

# EXECUTIVE SUMMARY

## Land Suitability Evaluation and Mapping of Regional Potential for the Development of Agricultural, Livestock, Fisheries, and Forestry Commodities

## Timor-Leste

# Foreword

Eng. Marcos da Cruz, MAgSt



With gratitude to Almighty God, I am honoured to present this Executive Summary of Key Findings entitled Land Suitability Evaluation and Mapping of Regional Potential for the Development of Agricultural, Livestock, Fisheries, and Forestry Commodities in Timor-Leste. This publication is the result of a strategic collaboration between the Ministry of Agriculture, Livestock, Fisheries, and Forestry of Timor-Leste and the Faculty of Agriculture, Udayana University, supported by the Government of Timor-Leste under Contract No. 24/MAPPF/IV/2024.

This Executive Summary presents the principal findings of a comprehensive assessment undertaken across fourteen administrative areas of Timor-Leste. It provides an evidence-based overview of land potential, commodity suitability, major biophysical constraints, and priority directions for the development of agriculture, livestock, fisheries, aquaculture, and forestry. The findings confirm that Timor-Leste possesses significant potential to strengthen food security, improve local production systems, and support more balanced and sustainable regional development.

At the same time, this study highlights the importance of integrated land and water management in addressing key national challenges, including climate variability, seasonal drought, land degradation, declining soil fertility, and erosion on steep slopes. It further emphasizes the strategic importance of sustainable agriculture, agroforestry, mangrove protection, and responsible aquaculture as part of Timor-Leste's broader commitment to the green economy, blue economy, and the Sustainable Development Goals.

I encourage government institutions, local authorities, development partners, academic institutions, and communities to use this Executive Summary as a strategic reference for policy formulation, investment planning, and the implementation of integrated development programmes. I extend my sincere appreciation to all institutions, experts, field teams, and community members whose dedication made this work possible. It is my hope that this publication will support Timor-Leste in advancing toward a more food-secure, resilient, and sustainable future.

Sincerely,

**Eng. Marcos da Cruz, MAgSt**
Minister of Agriculture, Livestock,
Fisheries, and Forestry
Democratic Republic of Timor-Leste



# RESEARCH KEY FINDINGS

## LAND EVALUATION PROJECT OF TIMOR-LESTE

# AGRICULTURE SECTOR OF TIMOR-LESTE

## Key Findings from Land Suitability Evaluation and Regional Development Potential

The agriculture sector of Timor-Leste is strategic foundation for national food security, regional production regional production growth, and hermanment mend ofratise to mamuream recuties it, powth and sustainable land management.

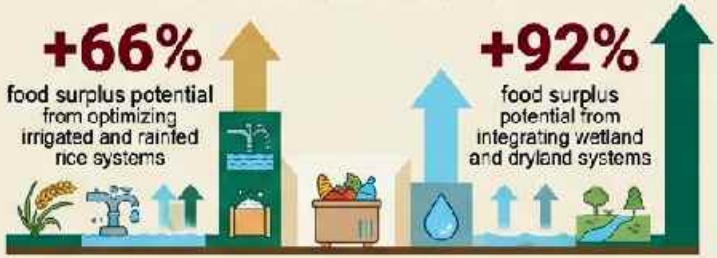
### KPI SECTION

| | | |
|---|---|---|
| **28.75%** Agroforestry | **26.76%** Dryland Agriculture | **11.51%** Irrigated Rice Fields |
| **7.05%** Rainfed Rice Fields | **+66%** Potential Food Surplus | **+92%** Potential Integrated Food Surplus |

### COMMODITY SECTION

rice, maize, citrus, coffee, cacao, coconut, vanilla, sugarcane, sorghum, chili, tomato, mango, papaya, highland horticulture

### FOOD SECURITY SECTION




### CONSTRAINTS AND SOLUTIONS SECTION

| Constraints | Solutions |
|---|---|
| acid soils in Aileu, especially Liquidoe | balanced fertilization based on soil testing |
| alkaline soil conditions in Manatuto | dolomite and liming for acid |
| low organic carbon in some areas | sulfur, gypsum, compost, and biochar |
| erosion risk on steep slopes | organic matter improvement |
| irrigation limitations | biofertilizer support |
| | irrigation efficiency |
| | adaptive varieties |

### LOWER CONTENT AREA

bench terraces, contour bunds, vetiver hedgerows, alley cropping, small check dams, rainwater reservoirs, vegetative river buffers, conservation drainage, biopore infiltration

# FORESTRY SECTOR OF TIMOR-LESTE

## Agroforestry, Protected Forests, Mangroves, and Strategic Carbon Assets

Forestry in Timor-Leste is both a conservation priority and's a strategic driver asset sustainable economic development, climate resilience, and long-term spatial planning.

### TOP KPI SECTION

| | | | | | |
|---|---|---|---|---|---|
| **4,288.69 km²** Agroforestry | **28.75%** | **3,552.80 km²** Protected and Conservation Forest | **23.81%** | **48.20 km²** Mangroves | **0.32%** |

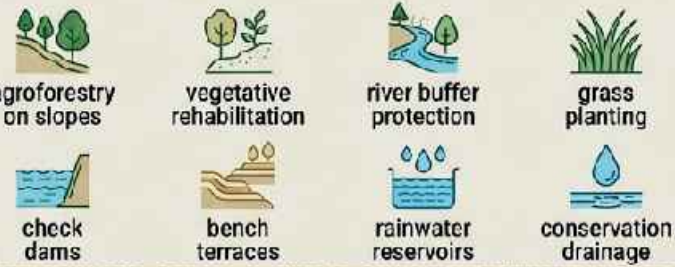
### CENTER LEFT STRATEGIC LANDSCAPE SECTION

- **RAEOA**: sandalwood
- Ermera, especially Letefoho: high-value coffee landscape
- Tutuala: protected landscape of high ecological value
- mangroves: strategic coastal asset
- agroforestry: largest production landscape

### CENTER RIGHT POLICY VALUE SECTION




### LOWER LEFT CONSERVATION SECTION




### LOWER RIGHT CARBON AND ECOSYSTEM SECTION



# LIVESTOCK SECTOR OF TIMOR-LESTE

## Ecological Suitability, Feed Strengthening, and Karau Timor Susubeen Development

### TOP KPI SECTION

**5** KTS Centers

KTS Natarbora ±40 ha

**11** Buffalo per Center

**10** Female : 1 Male

### PRIORITY LIVESTOCK SECTION

**Multi-livestock priority clusters**

Cool and wet areas suitable for **Beef cattle, buffalo,** and **pigs**



Hot and dry areas suitable for **Beef cattle** and **buffalo**



**Poultry** as the most adaptive commodity

### KTS STRATEGIC PROGRAM

**Pato**
Notes conrowa suitable livestock centers

**Raitahu**
Notes use in beef cattle, and buffrord centers

**Dotik**
Communiconals and ecolocal centers

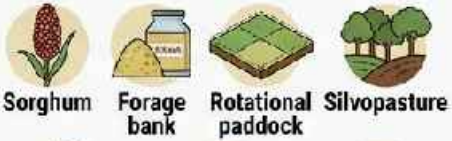
**Natarbora**
Notes to nouil natiand and inostiucture centers

**Corluli**
Other contech centers

- Buffalo milk
- Breeding
- School nutrition support
- Community-based livestock economy
- Local institutional strengthening

### FEED AND SUPPORT







**Raitahu shows strong integrated farming potential,**
**Raitahu** shows strong **integrated** farming potential, where forage development and horticulture can grow together in one system.

# FISHERIES AND AQUACULTURE SECTOR OF TIMOR-LESTE

## Land Suitability, Water Quality, and Coastal BLUE ECONOMY

### KPI TECHNICAL SUITABILITY

- ≤ 2% slope
- 20–30% clay fraction
- DO > 5 mg/L
- ammonia < 0.3 mg/L
- pH 6.5–8.5
- TDS 1,000–1,500 mg/L
- 10–20 ppt for brackish aquaculture

### DOMINANT LAND TEXTURE COMPOSITION




### PRIORITY DEVELOPMENT

- Verified sites in Manatuto
- Potential clusters in RAEOA
- Potential clusters in Covalima
- Potential clusters in Viqueque
- Expansion potential in Lautém
- Demonstration model in Dili

### BLUE ECONOMY IS

## BLUE ECONOMY

- Mangrove protection
- Blue carbon
- Water quality buffering
- Nursery ground function
- Responsible aquaculture
- Community livelihoods

### SUSTAINABLE AQUACULTURE MANAGEMENT ACTIONS

- Simple aeration
- Controlled stocking
- Biosecurity
- Local hatcheries
- Community field schools
- Feed storage
- Mangrove rehabilitation

# Key Agricultural, Livestock, & Fisheries Commodities in Timor-Leste

## High Economic Value Industrial Crop Commodities






**Strategic Zoning**

- Agroforestry
- Protected Forest
- Mangrove Forest
- Grazing Area
- Dryland Farming
- Irrigated Rice Fields
- Rainfed Rice Fields

## Recommendations for Vegetable Horticulture Development



## Recommended Fruit Horticulture for Dryland Farming



**48 villages are integrated through an approach that combines high-potential areas for the development of agriculture, livestock, and fisheries**




# MAIN DEVELOPMENT INTEGRATION MAP BY SUCO IN TIMOR-LESTE

30 0 30 60 90 km

Scale 1 : 700.000

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

Integration Zone by Suco

No Integration




**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# INTEGRATED FARMING CONCEPT OF TIMOR-LESTE

## An Integrated System for Food Security, GREEN ECONOMY, and BLUE ECONOMY

Agriculture, livestock, aquaculture, forestry), forestry, mangroves, water, feed, and organic resources that fnnas-oourpoes function as one integrated national system.

### KPI

**48** Suco Candidate Priority Areas

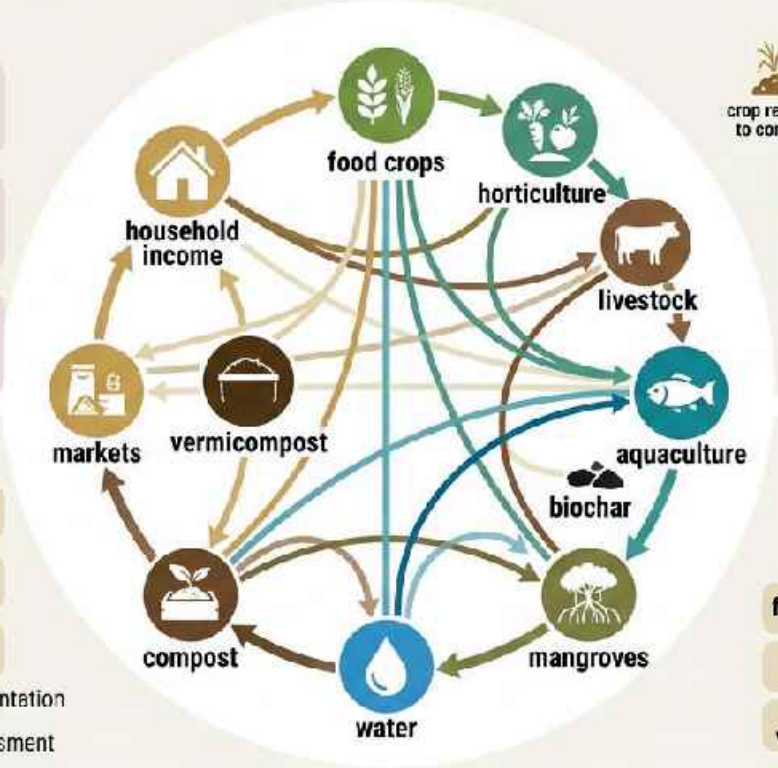
**+66%** Potential Food Surplus

**+92%** Integrated Food Surplus Potential

### PRIORITY EXAMPLE

| | |
|---|---|
| Raitahu | Pato |
| Natarbora | Manatuto |
| Lautém | Viqueque |
| Bobonaro | |

phased implementation requires further readiness assessment




### INTEGRATED CYCLE




### NATIONAL IMPACT

**GREEN ECONOMY**

**BLUE ECONOMY**

food security | land efficiency | water efficiency

conservation | local jobs

regional value added | circular economy | SDGs

# POLICY RECOMMENDATIONS AND FUTURE DIRECTIONS

## Implementation Roadmap for Land Suitability-Based Development in Timor-Leste

Conect Food Security, Spatial Planning, Integrated Farming, Climate Finance, Institutional Coordination

### STRONG NUMBER BLOCK KPI

**48 Suco** — **National Priority**

Integrated Food Security Model

### ASSESSMENT SECTION

- human resources
- water infrastructure
- roads
- local
- finance
- technical assistance
- local infrastructure
- market access

### NATIONAL ACTIONS SECTION

- balanced fertilization based on soil testing
- soil fertility rehabilitation
- organic matter improvement
- slope conservation above 45%
- 100 new earthen ponds
- strengthening 5 KTS centers
- irrigation rehabilitation

### SPATIAL PLANNING SECTION

- Regional Spatial Plan
- Detailed Spatied Spatial Plan
- coastal and marine spatial planning
- single national spatial framework
- reduced land-use conflict
- balance between production and conservation

### GEOSPATIAL

- soil maps
- land use
- geology
- slope
- agroclimate
- irrigation
- nationt
- **ONE MAP POLICY**
- malcatenians
- mangroves
- cultivation zones
- administrative boundaries
- protected areas
- national geospatial dashboard

### STRATEGIC FUTURE SECTION

- **GREEN ECONOMY**
- **BLUE ECONOMY**
- SDGs
- MRV for carbon assets
- coordination among government, NGOs, and development partners
- evidence-based investment
- national food security
- Timor-Leste competitiveness

### TARGET

| +20% | 30% | 10% | 50,000 ha | 20,000 ha | 30,000 ha | 40,000 ha |
|---|---|---|---|---|---|---|
| rice productivity | AWD adoption | rice-fish | maize–soybean rotation | coffee and cacao rehabilitation | silvopasture | watershed vegetative rehabilitation |




# INTRODUCTION & METHODS

# INTRODUCTION

## Background

As the 11th official member of ASEAN, Timor-Leste is entering a strategic phase in strengthening a national development pathway that is more resilient, productive, and sustainable. This milestone creates broader opportunities for regional economic integration, stronger competitiveness of primary sectors, improved market connectivity, and faster alignment of national policies with ASEAN's regional development agenda. In this context, the management of land, water, agriculture, livestock, fisheries and aquaculture, and forestry must be positioned as a national priority that is evidence-based, measurable, and oriented toward long-term development outcomes.

At the same time, Timor-Leste continues to face major structural challenges, including climate variability, seasonal drought, limited water infrastructure, land degradation, erosion on steep slopes, and the vulnerability of its food system to production and distribution shocks. These conditions require a more integrated development approach. Land-based and water-based sectors can no longer be planned separately, but must be addressed through a coordinated policy framework that reflects the country's biophysical conditions and spatial development priorities.

From a national development perspective, strengthening agriculture, livestock, aquaculture, and forestry is essential to advancing food security, reducing dependence on external supply, generating productive employment, and increasing local economic value. This direction is consistent with the principles of the green economy, through efficient land use, soil and water conservation, rehabilitation of degraded land, and reduced environmental pressure. It also supports the blue economy, through mangrove protection, sustainable aquaculture development, and integrated coastal resource management. More broadly, this development pathway is aligned with the Sustainable Development Goals (SDGs) and Timor-Leste's long-term commitment to building a more self-reliant, climate-resilient, and regionally competitive economy.

## B. Research Objectives

This study was conducted to:

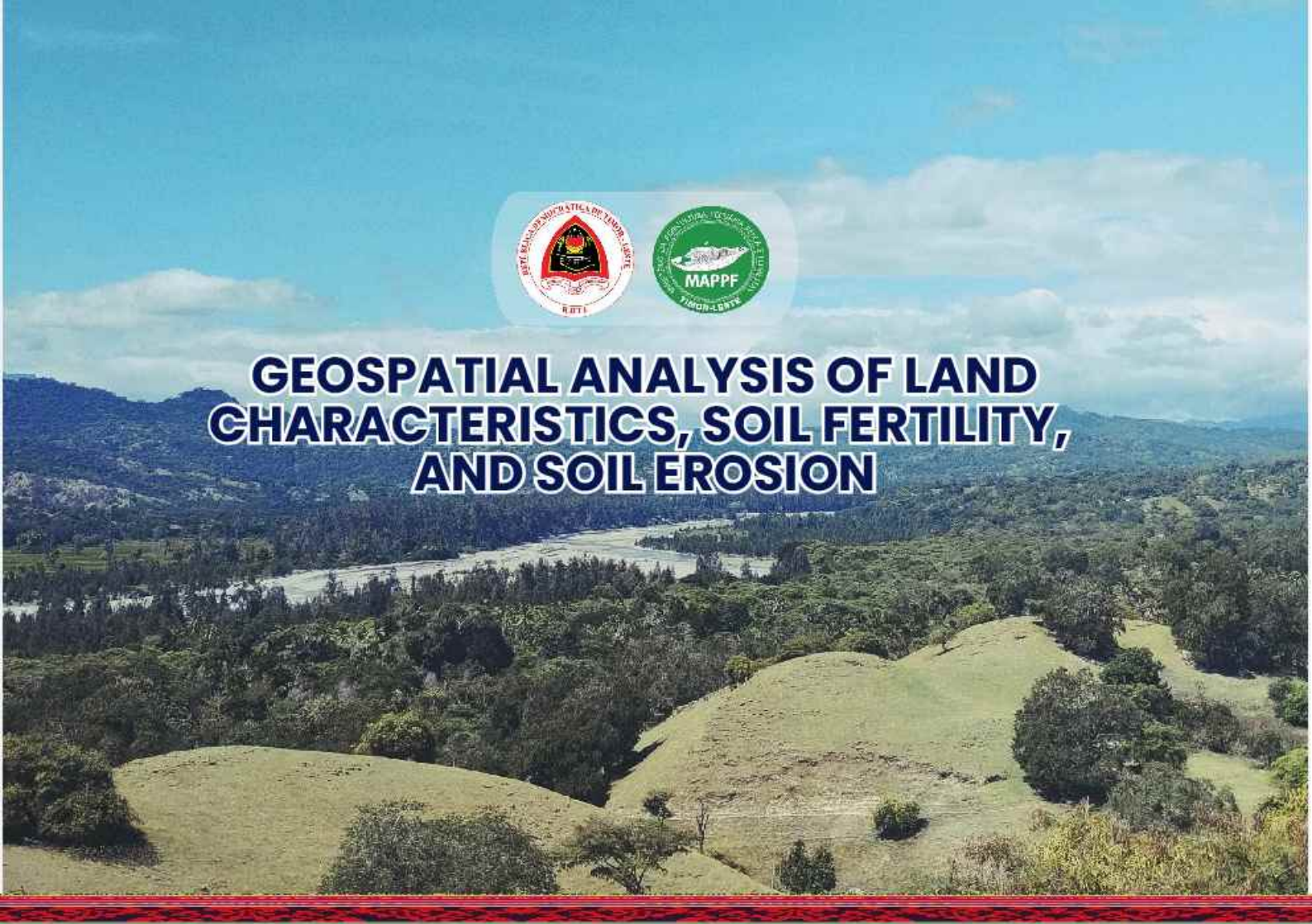
1. Develop validated spatial and non-spatial baseline data to support regional development planning.
2. Assess the physical and chemical properties of soils as a basis for fertilizer recommendations and water management.
3. Integrate soil, geology, land use, slope, and agroclimatic data within a Geographic Information System (GIS) framework.
4. Determine land suitability classes for food crops and horticultural commodities, including their main limiting factors.
5. Map erosion risk and identify priority conservation areas to support protection measures on very steep slopes.
6. Formulate commodity zoning and an integrated action framework for agriculture, livestock, aquaculture, and forestry, including food security projections and the strengthening of irrigation and institutional support






# Brief Methodology

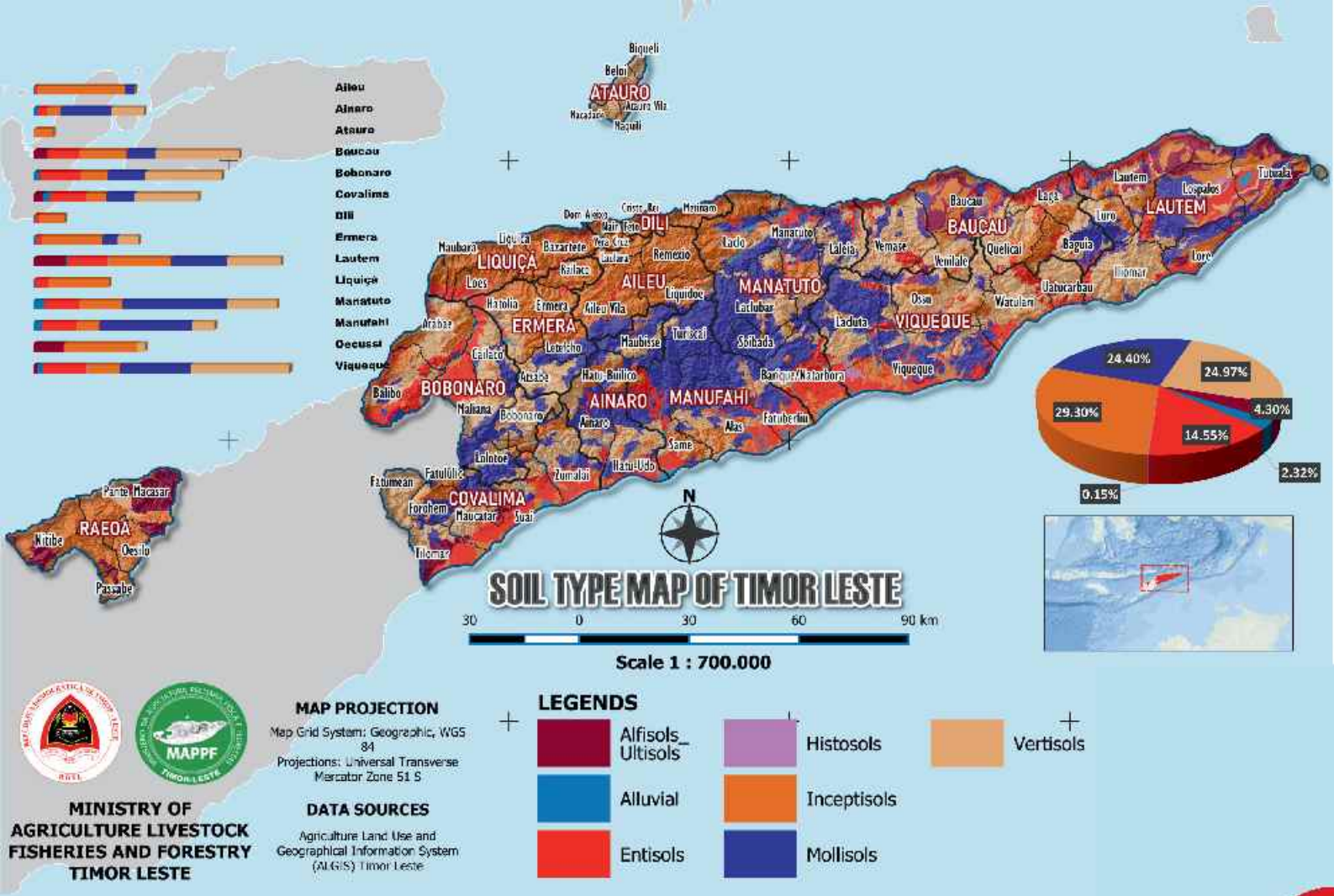
- **Geographic Information System (GIS)** was used to delineate land units based on land use, soil type, geology, slope, and agroclimatic conditions, which were then harmonized with administrative boundaries.
- **Field surveys and local consultations** were conducted in collaboration with President Authority Munisípiu (PAM), Servisu Munisípiu de Agrikultura (SMA), and agricultural extension officers to validate spatial findings and identify local constraints and development priorities.
- **For the livestock sector**, the study applied a participatory assessment approach combining technical field surveys, in-depth interviews with municipal livestock services, livestock owners, active farmer groups, and other local stakeholders. Soil samples were collected and analysed as baseline data for planning livestock forage development, while land suitability matching was used to assess the suitability of areas for forage crops and grazing systems under existing and potential improvement conditions.
- **Soil laboratory analyses** included soil texture, soil pH, organic carbon, total nitrogen, Cation Exchange Capacity (CEC), Base Saturation (BS), available and total phosphorus and potassium, Electrical Conductivity (EC), and micronutrients such as zinc (Zn) and sulfur (S). These analyses were used to assess soil fertility status and support site-specific recommendations for fertilization and soil management.
- **The Universal Soil Loss Equation (USLE)** was applied to estimate potential soil erosion, and the results were verified through field observations at priority locations, particularly in areas with steep slopes and visible land degradation.
- **For aquaculture assessment**, the study evaluated topography, soil texture, potential acid sulfate soils using pHF and pHFOX parameters, and pond water quality, including Dissolved Oxygen (DO), ammonia, pH, and Total Dissolved Solids (TDS). These parameters were used to determine the technical suitability of sites for freshwater and brackish-water aquaculture development.
- **Food security modelling was estimated using the Self-Sufficiency Ratio (SSR)** approach and scenario analysis at the Postu level. The calculation was based on three main variables: Postu name, population size, and the area of food-crop land under a single planting season. Standard assumptions on yield, cropping intensity, post-harvest loss, seed requirement, milling conversion, and per capita rice consumption were then applied to estimate rice availability, annual food requirements, and the level of food self-sufficiency

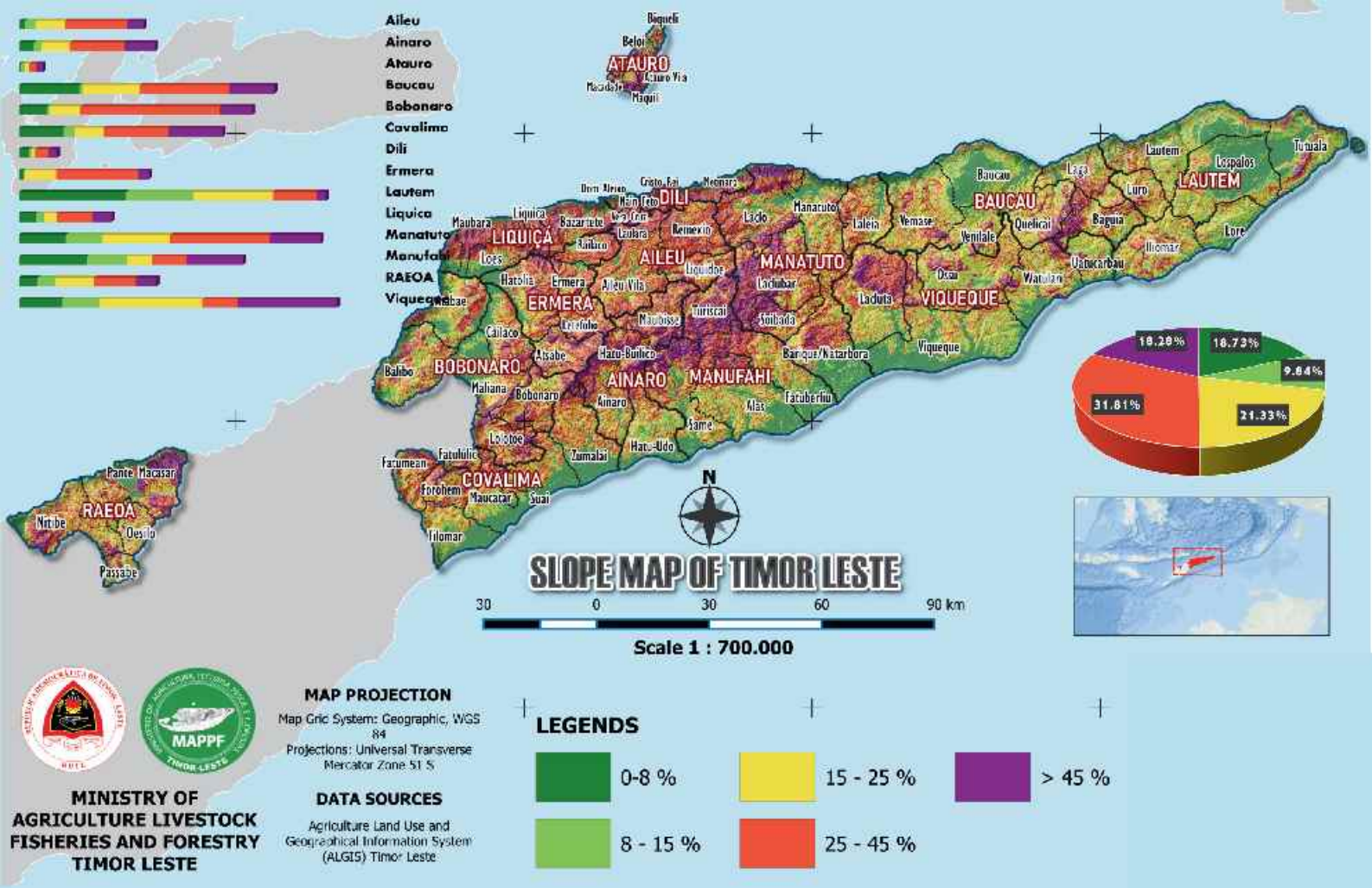



# GEOSPATIAL ANALYSIS OF LAND CHARACTERISTICS, SOIL FERTILITY, AND SOIL EROSION




**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**


Aileu
Ainaro
Atauro
Baucau
Bobonaro
Covalima
Dili
Ermera
Lautem
Liquiçá
Manatuto
Manufahi
Oecussi
Viqueque
ATAURO
DILI
LIQUIÇA
AILEU
MANATUTO
BAUCAU
LAUTEM
ERMERA
VIQUEQUE
BOBONARO
AINARO
MANUFAHI
COVALIMA
RAEOA
SOIL TYPE MAP OF TIMOR LESTE
30 0 30 60 90 km
Scale 1 : 700.000
N
24.40%
24.97%
4.30%
29.30%
14.55%
2.32%
0.15%
MAP PROJECTION
Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S
DATA SOURCES
Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste
LEGENDS
Alfisols_ Ultisols
Alluvial
Entisols
Histosols
Inceptisols
Mollisols
Vertisols
MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE


Aileu
Ainaro
Ataura
Baucau
Bobonaro
Covalima
Dili
Ermera
Lautem
Liquica
Manatuto
Manufahi
RAEOA
Viqueque
ATAURO
DILI
LIQUIÇA
AILEU
ERMERA
BAUCAU
LAUTEM
MANATUTO
VIQUEQUE
BOBONARO
AINARO
MANUFAHI
COVALIMA
RAEOA
N
SLOPE MAP OF TIMOR LESTE
30 0 30 60 90 km
Scale 1 : 700.000
18.20%
16.73%
9.84%
31.81%
21.33%
MAP PROJECTION
Map Gric System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S
DATA SOURCES
Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste
LEGENDS
0-8 %
8 - 15 %
15 - 25 %
25 - 45 %
> 45 %
MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE


0.01%
1.66%
14.73%
13.82%
3.71%
2.83%
4.44%
2.58%
12.88%
0.13%
16.93%
12.87%
0.70%
2.82%
2.01%
0.61%
0.06%
0.05%
0.63%
0.83%
1.05%
0.04%
Cities and Large Towns
Coastal Forests
Dry Lowland Forest - Mixed
Dryland Arable - Food Crops
Estate Crops
Grassland
Highland Forest - Moist Mixed
Highland Forest - Single Sped
Lowland Forest - Single Specie
Man-made Forest
Moist Lowland Forest - Dense
Moist Lowland Forest - Sparse
Montane Forest
Rice fields
River
Savanna
Shifting Cultivation Areas
Shrubs, Grasses and Reeds
Smallholder Estate Crops
Villages and Mixed Gardens
Wetland Arable
Wetland forest - Swamp
Baguelli
Beloi
ATAURO
Macadade
Vila
Maquli
DILI
Dom Aleixo
Cristo Rei
Metinaro
Hera
Fera
Nova Cruz
Manatuto
Lacio
Laleia
Remexio
Liquica
Maubara
Bazartete
LIQUIÇA
Loes
Hatolia
Ermera
Atabae
ERMERA
Letefoho
Gleno
Railaco
Laulara
AILEU
Aileu Vila
Liquidoe
MANATUTO
Ladubar
Laclubar
Turiscai
Soibada
Maubisse
Cailaco
Atsabe
Hatu-Builico
Balibo
BOBONARO
Maliana
Bobonaro
AINARO
Ainaro
MANUFAHI
Alas
Fatuberlim
Same
Hato-Udo
Lolotoe
Zumalai
Facumean
Fatululic
COVALIMA
Fohorem
Maucatar
Suai
Tilomar
Pante Macasar
RAEOA
Nitibe
Oesilo
Passabe
Baucau
Laga
BAUCAU
Quelicai
Venilale
Vemase
Bagaia
Lautem
Tutuala
Lospalos
LAUTEM
Luro
Iliomar
Lore
Uatucarbau
Watulari
Ossu
VIQUEQUE
Laduta
Viqueque
Barique/Natarbora
N
LAND USE MAP OF TIMOR LESTE
30 0 30 60 90 km
Scale 1 : 700.000
LEGENDS
Cities and Large Towns
Coastal Forests
Dry Lowland Forest - Mixed
Dryland Arable - Food Crops
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Wetland Arable
Wetland forest - Swamp
MAPPF
MAP PROJECTION
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DATA SOURCES
Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste
MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE




## LEGENDS

- Aileu Formation
- Ainaro Formation
- Aitutu Formation
- Aliambata Formatio
- Alluvial
- Alluvial Deposits
- Barique Formation
- Baucau Limestone
- Bisane Formation
- Bobonaro Complex
- Bobonaro Formation
- Borolalo Formation
- Borolalo Formation
- Cablaci Limestone
- Coral Limestone
- Cribas Formation
- Dartollu Limestone
- Dilor Formation
- Lariguti Formation
- Lolotoi Formation
- Maubisse Formation
- Noele Formation
- Selorejo Formation
- Sual Formation
- Surobeço Formation
- Viqueque Formation
- Walbua Formation
- Wailuli Formation

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# Findings



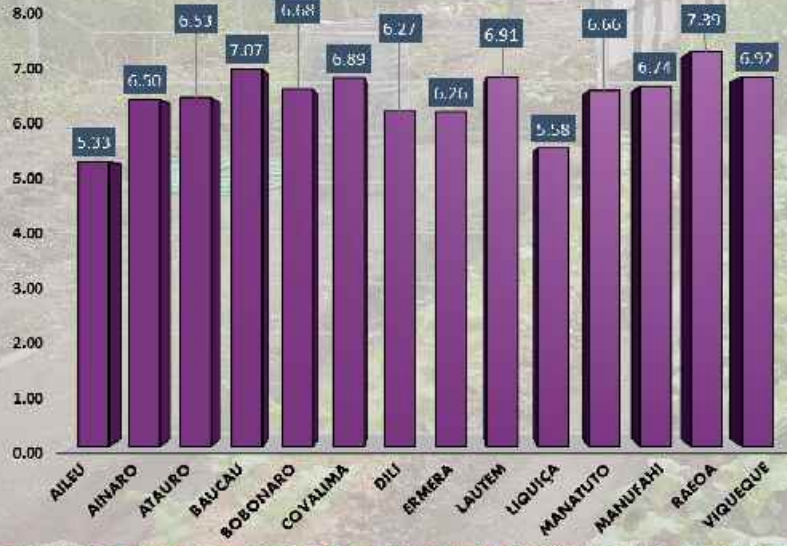

## Soil pH



**Soil pH ranges from**

**5.11 to 7.90**

**Avarange by Sub-districts**




### Acidic areas:

**Aileu District** (Liquidoe, Remexio, Aileu Vila, and Laulara Sub-Districts)
**Liquiça District** (Maubara, Loes, Liquiça, and Bazartete Sub-Districts).

### Alkaline areas:

**Manatuto District** (Laleia Sub-District)
**RAEOA** (Pante Macassar, Nitibe, and Oesilo Sub-Regions)
**Baucau District** (Baucau Vila and Laga Sub-Districts),
**Lautem District** (Lautem, Iliomar, and Luro Sub-Districts).

# Findings







## Electrical Conductivity

Soil electrical conductivity ranges from

**0.10 to 0.79 dS/m**

Avarange by Sub-districts

### Areas approaching the salinity threshold:

**Uatucarbau Sub-district** (0.79 dS/m) **Vemasse** (0.75 dS/m), **Fatululic** (0.72 dS/m), **Maucatar** (0.67 dS/m), **Tilomar** and **Suai** (0.60 dS/m), and **Baucau** and **Laga** (0.60 dS/m).

### Areas with very low electrical conductivity:

**Dili** (0.11 to 0.28 dS/m), **RAEOA** (0.09 to 0.14 dS/m), and **Lautem** (0.13 to 0.26 dS/m).

These conditions are safe for food

### moderate but safe electrical conductivity:

**Ainaro, Bobonaro, Manatuto, Ermera, and Manufahi Districts**

which are suitable for rice and corn.

# Findings




## Soil Organic Carbon

Soil organic carbon ranges from

**0.82 to 3.77 %**

Avarange by Sub-districts




**Areas with high soil organic carbon (SOC) (> 2,5 %)** include **Tutuala** (3,77 %), **Soibada** (3,28 %), **Baucau** (3,25 %), **Venilale** (2,89 %), **Forohem** (2,81 %), **Biqueli Village (Atauro)** (2,70 %), **Ermera** (2,62 %), and several other Sub-Districts (**Laclubar, Letefoho, Turiscai, Macadade, Liquiça, and Fatumean**).

**Areas with low soil organic carbon (SOC) (< 1.5 %)** include **Nain Feto** (0,82 %), **Metinaro** (1,00 %), **Luro** (1,09 %), **Nitibe** (1,23 %), **Laleia** (1,32 %), **Liquidoe** (1,17 %), and **Loes** (1,35 %).

# Findings




## Cation Exchange Capacity

Soil cation exchange capacity (CEC) ranges from

**11.39 to 47.14 me/100 gr**

**Avarange by Sub-districts**




Areas with low cation exchange capacity (< 13 me/100 g)

include **Metinaro**, **Loes**, **Lore**, **Liquidoe**, and **Cristo Rei**

Areas with high cation exchange capacity (CEC) (> 30 me/100 g)

include **Nain Feto** (47.14 me/100 g), **Passabe** (43.19 me/100 g), **Tutuala** (38.06 me/100 g), and Sub-Districts in **Ainaro**, **Ataúro**, **Baucau**, and **Bobonaro Districts**.

# Findings




## Cation Exchange Capacity



Soil base saturation ranges from

**28.92 to 99.94 %**

**Avarange by Sub-districts**




### Areas with low base saturation (< 50 %)

**Aileu District** (Laulara, Liquidoe, and Remexio Sub-Districts) and **Liquiça District** (Liquiça and Loes Sub-Districts).

### Areas with very high base saturation (> 90 %)

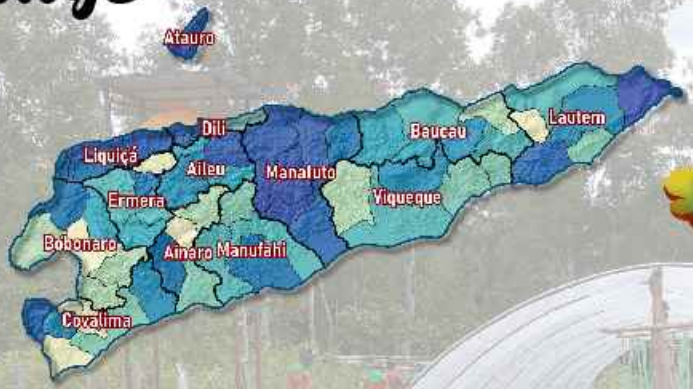
**Dili District** (Metinaro and Nain Feto Sub-Districts), **Autoridade Administrativa Ataúro** (Vila Maumeta and Maquili Village), **Lautem District** (Luro and Lautem Sub-Districts), **RAEOA** (Pante Macassar, Oesilo, Nitibe, and Passabe Sub-Regions), **Covalima District** (Fatululic and Fatumean Sub-Districts), and **Bobonaro District** (Balibo and Cailaco Sub-Districts)

### Areas with moderate to high base saturation (50 to 85 %)

**Ermera District** (Letefoho, Railaco, Atsabe, and Ermera Sub-Districts), **Manufahi District** (Alas and Fatuberliu Sub-Districts), and **Viqueque District** (Watulari, Ossu, and Uatucarbau Sub-Districts)

# Findings

## Total Nitrogen

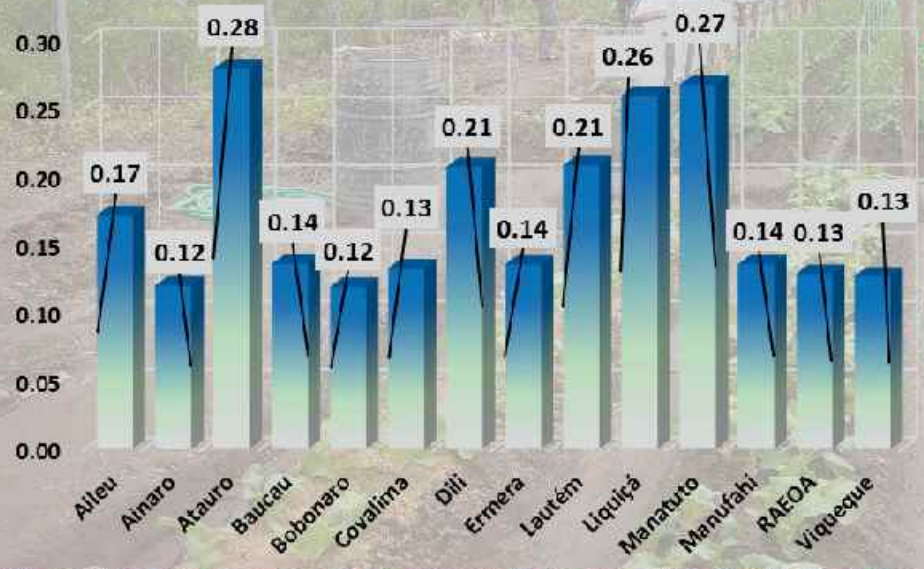





Total Nitrogen ranges from

**0.07 to 0.53 %**

Avarange by Sub-districts




### The very lowest national values

| Maucatar (Covalima) | Maliana (Bobonaro |
|---|---|
| 0.07 % | 0.08 % |

### The highest national values

| Tutuala (Lautem) | Soibada (Manatuto) |
|---|---|
| 0.53 % | 0.34 % |

# Findings




## Cation Exchange Capacity

Available Phosphorus ranges from

**0.22 to 7.81 ppm**

Avarange by Sub-districts




**The lowest national values**

Laulara *(0,22 ppm)* Loes *(0,30 ppm)*

indicating serious nutrient limitations.

**The highest national values**

Ataúro *(7.81 ppm)* Metinaro Vila *3.91 ppm)*

Reflecting very high fertility potential

# Findings

## Cation Exchange Capacity




Total phosphorus ranges from

**7.37 to 159.32 mg/100g**

Avarange by Sub-districts




**The lowest national values**

Macadade (Ataúro) — *(7.37 mg/100g)*

Biqueli (Ataúro) — *(8.96 mg/100g)*

**The highest national values**

Baucau Sub-district (Baucua) — *(92.24 mg/100g)*

Fatululic (Covalima) — *(159.32 mg/100g)*

# Findings

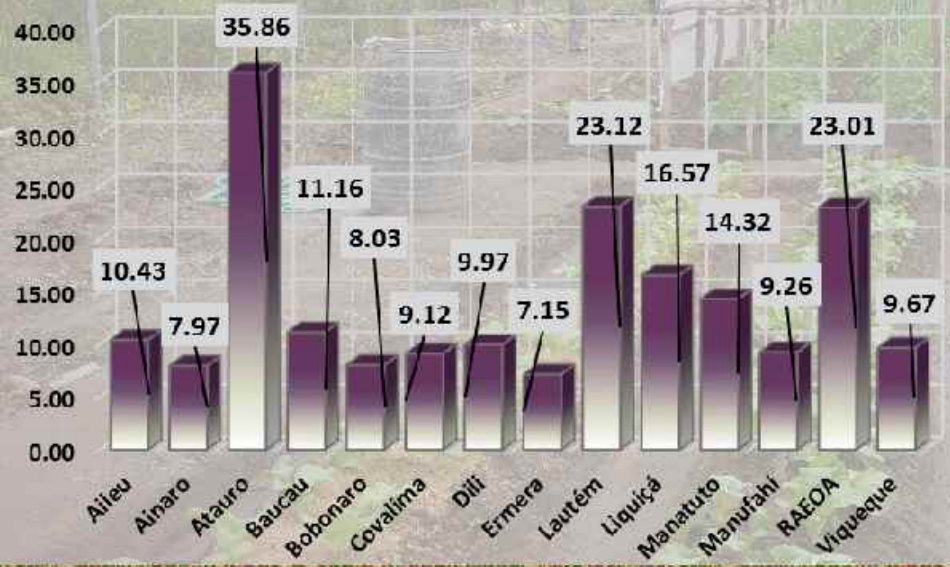
# Available Potassium




Available Potassium ranges from

**3.53 to 53.38 %**

Avarange by Sub-districts




**The lowest national values**

| Nain Feto (Dili) | Cristo Rei (Dili) |
|---|---|
| 3.53 % | 4.55 % |

**The highest national values**

| Maumeta Vila (Ataúro) | Beloi (Ataúro) |
|---|---|
| 53.38% | 39.11 % |

# Findings




## Total Potassium

Total Potassium ranges from

**6.45 to 261.65 mg/100g**

Avarange by Sub-districts




**The lowest national values**

| Maucatar (Covalima) | Ermera (Ermera) |
|---|---|
| 6.45 % | 7.91 % |

**The highest national values**

| Metinaro (Dili) | Maumeta Vila (Ataúro) |
|---|---|
| 261.65 % | 223.15 % |

# Findings

# Available Zinc




Zinc

Available Zinc ranges from

**0.33 to 3.37 ppm**

Avarange by Sub-districts




**The lowest national values**

| Biqueli (Ataúro) | Laulara (Aileu) |
|---|---|
| 0.33 ppm | 0.33 ppm |

**The highest national values**

| Laclubar (Manatuto) | Soibada (Manatuto) |
|---|---|
| 3.36 ppm | 2.93 ppm |

# Findings

## Total Zinc




Zinc

Total Zinc ranges from

**29.15 to 107.29 ppm**

Avarange by Sub-districts




### The lowest national values

| Maumeta Vila (Ataúro) | Biqueli (Ataúro) |
|---|---|
| 29.15 ppm | 29.85 ppm |

### The highest national values

| Ermera (Ermera) | Vera Cruz (Dili) |
|---|---|
| 107.29 ppm | 100.95 ppm |

# Findings




## Available Sulfur

SULFUR

Available Sulfur ranges from

**29.15 to 107.29 ppm**

Avarange by Sub-districts




### The lowest national values

| Hatu-Builico (Ainaro) | Letefoho (Ermera) |
|---|---|
| 29.15 ppm | 29.85 ppm |

### The highest national values

| Nitibe (RAEOA) | Laleia (Manatuto) |
|---|---|
| 90.80 ppm | 58.37 ppm |

# Findings



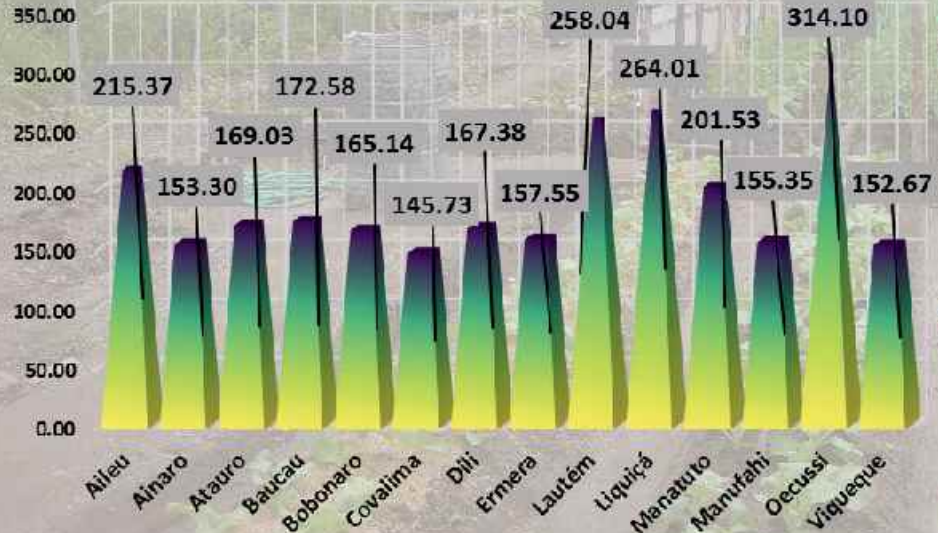

## Available Sulfur

SULFUR

Total Sulfur ranges from

**29.15 to 107.29 ppm**

Avarange by Sub-districts




**The lowest national values**

**Maumeta Vila (Atauro)** — **27.05 ppm**

**The highest national values**

**Nitibe (RAEOA)** — **587.58 ppm**

**Lore (Lautem)** — **479.92 ppm**

# Soil Fertility Status




**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

High | Moderate | Very Low | Low

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

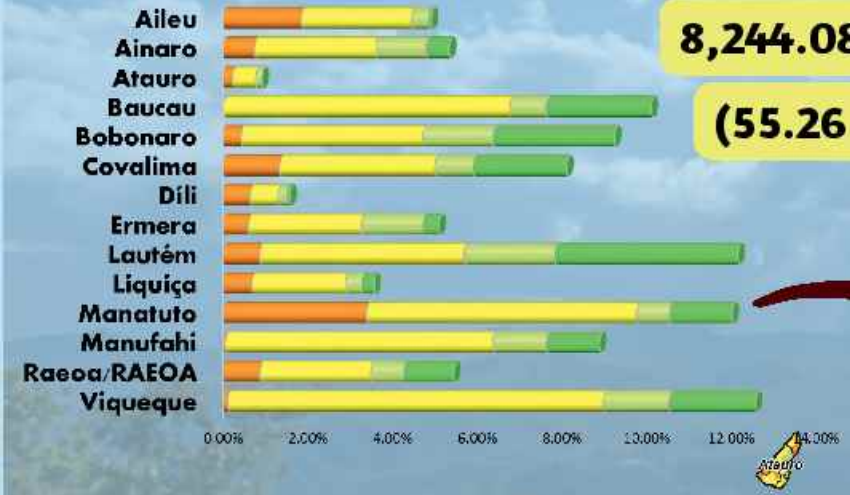
# SOIL FERTILITY

Most of the land area falls into the low fertility

**8,244.08 km²**

**(55.26 %)**




**High Fertility**

Lautem District

4.32%

**Very Low Fertility**

Manatuto District

3.39%







**Moderate Fertility**

Lautem District

2.13%

**Low Fertility**

Viqueque District 8.86%

# Soil Erosion




**MAP PROJECTION**

Map Grid System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

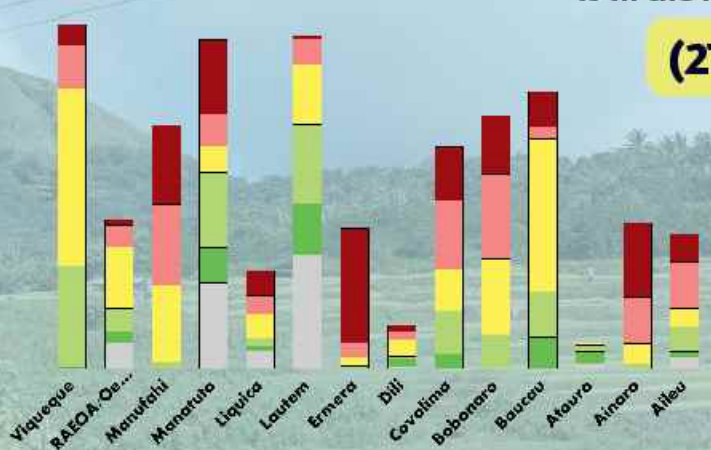
- No Erosioin
- Light
- Heavy
- Very Light
- Moderate
- Very Heavy

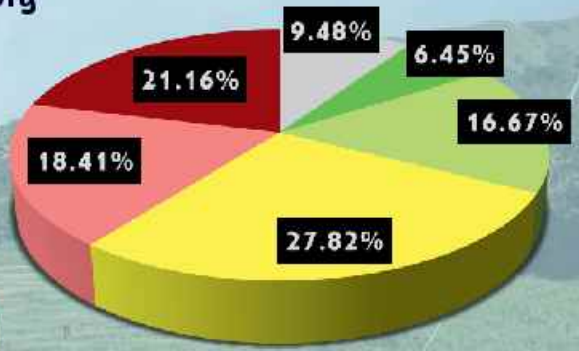
**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# SOIL EROSION

The largest share of erosion is in the moderate category

(27.82 %)




**Very Heavy Erosion**

Ermera District

4.18%

**Very Light Erosion**

Lautem District

4.14%

**Heavy Erosion**

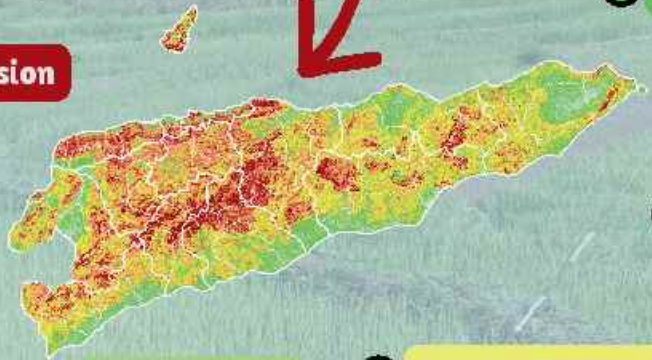
Bobonaro District

3.11%

**No Erosion**

Lautem District

4.14%

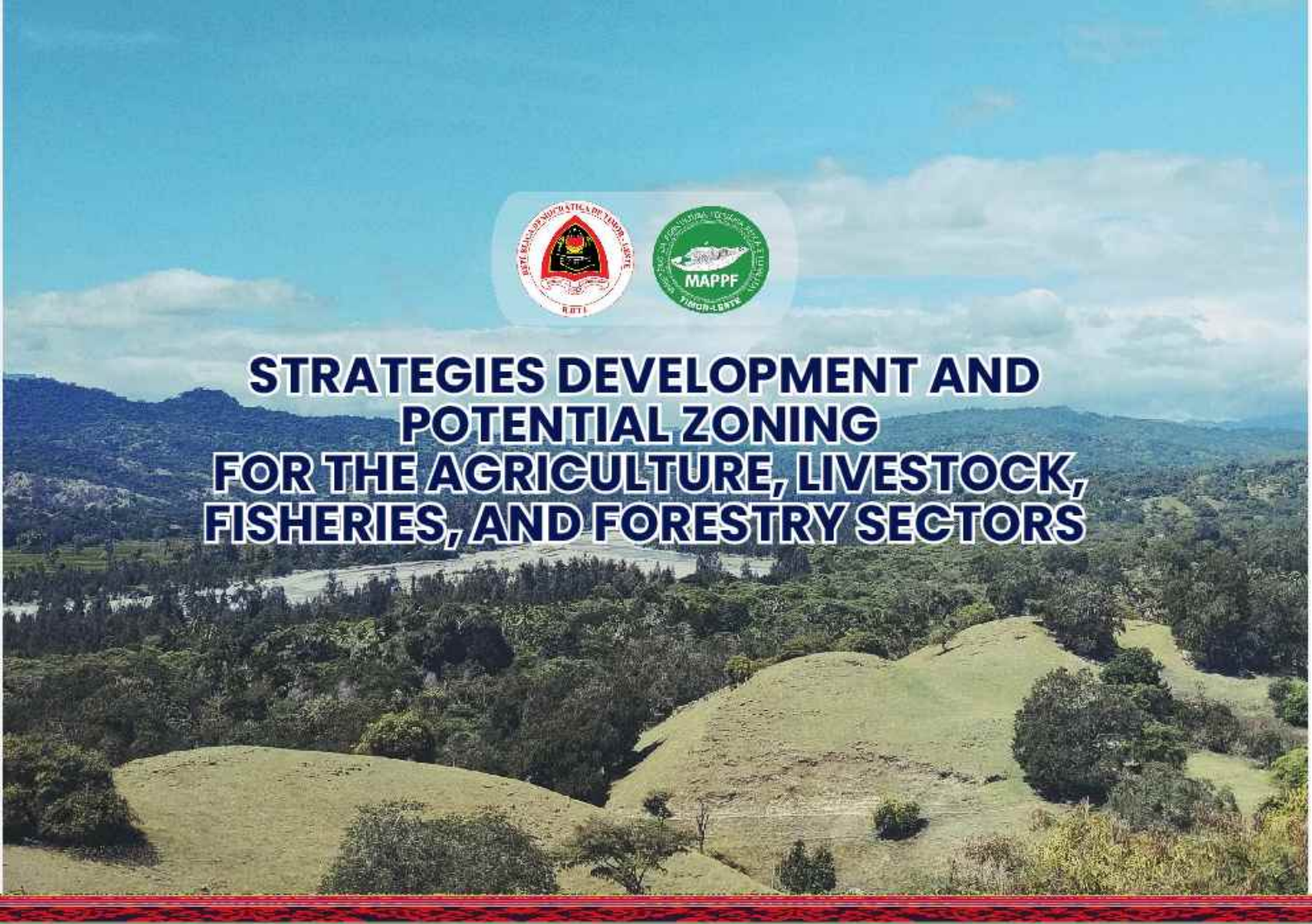


**Light Erosion**

3.68% Viqueque District

**Moderate Erosion**

Viqueque District 6.50%




# STRATEGIES DEVELOPMENT AND POTENTIAL ZONING FOR THE AGRICULTURE, LIVESTOCK, FISHERIES, AND FORESTRY SECTORS

# MAP OF STRATEGIC ZONING OPPORTUNITIES FOR AGRICULTURAL DEVELOPMENT TIMOR-LESTE




**MAP PROJECTION**

Map Gric System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

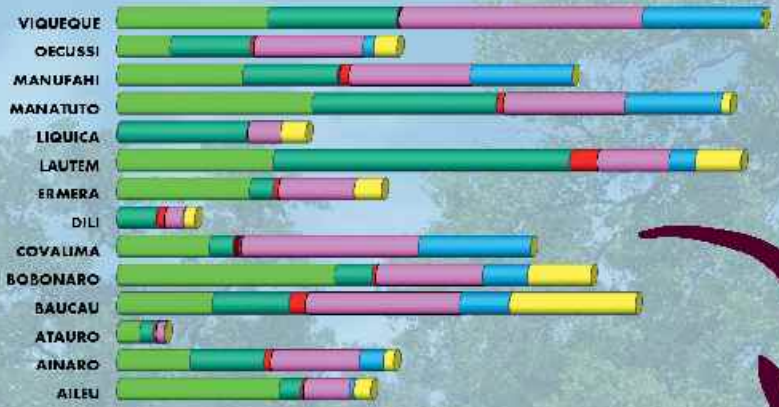
Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

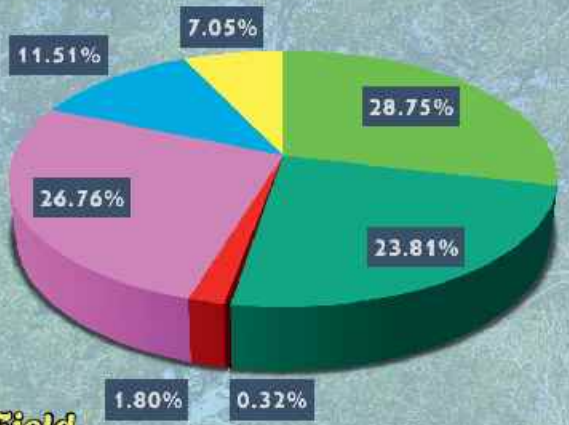
**LEGENDS**

- Agroforestry
- Protected Forest
- Mangrove Forest
- Grazing Area
- Dryland Farming
- Irrigated Rice Fields
- Rainfed Rice Fields

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# STRATEGIC ZONING DEVELOPMENT



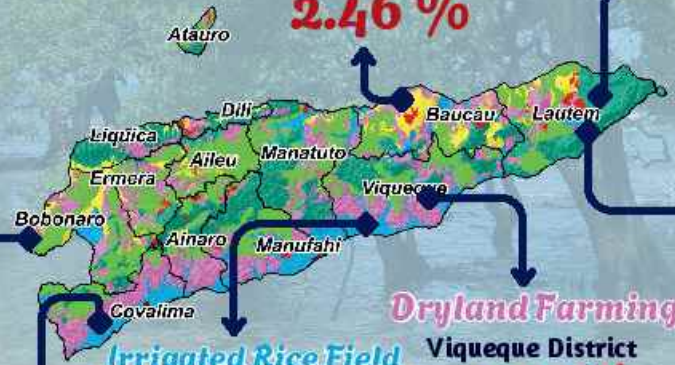




## Proportional Dominance

### Rainfed Rice Field
Lautem District
**2.46 %**

### Agroforestry
Bobonaro District
**4.24 %**

### Grazing Area
Lautem District
**0.53 %**




### Mangrove Forest
Covalima District
**0.12%**




### Protected Forest
Lautem District
**5.77 %**

### Dryland Farming
Viqueque District
**4.74 %**

### Irrigated Rice Field
Viqueque District
**2.32%**

# ALTERNATIVE 1 - (ONLY UTILIZING IRRIGATED RICE FIELDS AND RAINFED RICE FIELDS)




## SELF-SUFFICIENCY RATIO MAP OF TIMOR-LESTE

Scale 1 : 700.000

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

SSR

- 0 - 10
- 11 - 30
- 31 - 50
- 51 - 70
- 71 - 100
- 101 - 500
- 501 - 1000
- 1001 - 3000
- 3001 - 5000
- 5001 - 13002

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# ALTERNATIVE 2 - (OPTIMIZATION OF IRRIGATED RICE FIELDS, RAINFED RICE FIELDS, GRAZING AREA AND DRYLAND)




## SELF-SUFFICIENCY RATIO MAP OF TIMOR-LESTE

30 0 30 60 90 km

Scale 1 : 700.000

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

SSR

- 0 - 10
- 11 - 30
- 31 - 50
- 51 - 70
- 71 - 100
- 101 - 500
- 501 - 1000
- 1001 - 3000
- 3001 - 5000
- 5001 - 76505

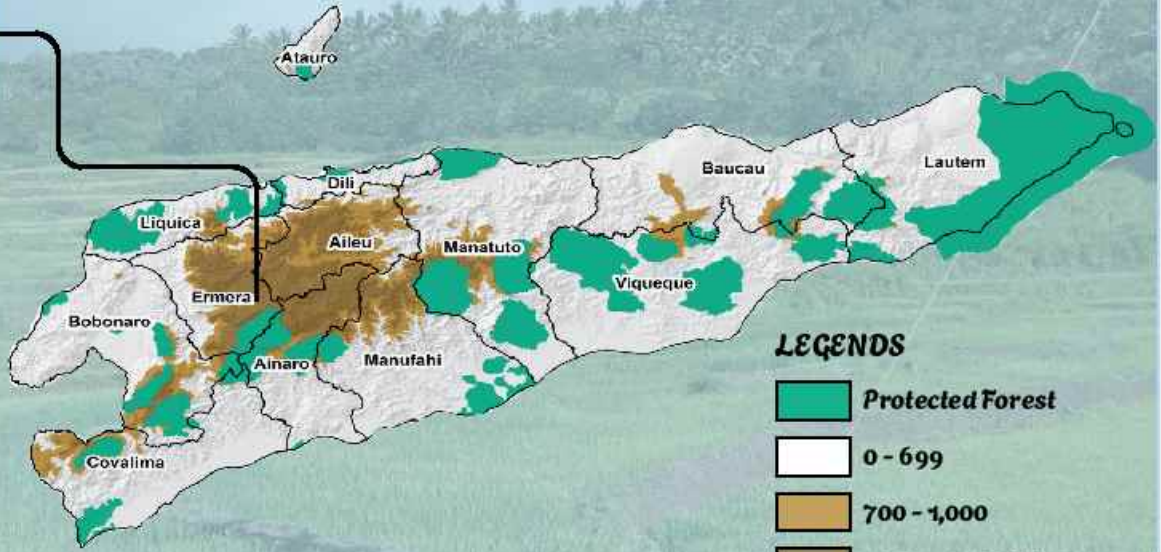
**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# POTENTIAL FOR COFFEE CROP DEVELOPMENT

***Largest* coffee development center**






***LEGENDS***

- ***Protected Forest***
- **0 - 699**
- **700 - 1,000**
- **1,100 - 2,900 *Masl***




***Example of product development***

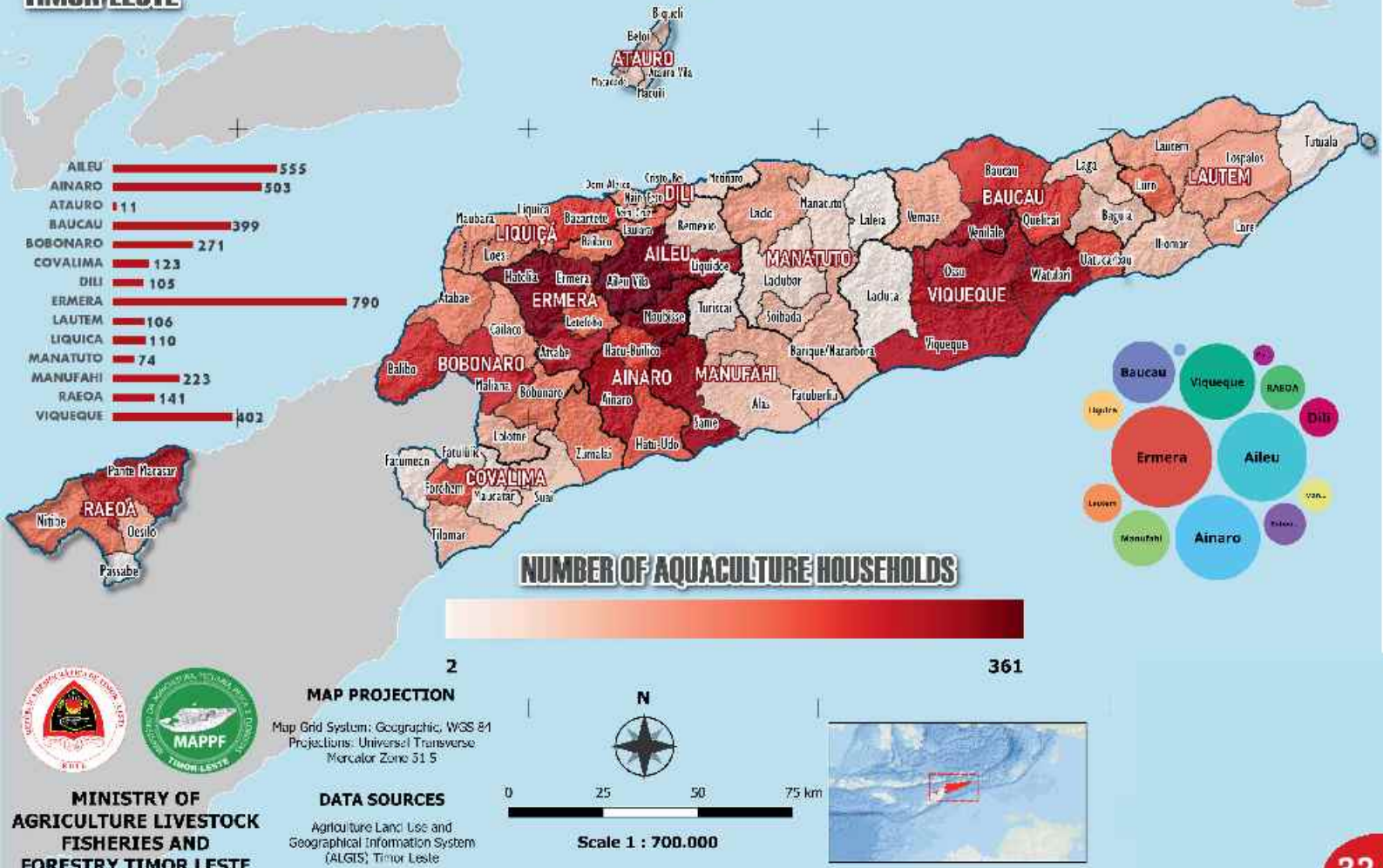








# MAP THE NUMBER OF AQUACULTURE HOUSEHOLDS IN TIMOR-LESTE




**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# MAP THE NUMBER OF POUNDS IN TIMOR-LESTE













## NUMBER OF POUNDS

2 — 681

**MAP PROJECTION**

Map Gric System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

N

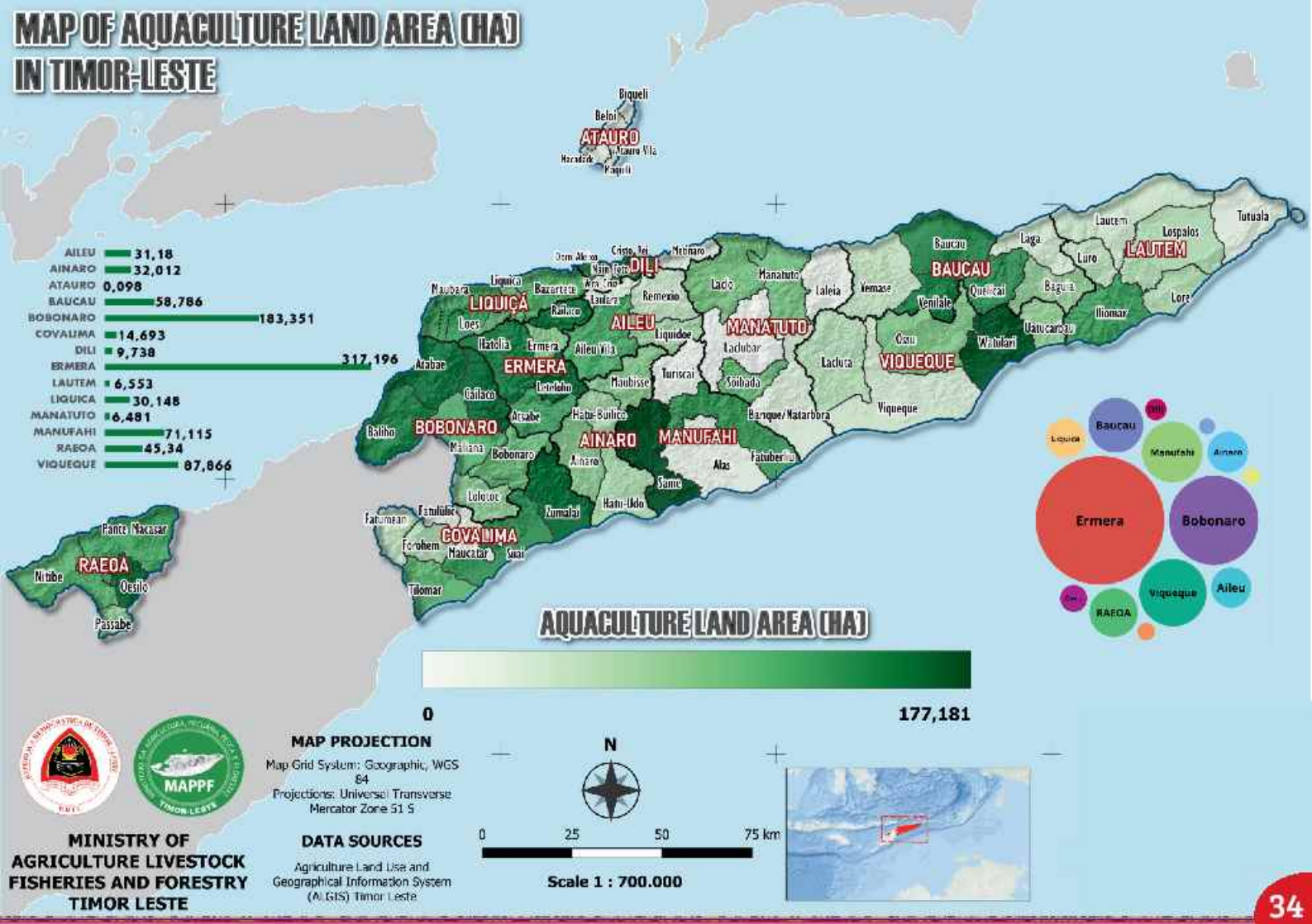
0 25 50 75 km

Scale 1 : 700.000



**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# MAP OF AQUACULTURE LAND AREA (HA) IN TIMOR-LESTE




**MAP PROJECTION**

Map Grid System: Geographic, WGS 84

Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# Aquaculture Proportion Map of Timor-Leste






## AQUACULTURE PROPORTION MAP OF TIMOR-LESTE

30 0 30 60 90 km

Scale 1 : 700.000

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

- Fish Pond
- Aquaculture Pond
- Floating Net Cage
- Rise-Fish System
- Fish Hatchery

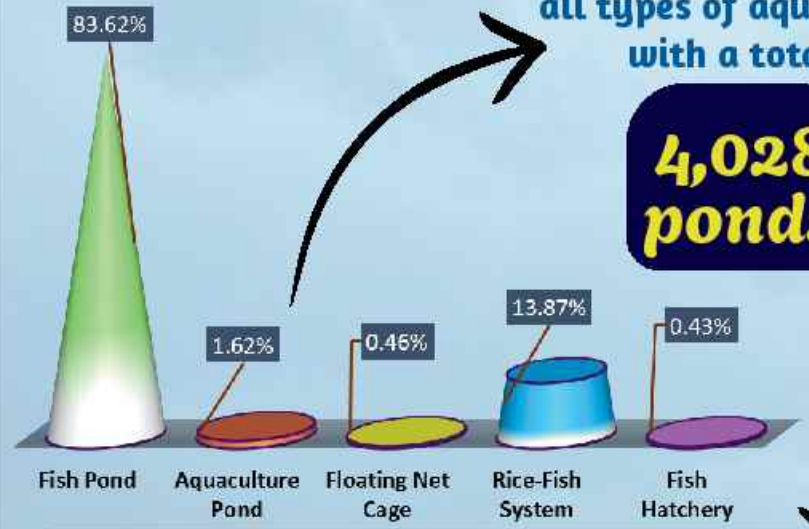


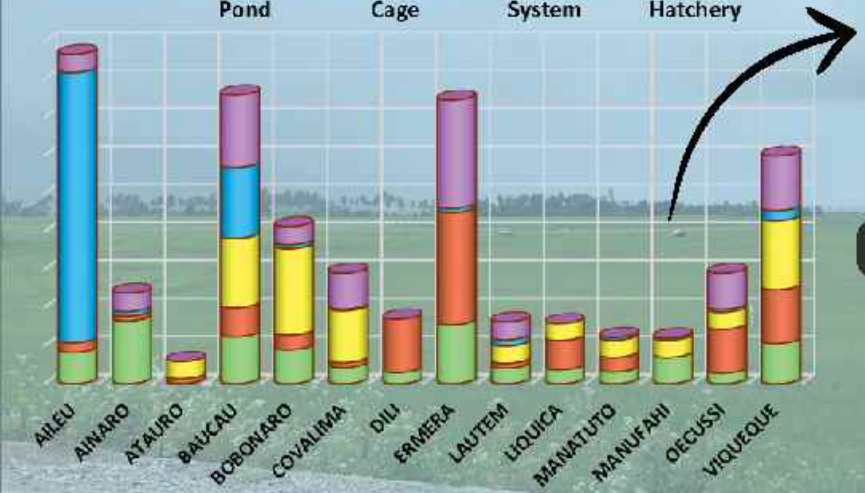
**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# AQUACULTURE PROPORTION GRAPH

Fish ponds dominate among all types of aquaculture, with a total of

**4,028 ponds**




**Dominance of Fish Ponds**

Ainaro District

666 Fish Pond (16.52%)

**Dominance of Aquaculture Pond**

Ermera District

23 Pond (29.49%)

**Dominance of Floating Net Cage**

Bobonaro District

5 Cage (22.73%)

**Dominance of Rice Fish System**

Bobonaro District

475 Unit (71.11%)

**Dominance of Fish Hatchery**

Ermera District

6 Unit (28.57%)

# Livestock Development Priorities




## LEGENDS

- Beef Cattle > Pig
- Beef Cattle > Pig > Buffalo
- Beef Cattle > Pig > Buffalo = Sheep = Dairy Cattle
- Beef Cattle = Pig > Buffalo = Sheep = Dairy Cattle
- Beef Cattle = Buffalo > Pig = Sheep = Dairy Cattle
- Beef Cattle = Pig = Buffalo = Dairy Cattle > Sheep
- Beef Cattle = Buffalo = Sheep = Dairy Cattle > Pig
- Beef Cattle = Pig = Buffalo = Sheep = Dairy Cattle

**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

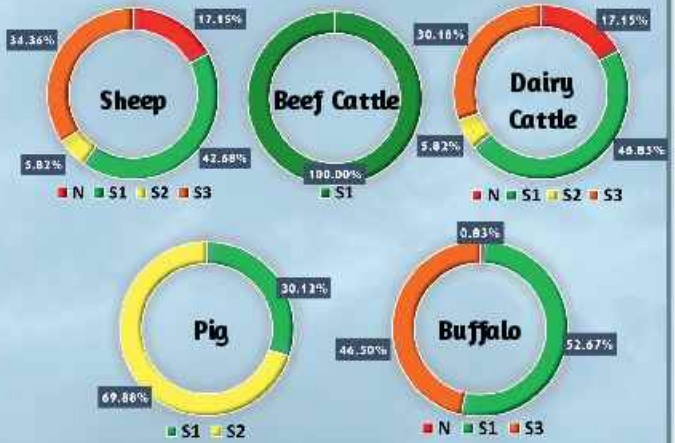
Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

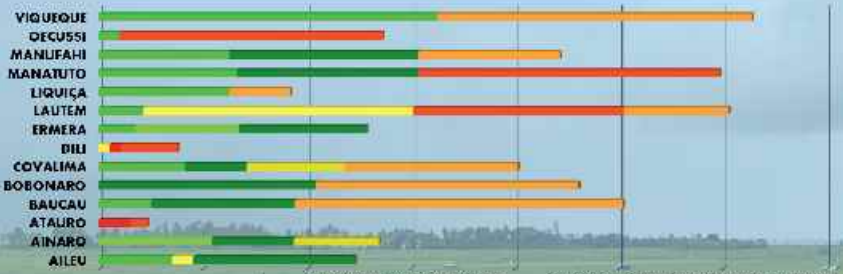
**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**

# LIVESTOCK DEVELOPMENT PRIORITIES GRAPH




- Beef Cattle > Pig
- Beef Cattle > Pig > Buffalo
- Beef Cattle > Pig > Buffalo – Sheep – Dairy Cattle
- Beef Cattle – Pig > Buffalo – Sheep – Dairy Cattle
- Beef Cattle – Buffalo > Pig – Sheep – Dairy Cattle
- Beef Cattle – Pig – Buffalo = Dairy Cattle > Sheep
- Beef Cattle – Buffalo – Sheep – Dairy Cattle > Pig
- Beef Cattle – Pig – Buffalo Sheep Dairy Cattle




| | AILEU | AINARO | ATAURO | BAUCAU | BOBONARO | COVALIMA | BIRI | ERMERA | LAUTEM | LIQUIÇA | MANATUTO | MANUFAHI | OECUSSI | VIQUEQUE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beef Cattle – Buffalo – Sheep – Dairy Cattle > Pig | 1.42% | 0.00% | 0.00% | 1.01% | 0.00% | 1.65% | 0.00% | 0.71% | 0.86% | 2.51% | 2.66% | 2.51% | 0.41% | 6.52% |
| Beef Cattle – Buffalo > Pig – Sheep – Dairy Cattle | 0.41% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.22% | 0.00% | 5.19% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Beef Cattle – Pig – Buffalo – Dairy Cattle > Sheep | 0.00% | 2.19% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 1.99% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Beef Cattle – Pig – Buffalo – Sheep – Dairy Cattle | 3.12% | 1.58% | 0.00% | 2.76% | 4.18% | 1.19% | 0.00% | 2.40% | 0.00% | 0.00% | 3.48% | 3.64% | 0.00% | 0.00% |
| Beef Cattle – Pig > Buffalo – Sheep – Dairy Cattle | 0.00% | 1.63% | 0.00% | 0.00% | 0.00% | 1.90% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Beef Cattle > Pig | 0.00% | 0.00% | 0.63% | 0.00% | 0.00% | 0.00% | 0.22% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Beef Cattle > Pig > Buffalo | 0.00% | 0.00% | 0.63% | 0.00% | 0.00% | 0.00% | 1.00% | 0.00% | 0.86% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Beef Cattle > Pig > Buffalo > Sheep > Dairy Cattle | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |

**Suitable for all types of livestock (multi-commodity)**

**Aileu Vila, Liquidoe, Ainaro, Quelicai Sub-districts**

**Suitable for beef cattle, buffalo, and pigs (cool climate, high rainfall).**

**Hatubuilico, Maubisse, Atsabe, Letefoho Sub-districts**

**Suitable for beef cattle, buffalo, and pigs (cool climate, high rainfall).**

**Laulara, Vera Cruz, Tutuala Sub-districts**

**Single-commodity priority for beef cattle.**

**Dom Aleixo, Beloi, Biqueli, Ataúro Vila**

# RESULTS OF LAND SUITABILITY EVALUATION FOR FORAGE FEED DEVELOPMENT



*Gliricidia sepium*



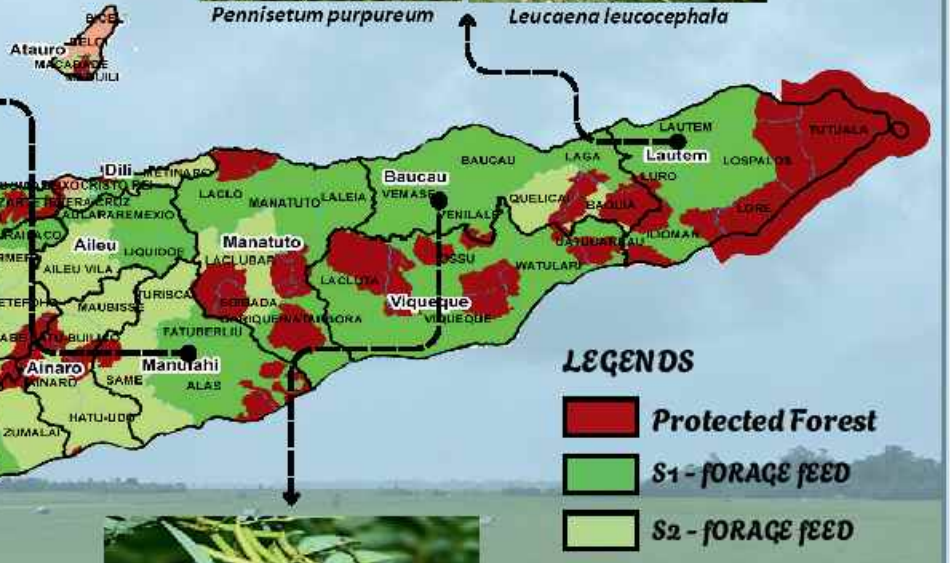
*Setaria sp.*



*Pennisetum purpureum*



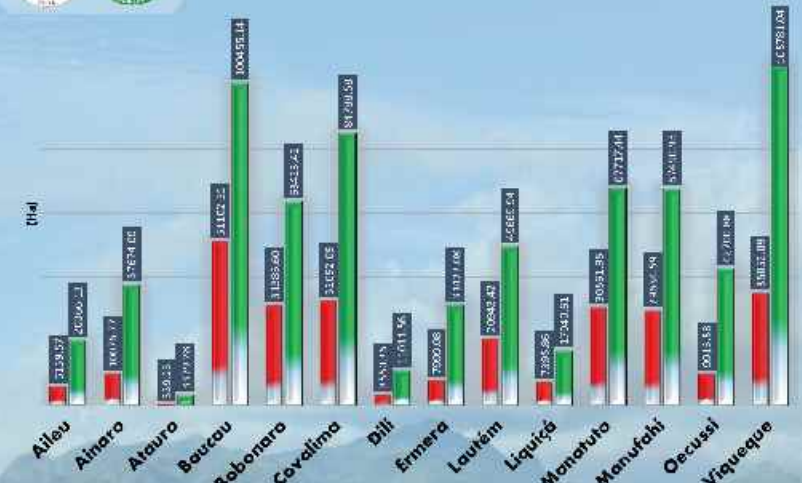
*Leucaena leucocephala*






*Indigofera zollingeriana*

# FOOD SECURITY GRAPH













**Pangan_I : Only Utilizing Irrigated Rice Fileds and Rainfed Rice Fields**

**Pangan_II : Optimization Of Irrigated Rice Fields, Rainfed Rice Fields, Grazing Area, and Dryland**

| food surplus | food deficit |
|---|---|
| 66% | 34% |

Deficit areas cover

**24 Sub-Districts**

The highest-surplus areas

Viqueque Sub-Districts

**13002 SSR**

Only Utilizing Irrigated Rice Fields and Rainfed Rice Fields

| food surplus | food deficit |
|---|---|
| 92% | 8% |

Deficit areas cover

**6 Sub-Districts**

The highest-surplus areas

Viqueque Sub-Districts

**76505 SSR**

Optimization Of Irrigated Rice Fields, Rainfed Rice Fields, Grazing Area, and Dryland

**48 villages are integrated through an approach that combines high-potential areas for the development of agriculture, livestock, and fisheries**




**MAP PROJECTION**

Map Grid System: Geographic, WGS 84
Projections: Universal Transverse Mercator Zone 51 S

**DATA SOURCES**

Agriculture Land Use and Geographical Information System (ALGIS) Timor Leste

**LEGENDS**

Integration Zone by Suco

No Integration




**MINISTRY OF AGRICULTURE LIVESTOCK FISHERIES AND FORESTRY TIMOR LESTE**



# KEY FINDINGS BY MUNICIPALITY

# AINARO
## MUNICIPALITY















***Agricultural:***

- **Hatu-Udo Sub-District** has strong potential as a rice production center through irrigation improvement and sustainable soil management.
- **Agroforestry and protected forest** areas (64.09%) support high-value commodities such as **coffee, cacao, and horticulture.**

***Livestock:***

- **Ainaro Sub-District** is ecologically suitable for **dairy cattle** development.
- Availability of forage resources and favorable climate support sustainable production.

***Fisheries:***

- Land evaluation indicates good potential for freshwater aquaculture despite technical and geographical constraints.
- Semi-permanent pond systems are already operating in **Soru Craik, Nuno-Mogue, and Horai-Quic Villages.**

# AILEU MUNICIPALITY














**Agricultural:**

- **Aileu Vila Sub-District** has strong potential for irrigated and rainfed rice, along with integrated mixed farming systems combining **spice, horticulture, and forestry commodities.**
- It functions as a **horticulture and coffee center** (citrus, vegetable, Robusta and Arabica coffee), although citrus productivity in **Liquidoe Sub-District** is constrained by premature tree mortality.

**Livestock:**

- **Fatubosa, Seloi Craik, and Manucasa Villages** are prioritized for ruminant development.
- Main commodities include **buffalo and Bali cattle.**

**Fisheries:**

- **Lahae Village** cultivates common carp (**100 fish per pond**), while **Raifusa Village** has inactive conventional earthen ponds.
- **Seloi Craic Village** has a lake supporting natural fish stock with potential for recreational fishery development.

# AUTORIDADE ADMINISTRATIVA ATAURO







***Agricultural:***

- **Atauro** has broad potential for fruit and vegetable development across all Villages, with **Macadede** as the priority area due to fertile soil, water availability, and better market access.
- Tree crops and forest species such as **moringa, tamarind, candlenut, eucalyptus, teak, mangrove, Hibiscus tiliaceus, and bamboo** are widely distributed, especially in **Macadede, Beloi, and Maquili.**

***Livestock:***

- Forage development (**Elephantgrass, Gliricidia, Leucaena, Sesbania**) is concentrated in **Beloi and Biqueli Villages.**
- Pilot goat farming projects are actively developing in **Atauro-Vila and Beloi** through community groups.

***Fisheries:***

- **Beloi Village** is developing **vannamei shrimp** farming under a Public-Private Partnership scheme.
- The system includes 30 circular ponds focused on supplying the local market.











# BAUCAU
## MUNICIPALITY











***Agricultural:***

- **Baucau** plays a strategic role in national food security, with key production centers in **Baucau, Laga, Venilale, and Vemasse.**
- **Agroforestry and protected forest** areas (35.55%) support high-value commodities such as **Robusta coffee, oil palm, coconut, and horticulture.**

***Livestock:***

- **Triloka Village** is highly prospective as a pilot **cattle breeding center.**
- Suitable conditions support cattle development.

***Fisheries:***

- High suitability for freshwater aquaculture (**catfish, tilapia, common carp**).
- Strong potential in areas with stable water availability, especially **Vemasse and Caibada Villages.**











# BOBONARO
## MUNICIPALITY















***Agricultural:***

- **Bobonaro** is a key food security district, with main production centers in **Maliana, Cailaco, Atabae, and Lolotoe.**
- **Agroforestry and protected forest** areas **(56.53%)** support **coffee, coconut, and horticulture,** while maintaining ecosystem and climate functions.

***Livestock:***

- **KTS** (Karaw Timor Susubeen) Center in **Korluli (Maliana)** has strong forage resources.
- **Elephantgrass, Setaria, and grazing areas** support livestock development.

***Fisheries:***

- Aquaculture centers are established in **Leohito (Balibo)** and **Raifun (Maliana).**
- Earthen and concrete pond systems are developed with community involvement.

# COVALIMA
## MUNICIPALITY

















***Agricultural:***

- **Suai** is suitable for irrigated rice and major food crop; **Zumalai and Tilomar** serve as mixed garden center.
- **Agroforestry and protected forest (31.18%)** support **coffee, cacao, coconut, and horticulture** with conservation benefit.

***Livestock:***

- **Lactos, Calobor, and Fohorem** are potential beef cattle center.
- Land and resource support development.

***Fisheries:***

- Constraint in **Suai Loro** (fish mortality) and **Matai** (unused pond).
- Low participation in **Maucatar** and limited freshwater in **Beco (300 ha mangrove)**.

# DILI MUNICIPALITY













***Agricultural:***

- Suitable for dryland crop, irrigated rice (**Hera**), grazing (**Becora**), and priority commodities including **coconut, cacao, coffee, and forest species.**
- **Agroforestry** potential in **Dare, Lahane Oriental–Ocidental,** and **Balibar,** with citrus constraint in **Dare.**

***Livestock:***

- **Dili** serves as a livestock post-production center.
- Focus on supply chain and downstream industry.

***Fisheries:***

- Diverse systems: household pond (**Balibar**), coastal collaboration (**Metinaro**), and private partnership (**Hera**).





# ERMERA
## MUNICIPALITY















***Agricultural:***

- **Hatolia** is projected as a main rice center, while **Hatolia and Ermera** have strong potential for dryland crop and horticulture.
- **Agroforestry and protected forest (64.54%)** support **coffee, cacao, and fruit-vegetable commodities** with conservation function.

***Livestock:***

- **Ermera** has strong potential as a poultry pilot area.
- Strategic location near Dili supports market access and industry development.

***Fisheries:***

- Tilapia hatchery center operates in **Talimoro** with permanent spring water source.
- Large-scale community fish grow-out **(>800 pond unit)** develops in **Tocoluli.**

# LAUTÉM
## MUNICIPALITY























***Agricultural:***

- Broad potential for dryland food crop and grazing, with **Lospalos** strategic for rice and **Tutuala** functioning as conservation and carbon reserve area.
- Production cluster include rice–corn (**Lospalos**), roots–legume (**Iliomar, Cotamutu**), and coconut–coastal horticulture (**Com, Parlamento**).

***Livestock:***

- **KTS Pato** supports karaw timor development.
- **Seiraa–Meihara–Tutuala** serves as pilot integrated land project (food and brackish fisheries).

***Fisheries:***

- **Parlamento** is proposed as pilot aquaculture site (tilapia up to 1,000,000 fish/year).
- Coastal area also suitable for milkfish, though infrastructure need improvement.

# LIQUIÇÁ
## MUNICIPALITY

























***Agricultural:***

- Potential for irrigated rice (**Lissadila, Leoteala**), sorghum (**Gugleur, Guico**), fruit (**Leorema**), and integrated spice–agroforestry system.
- Grazing area in **Fahilebo** and **Leorema** support irrigation block, feed corridor, and ecosystem stability.

***Livestock:***

- **Vatuboro** has potential as pig breeding center.
- **Lissadila** supports integrated livestock–food crop system.

***Fisheries:***

- **Ulmera** and **Lissadila** show strong community interest in aquaculture.
- Productivity remain low due to technical limitation.

# MANATUTO
## MUNICIPALITY























**Agricultural:**

- Rice production across **Laleia, Manatuto, Laclo, and Barique/Natarbora**, with **Natarbora** as priority food center.
- **Soibada** serves as horticulture center (**Arabica, Robusta, vanilla**), supported by forage in **Abat Oan.**

**Livestock:**

- **KTS Barique/Natarbora** supports Timor buffalo development program.
- Focus on high-quality forage provision.

**Fisheries:**

- Aquaculture develops in **Manatuto, Laclo, and Barique/Natarbora.**
- **Aubeon** is proposed as pilot family-based freshwater site.

# MANUFAHI

## MUNICIPALITY





















***Agricultural:***

- **Alas** is prioritized as rice production center, while **Same** supports diverse dryland commodity.
- **Agroforestry and protected forest (51.07%)** strengthen **coffee, cacao, coconut, and horticulture** development.

***Livestock:***

- **KTS Dotik** supports Timor buffalo development for milk production.
- Contributes to national livestock program.

***Fisheries:***

- Strong aquaculture potential in **Same, Fatuberliu, and Alas.**
- **Clacuc** (Fatuberliu) proposed as **20 ha** pilot for **tilapia, common carp, catfish, and mangrove crab.**

# REGIÃO ADMINISTRATIVA ESPECIAL OE-CUSSE AMBENO


















***Agricultural:***

- Irrigated and rainfed rice in **Nitibe, Pante Macassar, and Oesilo** require simple water improvement.
- Dryland potential in **Nitibe, Oesilo, and Passabe** supported by vegetation cover.

***Livestock:***

- **Taiboco** (CPA Makelap) is recommended as improved livestock breeding center.
- Supported by high-quality forage resource.

***Fisheries:***

- 80 household conduct aquaculture in **Pante Macassar and Nitibe.**
- **Pante Macassar** is suitable as pilot pond and brackishwater site.

# VIQUEQUE
## MUNICIPALITY



























**Agricultural:**

- **Viqueque, Lacluta, Ossu, and Watulari** are main food production center.
- **Agroforestry and protected forest (44.77%)** support cacao, coconut, tobacco, and horticulture with conservation function.

**Livestock:**

- **KTS Raitahu** supports Timor buffalo development program.
- Focus on high-quality forage **(Setaria and legume mix 60:40).**

**Fisheries:**

- **Ossuu De Cima (Ossu)** is proposed as pilot community pond site.
- 30 earthen pond managed actively with alternative maggot feed.




# TEAM OF RESEARCHERS PROJECT (2024–2025)

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## A. Researchers from Udayana University



### Prof. Dr. Ir. Ni Made Trigunasih, M.P. (Team Leader)

**Education:** B.Eng./B.Sc. in Agricultural Engineering (Udayana University); M.Sc. in Soil Science (Padjadjaran University); Ph.D. in Agricultural Science (Udayana University).
**Academic Rank:** Full Professor.
**Teaching Experience:** 1986–present.
**Areas of Expertise:** Land resource development grounded in environmental conservation; land suitability evaluation; soil and water conservation; sustainable land-use planning and management.
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### Ir. I Dewa Made Arthagama, M.P.

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### Prof. Dr. Ir. I Made Mega, M.S.

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### Ir. I Nyoman Dibia, M.Si

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### Ir. Moh Saifulloh, S.P., M.Sc.

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**Professional Engineer (Insinyur):** Geodesy / Regional Mapping.
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## B. Researchers from MAPPF, Timor-Leste



**Eng. Celestino Luis Moreira, MP**
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**Eng. Cesar Jose da Cruz, PG-GSRNA**
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