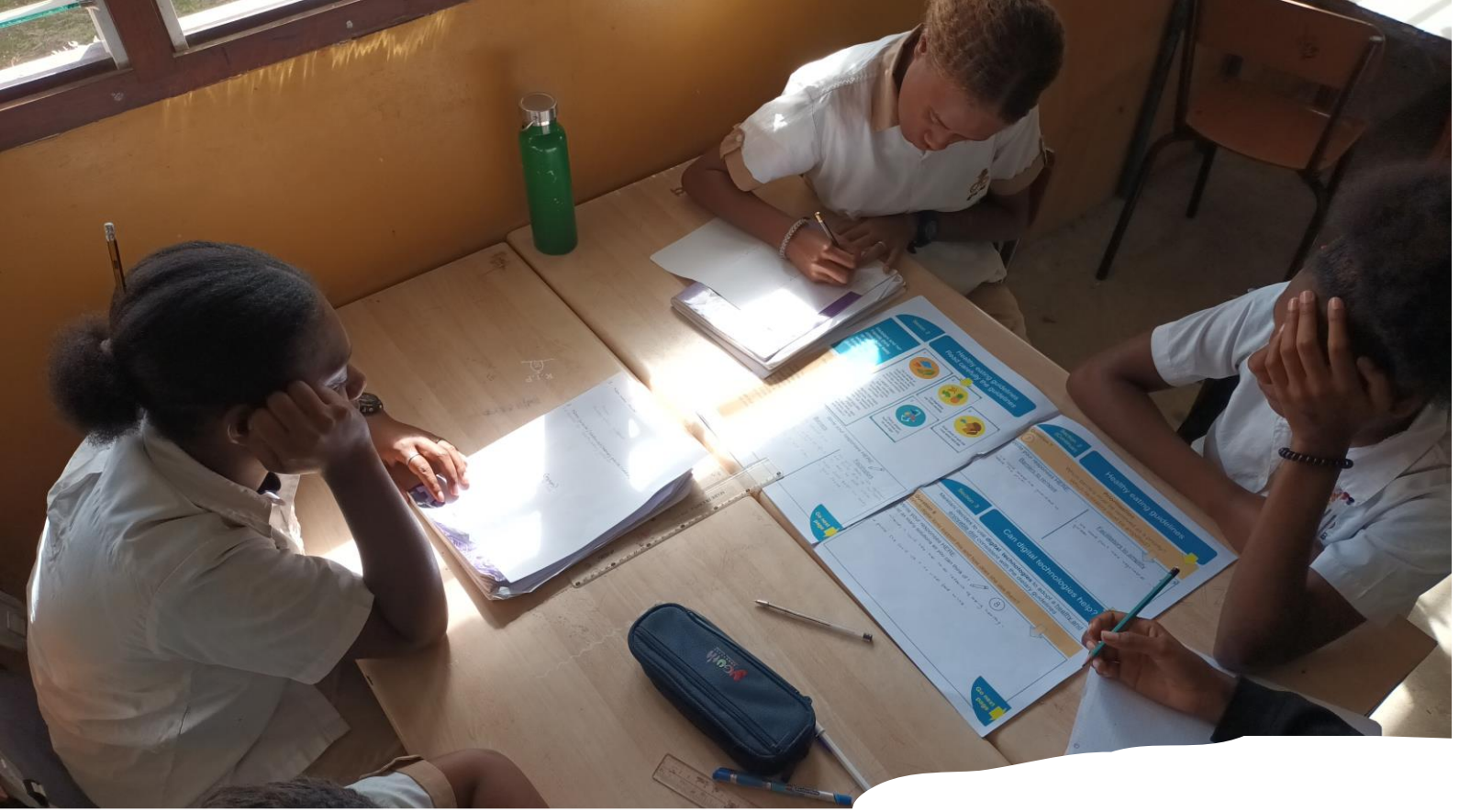
While many adolescents may be exposed to health or climate threats, the adolescent period of life is also identified as a unique window of opportunity for health and well-being particularly when they can voice their challenges and opportunities.

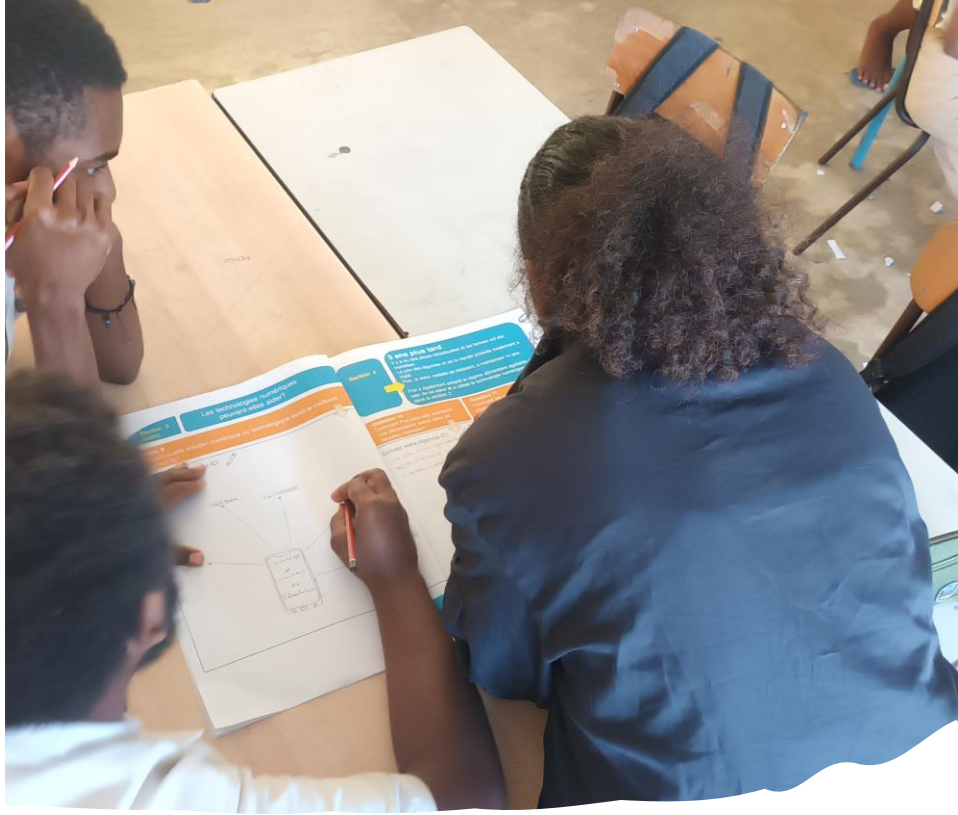
Aims

1) Determine adolescents' priorities for health and wellbeing, specifically diets and physical activity.
2) Establish how digital technologies could be leveraged to help adolescents achieve health and wellbeing outcomes

Approach

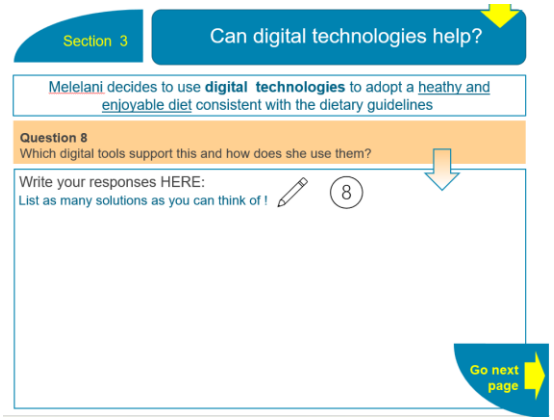
- Collaborative activities with adolescents through co-design workshops
- Workshop activities explore young people's lived experiences, views, attitudes
- Partner with schools in Australia, New Caledonia and Vanuatu

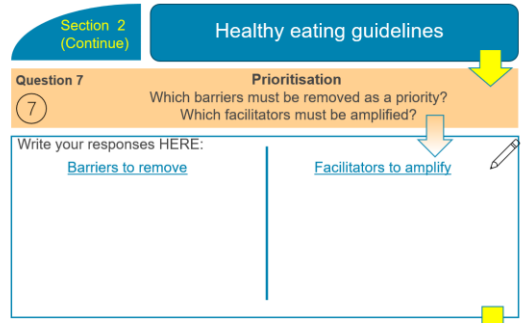


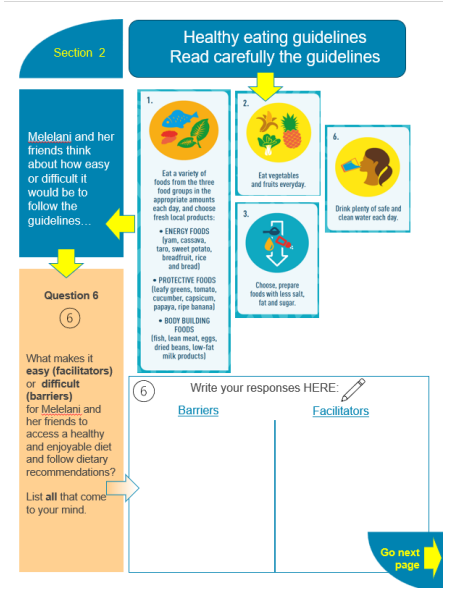


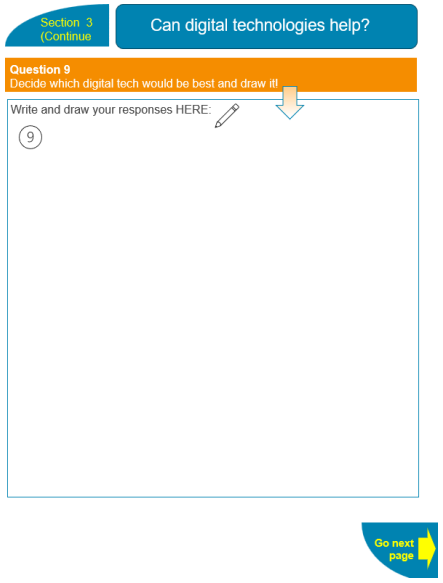
Gathering Data: Classroom Workshops

- Information is revealed **progressively** to encourage open brainstorming
- Booklets presented in French or English depending on the school
- Students collaborate in **groups of ~5**
- Encouraged **writing, drawing and annotating diagrams**
- Moves from health priorities, to the use of digital technologies to address these priorities, to using these solutions in the wake of climate change







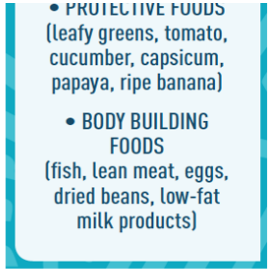


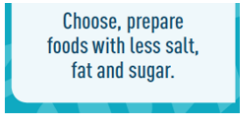
Question 6

6

What makes it **easy (facilitators)** or **difficult (barriers)** for Melelani and her friends to access a healthy and enjoyable diet and follow dietary recommendations?

List **all** that come to your mind.





6 Write your responses HERE:

Barriers | Facilitators

Section 2 (Continue)

Healthy eating guidelines

Question 7

7

Prioritisation

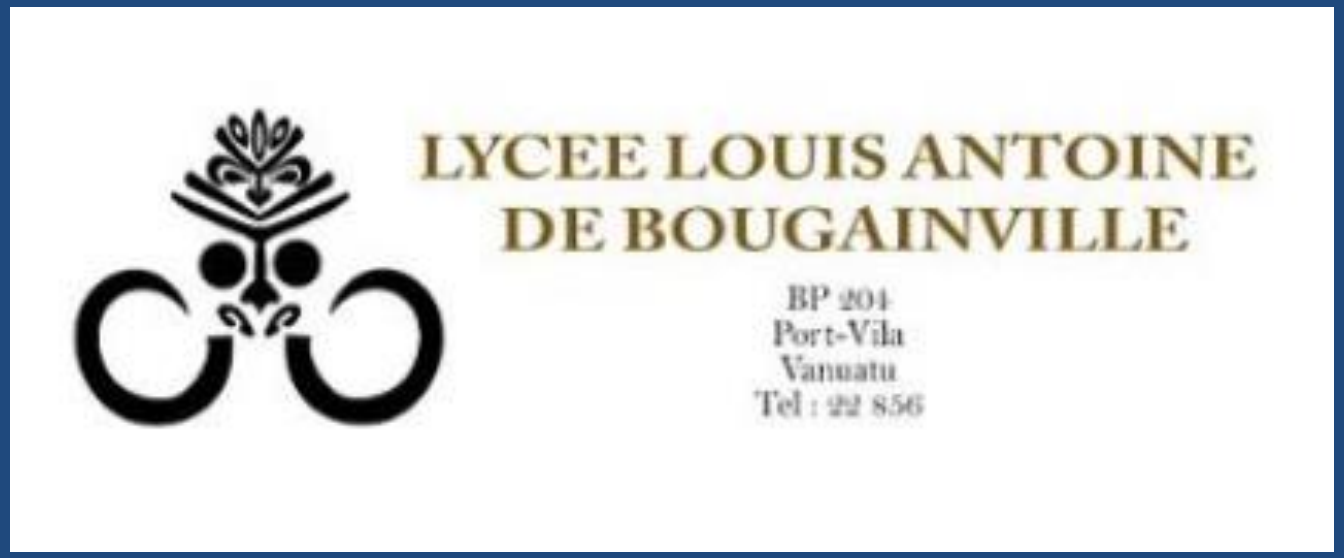
Which barriers must be removed as a priority?
Which facilitators must be amplified?

Write your responses HERE:

Barriers to remove | Facilitators to amplify

Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Thème 2: solutions numériques/ *digital technologies*



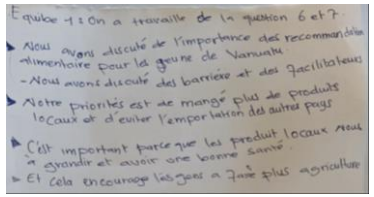
Classe 10D

Class 10D

LYCEE LOUIS ANTOINE DE BOUGAINVILLE
BP 204
Port-Vila
Vanuatu
Tel : 22 856

Classe 10D Equipe 1

Class 10D Team 1



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Nous avons discute de l'importance des **recommandations alimentaires** pour les jeunes du Vanuatu.
Nous avons parle des barrières et facilitateurs pour suivre les recommandations

Notre priorité : manger davantage de produits locaux et éviter l'importation des autres pays.

C'est important parce que :
- Les produits locaux nous aident a grandir et a avoir une bonne sante
- Cela encourage les gens a faire plus d'agriculture

We discussed the importance of **dietary recommendations** for young people in Vanuatu.

We talked about barriers and facilitators to follow the recommendations

Our priority: eat more local products and avoid importing from other countries.

This is important because:
- Local products help us to grow and have a good health
- It encourages people to do more agriculture.

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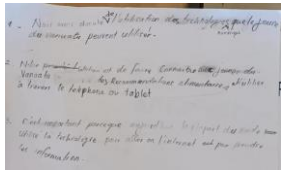
Classe 10D Equipe 2

Class 10D Team 2



Thème 2: solutions numériques/ *digital technologies*

Nous avons discuté des **technologies numériques** que les jeunes du Vanuatu peuvent utiliser.

Notre solution est de faire connaitre les recommandations alimentaire à travers le téléphone ou la tablette

C'est important parce que:
La plupart des personnes utilisent la technologie pour aller sur l'internet et pour prendre des informations

We discussed the **digital technologies** that young people in Vanuatu can use.

Our solution is to make the dietary recommendations known through the phone or tablet

This is important because:
Most people use technology to go on the internet and to find information

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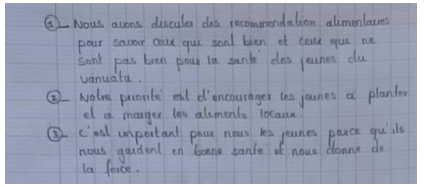
Classe 10D Equipe 3

Class 10D Team 3



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Nous avons discute des recommandations alimentaires pour savoir quels aliments sont bien et ceux qui ne sont pas bien pour les jeunes du Vanuatu.

Notre priorité : encourager les jeunes à planter et a manger les aliments locaux.

C'est important pour nous les jeunes parce qu'ils nous gardent en bonne santé et nous donne de la force

We discussed dietary recommendations to find out which foods are good and which are not good for young people in Vanuatu.

Our priority: encourage young people to plant and eat local food.

This is important for us young people because they keep us healthy and give us strength.

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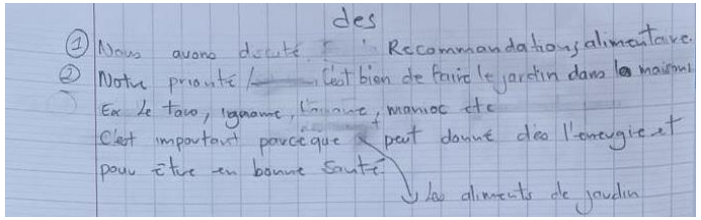
Classe 10D Equipe 4

Class 10D Team 4



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Nous avons discuté des **recommandations alimentaires** pour les jeunes du Pacifique

Notre priorité c'est de:
Bien faire le Jardin à la maison, par exemple faire pousser le taro, igname, banana, manioc etc…

C'est important parce que:
Les aliments du jardin donnent de l'énergie et permettent d'être en bonne santé

We discussed **dietary recommendations** for Pacific youth.

Our priority is to: Make the Garden well at home, for example grow taro, yam, banana, cassava etc ...

This is important because:
The food of the Garden gives energy and keep people in good health

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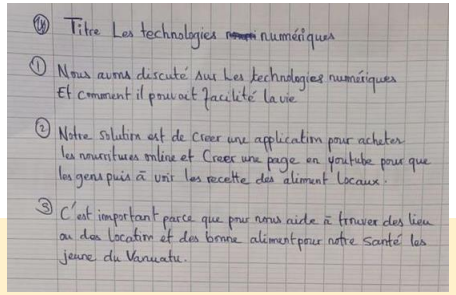
Classe 10D Equipe 5

Class 10D Team 5


Titre Les technologies numériques
Nous avons discuté sur les technologies numériques Et comment il pouvait faciliter la vie
Notre solution est de créer une application pour acheter les nourritures online et Creer une page en youtube pour que les gens puis a voir les recette des aliment locaux.
C'est important parce que pour nous aide à trouver ou des locatin et des bonne aliment pour notre santé les jeune du Vanuatu.

Thème 2: solutions numériques/ *digital technologies*

Nous avons discuté des **technologies numériques** et comment elles peuvent faciliter la vie

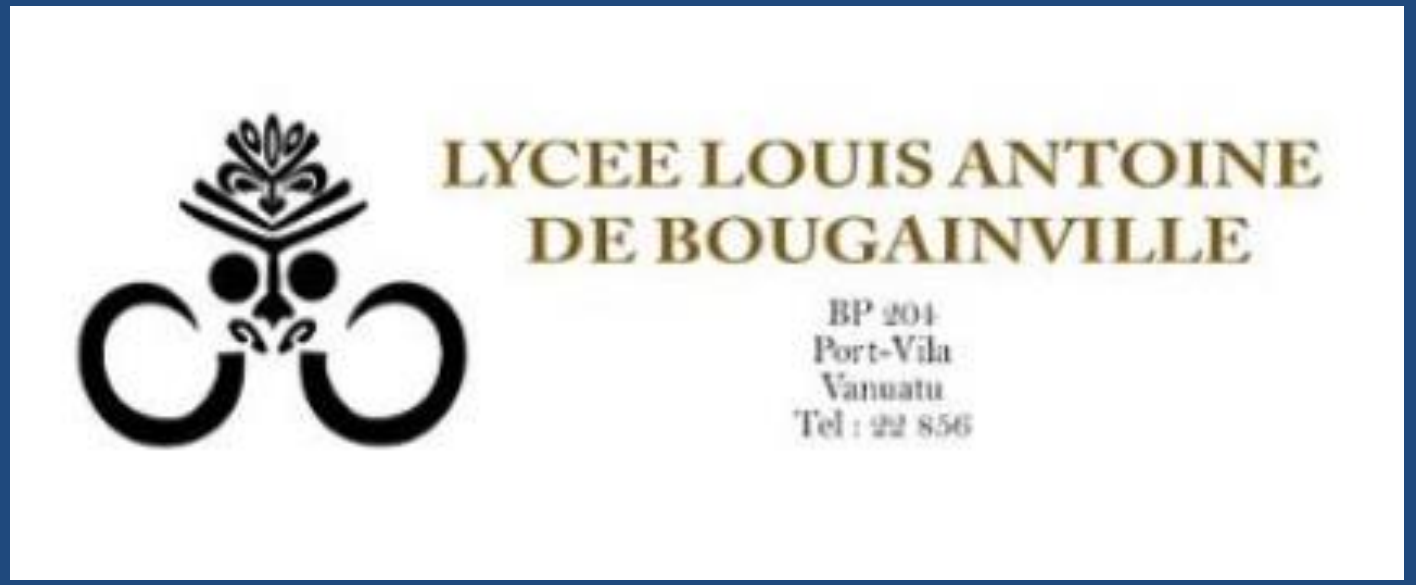
Notre solution est de créer une application pour acheter les nourritures online et créer une page YouTube pour que les jeunes puissent voir les recettes des aliments locaux

C'est **important parce que** cela nous aide à trouver ou acheter les bons aliments pour la santé des jeunes du Vanuatu (et savoir les cuisiner)

We discussed **digital technologies** and how they can make life easier

Our solution is to create an application to buy food online and create a YouTube page for young people to see the recipes of local foods

This is important because it helps us to find or buy the right foods for the health of Vanuatu's youth (and know how to cook them)



Classe 11S3

Class 11S3

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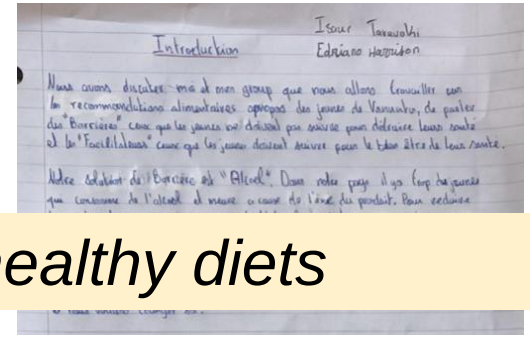
Classe 11S3 Equipe 6

Class 11S3 Team 6



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Nous avons discuté moi et mon groupe que nous allions travailler sur les recommandations alimentaires à propos des jeunes du Vanuatu

Notre solution pour adresser les barrières est l'alcool. Dans notre pays, il y a trop de jeunes qui consomment de l'alcool et qui meurent a cause des effets du produit. Pour réduire le nombre de jeunes qui consomment de l'alcool. Pour cella on doit:

- Diminuer le nombre de vendeurs d'alcool
- Donner des restrictions sur l'age des acheteurs

C'est important parce que beaucoup de jeunes meurent a cause de l'alcool au Vanuatu et nous voulons changer cela.

We discussed with me and my group that we were going to work on **food recommendations** for young people in Vanuatu.

Our **solution** to address barriers is alcohol. In our country, there are too many young people who consume alcohol and die because of the effects of the product. To reduce the number of young people who consume alcohol, one must:

- Reduce the number of alcohol sellers
- Give restrictions on the age of buyers

This is important because many young people are dying because of alcohol in Vanuatu and we want to change that.

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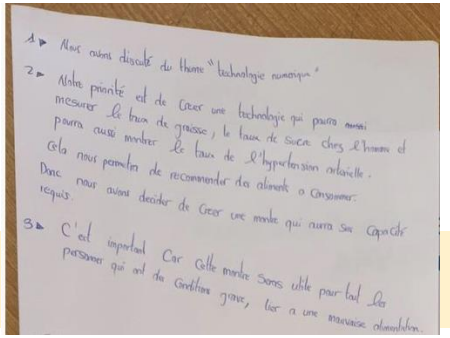
Classe 11S3 Equipe 7

Class 11S3 Team 7



Thème 2: solutions numériques/ *digital technologies*

Nous avons discute du thème “technologie numérique”

Notre priorité est de créer une technologie qui pourra mesurer les taux graisse et de sucre chez l’homme et pourra aussi mesurer le taux d’hypertension artérielle. Cela nous permettra de recommander des aliments à consommer.

Donc nous avons décidé de créer une montre qui aura la capacite requise.

C’est important car cette montre sera utile pour toutes les personnes qui ont des conditions graves, liées à une mauvaise alimentation

We discussed the them "digital technology”

Our priority is to create a technology that will be able to measure the fat level, the sugar level in humans and can also measure the rate of arterial hypertension. This will allow to recommend appropriate foods to consume.

So, we decided to create a watch that will have the required capacity.

This is important because this watch will be useful for all people who have serious conditions, related to poor diet.

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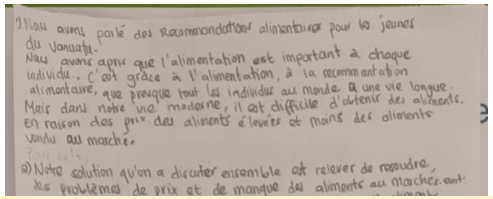
Classe 11S3 Equipe 8

Class 11S3 Team 8



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

Nous avons discute des **recommandations alimentaires** pour les jeunes du Vanuatu.
Nous avons appris que l'alimentation est importante a chaque individu. C'est grâce aux recommandations alimentaires que Presque tous les individus au monde ont une vie longue. Mais dans notre vie modern il est difficile d'obtenir les aliments, en raison du prix des aliments au marche et moins d'aliments vendus au marche.

Notre solution est de résoudre les problèmes de prix et du manque d'aliments au marche. Pour les prix des aliments trop élèves, les vendeurs de ces aliments doivent diminuer le prix.
Pour les marches qui manquent d'aliments, nous décidons que les vendeurs doivent augmenter les plantations de légumes (planter plus d'aliments) pour qu'ils puissant les vendre et en retour assurer la sante des clients.

We discussed dietary recommendations for young people in Vanuatu.

We have learned that diet is important to each individual. It is thanks to **dietary recommendations** that almost every individual in the world has a long life. But in our modern life it is difficult to get food, because of the price of food on the market and less food sold on the market.

Our solution is to solve the problems of price and lack of food on the market. For food prices that are too high, the sellers of these foods must lower the price.
For markets that lack food, we decide that sellers must increase vegetable plantations (plant more food) so that they can sell them and in return ensure the health of customers.

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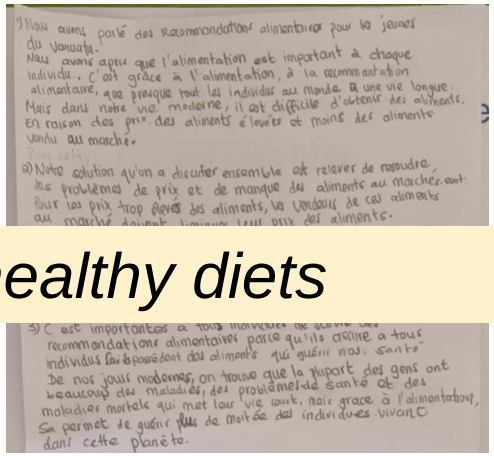
Classe 11S3 Equipe 8

Class 11S3 Team 8



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*

C'est important pour tous les individus de suivre les recommandations alimentaires parce qu'elles assurent aux individus qui les possèdent une bonne santé.

De nos jours modernes, on trouve que la plupart des gens ont beaucoup de maladies, des problèmes de santé, et des maladies mortelles qui raccourcissent leur vie. Mais grâce a l'alimentation saine, on pourra guérir plus de la moitie des individus vivants dans cette planète.

It is important for all individuals to follow dietary recommendations because they ensure to individuals who adhere to them a good health.

Nowadays, we found that most people have many diseases, health problems, and deadly diseases that shorten their lives. But thanks to healthy food, we will be able to cure more than half of the individuals living on this planet.

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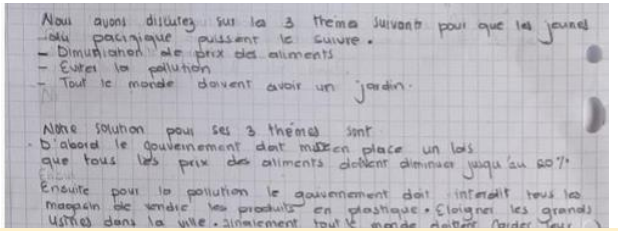
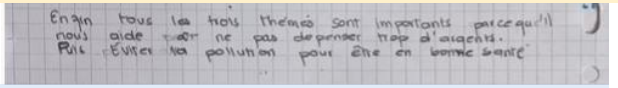
Classe 11S3 Equipe 9

Class 11S3 Team 9


Nous ayons discutez sur les 3 thèmes suivants pour que les jeunes du pacifique puissent le suivre.
- Diminution de prix des aliments
- Eviter la pollution
- Tout le monde doivent avoir un jardin.

Notre solution pour ses 3 thèmes sont
D'abord le gouvernement doit mettre en place un lois que tous les prix des aliments doivent diminuer jusqu'au 60%
Ensuite pour la pollution le gouvernement doit interdit tous les magasin de vendre les produits en plastique. Eloigner les grandes usines dans la ville. finalement tout le monde doivent garder leur environnement propre. Cultiver leur

Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*


Enfin tous les trois thèmes sont importants parce qu'il nous aide à ne pas dépenser trop d'argents.
Puis éviter la pollution pour être en bonne santé

Nous avons discute des 3 thèmes suivants pour que les jeunes du pacifique puissent suivre les recommandations alimentaires:
- Diminution du prix des aliments
- Eviter la pollution
- Tout le monde doit avoir un Jardin

Notre solutions pour ces 3 thèmes sont:
- d'abord le gouvernement doit mettre en place une loi pour que tous les prix des aliments diminuent jusqu'a 60%.
- Ensuite pour la pollution, le gouvernement doit interdire tous les magasins qui vendent les produits en plastique. Eloigner les grandes usines de la ville, finalement tout le monde doit garder leur environnement propre
- Tout le monde doit pratiquer les cultures dans leur environnement.

Tous les thèmes sont importants parce qu'ils nous aident pour ne pas dépenser trop d'argent et éviter la pollution pour être en bonne santé.

We discussed the following 3 themes for young people from pacific to follow **dietary recommendation**:
- Lower food prices
- Avoiding pollution
- Everyone must have a Garden

Our solutions for these 3 themes are:
- First the government must put in place a law so that all food prices decrease by up to 60%.
- Then for pollution, the government must ban all shops that sell plastic products.
- Moving the big factories away from the city, eventually everyone has to keep their environment clean.
- Everyone must practice crops in their environment.

All themes are important because they help us not to spend too much money and avoid pollution to be healthy.

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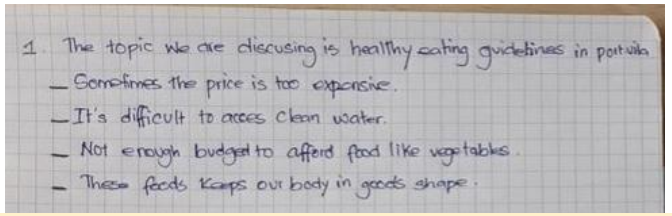
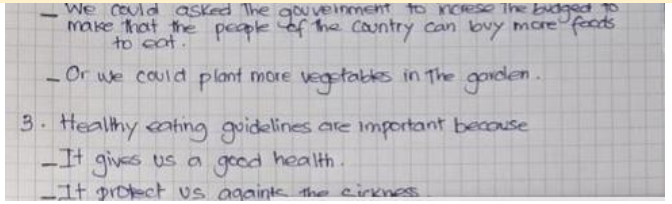
Classe 11S3 Equipe 12

Class 11S3 Team 12



Thème 1: priorités pour une alimentation saine / *Priorities for healthy diets*



The topic we are discussing is **barriers** for healthy eating guidelines

- Sometimes the price is too expensive
- It's difficult to access clean water
- Not enough budget to afford food like vegetables
- These foods keep our body in good shape

Our priority is:

- We could ask the government to reduce the price
- We could ask the government the increase the budget to make that people of the country can buy more food to eat
- We could plant more vegetables in the garden

Healthy eating guidelines are **important because**:

- It gives us a good health
- It protects us against sickness

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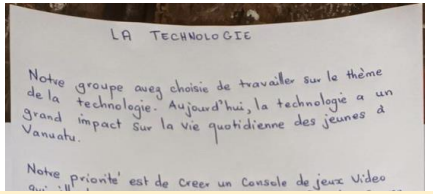
Classe 11S3 Equipe 13

Class 11S3 Team 13


LA TECHNOLOGIE

Notre groupe aveg choisie de travailler sur le thème de la technologie. Aujourd'hui, la technologie a un Grand impact sur la vie quotidienne des jeunes à Vanuatu.

Notre Priorité est de Creer un Console de jeux Video

famille.

C'est important parceque tout les jeunes d'aujourd'hui Sont interresser à joubr des jeux Vidéo. donc le fait de Creer un Console de jeux vidéo qui peut motive les jeunes a adopter une alimentation Saine et agréable qui peuvent vraiment les aider à être en bonne Sante.

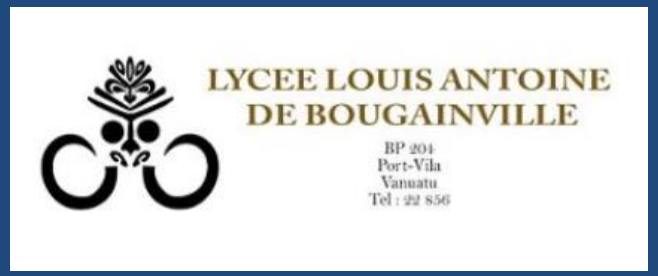
Thème 2: solutions numériques/ *digital technologies*

Notre group a choisi de travailler sur le theme de la technologie. Aujourd'hui la technologie a un grand impact sur la vie quotidienne des jeunes du Vanuatu.

Notre priorite est de creer une console de jeux video qui illustre un petit bonhomme qui fait la course pour collecter des legumes qui lui fait gagner des points bonus en retour. En route, il doit evietr de manger les sucreries qui peuvent reduire ses points bonus. Ce jeux peut se jouer individuellement a deux ou bien en famille.

C'est important parce que tous les jeunes d'aujourd'hui sont interresses a jouer a des jeux videos dans le fait de creer une console de jeux qui peut motive les jeunes a adopter une alimentation saine et agreable qui peuvent vraiment les aider a etre en bonne sante.

Our group has chosen to work on the theme of technology. Today technology has a great impact on the daily lives of young people in Vanuatu.
Our priority is to create a video game console that illustrates a little guy who races to collect vegetables that earns him bonus points in return. On the way, he must avoid eating sweets that can reduce his bonus points. This game can be played individually with two or as a family.
This is important because all young people today are interested in playing video games in creating a game console that can motivate young people to adopt a healthy and enjoyable diet that can really help them to be healthy.



Tankiu tumas

Merci !

Thank you !

Cultural practices in mathematics education in Vanuatu

An experiment with sand drawings

Port-Vila , 21 June 2023

Pierre METSAN

Ministry of Education and Training , Vanuatu

With the supervision of Pr. Catherine Ris and the collaboration of Pr. Jean-Marie Fotsing

LARJE , UNIVERSITY OF NEW CALEDONIA

Keywords : Mathematics, Students , Cultural Practices, Assessment, Vanuatu.

Overview

- Context
- Research question
- Methodology
- Results
- Discussions

CONTEXT OF THE STUDY

- Vanuatu, a Melanesian archipelago in South West Pacific
- 83 islands and 6 provinces
- 300 019 inhabitants with 80 % of population living in rural areas (VNSO, 2020).
- Over 138 different languages, all belonging to the Austronesian family
- Once known as the French & English Condominium of New Hebrides (established in 1906), Vanuatu achieved its political independence in 1980
- Dual education system as an heritage of the colonization

Map of the Republic of Vanuatu @Meleul Adeline,2023

CONTEXT OF THE STUDY

- Elaboration of a local culture based curriculum has been undertaken in many different indigenous societies around the world—as part of decolonization processes.

- Through an intercultural approach , educational processes are seen as ethical, political and epistemic strategies to promote a dialogue between different kinds of knowledge that allows for the empowerment of historically marginalized cultural groups (Candau & Russo, 2010).

- In that intercultural perspective, Vanuatu alike some indigenous societies around the world has come to recognize the value of its own traditional knowledge and practices.

- Local heritage is perceived to be in decline, as a result of colonization and globalization, formal

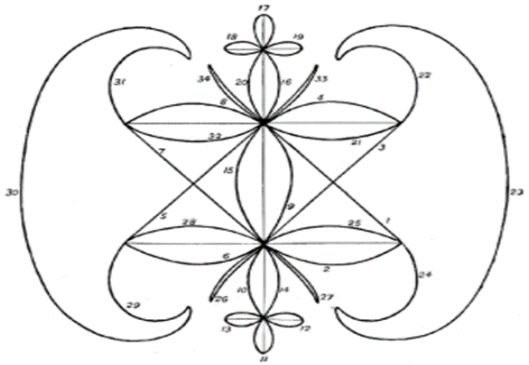
  inclusion of culture in the school curriculum has become a national education priority.

CONTEXT OF THE STUDY

- Reform of the inherited national curriculum to promote the diversity of local cultures and vernacular languages (VCNS, 2010).
- The national curriculum promotes modern ways of communication alongside traditional forms such as dance forms, masks, costumes and body painting, drumming and sand drawing (VNCS, 2010:34).
- Culturally based mathematics curricula to valorize traditional knowledge and enhance student's academic competencies to succeed in life.
- Use a cultural practice—locally known as "sand drawing" as a possible lever to address student's underachievement in mathematics (MOET, 2021).

CONTEXT OF THE STUDY

- Why choosing Sand Drawing?
- Sand drawing practices have been first documented by British anthropologist Arthur Bernard Deacon in the 1920s (Deacon & Wedgwood, 1934).
- This multifunctional “writing” is more than an indigenous artistic expression and it occurs in a wide range of ritual, contemplative and communicative contexts (Unesco, 2008)
- Produced directly on the ground, in sand, volcanic ash or clay using one finger and tracing a continuous line.



Sand drawing *vwaevwae* “a particular yam, a root crop” (performed by Edgard Hinge, 2021). © Pierre Metsan

CONTEXT OF THE STUDY

- Sand drawings were and sometimes still are used in daily life as a means of communication in a traditional context.

- Several functions : mnemonic devices to record and transmit rituals, mythological oral information about local histories, cosmologies, kinship systems, song cycles, farming techniques, architectural and craft design, and choreographic patterns.

- Several layers of meaning: artistic works, repositories of information, illustration for stories, signatures, or simply messages and objects of contemplation.

- Combination of knowledge, songs, and stories with sacred or profane meanings.

- Recognition of sand drawing in 2008 on the UNESCO list of Intangible Cultural Heritage of Humanity.

CONTEXT OF THE STUDY

- Mathemathematical character of Ni-Vanuatu sand drawing (Ascher 1988, 1991, Da Silva 2022, Vandendriessche & Da Silva, 2022)
- Promising pedagogical implications production of didactic resources aimed at introducing sand drawing in the national school curriculum (Hinge, 2008; Rory et al., 2008).
- A tool for understanding concepts and solving mathematical problems.
- Object of study for the development of algorithms, properties of the continuous line or the Eulerian graph.
- Several systems of representation designed and codified.

OBJECTIVES

- Undertake a pedagogical post and pre experimental research on sand drawing and assess its effectiveness on students performance in mathematics, engagement and perception.

- The main research question that guides the study is whether and how a long-term and regular pedagogical use of sand drawing practices could enhance student's academic achievement, engagement and perception in mathematics ?

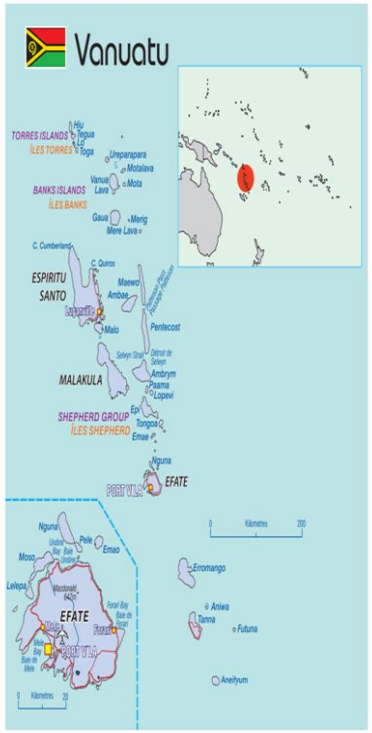
HYPOTHESIS

- Regular practice of sand drawing with the experimental group of students during 5 months enhances their mathematics performance, socio affective attitude and perception compared to the test group of students.

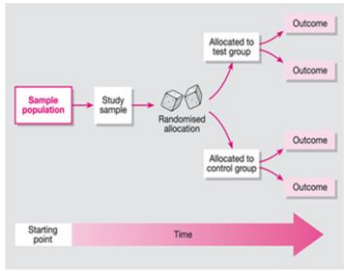
- Practice of sand drawing in classroom over time can increase secondary school students' academic skills in mathematics and modify their perception on the existence of mathematics ideas in other cultural practices.

METHODOLOGY AND TOOLS: SAND DRAWING XPERIMENTAL DESIGN

MAP OF VANUATU



Vanuatu 2020 National Population and Housing Census



Randomised Control Trial Methodology, *(Duflo, 2009)*

Post Mathematics Test

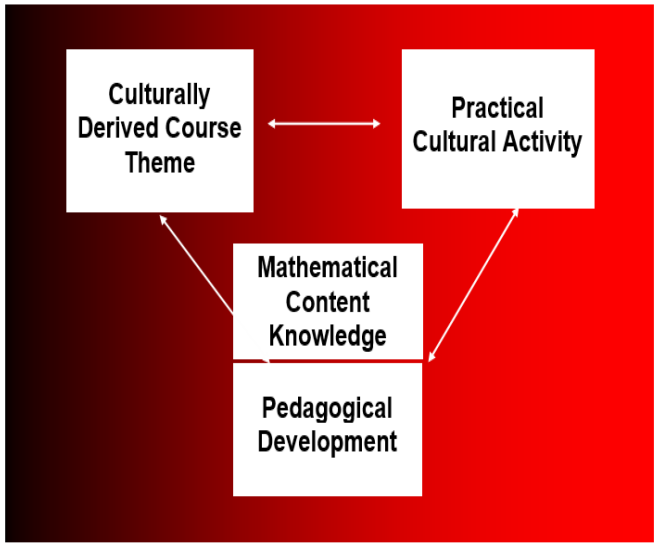
Pre Mathematics Test

Overall Assessment

Sand drawing interventions

Randomised assignment of Students per class

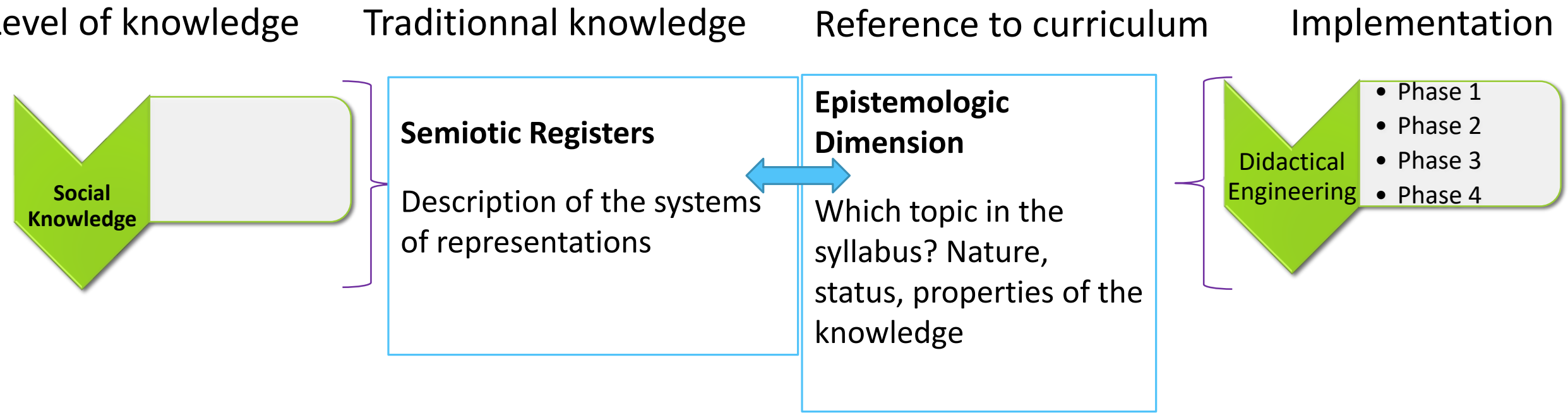
Teacher's Professional Development



Averill, R., Anderson, D., Easton, H., Te Maro, P., Smith, D., & Hynds, A. (2009). Culturally responsive teaching

ENDL Students performing sand drawing

PROPOSED DIDACTIC MODEL TO INTRODUCE SAND DRAWINGS IN MATHEMATICS CLASS



Cultural framework for teaching and learning traditionnal knowledge (Boulekouran & Metsan)

PHASE 1 : TEACHERS PROFESSIONNAL DEVELOPMENT

Sand drawing Maths Teachers Workshop Photos © Pierre Metsan 2021

PHASE 2: SCHEME OF WORK AND LESSON PLANS DESIGN

Step 1
- Modification of the classroom set up
- Introduction of sand drawing cultural meaning by an expert

Step 2
- Use pedagogical and didactic concepts to introduce sand drawing lesson
- Interaction with a cultural object to understand formal concepts

Step 3
- Link between mathematical ideas and formal mathematics concepts
- Mobilize mathematics cognitive skills to solve problem using mathematical ideas of sand drawings

Step 4
- Conclusion and dicussions with students

Step 5
- Formative assessment on the lesson
- Practice of sand drawings by students

PHASE 3: IMPLEMENTATION PHASE

Sand drawing Maths Class Photos © Pierre Metsan 2021

PHASE 4: EVALUATION OF THE IMPACT

Criterias of assessment :

- Student’s mathematics performance test
- Mathematics student’s perception questionnaire
- Socio affective student’s questionnaire

Tools of assessment :

- Statistical test of t students and Alpin Welch
- Qasam Questionnaire

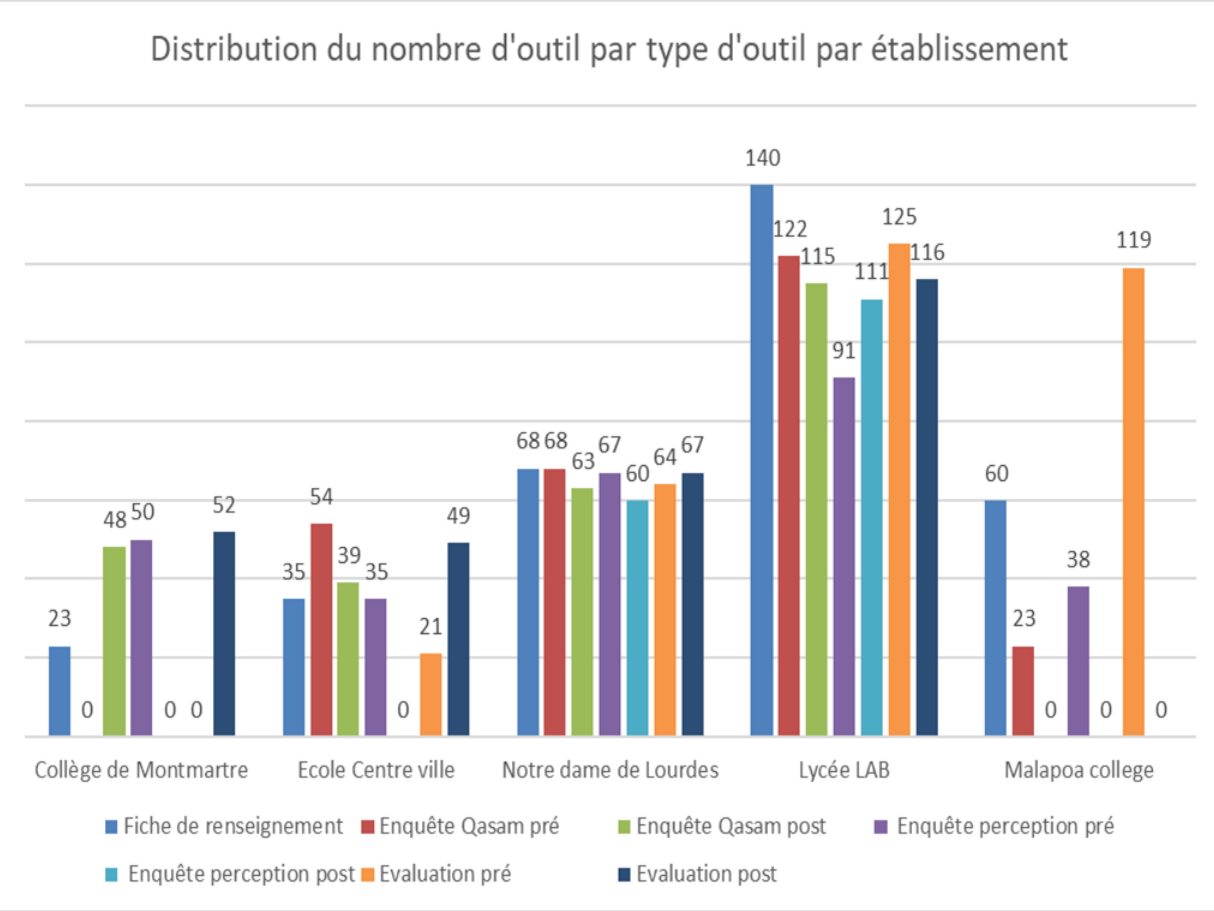
RESULTS

Total number of students and schools

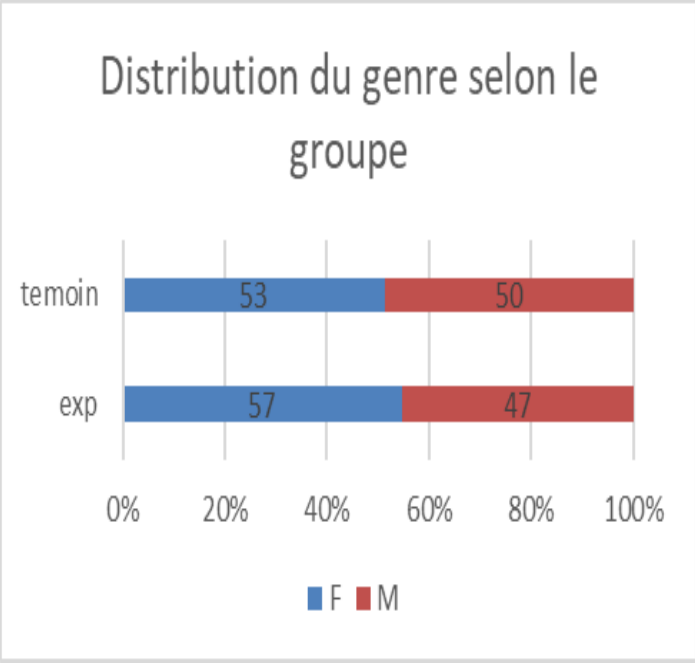
Schools	Experimental group	Test group	Total
Lycée Louis Antoine de Bougainville	78	71	149
Lycée de Montmartre	64	59	123
Ecole Centre-Ville	39	33	72
Collège de Malapoa	82	81	163
Ecole d'Anaburu	33	35	68
Collège Tobol	6	5	11
Total	302	284	586

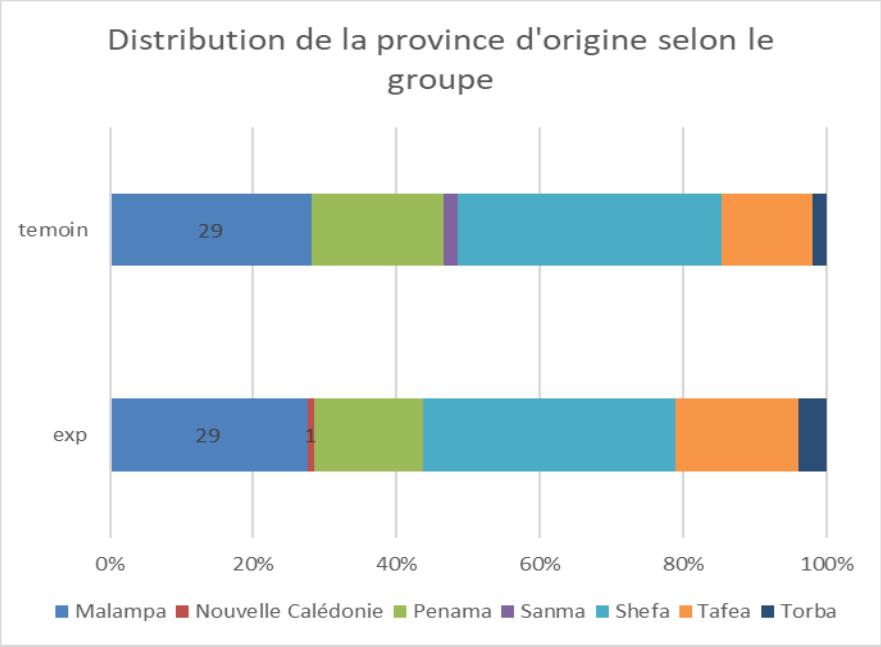
DATA ANALYSIS

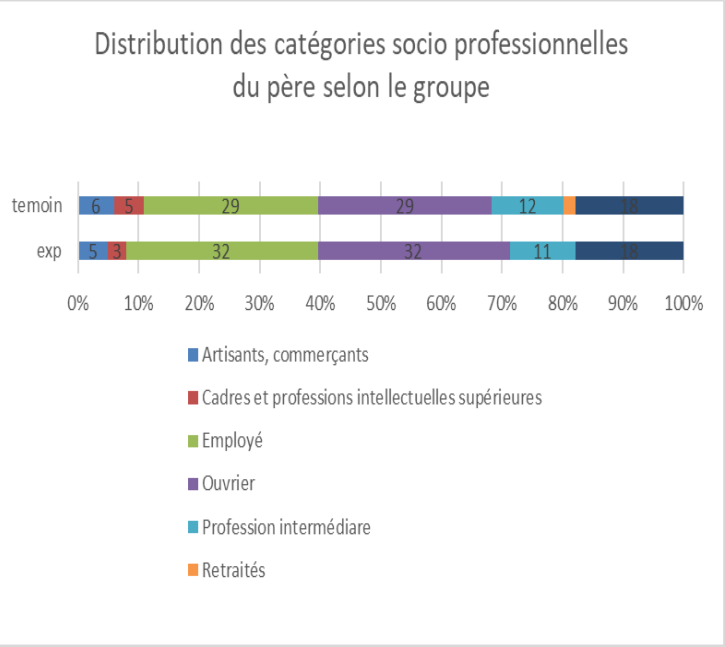
- A total of 1923 data collection tools used with students in 5 schools
- The graph clearly shows that the most complete data is for 2 establishments.
- The cross-analysis of the data (pre-post) therefore focused on these 2 establishments



Validation of comparability of groups







RESULTS

Impact of the assessment on student's Mathematics test

		Type of assessment and results out of 40	
		PRE	POST
Type of group	Experimental	20,5	23,0
	Test	21,0	21,1

Detail analysis of the Impact of the assessment on student's Mathematics test

- Hypothesis H0: Equality of means : POST-PRE = 0
- Hypothesis H1: Diffrence of means: POST-PRE ≥ 0.

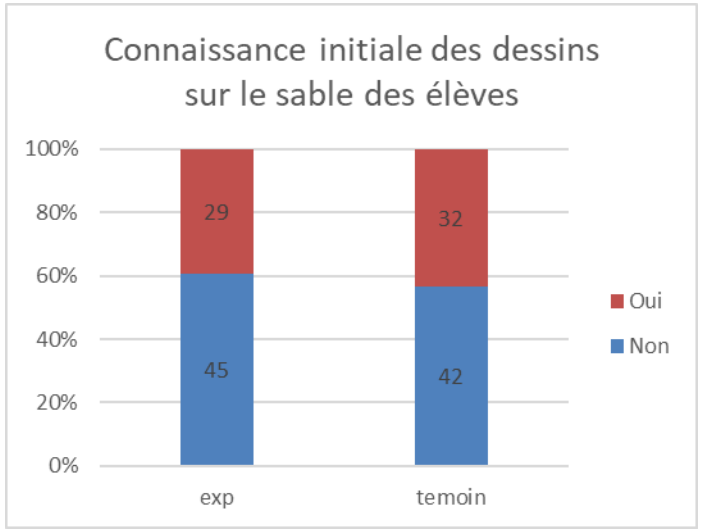
HYPOTHESIS TESTS	DIFFERENCE OF MEANS	RESULTS	INTERPRETATION
Test A: H0	GTEM PRE - GTEST PRE	H0 (90%)	Exp groups and test groups are comparable before the assessment.
Test B: H0	GTEM POST - GTEM PRE	H0 (95%)	
Test C: H1	GTEST POST - GTEST PRE	H1 (45%)	Positive impact on the experimental group of students
Test D:H1	GTEST POST - GTEM POST	H1 (45%)	

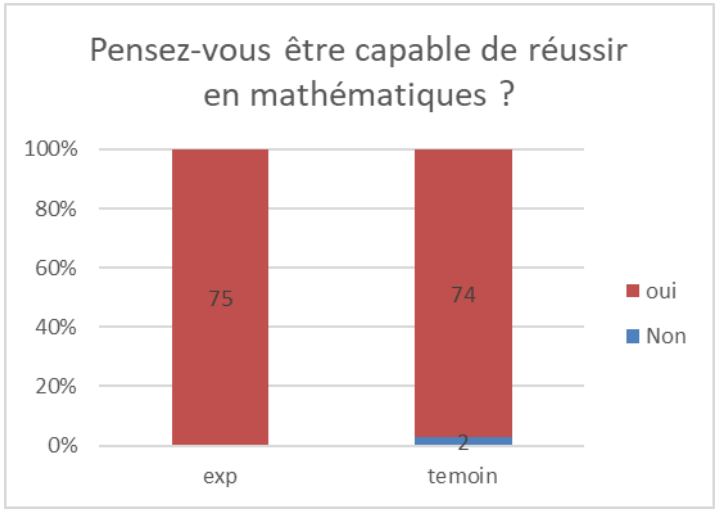
Qasam questionnaires results

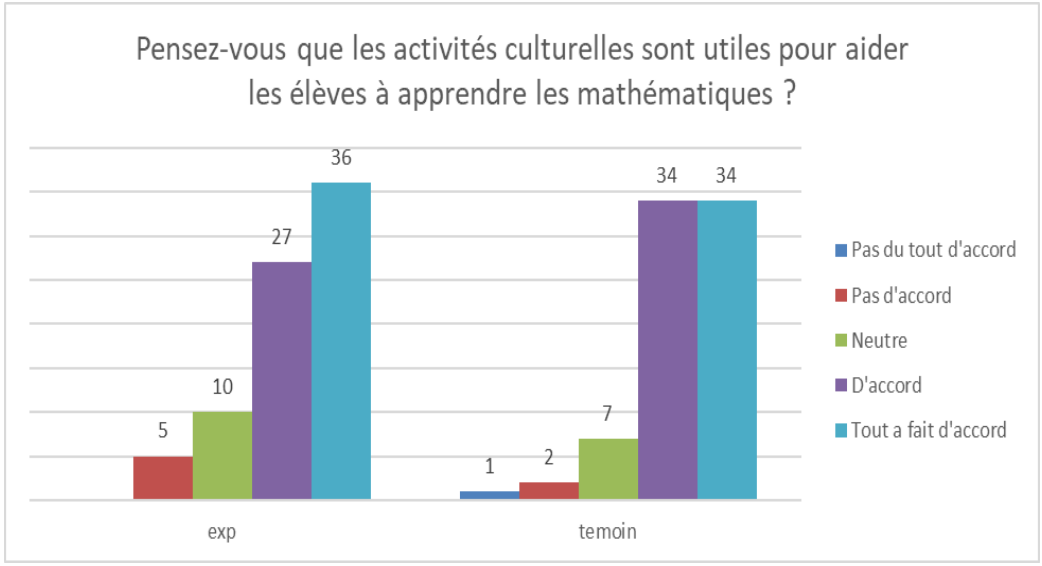
Registres	Dimensions
Registre cognitif	Utilité
	Compétence
	Controlabilité
Registre affectif	Affectifs positifs
	Affectifs négatifs
	Régulation affective
Registre comportemental	Investissement
Mesure normative	Masculinité

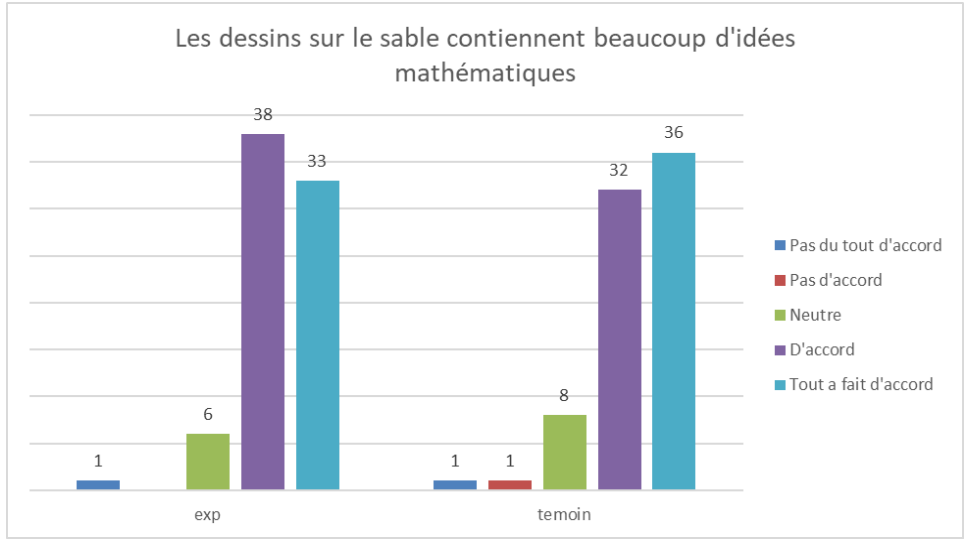
Registre	IC_R
Utilité	0,181
Compétences	0,184
Contrôlabilité	0,140
Affectifs positifs	0,323
Affectifs négatifs	0,237
Régulation affectives	0,121

Student’s perception on mathematical ideas of cultural practices

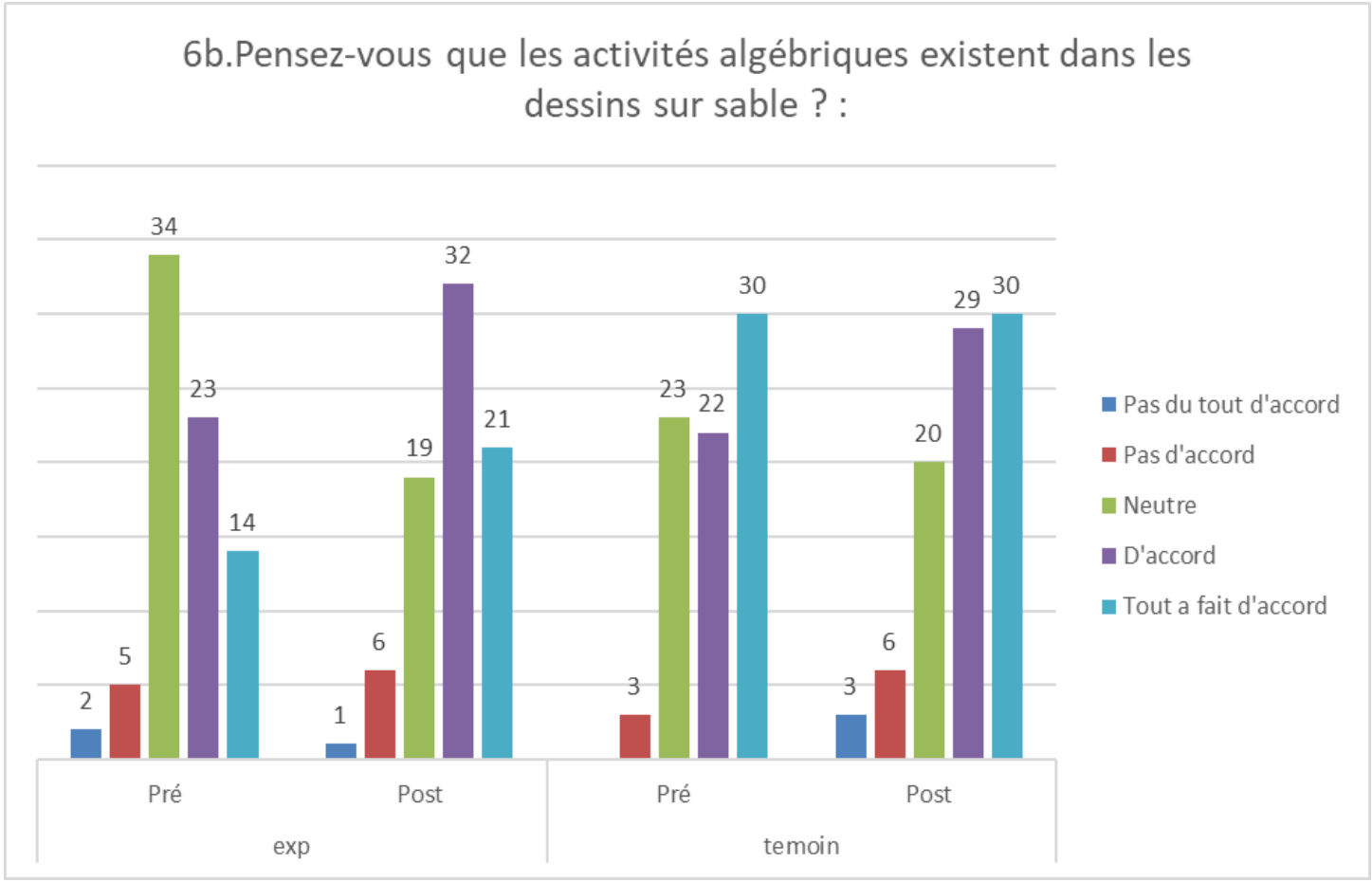





Pensez-vous que les activités culturelles sont utiles pour aider les élèves à apprendre les mathématiques ?
5
10
27
36
1
2
7
34
34
exp
temoin
Pas du tout d'accord
Pas d'accord
Neutre
D'accord
Tout a fait d'accord


Les dessins sur le sable contiennent beaucoup d'idées mathématiques
1
6
38
33
1
1
8
32
36
exp
temoin
Pas du tout d'accord
Pas d'accord
Neutre
D'accord
Tout a fait d'accord

Link between algebra and sand drawing concepts



DISCUSSIONS

- A slight impact was statistically perceptible
- Student’s increasing interest in practicing sand drawings, as well as discussing their mathematical characteristics
- Sand drawing experiment seems to have raised students’ engagement and motivation in practicing mathematics
- Expanding the integration other cultural practices such as the cultivation of yams, traditional houses and fishing activities

Nimatan traditionnal house

Fishing activities

Traditionnal cultivation of yam

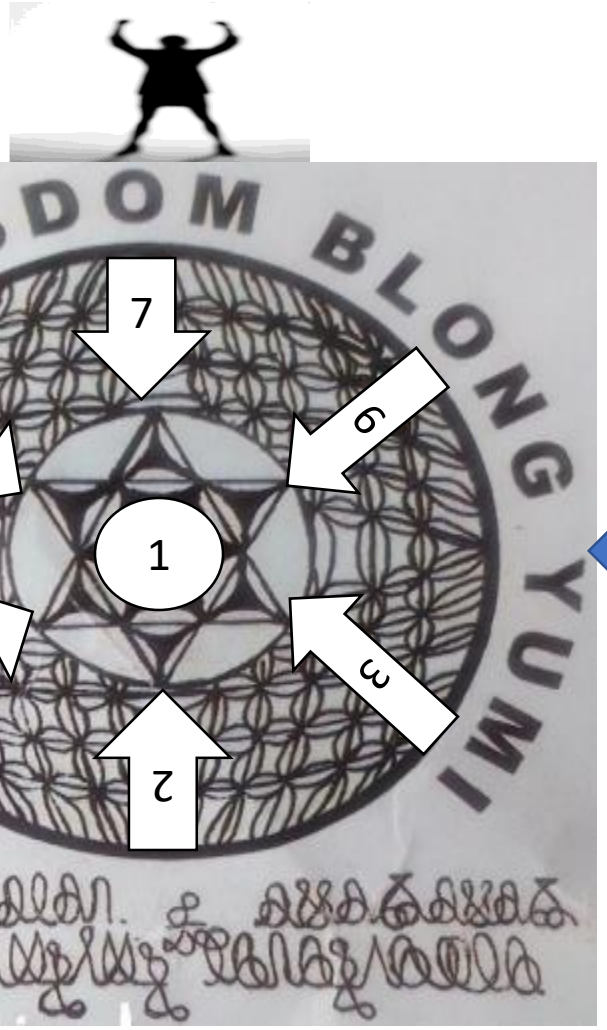
RECOMMANDATIONS

- Contextualize national curricula and engage research in relevant cultural framework
- Introduce sand drawings at primary level with vernacular languages
- Introduce educational research in culturally sustained education at the SOE NUV
- Involve students in ethnomathematics projects at initial training at SOE and also on in service
- Revisit or rethink the meaning of the slogan “Education for all”

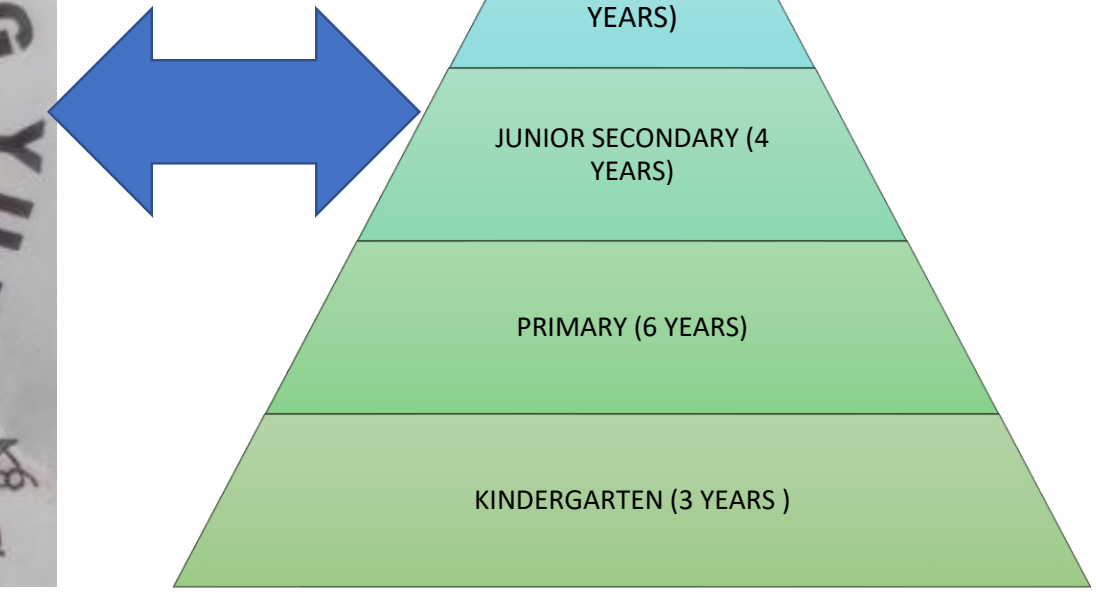
DECOLONIZING EDUCATION

A BALANCE BETWEEN TRADITIONNAL AND MODERN EDUCATION SYSTEM

SUSTAINABLE LIVING



CAPITALIST MINDSET



Source : (Assial, 2021)

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Tankiu tumas

FALAH Congress

21st to 23rd of June 2023

Holiday Inn Hotel, Port Vila, Vanuatu

Fishing, crops cultivation, access to fresh water: how do cyclones, the COVID pandemic and seasonal workers' migration interfere with the way of life in Vanuatu?

Catherine Sabinot, Felicity Rogers, Pierre Metsan, Gilbert David

Fishing, crops cultivation, access to fresh water: how do cyclones, the COVID pandemic and seasonal workers migration interfere with the way of life in Vanuatu?

➔ How has temporary migration to New Zealand and Australia evolved since the first bilateral agreements?

➔ What were the consequences for food practices and subsistence activities?

➔ How cyclones, the COVID pandemic and the migration of seasonal workers interfere with the way of life in Vanuatu, sometimes creating new inequalities?

Fishing, crops cultivation, access to fresh water: how do cyclones, the COVID pandemic and seasonal workers migration interfere with the way of life in Vanuatu?

- **1 - What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?**
- **2 - How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?**
- **3 - How was managed food security after cyclone in Santo during COVID lockdown ?**

➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

. Vanuatu/New-Zealand - 2007
“Recognised Seasonal Employer” program (RSE)

. Vanuatu /Australia - 2009
“Australian Seasonal Worker Programme” (ASWP)

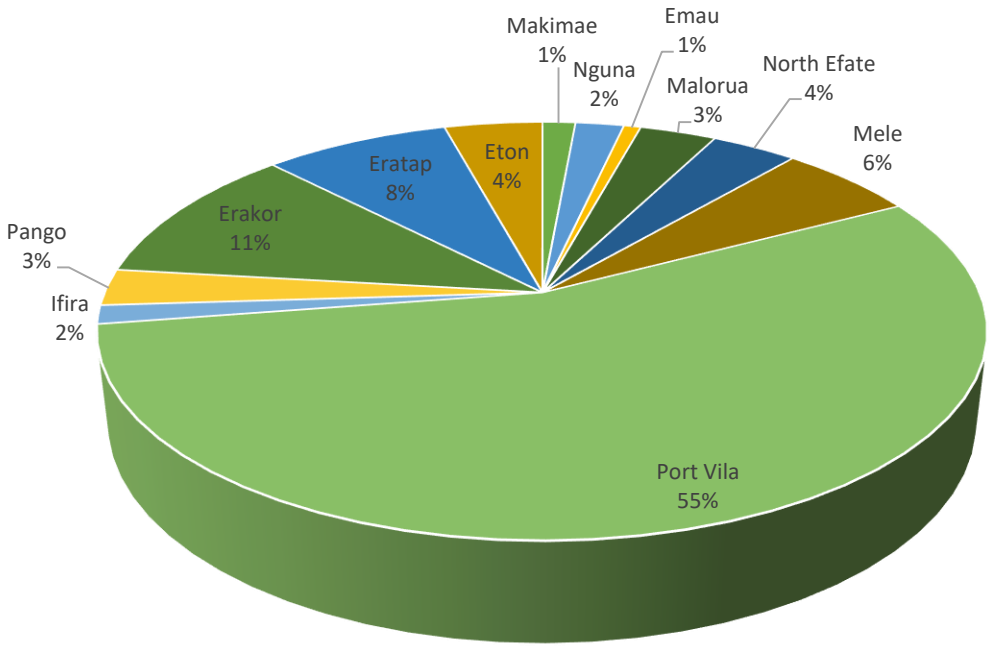
⇨ **“Triple win effect” for New-Zealand government**

⇨ **Various reason lead Ni-Vanuatu to work abroad.**

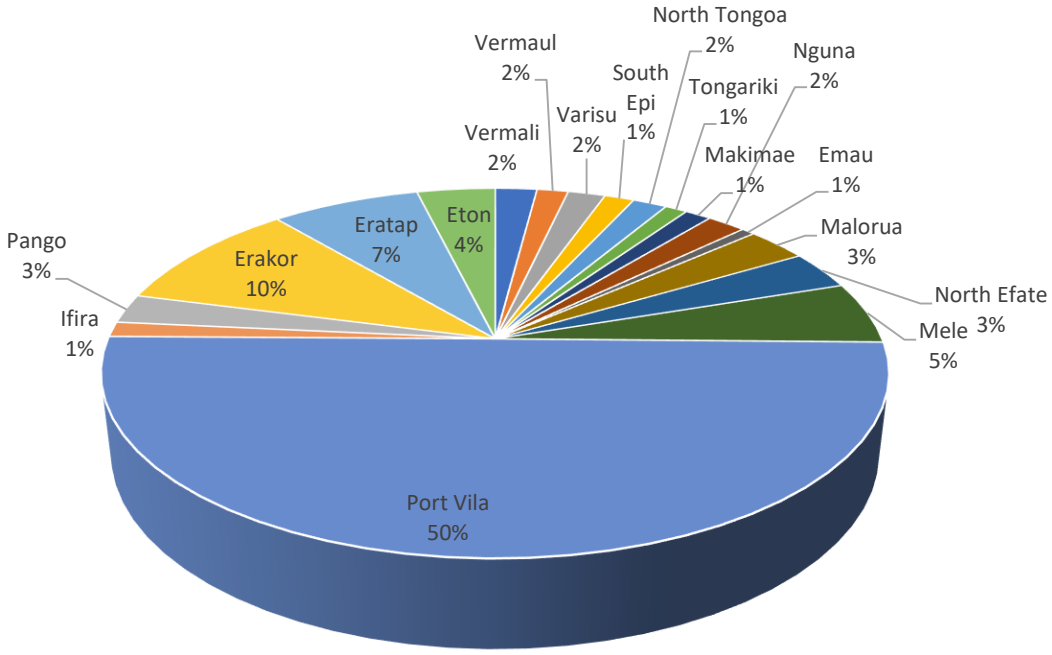
➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

Distribution of seasonal migrants in Efate

Efate population ever participated in Region Seasonal Employment (RSE)

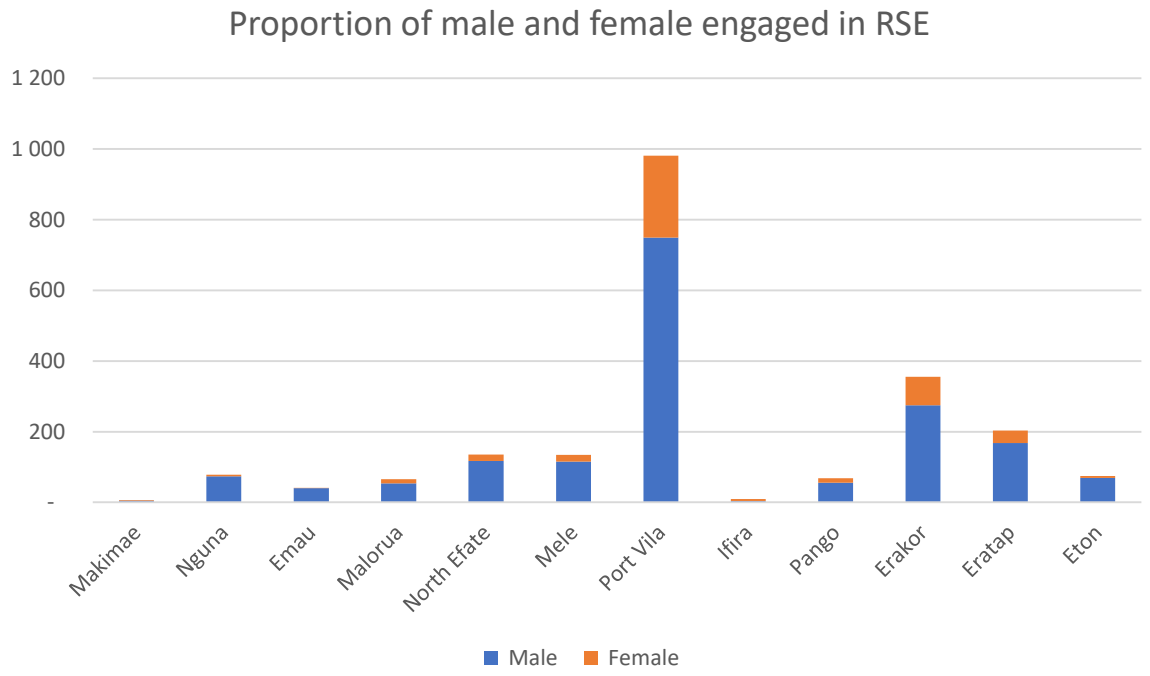


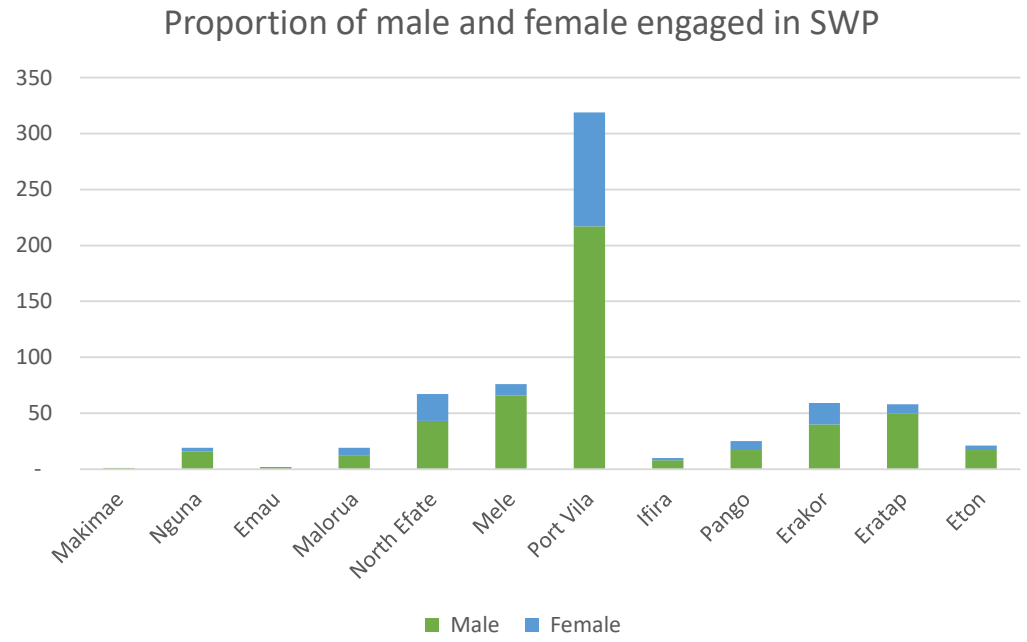
Efate population ever participated in the Seasonal Workers Program (SWP)



➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

Gender distribution of seasonal migrants in Efate

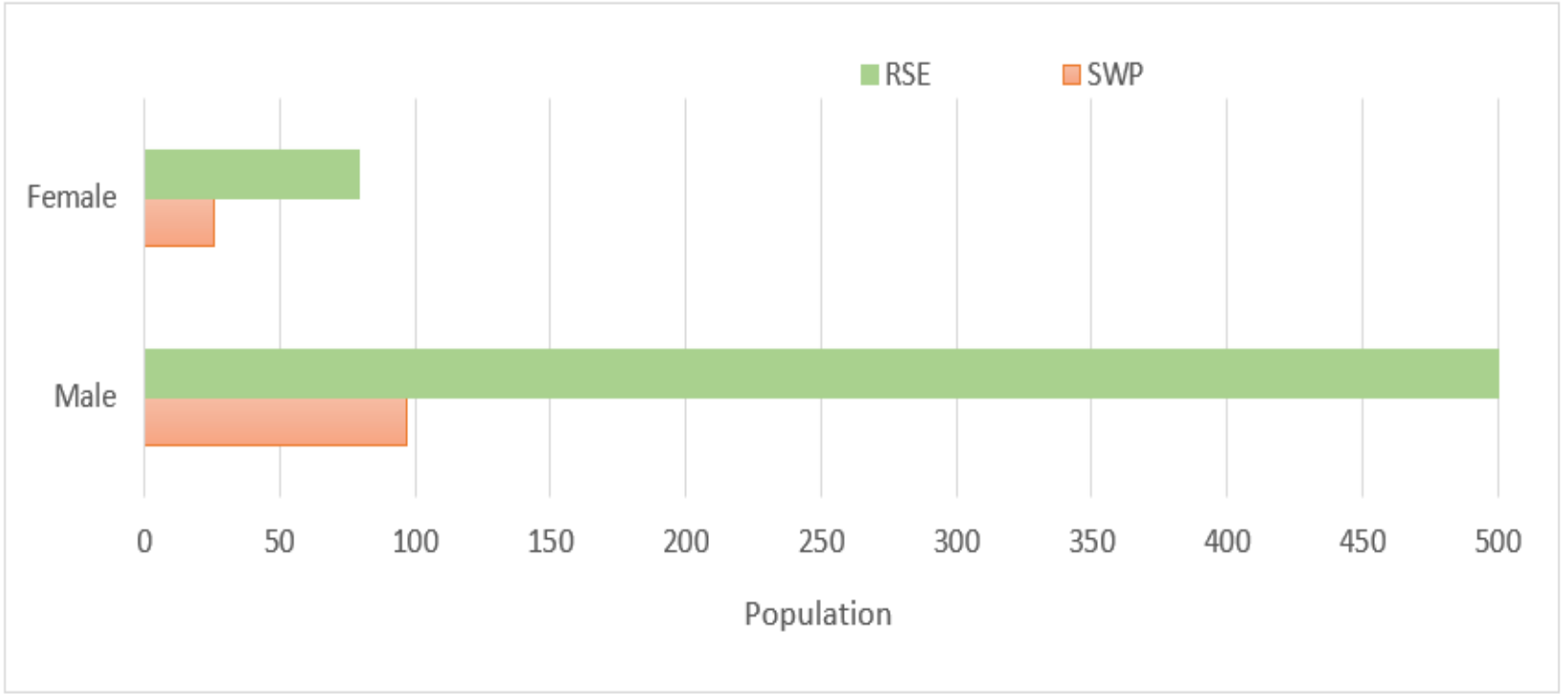




➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

Distribution of the number of seasonal migrants in Santo

Fig. 27 Sanma population ever participated in SWP or RSE Programmes

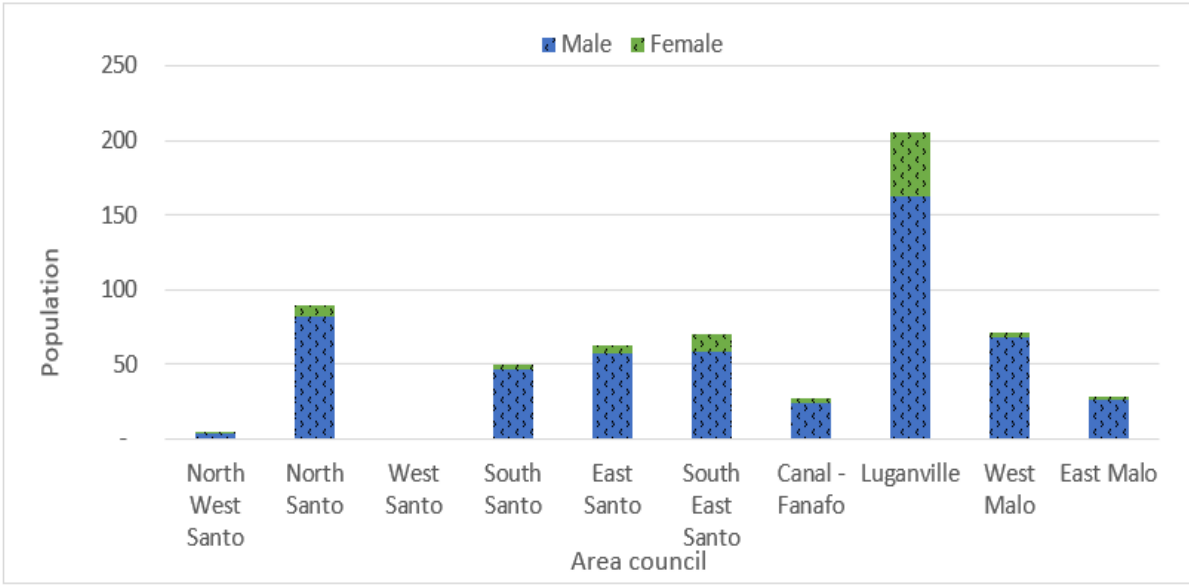


Source: Vanuatu National Statistics Office

➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

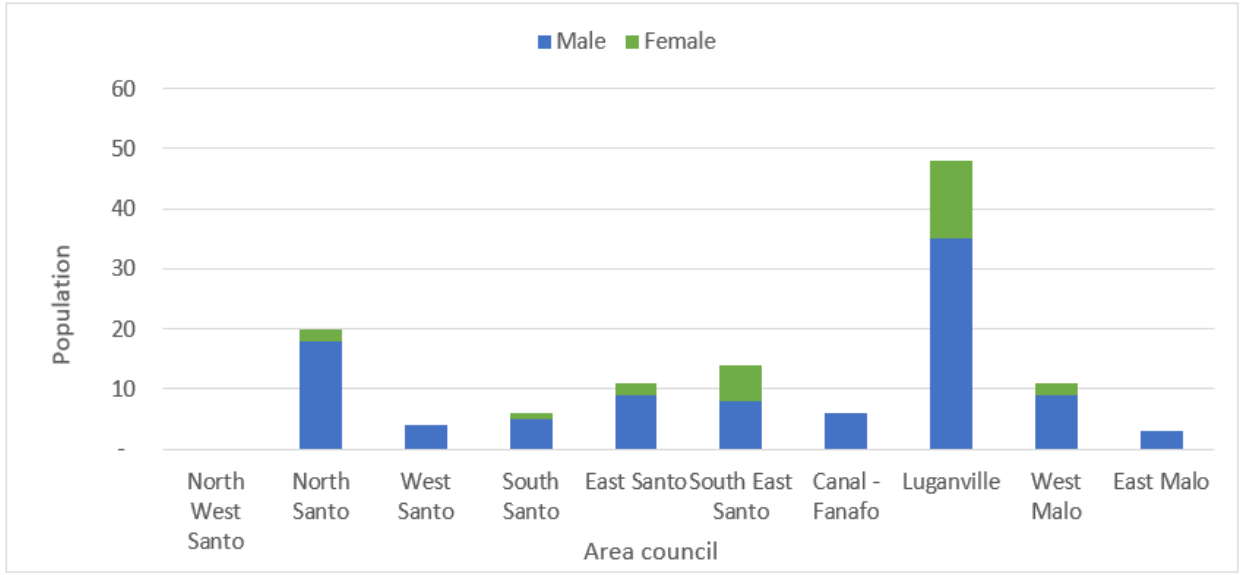
Gender distribution of seasonal migrants in Santo

Fig. 28 Sanma population ever participated in Regional Seasonal Employment (RSE) by region



Source: Vanuatu National Statistics Office

Fig. 29 Sanma population ever participated in Seasonal Workers Program (SWP) by region



Source: Vanuatu National Statistics Office

➢ 1 – What do we know about bilateral programs that strengthen economic migration of ni-Vanuatu?

Evolution of the gender distribution of seasonal migrants departing from Santo and Efate

→ **Increase in the number of women**

→ **Change in family composition**

→ **Increased length of absence from island of residence**

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

Case study > Takara village after Cyclone PAM in 2015-16 and regular observations and interviews the following years

Dans le sillage du cyclone Pam

Quand la catastrophe fait quotidien au Vanuatu

Mémoire de Master 2

Manon Garcia

École des Hautes Etudes en Sciences Sociales

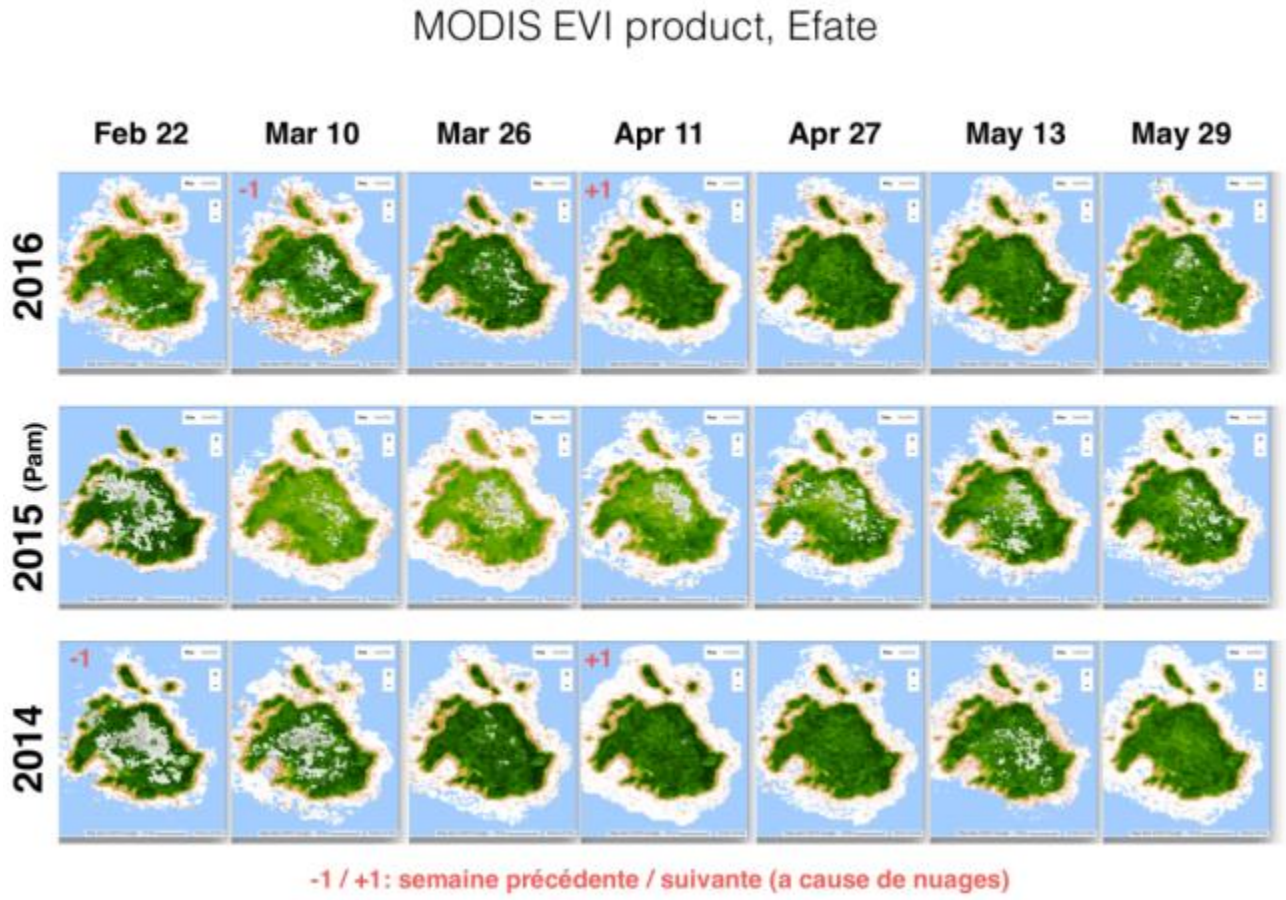
Mention Étude Comparative du Développement

Année 2016-2017

Sous la direction de Eric Wittersheim et Catherine Sabinot

Rapporteuse : Sandrine Revet

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?



⇨ **Defoliation and recovering on Efate (10 March – 29 May)**

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

The emergency time: humanitarian aid and migration

**** Management of the disasters by NDMO (National Disaster Management Office) ****

> " effervescence" "of help during the weeks following the cyclone

> feeling of abundance

"Afta Pam, blessing i foldaon.
Wanem yu no bin gat, yu gat "
"After Pam, the blessing fell down. (…) What you haven't got before, you received after"

⇨ **The security in having food and goods from NDMO and international aid is becoming a sufficient reason for staying in a foreign country, earning money.**

*"When I went to New-Zealand, like... I was there when the hurricane came. Ok, after that, we live like that. So **I knew what were the conditions of our life here, so I flew**. After living, I worked, I was ringing them: "Food from NDMO?". She [his wife] said: "It's close to the end". So I sent money for Esther, in order for her to pay a pack of rice with a pack of biscuits. After that, they were eating until NDMO came to give food for them, so she was ringing me: "No, NDMO came for giving some food again". It stayed like that until she rang again: "No, there is no food anymore". I sent money again to pay food, and it stayed like that**. Because I have already looked [the situation] so I could go and I had to send, that's all**."*

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

The emergency time: humanitarian aid and migration

**** Management of of the sea and reefs after the cyclone ****

- **Too much fishing for money**
- **Lack of respect for *mangeas* spirits**

⇨ **People couldn’t rely on the sea to provide them food or money anymore. They had to wait few months before the situation came back as it was before.**

⇨ **Consequently, migration was chosen as an alternative for earning money.**

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

Ins and outs of absence of ni-Vanuatu men

- **Mobile phone, skype and assistance**
- **Houses, materials and step-by-step process**

Half-built “permanent houses”

Temporary house

Natangura and “kapa house”

Concrete and “kapa house”

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

Ins and outs of absence of ni-Vanuatu men

- **Mobile phone, skype and assistance**
- **Houses, materials and step-by-step process**
- **Droughts and water issues**

"aye blong wota"
(eye of water)

Well in Takara

Coming back from wells

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

Ins and outs of absence of ni-Vanuatu men

- **Mobile phone, skype and assistance**
- **Houses, materials and step-by-step process**
- **Droughts and water issues**

Work at the retention basin

➢ 2 – How was managed the emergency time after cyclone PAM, combining humanitarian aid and migration?

Ins and outs of absence of ni-Vanuatu men

- **Mobile phone, skype and assistance**
- **Houses, materials and step-by-step process**
- **Droughts and water issues**

⇨ **Before PAM, water was water, and after Pam various kind of waters emerged (the dirty ones, the clean ones, the sold ones….)**

⇨ **Many transformations affected the tasks related to water access that redefined gendered areas and gave a different duration to daily activities.**

⇨ **Eight years after, more young people are involved in “mane blong aple” and have invested in fishing boats, in nakamal, in solar electricity**

➢ 3 – How was managed food security after cyclone in Santo during COVID lockdown ?

- **FORMAL DISTRIBUTION NETWORK**
  - **Limited international aid**
  - **Food security agriculture cluster initiatives**

- **INFORMAL DISTRIBUTION NETWORK**
  - **Crops and fish distribution network**

Conclusions

. The "Recognised Seasonal Employer" program aims to help the development of the country.

. People play with opportunities, necessities and duties.

⇨ ***This program is integrated in a social network that "uses" it***

. Following his own criteria of development

. Answering to his own preoccupations and issues

. Dealing with collective and individual issues

⇨ ***And how to manage the future in this context?***

Fishing, crops cultivation, access to fresh water: how do cyclones, the COVID pandemic and seasonal workers' migration interfere with the way of life in Vanuatu?

Espace DEV
OBSERVATION SPATIALE, MODÈLES & SCIENCE IMPLIQUÉE

FALAH
Family farming, lifestyle & health

Catherine Sabinot, Felicity Rogers, Pierre Metsan, Gilbert David




Institut de Recherche pour le Développement FRANCE
French National Research Institute for Sustainable Development

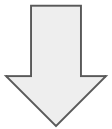
catherine.sabinot@ird.fr

Permaculture as an agri-food model ? : the case of an organized citizen organization

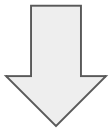
Amelle Aoudia (Phd student), Nathalie Angelé-Halgand (Pr), Gulliver Lux (Pr)
Laboratoire des recherches juridiques et économiques, University of New Caledonia

Food in management sciences

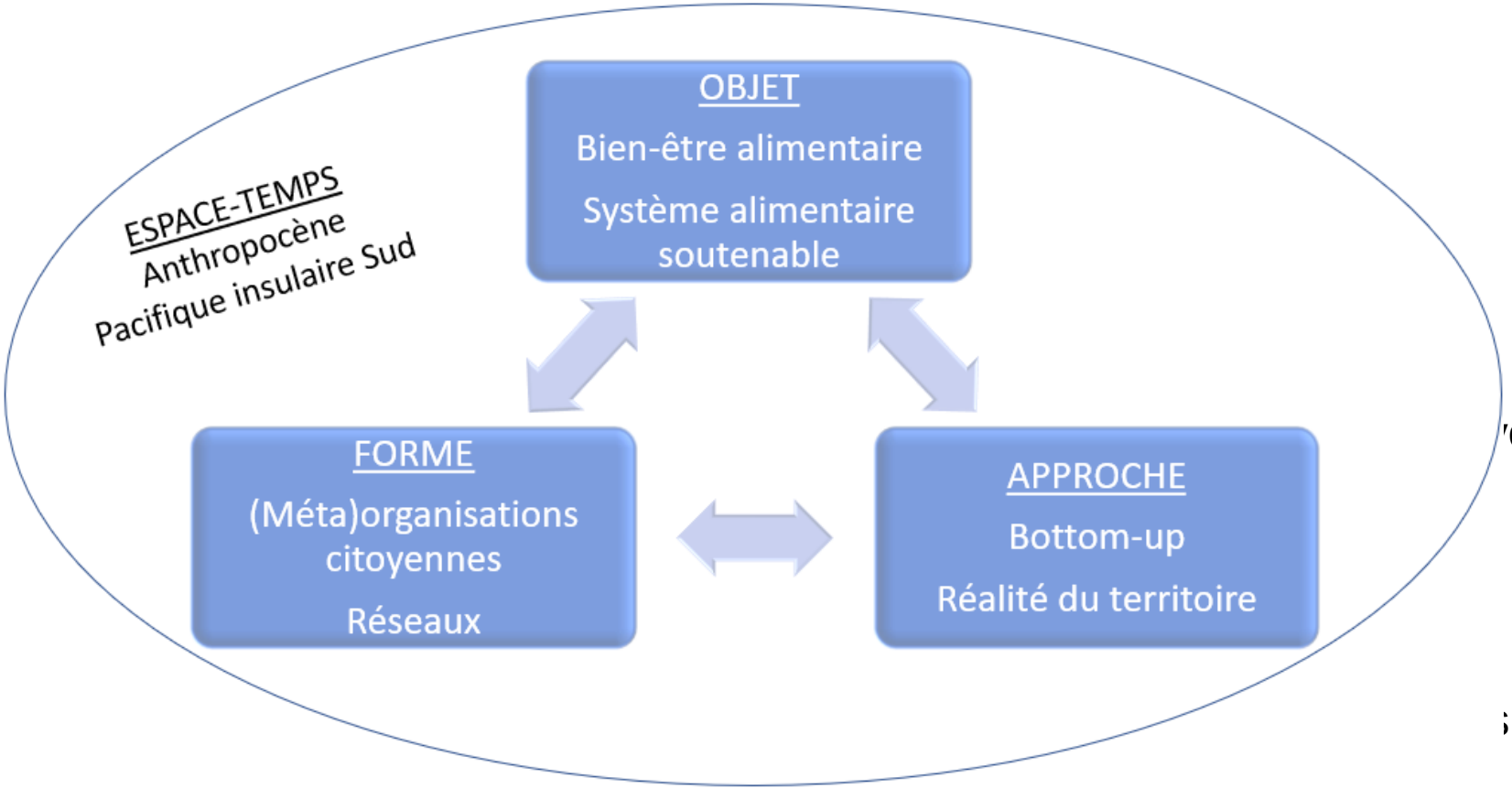
Agri-food systems participate to damage Earth / are affected as well (Valiorgue, 2020)



A great challenge of our times (EAT-lancet, FAO) that calls for new ways of thinking and organizing (Clark, 2015)



Civil society as a key player (Wright & al, 2018 ; Sovovà & al, 2021 ; Beacham, 2018)


ESPACE-TEMPS
Anthropocène
Pacifique insulaire Sud
OBJET
Bien-être alimentaire
Système alimentaire soutenable
FORME
(Méta)organisations citoyennes
Réseaux
APPROCHE
Bottom-up
Réalité du territoire

Case study : Permatour NC

Structure	Non-profit civil society organization = members are volunteers Independent association since September 2022
Objectives	Promoting and practicing permaculture = lifestyle and toolbox Contributing to food security in NC Knowledge and practices exchange (land farming and cooking) Intercultural and urban-rural exchange = connecting people between them and people to the ground
Action	An iconic annual project “the Permatour” A kind of “organized wwoofing” = immersions in families with working times

Methodology

Selection criterias	Studied actors
- Operationality - Participatory functioning - Network dynamic - Fresh vision of food issue + brand awareness	- Top-team members - Participants in Permatour 2022 = hosts and guests

Research approach

- inductive and comprehensive
- exploratory case studies
- from actors' reality

Qualitative methods

- immersion as a member
- participatory observation
- semi-directive interviews

Data analysis

- inductive and thematic coding
- situations are considered

\+ *special tools for collecting and measuring affects and their role in the collective dynamic*

Litterature review about permaculture

1. *Permaculture common principles (Molison & Holmgren, 1978 ; Morel, 2022) :*

- care for Earth, care for humans, social justice and equity
- techniques based on mimicry, optimization, observation, experimentation
- practitioner' subjectivity is important

1. *Permaculture is part of agroecology (HLPE, 2019 ; Fergusson & Lovell, 2014) :*

- interactional perspective providing mutual benefits
- social movement resulting of collaborations / small-scale and networking

Litterature review about permaculture

3. Permaculture and indigenous traditions (Morel, 2022 ; McCleary & Moran, 2019 ; Gashute & Hale, 2022) :

- guiding principles are rooted in Aborigenes' vision (energies, cosmogony)
- revitalizing heritages in postcolonial contexts / easier appropriation)
- risk of spiritual excesses (scientificity vs believes)

4. Permaculture from a managerial point of view (Roux-Rosier, 2018; Vitari & David, 2016 ; Lodhi & Khan, 2014) :

- an ethical framework supporting an ecocentric vision
- a design replicable in most organizations with a societal purpose

Points of interest

No single definition but different ways to address permaculture : empirical studies needed !

-> Permaculture as a vision of food issue, and a design for food-related activities // facilitating exchange of knowledge and practices ?

-> Permaculture-Permatour as a bridge (or gap) with oceanian traditions // particularly those of indigenous people ?

-> Permatour as an organizing model, collectively and locally driven // potentially replicable outside ?

Q? How a permaculture citizen initiative may support a turn in the Pacific islands' agri-food model ?

Main findings 1 : Permatour NC vision

The vision of top-team members is rooted in Oceanian traditions	The vision proceeds through values and symbolic = meaningful for all participants	Facing confusion, solidarity-based vision has been reinforced !
Ecocentric perspective (Heikurrinen & al, 2016 ; Leblic, 2018)	Imaginaries (Castoriadis, 1975 ; Wright & al, 2013)	Flexible vision of permaculture (hosts selection and worksites design)

It seems beneficial to the organization purpose !

Main findings 2 : actors' profiles and motivations

Top-team members	Most are Caledonian with european roots	• Already involved in citizen initiatives • "Sustainable" food-related activities
Hosts participants	They are reflecting the NC socio-cultural diversity	• Need help and be more resilient • Want to share their lifestyles
Guests participants	Most are travellers coming from France	• In quest of meaning • Want to discover local people and places

Most of them don't associate themselves to permaculture !

Main findings 3 : managerial tools and practices

Participants are connecting through “coutumes” and seeds

No tool to follow-up buildings

A symbolic network where learning is limited ?

Leadership in worksites = between discipline and agility

Participatory but only for confirmed practitioners ?

Progressive formalization of the organization

New tools and format renewal

A loss of initial spirit ?
Suitable to the context ?

Work in progress to improve action efficiency !

The Permatour model : limits and insights

Tension points	**Insights**
Vision is connected to Oceanian customs *-> but few Oceanian people among guests participants*	- Meaningful for many people -> replicable outside - But which places to get various people to join ?
Networking-participatory model is relevant regarding the context *-> but it remains a short-term project* *-> participants confess they don't necessarily change their habits*	- Involvement in the field and great achievements - Lifestyles experiencing and strong friendships - A permanent effort from the top-team would be desirable to maintain the human dynamic and support a real change
Permaculture is a flexible framework usefull to rethink organizations and food-related activities *-> is it desirable to formalize it ?* *-> even more in Oceanian contexts ?*	The challenge is to find a balance between the organizational (and societal) performance and the friendly spirit !

Thanks for your attention !
Time to discuss

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