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Partnership for Sustainable Agroforestry (PSAF) project

"This project is co-funded by the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ) as part of the Ai ba Futuru project."

CIRAD long-term adaptive researches programme to support and underpin the implementation of PSAF.

Short-term mission for the long-term adaptive research project take-off

Mission report (January 24th to February 8th)

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Implemented by

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Acknowledgements

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- First, the staff of the GOPA and MAP,
- But also, all the farmers who have accepted to answer to our question and to visit their fields and nurseries.

Thank you all for allowing us to do our work in excellent material conditions, in an atmosphere of fruitful and friendly cooperation.

1 EXECUTIVE SUMMARY

A Short-term mission was implemented from January 24th to February 8th, by Marguerite Cogné, Alain Rival and Régis Peltier, from Cirad, in Timor-Leste. The purpose of this mission was to take-off the "CIRAD Long-term adaptive researches programme" to support and underpin the implementation of the project "Partnership for Sustainable Agroforestry" (PSAF). This project is co-funded by the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ) as part of the Ai ba Futuru project.

The objective was threefold:

- Have an overview of GIZ partners (from Dili to Baucau),
- Update PSAF project advances,
- Accompany field observations to give advises on research program within existing resources,
- Help to fix logistic problem.

In order to better meet the needs of the rural and urban populations of Timor, it seems essential to us to fully understand the functioning of the main types of agrarian systems that can be described.

It will be necessary to take into account the fact that each farm can divide its activities in several types of cropping systems, these including agroforestry systems with dense cover (with tubers in understory), with light cover (with cereals and legumes in understory), totally open fields (cereals or legumes), mono-specific orchards, forest plantations, pastures with hedges and tree cover or not, etc. These systems will have to be replaced in a historical evolution, taking into account the traditions of the first known masters of the land, the current ethno-linguistic group, the contributions of the colonizers, State services, various projects and, finally, current economic conditions of the managers of the system: elderly or young person, with or without labour, with or without extra-agricultural income (pension, transfer of city dwellers or expatriates, etc.). These systems will also have to be located in relation to landscaped transects, taking into account the type of soil, altitude, rainfall and the supply of groundwater or irrigation.

Different tools can be used to describe as wide a range of these systems as possible, for example:
- In vivo drawing of landscape transects,
- Analysis of satellite images,
- Ground inventories,
- Socio-economic surveys,
- Modelling.

We assume that once these systems have been described, or even modelled, it will be easier for future projects to plan their contributions to a much higher number of farmers, with a much higher profitability of the action.
The research questions will be clarified by the Cirad team in the coming months.
Based on the remarks made above, they will most likely relate to the above topics:
- What are the main cropping systems in the eastern part of Timor-Leste (AFS or not) and how the dynamic agroforestry systems promoted by Gopa articulate with traditional systems;
- How do AFS operate and what are their self-consumed or marketed productions (description of value-chains);
- What are the ecological and social services of AFS felt by their users;
- How do AFS contribute to the ecological and social resilience of the region. How AFS contribute to food safety and product quality;
- How do the different cropping systems work within farms and what is the special place of AFS;
- How are the different cropping systems articulated along altitudinal transects, in the 4 municipalities of the PSAF project;
- In the particular case of two or three well-represented AFS types, what have been the contributions of colonizers, state services, projects and NGOs over the past century on their evolution;
- What are the support requests (techniques, genetic material, organization of harvesting, processing

and marketing of products, phytosanitary treatments, etc.) expressed by different types of users (old, young, women, men , etc.) to improve the production and sustainability of these AFS;
- Is it possible to map these AFS at the level of the 4 municipalities;
- Is it possible to represent some of these AFS in 3 dimensions, then to model their evolution, according to human intervention, by calculating the impact on production, the carbon stock, biodiversity;
- In 2021, will it be possible to offer agroforestry support projects to be more effective than past or current projects, thanks to better targeting of actions and better consideration projects and possibilities of a large number of actors?

During the mission, the 4 municipalities in which the PSAF-Timor project intervenes were visited. During the visits, 98 GPS points were identified, in order to create the embryo of a database which could be improved and completed by Marguerite Cogné, by the short-term experts and by the students working with the CIRAD team. Such a database could be used for various uses: cartography, analysis of satellite images, etc.

Meetings with three academic representatives had been pursued on the 6th of February. The universities are UNTL (public), ETCI (private) and UNITAL (private). The last two specialize in forestry management. UNTL specializes more in general agronomy but they started to open a faculty department for forestry class. These meetings aimed to inform the universities about Ai ba Futuru project and the possibility to offer internships for their students to help on the research program. Some small conferences could also be provided by the short-term mission experts.

One courtesy meeting had been pursued with the *Cooperation Attaché* for the France Embassy in Indonesia and Timor-Leste and for the *Institut Français* in Timor-Leste and with the *Cooperation Attaché* for the DEU in Dili, to inform them about the research program linked to GIZ-PSAF project. Another notification meeting had been pursued with the PSAF advisor to inform GIZ about the mission observations and the planned research which will be specified in the coming months.

2 INTRODUCTION

2.1 Background

The systematic promotion of agroforestry systems in Timor-Leste is rather new. It is important that an adequate basis of both demonstration and applied research and development (R&D) is established in order to ensure sound production, processing and marketing practices. This refers especially to the identification and development of suitable, sustainable and profitable agroforestry value chains, associated agroforestry systems, management and marketing practices. Currently, one programme working specifically on agroforestry in Timor-Leste is the Partnership for Sustainable Agroforestry (PSAF) project.[1] CIRAD is proposing a long-term adaptive research programme to support and underpin the implementation of PSAF.

Three potential topics for research are proposed, related to market/value chain analyses, immediate ecological benefits from agroforestry systems as well as socio-economic impacts, and the implications of both for resilience building towards the impacts of climate change. Agroforestry-specific recommendations will be made that will be included into the country's extension material as well as to contribute to long-term forestry sector policy- and decision-making.

Specifically, research results will contribute to:

[1] https://www.giz.de/en/worldwide/70499.html

- The identification of constraints limiting increase in production, income and/or employment from agroforestry systems and related value chains;
- The identification of immediate/short-term socio-ecological benefits from the establishment/expansion of agroforestry production systems.

As such, the focus is on the identification of constraints in the agroforestry sector as well as on the potentials of agroforestry – income and employment-generation along the value chain but also other benefits that contribute to resilience-building (of farmers) towards the impacts of climate change – if the barriers to realizing those were lifted. These objectives fit very well into the objectives of PSAF. Therefore, CIRAD is proposing to implement this research in close cooperation and within the framework of the PSAF. CIRAD will benefit from the work PSAF already implemented in the field of agroforestry in Timor-Leste, including its network of agroforestry sector stakeholders, while it will implement a research programme that will allow underpinning the practical implementation of the PSAF with a sound scientific basis.

A two-year research program based on three scientific-support activities

CIRAD's scientific-support proposal consists of three main activities:

- A preliminary analysis of the scientific needs and capacities of the PSAF partners;
- A technical, ecological and socio-economic diagnosis of current and future agroforestry systems; and
- A follow-up of the improved agroforestry systems.

The activity 1 is detailed here below.

Activity 1: A preliminary analysis of the scientific needs and capacities of the PSAF stakeholders

There are already research outputs available on agroforestry in Timor-Leste and a variety of actors is actively involved in implementing agroforestry projects in the country that may include research activities, e.g. through demonstration plots. It is of great importance that the research program to be implemented by CIRAD builds on past and ongoing efforts, fosters synergies and avoids duplication. Therefore, prior to a final definition of the research questions, initial research and consultations with stakeholders will be carried out, with the main objectives to:

- Identify agroforestry sector knowledge and capacities already available in the country;
- Understand the current state of knowledge of the PSAF project;
- Understand agroforestry value chain actors' (including farmers and actors down the value chain, such as entrepreneurs in the wood sector) as well as PSAF technical staff's expectations with regards to the main benefits from agroforestry;
- Identify the main constraints faced by agroforestry value chain actors and PSAF technical staff in implementing improved agroforestry systems and developing agroforestry value chains that will meet stakeholders' expectations;
- Formulate research questions that address gaps in the available knowledge and capacities and will allow contributing towards realizing stakeholders' expectations concerning agroforestry.

In order to achieve these objectives, CIRAD will review relevant scientific literature, consult Governmental and development partners, review materials provided by the PSAF and consult PSAF technical staff as well as PSAF farmers and other value chain actors.

Cooperation with national educational institutions

After the final definition of the research questions, CIRAD will meet with scientific and educational institutions in Timor-Leste, such as the University of Timor-Leste (UNTL), the *Universidade Oriental de Timor-Leste* (UNITAL) and the *Universidade da Paz* (UNPAZ), in order to identify the capacities available to support this research. From these institutions – if necessary through formal partnerships – CIRAD will recruit a limited number of Bachelor students to be involved in the research. This will be a two-sided commitment – the students' will support the research, while CIRAD will provide them with hands-on training that will help them improve their research skills.

Person in charge: Junior expert (Timor-based) supported by one senior scientist (1 mission)

Period: months 1-2 (February and March 2020)

Outputs: Report including: (1) Literature review and consultations with stakeholders, (2) final definition of research questions, (3) engagement strategy with national educational/scientific partners.

2.2 Objectives of the mission

This first mission was carried out from January 24th to February 8th.

The agenda and the list of participants are reported in chapter 6.1 & 6.2.

The objective was threefold:

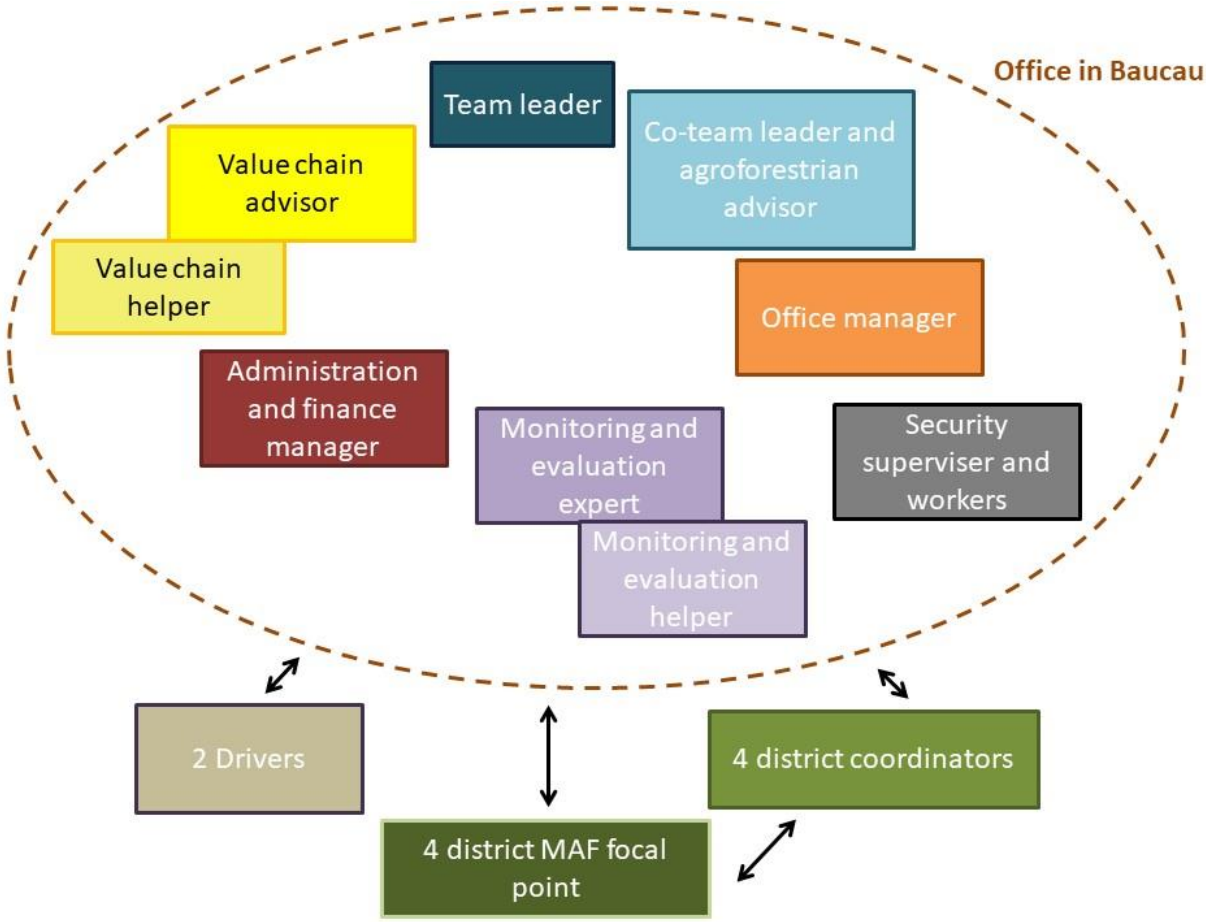
- Have an overview of GIZ partners (from Dili to Baucau),
- Update PSAF project advances,
- Accompany field observations to give advises on research program within existing resources,
- Help to fix logistic problem.

3 MEETING AT GOPA OFFICE IN BAUCAU

3.1 Presentation of GOPA team

A first meeting with GOPA group happened on Tuesday the 28th of January in Baucau Vila. GOPA is the main partner for GIZ PSAF – Ai ba Futuru project to develop Dynamic Agroforestry Systems (DAS) in the selected areas.

In August 2018, GOPA started to hire the local team in the targeted areas. The following scheme resumes the different repartition of actors inside the GOPA team:



3.2 GOPA network strategy

The target groups of GOPA for PSAF – Ai Ba Futuru project are classified into 4 main categories:

- Model farmers,
- Extension workers in the 4 districts as intermediary between the project and the farmers (50),
- Extension workers belonging to MAF. They are MAF focal points,
- *Xiefe Aldea* and *Xiefe Suku* in the targeted areas.

The target number of Farmers working in relation with the project is around 100 per suku[2] and the target number of suku per district is 10.

The farmers need to build living fences in order to access to new trees from PSAF – Ai Ba Futuru project. GOPA is already monitoring for the number of survival rates from last year planting 2019.

From 2019, GOPA has established relations with different NGOs, government (MAF related), commercial and community nurseries to get the number of seedlings required by the PSAF – Ai Ba Futuru project (3 million in totals at the end of 2022).

GOPA established 3 main innovative platforms in 3 different municipalities and aldeas:

[2] A suku is an administrative status that links together several sub-villages also named aldeas. The project target number of aldeas per suku is from 4 to 10.

- Fatubela (Manatuto district) with a community partnership (around 6ha),
- Tirloka (Baucau district), in partnership with CDC local NGO,
- Lospalos (Lautem district), within the MAP regional nursery, close to CCT (Cooperativa Café Timor) nursery.

They are also negotiating for a new platform in Viqueque on a land owned by the church.

Besides these demo-plot innovative platforms, GOPA is also supporting NGO such as COTIE and With One Seed who are implementing carbon off-set subsidies with different communities in the four-target district.

GOPA is particularly interested in the case study of Fatubela aldea (Manatuto Vila Posto). GOPA team started field workshop on a plot that had been previously grown as tree plantation by one community that benefit a UNDP project from 2017 to 2019 (Mahogany, Red Cedar, Jackfruits and *Leucaena leucocephala* mainly). The workshop was about how to integrate annual food crops under the trees (corn, beans, Pigeon peas, cassava…). The group has access to water and their trees are already 2-3m tall. GOPA wants to use this community farm to make people of Fatubela "ambassadors for dynamic agroforestrian systems" to other communities in a "farmer to farmer knowledge transmission" method.

GOPA is also interested by the relationship with MAF and CCT in Lospalos in order to develop new crops inside the Dynamic Agroforestrian Systems (DAS). They are still in negotiation to get sticks from vanilla, pepper and other fruits seedlings developed by CCT.

3.3 Research question emerging from GOPA's activities

During meetings organized in GOPA's Baucau office with CIRAD, the project manager expressed what he considered to be his priorities in terms of research support for his field work.

Six main research questions had been raised:

- How and where had been established the agroforestrian systems recommended by GOPA?
- What are the innovative systems?
- What are the water absorption capacities of these agroforestrian systems?
- How extensionists share the knowledge? How can they really influence change in farmer systems (related to indicator 1 in PSAF – Ai Ba Futuru proposal)?
- How strengthen the district authorities (xiefe aldea, xiefe suku…) and make them work with MAF extensionists in the decentralization process (Related to indicator 1 in PSAF – Ai Ba Futuru proposal)?
- What are the income benefits from agroforestrian plots? How do they apply the value chain? (Transformation of several products such as clove oil…).

Other qualitative study about the cultural context and the acceptability of Ai Ba Futuru project had also been one point of interest related during the meeting. Indeed the community system is much related to some cultural rules themselves related to the use of lands. These rules need to be respected in order to make the project efficient.

CIRAD has noted this interest in these research points; We will first define the scope of Cirad's work and then see to what extent we can help respond to certain requests from Gopa (notably the first two and the last). Some are part of an external audit or a targeted contribution in relation to the Gopa device.

3.4 Some research questions which will have to be confirmed in the next months

3.4.1 Context

The agrarian systems of the 4 municipalities of Timor where GIZ works under the PSAF, are still very poorly understood. This can be seen, for example, by reading the document that describes the baseline at the start of the project (Butterworth & Kielwein, 2018). In this one, we hardly speak of traditional agroforestry systems and we describe products that come either from cultivated fields, or forests, or rangelands. However, if we refer to the description of the agrarian systems commonly used by the scientific community, in particular by ICRAF (WAC), and more specifically by NAIR (1985), the majority of the cultivated land of the 4 municipalities falls into different categories agroforestry systems (including sylvo-pastoral). It is also necessary to deepen and complete the studies made in 2019 on the livelihoods of different types of families (Butterworth & Mesquita, 2019) as well as the study "crop cutting baseline" (GIZ, 2019) which studies in particular the corn / cassava / sweet potato / banana cropping system.

3.4.2 General objective of the proposed research: to better understand the agrarian systems of East Timor-Leste

In order to better meet the needs of the rural and urban populations of Timor, it seems essential to us to fully understand the functioning of the main types of agrarian systems that can be described. It will be necessary to take into account the fact that each farm can divide its activities in several types of cropping systems, these including agroforestry systems with dense cover (with tubers in understory), with light cover (with cereals and legumes in understory), totally open fields (cereals or legumes), mono-specific orchards, forest plantations, pastures with hedges and tree cover or not, etc. These systems will have to be replaced in a historical evolution, taking into account the traditions of the first known masters of the land, the current ethno-linguistic group, the contributions of the colonizers, State services, various projects and, finally, current economic conditions of the managers of the system: elderly or young person, with or without labor, with or without extra-agricultural income (pension, transfer of city dwellers or expatriates, etc.). These systems will also have to be located in relation to landscaped transects, taking into account the type of soil, altitude, rainfall and the supply of groundwater or irrigation.

3.4.3 Scientific tools that can be used

Different tools can be used to describe as wide a range of these systems as possible, for example:
- In vivo drawing of landscape transects,
- Analysis of satellite images,
- Ground inventories,
- Socio-economic surveys,
- Modeling.

3.4.4 What interest of the proposed research for the development of Timor

We assume that once these systems have been described, or even modeled, it will be easier for future projects to plan their contributions to a much higher number of farmers, with a much higher profitability of the action.
Let's take a few examples (so far imaginary) to illustrate what the results might be:
Example 1: If we realize that there are in the region of Baucau, at mid-altitude, on low-slope

colluviums, thousands of traditional AFS with dense canopy, including in the dominant layer palm trees (coconut palms , *Areca catechu*, *Borassus sp.,* etc.), fruit trees (breadfruit, jackfruit, citrus,), timber (teak*, Albizia, Gmelina*, etc.) and sacred or various trees (Kapok tree (*Ceiba pentandra)*, *Ficus spp*., etc.) ; that under these trees grow only tubers intended for humans but especially for pigs; that these formations are renewed by gaps of a few hundred m^2 during the fall or the exploitation of an old tree (250 m^2 to be renewed each year per ha, on the basis of a rotation of 40 years); Then it will be possible to understand that the need for young tree seedlings will be around 20 young trees per year per ha. We can then adapt the supply of tree species, depending on the choice of planters (grafted fruit trees, trees producing short-revolution lumber, cocoa shade tree, etc.) and distribute a network of nurseries adapted to this request. This will keep a AFS that is several hundred years old alive, which preserves biodiversity, fixes carbon and protects the soil, while providing a pleasant living environment and sufficient livelihoods for a large population (healthy and varied food, in accordance with traditions and some monetary income);
Example 2: If we see that many agro-pastoralists on the Laspalos plateau are not really interested in a sustainable multi-stage agroforestry system, because they have large areas and do not want to invest too much work on a small plot , and only want to build a small capital, easily mobilized in fifteen years; We can then offer them to enclose a few ha with live fences reinforced with barbed wire, to plow the ground, to plant there fast-growing trees of improved Teck or *Swietenia mahogany* type, with a spacing of 2 x 6 m, then to carry out intercropping for 3 or 4 years, before letting the trees grow and gradually thin them out, before final cutting and possible replanting;
Example 3: If we see that agro-pastoralists in the mid-altitude region of the Viqueque region, where natural seedlings and teak shoots have developed in their pastures since Portuguese times, have integrated these trees into a agroforestry rotation system (in the broad sense) which consists of exploiting gaps of ten trees for the production of lumber and a little wood-energy, before burning the small branches and cultivating corn, for one or two years before letting new teak sprouts and seedlings grow; Then, it will be possible to propose methods to clarify these coppices and sowing, to obtain better quality wood, in less time and therefore to increase farmers' incomes, while conserving carbon storage and soil fixation, enabled by maintaining the teak stand, at the landscape scale;
Example 4: If in the large Manatuto alluvial valley, in the Fatubela group of farmers, it appears that the first plantations of fast-growing trees on irrigated alluvium have too little spacing between the trees, so that the “Dynamic AFS” promoted by the project is not working properly (trees that are too thin that risk being broken by the wind, too much shade for crops, etc.); then it will be possible to advise farmers to thin the plantation gradually.

We therefore see that the solutions that probably will be proposed at the end of the study, at the time of regional work-shops, will certainly not favor the dissemination of a single model, perfect from the point of view theoretical, but rather a bundle of pragmatic solutions, which, at the landscape scale, will enable the inhabitants of the country to benefit from most of the advantages of agroforestry (varied local production, healthy and resilient to climate change , maintaining biodiversity and the carbon stock above ground and in the soil, respect for local traditions, progressive adaptation to social and economic changes, etc.).

3.4.5 First proposals on research questions that CIRAD could help answer

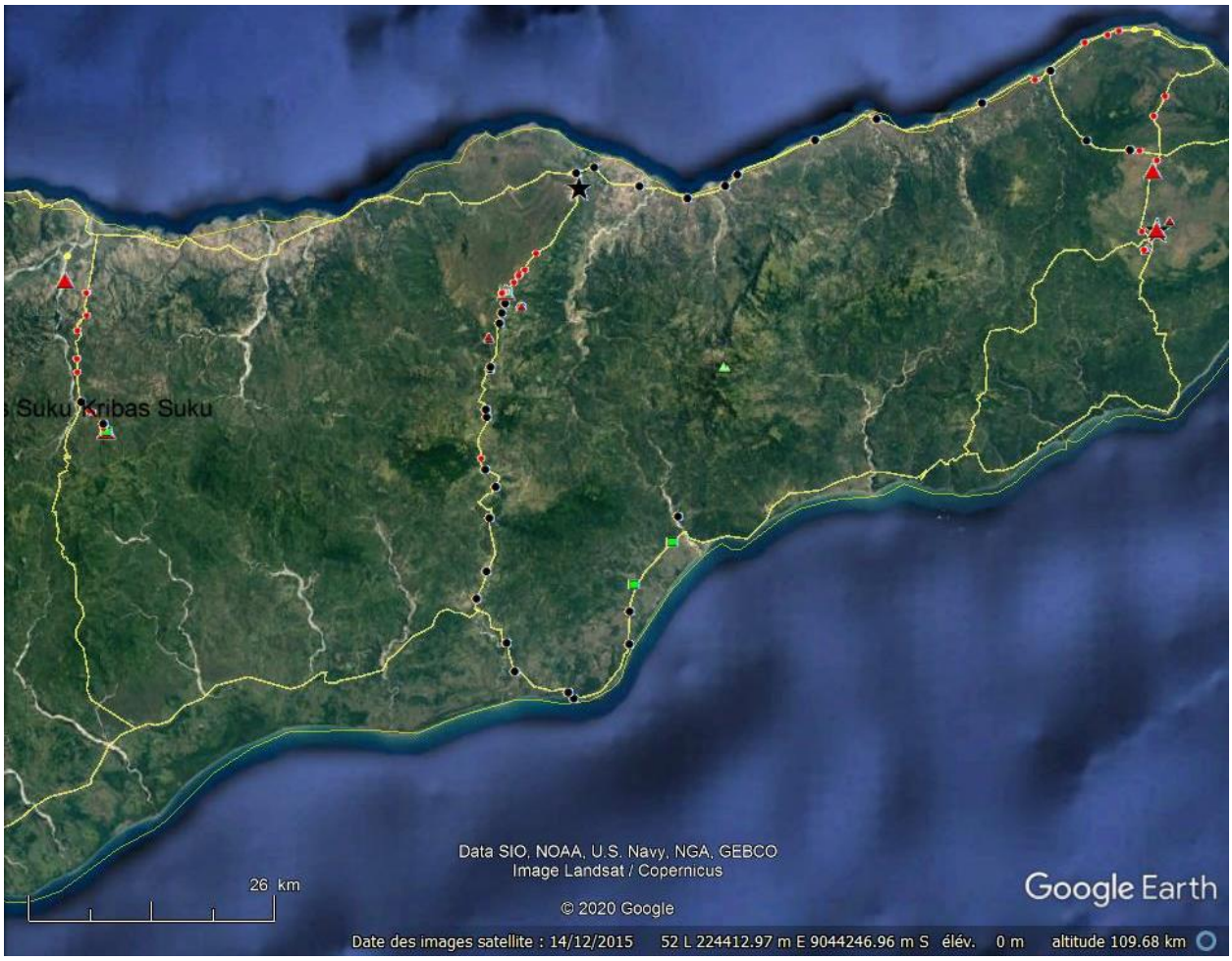
The research questions will be clarified by the Cirad team in the coming months.

Based on the remarks made above, they will most likely relate to the above topics:
- What are the main cropping systems in the eastern part of Timor-Leste (AFS or not) and how the dynamic agroforestry systems promoted by Gopa articulate with traditional systems;
- How do AFS operate and what are their self-consumed or marketed productions (description of value-chains). In addition to sector studies, it will also be possible to study the market possibilities for agroforestry products and look for national players who could help the creation of cooperatives and / or associations to create an outlet for these products;
- What are the ecological and social services of AFS felt by their users;
- How do AFS contribute to the ecological and social resilience of the region. How AFS contribute to food safety and product quality;
- How do the different cropping systems work within farms and what is the special place of AFS;
- How are the different cropping systems articulated along altitudinal transects, in the 4 municipalities of the PSAF project;
- In the particular case of two or three well-represented AFS types, what have been the contributions of colonizers, state services, projects and NGOs over the past century on their evolution;
- What are the support requests (techniques, genetic material, organization of harvesting, processing and marketing of products, phytosanitary treatments, etc.) expressed by different types of users (old, young, women, men , etc.) to improve the production and sustainability of these AFS;
- Is it possible to map these AFS at the level of the 4 municipalities;
- Is it possible to represent some of these AFS in 3 dimensions, then to model their evolution, according to human intervention, by calculating the impact on production, the carbon stock, biodiversity;
- In 2021, will it be possible to offer agroforestry support projects to be more effective than past or current projects, thanks to better targeting of actions and better consideration projects and possibilities of a large number of actors?

4 FIELD VISITS

During the mission, the 4 municipalities in which the PSAF- Ai ba Futuro project intervenes were visited.
During the visits, 98 GPS points were identified, in order to create the embryo of a database which could be improved and completed by Marguerite Cogné, by the short-term experts and by the students working with the CIRAD team. Such a database could be used for various uses: cartography, analysis of satellite images, etc.
In addition to the cities, villages, offices of Gopa and the MAP partners of the project, the nurseries and the fields being planted were identified. On the other hand, a number of cropping systems have been identified, with a view to establishing a first typology of land use.

It was also the occasion to evaluate the distances between Baucau-Vila (centre of GIZ and GOPA activities) and the other project centres in order to process the selection for research project. The access to these centres has been facilitated by GOPA leaders and their district coordinators by allowing us to accompany them on the field.



Map 1: GPS points noted during the mission, plotted on a Google-earth image, in the 4 municipalities of the project Ai Ba Futuru

4.1 Baucau

- Commercial nursery – ex GCCA nursery and visit to a time scaled Teak plantation and crop farming systems, posto Venilale:
  - Type of tree grown in the nursery: Candlenut (*Aleurites moluccanus*) (5000), Mahogany (*Swietenia mahagoni*) (16 000), Casuarina sp. (7000), Mandarin (*Citrus deliciosa)* (12 000), Salak palm (*Salacca zalacca*) (16 000), Jackfruits (*Artocarpus heterophyllus*) (5000), Coconut (*Cocos nucifera*) (2000), *Albizia sp.* (6000), Corossol (*Annona muricata*) (1000), Sandalwood (*Santalum paniculatum*) (1000), Avocado (*Persea americana*) (300), Rambutan (*Nephelium lappaceum*) (1000), Teak (*Tectona grandis*) (4000)
  - Observations: willing to expand Teak forest on rocky places, problems with neighbors (fire), private crop plantation are fenced with cassava, common family land are not fenced.
- 1st planting season (2019): 1 farm, suku Uma Ana Ulo:
  - Observations: weak survival rate of mahogany and sandalwood trees, the coconut tree seedlings survived (suku uma ulo).
- 2nd planting season (2020), 1 farming group land, tree delivering for sandalwood mixed with peanut crops, suku Uma Ana Ulo, aldea Venilale:

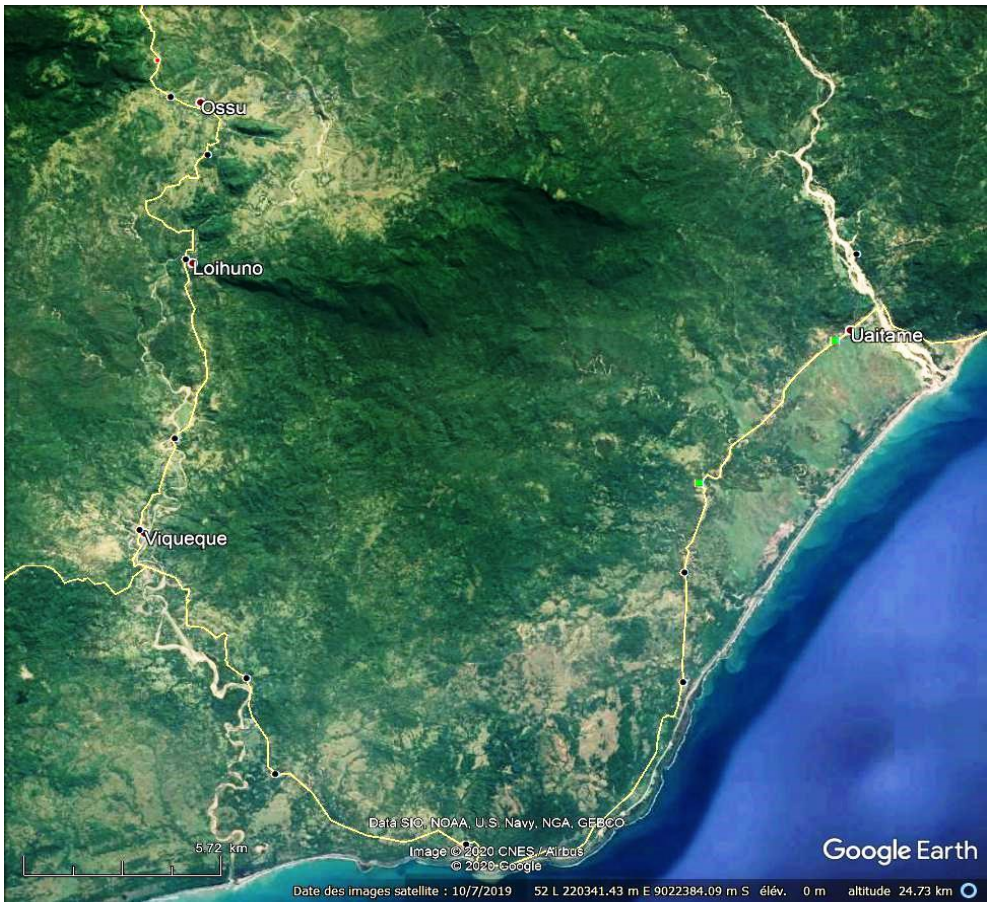
- Observations: sandalwood from 2019 died, the land chosen is flat and up the mountain, the ground contains red clays. The sandalwood trees are planted without host and there is no shadow tree around (crop fields).

Map 2: GPS points noted during the mission in Baucau municipality (The big red triangle represents the Commercial nursery, small red triangles the areas of plantation.

4.2 Viqueque

- 1st planting season (2019): 1 farm in partnership with MAF veteran project (8ha "farmer group"), suku Uatulari
  - Type of trees grown: mahogany, rambutan, salak, sandal wood from GOPA, teak and *Gmelina arborea* ("ai-teka Filipina"), Jackfruits and Breadfruits (Artocarpus *altilis*)… Also mixed corn field (corn, pumpkin and beans) and fish pound.
  - Observations: The owner of the place visited is veteran and he is used to be part of different projects. The grown land is situated after a teak forest in mountainous land that makes difficult their access to the road
- Community nursery, suku Makadiqui

- Type of trees grown in the nursery: mahogany, Australian red cedar (*Toona ciliata*) (“ai-seria” - 2000), mahogany (7300), *Sesbania sesban* (Legume host for sandal wood - 1000) but almost all dead, Jackfruits and coconut trees seedlings (800). Total = around 11000 seedlings.
- Observations: seedlings had been grown since November, at the time of the visit they were already big and ready to be planted but there was some delay in the delivery service.



Map 3: GPS points noted during the mission in Viqueque municipality (The green rectangles represents the Community nursery, suku Makadiqui)

4.3 Lautem

- Meeting with administration xiefe of MAP, Sergio da Silva, Lospalos Vila
- Visit to MAP plantation (experimental plantation)
  - Type of trees grown : Mahogany , Kapok tree (*Ceiba pentandra*), Almond tree (*Terminalia catappa*), *Albizia falcataria*, cacao and sandalwood, Kusum tree (*Schleichera oleosa*) (ai-dak), …
  - Observations: few density selection
- Visit to MAP beneficiary farmer group land, 1st year plantation (2019), Laru-ara
  - Crop grown: cowpeas (*Vigna unguiculata)* (“nehe”), snowpeas (Pisum sativum)(“tunis”), corn (*Zea mays*), peanut (*Arachis hypogaea*)…

- Tree grown: *Gliricidia sepium* for fences, sandalwood, mahogany, citrus trees
- Observations: the land is up from Lospalos Vila and contains a lot of rocks with little water retention, trees are small, 1 over 3 field visited with old sandalwood and mahogany from former project, trees distributed with low survival rate and burning tracks.

Map 4: GPS points noted during the mission in Lautem municipality (The big red triangle represents the Commercial nursery, small triangles the areas of plantation.

4.4 Manatuto

- Visit to community nursery and private field, suku Cribas
  - Observations: Middle mountain / eucalyptus forest (*Eucalyptus alba*) and *Ficus sp*. (ai-bonuk)
  - Trees grown in the nursery: Mahogany (9300), Casuarina (700), Teak, Sandalwood growing from seeds but did not work (planted 700, 2 survived…) /
  - Farmer field (Thomas Soarez): different generations of Mahogany, before he planted cacao but without shadow tree, consequently they died. He grows also Cinnamon (*Cinnamomum verum*) (kanela), rambutan, "here" (kau kasak local language) host for sandal wood, Kusum tree, legume tree ("roko") and *Ficus sp*. to feed the cows.

- Community nursery and "demo plot" for the project, 1st planting session in April 2017 by UNDP project, DAS workshop in January 2019, Farmer group of Fatubela:
    - Observations: Farmer group constituted by a whole family. The plot is flat and has easy access to water and clay mixed with lime as it is situated in the riverbed. Mahogany, Red Cedar and legume trees had been planted 2 years ago. They are now testing different mixed crops (food crop inside the alley such as corn, beans, Pigeon peas (*Cajanus cajan*,) and cassava, chili and banana in other places. They also extend their land where they are going to grow other trees such as citrus trees. They have a horticulture place that had been partly financed by GOPA (for the seeds). Their house and the central place is surrounded by coconut trees, Breadfruits and Jackfruits trees. Each plot is "fenced" by coconut or other fruit trees and bushes.

Map 5: GPS points noted during the mission in Manatuto municipality (The big red triangle represents the Fatubela nursery and plantation, small red squares the areas of plantation or natural forests.

4.5 General observations:

The survival rate from the 1st year plantation visited is very low. This is due to a long dry season during the year 2019 (from May to December-January 2020). Moreover, the first tree distribution has started a bit late (around April) due to the beginnings of the project. Unless their high productivity, community nurseries visited at that time faced a problem for delivering the trees, especially because of the lack of transport. The main tree seedlings observed in the nurseries are Mahogany and Casuarina. Other species can be very different from a nursery to the other, they can be local species grown into the land of the nursery owner that he/she reproduces from fruit seeds most of the time. Other community nurseries also received grafted and selected tree seedlings from MAP nurseries or other international organizations such as Quinta Portugal. The commercial nursery visited in Venilale, and other nurseries such as in Fatubela or Lospalos (MAP) that had been created more than 1 year ago are the most diversified (different fruit trees, palm trees, timber trees, legume trees…). Their diversity may also be due to their easy accessibility from the road and market.

5 MEETINGS IN DILI

5.1 Meetings with national universities

Meetings with three academic representatives had been pursued on the 6th of February. The universities are UNTL (public), ETCI (private) and UNITAL (private). The last two specialize in forestry management. UNTL specializes more in general agronomy but they started to open a faculty department for forestry class. These meetings aimed to inform the universities about Ai ba Futuru project and the possibility to offer internships for their students to help on the research program. Some small conferences could also be provided by the short-term mission experts.

5.2 Other meetings

One courtesy meeting had been pursued with the *Cooperation Attaché* for the France Embassy in Indonesia and Timor-Leste and for the *Institut Français* in Timor-Leste and with the *Cooperation Attaché* for the DEU in Dili, to inform them about the research program linked to GIZ-PSAF project. Another notification meeting had been pursued with the PSAF advisor to inform GIZ about the mission observations and the planned research which will be specified in the coming months.

5.3 Cropping systems

A first typology of land use is given below for the GPS points identified:

Type of land-cover (cropping systems, etc.)		Acronym	Code	N° GPS
Plantations and new dynamics AFS	Small trees (less than 5 m)	PST	4	2, 3, 5, 6, 35, 92
	Big trees (More than 5 m.)	PBT	5	43, 62, 69, 91, 99
Natural forests and invasive trees	Treed savannah on hills	Svh	6	73, 74, 96
	Eucalyptus	Ecs	7	83, 84, 86, 88, 94
	Teak	Teak	8	41, 45, 46, 68

	Dense low land forest	Llft	9	78, 80, 81
	Degraded forest	Dft	10	
Traditional AFS	Coastal Borassus orchards	Cbor	11	75, 76, 77
	Dense trees canopy (Palm & fruit trees)	DAF	12	32, 47, 48, 98
	Open trees canopy (Palm & fruit trees)	OAF	13	36, 37, 38
	Sylvo-pastoral Systems	SPS	14	28
Fields & Rangelands	Corn, peanuts	Cpt	15	44, 65, 85, 93
	Rice	Rice	16	41
	Pasture	Past	17	
	Fallow and Shrubs	FwSb	18	39

Photographs and a brief description of these types of land use, which for the most part correspond to cropping systems, can be found in the Annex, chapter 7.3.

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7 ANNEXES

7.1 Agenda of the mission

Date	Activity	Accommodation
January 24th to 27 th	- Travel to Dili - Arrival of R. Peltier & A. Rival	Dili
January 28th	- Meeting with GIZ Dili and road travel to Baucau - Meeting with Gopa leaders in Baucau	Baucau
January 29th	- Meeting with Gopa team in Baucau - Participation to planting of Sandal trees in two farms -	Baucau
January 30th	- Visit of a nursery and to a field planted in March 2019, in Baucau municipality - Departure of Alain Rival to Dili	Baucau
January 31th	- Visit of a nursery and to a field planted in March 2019, in Viqueque municipality - Departure of Alain Rival to Jakarta	Baucau
February 1rst	- Visits in Baucau town and report	Baucau
February 2d	- Visit in Baucau municipality and report	Baucau
February 3th	-	Baucau
February 4th	- Visit in Lautem municipality	Baucau
February 5th	- Visit in Manatuto, - Travel to Dili	Dili
February 6th	- Meeting with Amba-France, UE and University	Dili
February 7th	- Meeting with GIZ Dili - Departure of Regis Peltier to France	
	- France	

7.2 List of people met during the mission

7.2.1 Cirad team

Family name	First name	Organization	Function	Mail
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7.2.2 People outside Cirad met during the mission

Family name	First name	Organization	Function	Mail / tel
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TERHORST	Heinrich	GOPA, Baucau, Lutu Mutu, Timor-Leste	Team leader	
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7.3 Photographs and brief description of land use

7.3.1 Plantations and new Dynamics AFS (Small trees, less than 5 m)

7.3.2 Plantations and new Dynamics AFS (Big trees, more than 5 m)



7.3.3 Open natural forests and invasive trees (Treed savannah on hills and Eucalyptus)


7.3.4 Dense natural forests and invasive trees (Teaks and Dense low land forest)


7.3.5 Very open traditional Agro-Forestry-Systems (Coastal *Borassus* palms orchards and sylvo-pastoral systems)



7.3.6 Semi-open traditional Agro-Forestry-Systems (Open trees canopy: Palm & fruit trees)



7.3.7 Dense traditional Agro-Forestry-Systems (Dense trees canopy: Palm & fruit trees)

7.3.8 Fields & Rangelands (Corn, peanuts and rice)

7.3.9 Fields & Rangelands (Pasture, Fallows and shrubs)