

Exploratory diagnosis of agrarian dynamics of the Mount Ribáuè and M'Pàluwé region Intermediary report

By Margaux Béringuier

December 2020

nitidæ
landscapes & value chains





Warnings

This report presents the main findings of **the first exploratory phase of an agrarian diagnosis** of the Ribáuè and M'Pàluwé mountains region carried out by Nitidæ. This study builds on the previous field visits realized in 2019 and 2020 by Nitidæ and Legado teams.

The "exploratory phase" is **a qualitative and analytical work aiming to understand agricultural trajectories and dynamics**. Unfortunately, due to the start of the Covid 19 pandemic, only one week of the planned field work was carried out. Thus, only two areas among the eleven pre-identified for the surveys were study (see Table 2). **To complete the exploratory phase of the diagnosis, a minimum of three weeks of additional field work will therefore still be necessary.**

Once the "exploratory phase" is completed, it will also be necessary to **characterize more precisely each type of producer** in order to have a more complete knowledge of each type. This characterization work will require carrying out **quantitative surveys to collect key data**. To be representative of the area, these data should be collected in large numbers, with the **support of investigators**. The exploratory phase, will provide a foundation to make **a sampling strategy**.

Therefore, the results presented in this report are **incomplete and should be considered with caution as they deserve further field work to be confirmed**. They are the fruit of the "first intuition" from the field as an agronomist.

Thank you for your understanding and pleasant reading,

« Vive l'agriculture positive et systémique ! »

Margaux Béringuier

Cover photos

On the left: An old fallow covered by a secondary forest formation in the valley of Mithupa.

On the right: A *machamba* opened in the forest, in Massedo's area (on the top of Mount Ribáuè) fallow for a year and now entirely covered by *Vernonanthura polyanthes*.

Table of contents

1_	Context: between conservation and human threat	5
1.1.	Ribáuè and M'Pàluwé Forest Reserve	5
1.1.1.	A "forgotten reserve"	5
1.1.2.	What resources to conserve?	5
1.2.	A threaten area	7
1.3.	The threat of agriculture	8
2_	Methodology of the exploratory agrarian diagnosis	10
2.1.	Goals of the exploratory agrarian diagnosis.....	10
2.2.	Methodology of survey	10
2.3.	Choice of surveys' locations	11
2.4.	Agenda.....	12
3_	Farmers depending on forest resources	12
3.1.	Ribáuè and M'Pàluwé mounts and valleys: a diversified agricultural landscap	12
3.2.	Dependence on forest was gradually build	15
3.2.1.	Some key local historical facts	15
3.2.2.	Historical agricultural trajectories within Mount Ribáuè and M'Pàluwé region	17
3.3.	Producers do not depend on the natural resource for the same reasons	17
3.3.1.	Current agricultural dynamics	17
4_	Next steps	26
5_	References	27
6_	Annex	28

List of figures

Figure 1 : Ribáuè's district localization, map of Nampula province (Ministério da Administração Estatal 2014).	5
Figure 2 : Ribáuè and M'Pàluwé Forest reserve delimitation (source IIAM).	6
Figure 3 : Deforestation map between 2000 and 2020, mounts Ribáuè e M'Pàluwé (Nitidæ, 2020). 7	
Figure 4 : Reasons for local forest use as a percentage of all surveys completed until today.	8
Figure 5 : On the background of the deforestation map, representation of flows (confirmed and still hypothetical) between residential areas of the farmers and areas of intense deforestation.	9
Figure 6 : Living areas of farmers exploiting M'palue and Ribaue forests.....	11
Figure 7 : photos of old fallow in Mithupa's valley (Margaux Béringuier).	13
Figure 8 : Land cover map of the Mounts Ribáuè e M'Pàluwé (Nitidæ, 2019).....	14
Figure 9 : Diagram summarizing the progressive differentiation of agricultural production systems during the recent agrarian history in Mithupa's valley.....	18
Figure 10 : Water control in the machamba of a "Riverbanks producer". In the photo, culture of cassava, lemon and pineapple along the canal (Margaux Béringuier).	19
Figure 11 : Photos of fallows in the mountains (Margaux Béringuier).....	21
Figure 12 : Photos of tqbqcco production in Mithupa's valley (Margaux Béringuier).	22
Figure 13 : Diagram summarizing the dynamics of evolution of local agricultural production strategies by emphasizing the processes that explain the transition from one strategy to another.	24

List of tables

Table 1 : Type of information collected with the farmers.....	10
Table 2 : Origin of the producers who infiltrate the forest. Survey areas identified for the exploratory phase of the diagnosis.	11
Table 3 : Global agenda of mission carried out on the field until today.	12
Table 4 : Detailed agenda of the 1st agrarian diagnostic mission in March 20.	12
Table 5 : Why are these producers dependant on forest ressources ?	26



1 Context: Between Conservation and Human Threat

1.1. Ribáuè and M'Pàluwé Forest Reserve

1.1.1. A "forgotten reserve"

Ribáuè (-14.877196°, 38.256565°) and M'Pàluwé (-14.884933°, 38.315718°) are two neighboring mountains located in the province of Nampula, in Ribáuè's district (see Figure 1) that are classified as a Forest Reserve, officially established in 1950 during the colonial period (see Figure 2). However, today Mount Ribáuè and M'Pàluwé Forest Reserve does not benefit from any effective management, therefore its resources are exposed to unsustainable land use practices such as slash and burn agriculture and are no longer effectively protected.

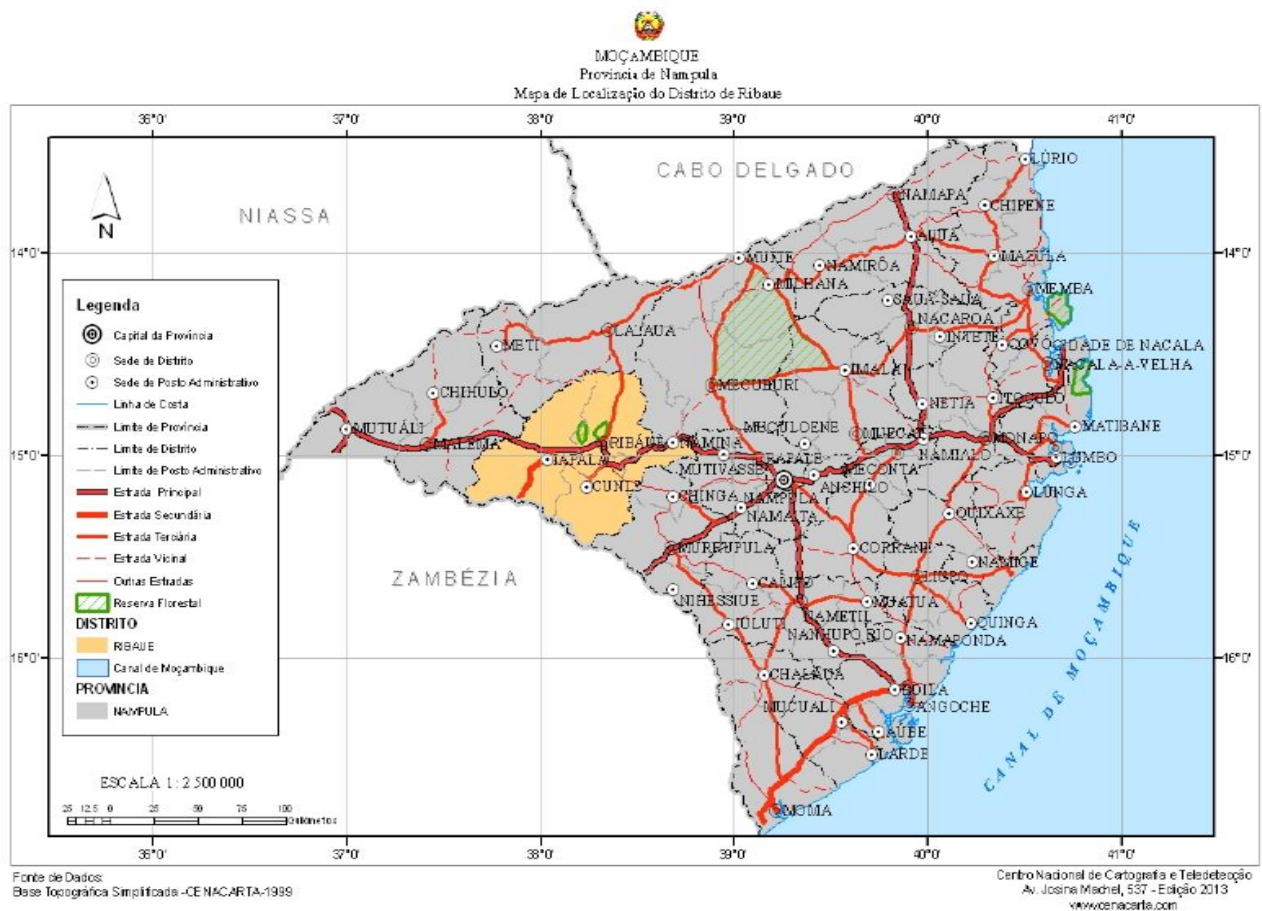


Figure 1 : Ribáuè's district localization, map of Nampula province (Ministério da Administração Estatal 2014).

1.1.2. What resources to conserve?

Biodiversity

The Ribáuè Mountains are a series of **granite inselbergs** in northern Mozambique near the town of Ribáuè in Nampula Province. The Ribáuè Mountains are composed of **Mount Ribáuè** and **Mount M'Pàluwé**. The inselbergs rise from a relatively flat landscape from 500-600 m altitude up to 1675 m on Monte M'Pàluwé. They form part of a belt of granite rock outcrops, inselbergs and mountains, running NE-SW across Nampula and Zambezia provinces and including Mt Inago (1804 m), Mt



Namuli (2419 m) and Mt Mabu (1700m) to the southwest of the Ribáuè massif (Kew Botanical Garden, 2018).

This belt is considered **a center of endemism** (Darbyshire et al., 2019). Overall, the site supports **15 nationally endemic plant taxa** (plants that only occur in Mozambique), **11 near-endemics** (plants that are restricted to Mozambique and neighboring countries) and **10 taxa that are threatened with extinction on the Global IUCN Red List** (Kew Botanical Garden, 2018). Steeply sloping granite rock outcrops, mid-altitude moist forest and Miombo woodland are the dominant habitat types at the Ribáuè massif. The site also includes smaller areas of gallery forest, marsh, seasonal stream gullies, seepage on granite rock, and shaded granite cliffs (Kew Botanical Garden, 2018).

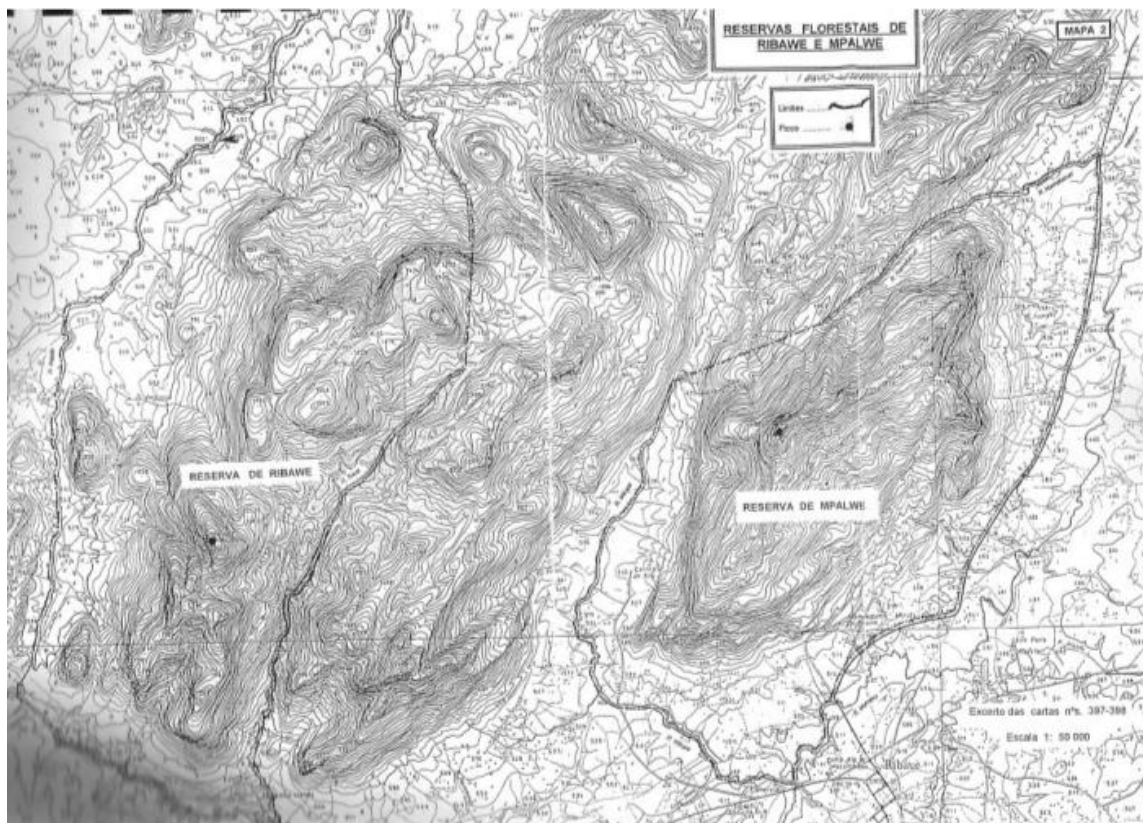


Figure 2 : Ribáuè and M'Pàluwé Forest reserve delimitation (source IIAM).

Mounts Ribáuè and M'Pàluwé has been considered in the process to be **classified as a Key Biodiversity area (KBA)**.

Water

These mountains (like Mount Namuli's chain) are high enough to attract rain and sufficient cloud cover to maintain relict forests. **These highland forests are a source of clean water**, providing **ecosystem services** to communities downstream. **Forests maintain water quality**, as well as its volume, and prevent silting up and loss of water through runoff. They are **essential to ensure a continuous water supply**. Mount M'Pàluwé for example is home to the source of the national water company Oasis mineral water sold throughout the province of Nampula and beyond.



1.2. A threatened area

In 2020, the Nitidæ Lab team produced **deforestation** (Figure 3) and **forest cover maps** (Figure 8) of the Mount Ribáuè and M'Pàluwé over the 2000-2020 period.

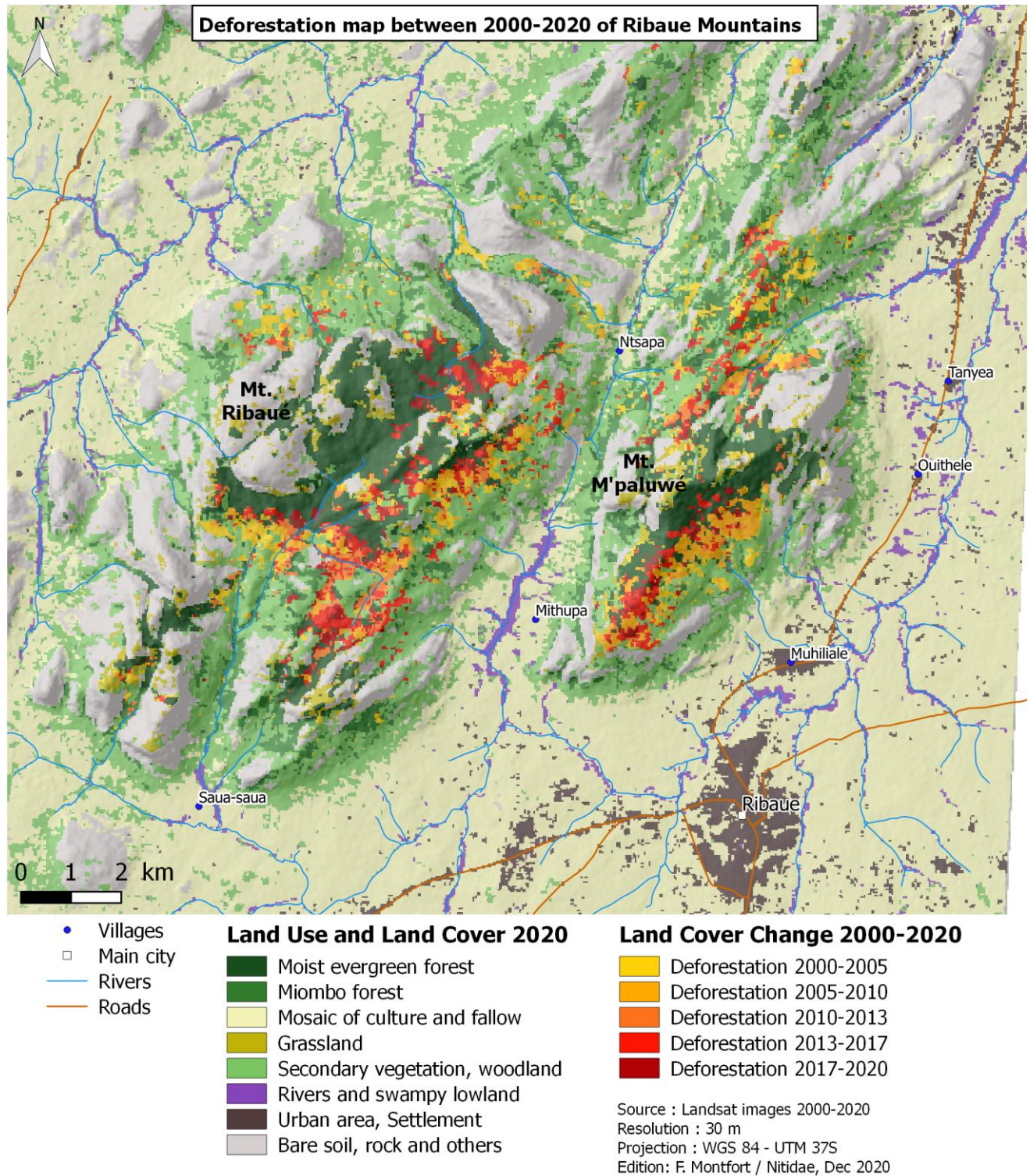


Figure 3 : Deforestation map between 2000 and 2020, mounts Ribáuè and M'Pàluwé (Nitidæ, 2020).



Forest cover in 2000 was estimated at 4555 ha and, in 2020 remaining forest patches are estimated at 2848 ha. Forests of the Mount M'Pàluwé, situated directly above the town of Ribáuè, have suffered greater deforestation than the forests of the Mount Ribáuè. **More than 37% (i.e. 910 ha) and 47% (i.e. 456 ha) of forested areas were lost between 2000 and 2020 on the Mount Ribáuè and Mount M'Pàluwé, respectively** (Nitidæ, 2020). **Between 2000 and 2020, the average annual deforestation rates were 2.5 % (47 ha per year) and 3.2 % (23 ha per year) for the Mount Ribáuè and Mount M'Pàluwé, respectively** (Nitidæ 2020).

On the Mount Ribáuè, remaining forest patches are estimated at 1556 ha in 2020: 1089 ha of moist evergreen forest and 467 ha of Miombo forest. **On the Mount M'Pàluwé, remaining forest patches are estimated at 520 ha in 2020: 402 ha of moist evergreen forest and 118 ha of Miombo forest** (Nitidæ 2020).

The deforestation rate has been steadily increasing since 2000. At the present rate of loss, the remaining forest can be expected to be exhausted within 35 years.

1.3. The threat of agriculture

During the first exploratory diagnostic study, 20 inhabitants of the Mithupa valley and the Muhiliale districts of Ribáuè city were investigated. During each interview, the interviewee was asked the reasons for his/her intrusion into the forest. The results are shown on Figure 4. Of course, the sample is absolutely not representative of the population and the percentages should therefore be taken with caution. However, this gives an idea of the **main reasons for local population exploring forest: agriculture** (slash and burn agriculture) and **the search for bamboo** (widely used for the delimitation of particular plots and the construction of roofs in the town of Ribáuè). Many producers also spoke about mushroom harvest¹ during the rainy season.

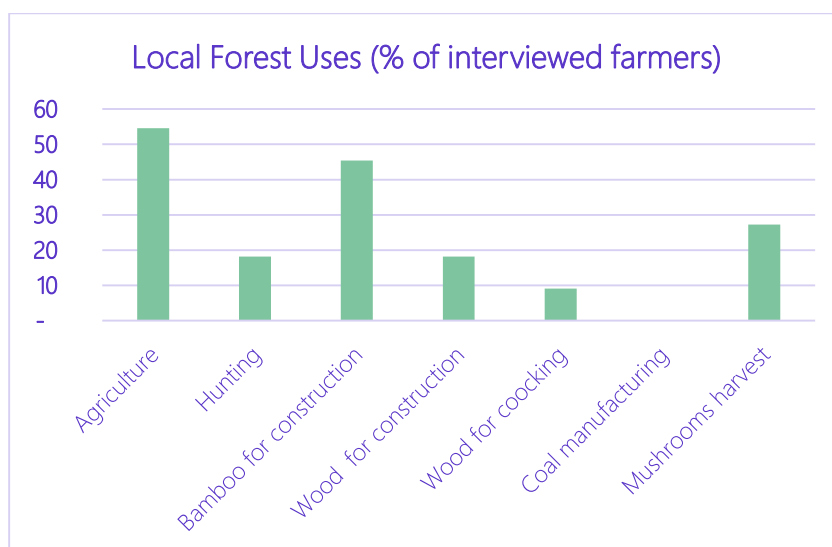
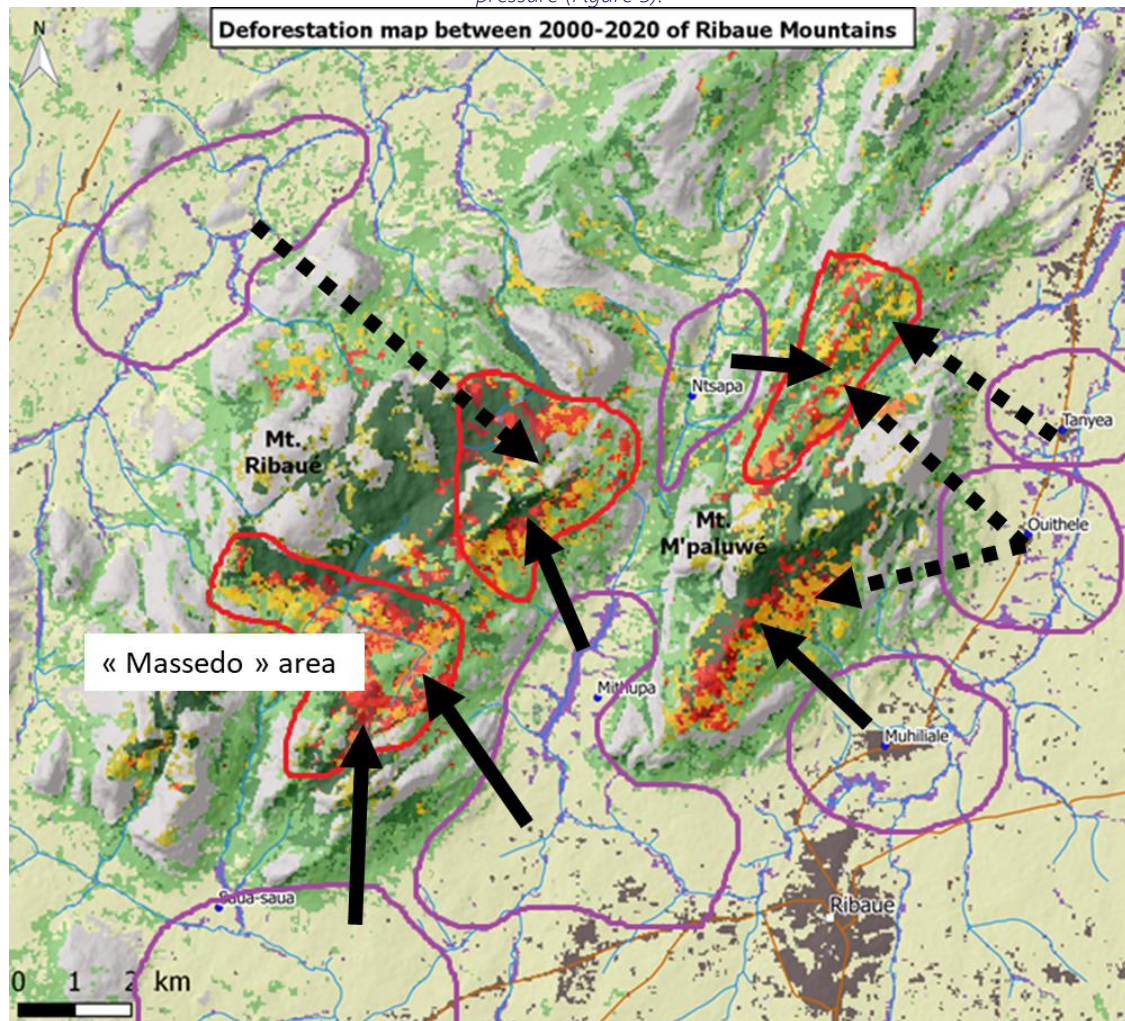


Figure 4 : Reasons for local forest use as a percentage of all surveys completed until today.

¹ List of mushrooms harvested (local names): *Natenieri* (very small and thin white mushroom), *Navivi*, *Caporantxatxe*, *Eukuli*, *Nicuhati*, *Tereiria*, *Nicumanacole*, *Inlapanacole* (very tasty and appreciated in the kitchen).



The fieldwork previously carried out by the Nitidæ and Legado teams, supplemented by these surveys, allowed to better understand the *origin of the populations that infiltrate the different parts of the reserve, including those under the highest pressure (Figure 5).*



Legend :



Areas of intense deforestation



Areas of origin of producers who infiltrate the forest (confirmed information)



Confirmed infiltration flows



Hypothetical infiltration flows

Figure 5 : In the background of the deforestation map, representation of flows (confirmed and still hypothetical) between residential areas of the farmers and areas of intense deforestation.



2_ Methodology of the exploratory agrarian diagnosis

The study presented below is based on the accelerated agrarian diagnostic methodology adapted by Nitidæ in the recent years to the context and needs of on the ground project implementation. Developed and popularized by the Nitidæ team, only the key essential points of this complex and technical methodology are presented below

2.1. Goals of the exploratory agrarian diagnosis

The goal of the exploratory agrarian diagnosis is to **understand the factors that can influence regional agricultural dynamics** (land tenure, strategy of land occupation (in particular forest), cultural and social dynamics, origin of populations, recent regional history, major types of production, market access, etc.). A first qualitative understanding of agricultural dynamics makes it possible to **make hypotheses on factors of differentiation between producers who, in the same environment, choose different trajectories**. This study therefore allows to establish **a first provisional typology of production systems in the area**, a typology that will be completed, corrected and quantified during the second phase of the diagnosis.

2.2. Methodology of survey

The first phase of the study focused on **the qualitative understanding of production trajectories and strategies as well as their evolution over time**. To understand these dynamics, semi-structured opened interviews were conducted with producers to collect the following information:

Qualitative information	General information
<ul style="list-style-type: none">- The origin of the producer / possible affiliation to specific social groups and possible implications regarding land tenure, production capacities or farming practices- Farmer modalities of access to land, (eventual influence of cultural and/or family rules)- Farmer life and work trajectory (change of practices, changes of production scale...) in the recent history of the region- Farmer objectives, production strategy- Characterization of the infiltration dynamic in the forest	<ul style="list-style-type: none">- The main productions (crops and animals)- Market linkage: destination of the productions (Self-consumption? Lean period? Sales? basic information on markets)- Access to production factors (average plot size, tools and inputs used to produce, available labor force)- Coarse distribution of expenditure and cash inflows over the year

Table 1 : Type of information collected with the farmers.

The survey sheets in Portuguese used on the fields are presented in Annex.



2.3. Choice of surveys' locations

Two first exploratory missions (see Table 3) carried out in the region by Nitidæ and Legado teams made it possible to identify (local testimonies) the origin areas of the producers who currently infiltrate the forest (Table 2). Some of these areas have been located on the map (see Figure 6).

Posto administrativo	Localidade	Bairro (district)	Prospection progress (agrarian diagnosis 1st phase)
Ribaué Sede	Ribaué Sede	Muhiliale	X
Ribaué Sede	Ribaué Sede	Quithele	
Ribaué Sede	Ribaué Sede	Murawuane	
Ribaué Sede	Mecuassee	Galileia	
Ribaué Sede	Mecuassee	Tanyea	
Ribaué Sede	Ribaué Sede	Mithupa	X
Ribaué Sede	Mecuassee	Ntsapa	
Ribaué Sede	Ribaué Sede	Saua Saua	
Ribaué Sede	Ribaué Sede	Napasso	
Ribaué Sede	Matharia	Cavucane	
Ribaué Sede	Namigonha	Namigonha	

Table 2 : Origin of the producers who infiltrate the forest. Survey areas identified for the exploratory phase of the diagnosis.

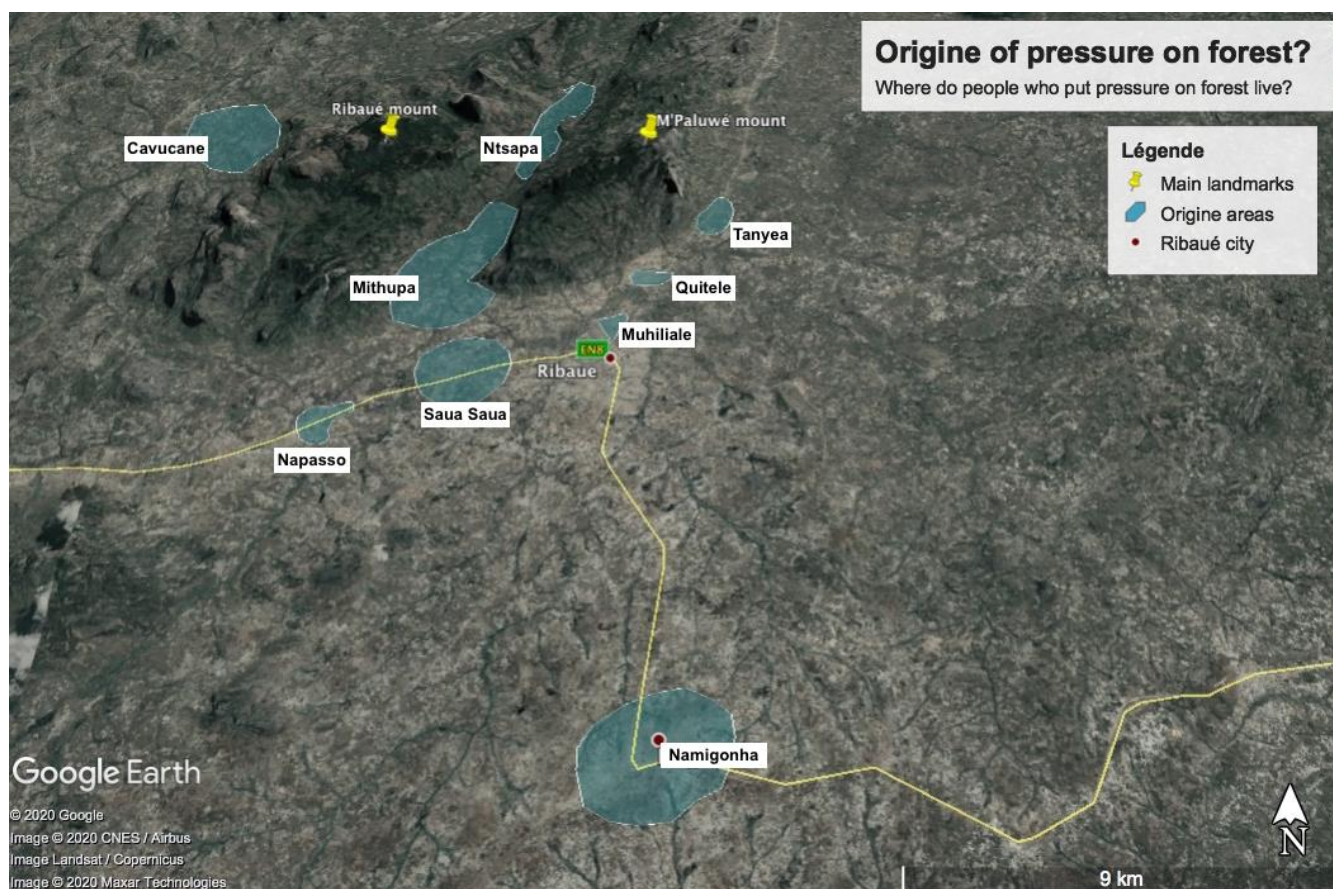


Figure 6 : Living areas of farmers exploiting M'Pàluwé and Ribaué forests.



2.4. Agenda

Dates	Who was present ?	What were the working goals ?
From 18/02/19 To 20/02/19	Jean-Baptiste Roelens (Nitidae)	<ul style="list-style-type: none"> - Presentation to local authorities - First field observations (landscape dynamic, deforestation front, main crops cultivated, community identification and main movement)
From 10/06/19 To 22/06/19	Stephanie Mladinich (Legado) Jean-Baptiste Roelens (Nitidae)	<ul style="list-style-type: none"> - Presentation to local authorities, - First landscape study - First identification of dynamics of infiltration in the forest - First identification of infiltration "fronts" and "homes"
From 18/02/2020 To 23/02/2020	Stephanie Mladinich (Legado) Frederique Montfort (Nitidae) Margaux Béringuier (Nitidae)	<ul style="list-style-type: none"> - Presentation to local authorities - Understanding of the administrative division of the area and the distribution of powers between official and traditional authorities - GPS readings for land use map - Confirmation of infiltration "homes" - First reading of the agrarian landscape
From 15/03/2020 To 24/03/2020	Margaux Béringuier (Nitidae)	Agrarian Diagnosis exploring phase

Table 3 : Global agenda of mission carried out on the field until today.

Dates	Activities	Interviews conducted
15/03/2020	Travel to Ribáuè	6 interviews
16 to 19/03/2020	Fieldwork in Mithupa district	5 interviews
20/03/2020	Fieldwork in Muhiliale district	6 interviews
21/03/2020	Climb of Ribáuè Mount	0 interviews
22/03/2020	Fieldwork in Muhiliale district	3 interviews
23/03/2020	Travel back to Gurué	/

Table 4 : Detailed agenda of the 1st agrarian diagnostic mission on March 20.

3_ Farmers depending on forest resources

3.1. Ribáuè and M'Pàluwé mountains and valleys: a diversified agricultural landscape

This report will not revisit the landscape studies carried out previously. In particular, the reader can read the report Land Use and Land Cover Map of Ribáuè Mountains (Mount Ribáuè and Mount M'Pàluwé) by Frederique Montfort in 2019 (Montfort, Nitidae 2019).



Extracted from this report, the land use map (Figure 8) shows that **agricultural occupation is more dense in the valley than on the upper slopes**. In fact, there are many more cultivated plots, young and old fallows below. Important detail for the following: the presence, at the foot of the mountains (Mithupa valley for example) of many patches of secondary vegetation (circled in pink on the map) could be noted. These are old fallows (over 15 years old) in which secondary forest formations (therefore different from primary forest in their density and species composition) have developed. These plots seem not to have been cultivated for a long time. **But why do farmers then make the effort to climb to the top of the mountain and cut down trees there when there is apparently available, fallow land so close? Why not cultivate closer to home, and to the city (and therefore to the market)?** The map therefore raises questions whose answers will be key to understanding the situation: **What opportunities does the forest provide? What constraints does it avoid?**



Old fallow covered with secondary forest in Mithupa Valley.



Old very degraded fallow land in the Mithupa Valley.



Appearance of the soil, red, compact, and leached in an old degraded fallow. Very compact, these soils are difficult to work with the hoe.



A machamba of cassava planted on an old degraded fallow land. On the right, we observe a furrow of surface water flow.

Figure 7 : photos of old fallow in Mithupa's valley (Margaux Béringuier).

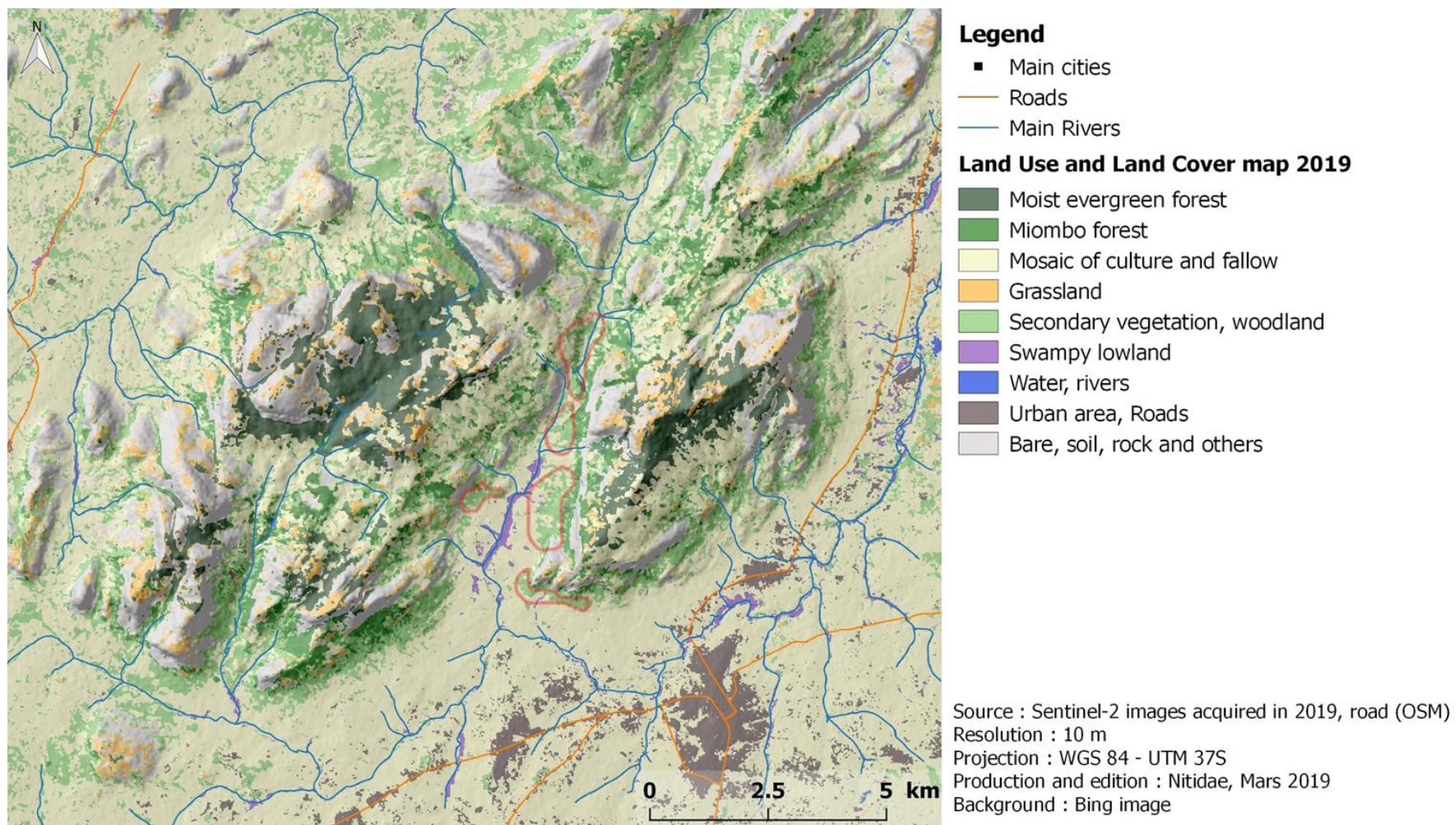


Figure 8 : Land cover map of the Mounts Ribáuè e M'Pàluwé (Nitidae, 2019).

3.2. Dependence on forest was gradually built

3.2.1. Some key local historical facts

Origin of the first inhabitants of the valley (the "natives")

Testimonies converge: Muhavula, "the king" ("o rei"), would be the first man to have settled, with his brother, in the valley between Mount Ribáuè and M'Pàluwé (on the current territory of Mithupa) during the colonial era.

These new inhabitants were farmers and hunter-gatherers. They demarcated large land reserves (primary forest). They built their homes, planted trees (including cashew trees still present in the landscape) and opened their *machambas*² on the fertile banks of the rivers Mithupa and Namicomera. The main crops grown were cassava, sorghum, cowpea and peanuts, which were used for self-consumption. Cash crops were also grown on a more or less large scale, such as cotton and then tobacco (cultures imposed by the Portuguese). To secure a heritage to their descendants they accumulated and secured (even today) much larger land than they needed for their own activity. At that time no one was growing in the forest.

The civil war

During the civil war, the inhabitants of the valley gathered in the community village ("aldeia comunitaria") of Saua-Saua (probably between 1982/1983 and 1993). This village, like many others established in the country at that time, was used by the ruling politic party as a tool to both protect and control population. Although displaced, the "villagers" kept their *machambas* in Mithupa (where they continued to work during the day) with their houses, most of their personal belongings and their trees.

The inhabitants of the town of Ribáuè (Muhiliale's, Quithele's and Tanyea's "bairros" included), meanwhile, stayed in town during the war. Very exposed, they used to flee towards Mithupa in the event of attacks. These "refugees" used to stay a few days in the valley, hidden by the mountains, living by hunting and gathering.

The arrival of families from Ribáuè after the war (the "refugees")

Hiding in the mountains during the civil war enabled many families from Ribáuè to discover this area (except for Combo's workers, see below) which constituted an unsuspected land reserve, crossed by many rivers and, very favorable to agriculture. At the end of the fighting, many young city dwellers ventured again into the valley to practice agriculture.

However, as seen above, the land in the valley was not free of ownership. The coveted forests were already reserved by "native" families. Concretely, to access land, new arrivals:

- Borrowed (overwhelmingly) plots in Mithupa from "natives". These loans sometimes give right to purchase the land after a few years (at least land to build a house and cultivate cassava, sorghum and beans),

² In Mozambique, word used to designate a set of adjoining agricultural plots belonging to the same farmer.



- Received plots "as gifts" (against small jobs or in-kind compensation), for those who maintain privileged relationships with local families,
- Explored beyond Mithupa, above the river Namicomera (direction of Ntsapa) to find forests free of rights.

In all cases, these "foreigners" found themselves with a much smaller number of plots than the natives (notably with less access to rivers). They grew cassava, sorghum, peanuts and cowpeas on small areas (distance to the rivers prohibited them from producing vegetable crops and rice). To earn a little money, they worked in the cotton and/or tobacco fields of the natives or practiced these crops themselves on small *machambas*. But cotton and tobacco competed more and more (competition for familial labor force and available *machambas*) with food crops. That's why these productions were gradually abandoned in favor of a new crop that could ensure both subsistence and income: corn. To cultivate this new gold, families soon turned to the mountains, a reserve of fertile lands.

Among these "refugees" households, some still live in the valley today, when others have since bought and built homes in town to get closer to basic services (school, hospital, market, electricity, etc). However, they keep their *machambas* in Mithupa and in the forest.

Large cash crops historical production in the region: from cotton to tomato

During the colonial era, the Portuguese forced the locals to grow **cotton**, which they exported to supply the textile industries of Portugal during the industrial revolution. In the valley (Mithupa) all rural households was cultivating cotton, some of which cultivated on a large scale. After independence, farmers gradually abandoned the cultivation of cotton, which disappeared around the 2000s. Cotton is, indeed, very labor-intensive. Its production entered dangerously in competition with the basic food productions like cassava, sorghum, beans or groundnut. In addition, the departure of the Portuguese (main buyers) marked the beginning of a drastic fall in prices (in the 1990s cotton is purchased from the producer 3Mt / kg, ie US \$ 0.0445).

In the 1990s, when cotton production declined, **tobacco** entered the region under the impetus of a private investor from Lapala's district. In most of the cases, it seems that a "contract farming" model has been set up: the manufacturer provides the producer with all the necessary inputs on credit (reimbursement after the harvest) and buys the production in the form of dried tobacco bundles. But tobacco prices also fell, and local production declined sharply from the year 2000. Today there would be only three tobacco producers left in Mithupa.

Maize arrived later, in the 2000s, with the gradual change in eating habits after the war. Producers began to grow maize for food and for sale, especially in the mountains (see above).

Finally, for the past decade, another cash crop has been in vogue: the **tomato**. Formerly cultivated on a very small scale, all year round, only for consumption, it quickly became one of the most popular cash crops of the region, exported to the wholesale market of Waresta in Nampula. At the same time, it is also becoming a new **driver of deforestation** (see below).



Combo

At the end of the colonial era, an employee of the "correio" (post service) of Ribaué set up a corn and sunflower farm in Mithupa. It employs a lot of city labor. Combo workers are also among the foreigners who, after the war, try to settle in Mithupa to cultivate there.

3.2.2. Historical agricultural trajectories within Mount Ribáuè and M'Pàluwé region

Farmers, during this story, have not all evolved in the same way. Facing specific events or changes, farmers sometimes had to find different adaptation strategies, according to their own constraints and opportunities. The diversity of these adaptation strategies ("responses" to the same situation) is at the origin of a progressive differentiation of agricultural production systems in the region. As it is often the case in Mozambique, the continuous differentiation process has mainly been determined by:

- The origin of the farmers and, therefore, their access to land in quantity and quality (access to the banks of a river for example allowing the diversification of production and the spread of income over the year),
- The different cash crops practiced by previous generations. These crops (like tea in Gurué for example) by occupying the family labor force, conditioned the possible paths of evolution for rural families.

Figure 9 summarizes the succession of the main cash crops and the process of differentiation of agricultural production systems during the recent agrarian history of the region.

3.3. Producers do not depend on the natural resource for the same reasons

3.3.1. Current agricultural dynamics

A provisional typology to describe a diversity of agricultural strategies

- **The distant landowner**

This producer is a **descendant of native families in the area**. He now lives far from Mithupa and therefore does not cultivate his *machambas*. However, **this heritage is not for sale**, in case (potentially) a family member needs it in the future. In Mozambique, **bequeathing land to future generations** is the fulfillment of a social duty and a safety net guarantee for the future. Therefore, keeping land **is a goal in itself for the farmer**. But if the owners aren't there and don't want to sell, what happens to these *machambas*?

These lands are characterized by **old fallows** (more than 15 years) formerly **exploited and that have lost fertility**. The soil is **red, stony and very compacted by erosion**, which makes it **difficult to work** with a hoe (*enxada*). In addition, recruits from secondary forest produce only little biomass (compared to primary forest). A clearing would not allow the introduction of a sufficient quantity of biomass into the soil to ensure its **physical and chemical fertility**. As a consequence, **these machambas are in reality little coveted by local farmers**.

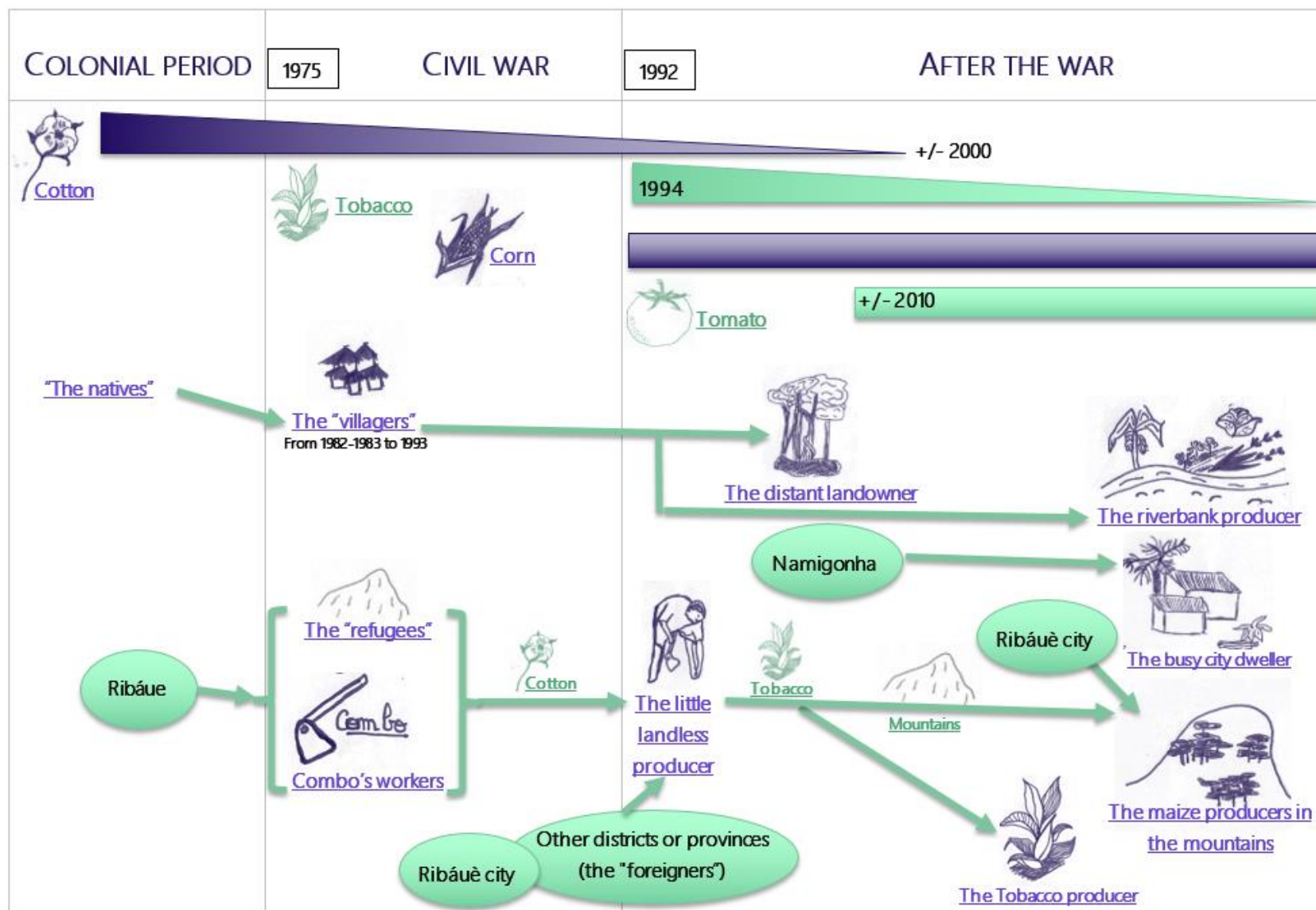


Figure 9 : Diagram summarizing the progressive differentiation of agricultural production systems during the recent agrarian history in Mithupa's valley.

However, some farmers looking for land in Mithupa (descendant of “refugees” or city dwellers from the towns of Ribáuè and Namigonha for example) **seek to borrow them** to cultivate the minimum amount of cassava, sorghum, maize and possibly (for the better off) peanut as the land pressure but also soil degradation is quite strong around the city.

- **The riverbanks producer**

This producer is a **descendant of native families**, and as such he inherited good quality land and **extended them over time** (more or less 4 *machambas*). In particular, he has privileged **access to the banks of rivers** where the soils are silty and fertile.

The moisture of the soil and the ease of watering make him **less dependent on rain** for his **seedlings**. This farmer is therefore **more diversified** and **his production is more dispersed throughout the year**. In addition to the traditional *machamba* of cassava, maize, sorghum and cowpea, he also has at least **a *machamba* of rice by the river** (rice is followed by an off-season maize associated with market gardening) and a *machamba* of **sugar cane** (often transformed into *catchaço*).

Thanks to his dispersed production **he does not suffer from a lean period** (two corn cycles) and **has spread out incomes**. Sometimes these productions are supplemented by the sale of fruits (bananas, lemons, oranges...) and charcoal. In Ntsapa it seems that there is a specific profile of farmers specialized in growing onions on the riverbank (to be confirmed).

With his incomes and his staggered work schedule **the producer has neither the time nor the need to go up the mountain**.



Figure 10 : Water control in the *machamba* of a "Riverbanks producer". In the photo, culture of cassava, lemon and pineapple along the canal (Margaux Béringuier).



- **The maize producers in the mountains**

These producers are often **from foreign families** who arrived between the end of the war ("the refugees") and today ("the strangers"). They are characterized by **difficulties in accessing land in the valley**. The first to arrive are the best assimilated and have often been able to buy at least a *machamba* or even land on which to build a house in Mithupa. New arrivals, on the other hand have no choice but to borrow a *machamba* (when they can).

Borrowing a plot is not enviable for a Mozambican farmer (see box below). For this reason, growers rarely own more than one *machamba* in Mithupa. Easy to access, it is reserved for **food crops** whose harvest yield match to the consumption needs along the year: cassava, sorghum, and cowpeas. It is a real "granary plot" in which the products can be conserved for several months (not possible for corn and beans in Namuli due to the humidity). However, these **soils have in general lost part of their fertility** and **the lack of a perennial river nearby limits yields**. The *machambas*, despite a high workload (because the soils are also difficult to work) does not produce enough to secure the food and the basics products (salt, oil and soap) the farmers need.

Thus, for these producers, clearing an area of forest in the mountains free is the easiest way to both **secure land for them and descendants and ensure food security by taking advantage of forest fertility and easier soils to work**.

The choice of the allocation of working time between cash crops (cotton, tobacco...) and food crops (cassava, sorghum...) has always been a dilemma for the local farmer. After the war, corn spread in the area. This crop has a double advantage. First it can be consumed in the same form as cassava (ball of flour or fresh boiled or roasted), second it attracts traders from Namigonha and Nampula.

Why is land borrowing not an enviable situation for a Mozambican farmer?

*The first reason is cultural: the land, before being a factor of production, is a bond of belonging with a country, which means that a person takes root and belongs to a place. It is also (see above) a good to bequeath to fulfill his social duty as a senior and at the same time to ensure a retirement. Second, the discomfort comes from the instability that borrowing brings. Indeed, if the owners do not generally ask for compensation (in money or in harvest) situations of jealousy are frequent. It is not uncommon, in a year when the harvest has been good, to arouse the greed of the owner who then claims his due. In addition, the loan of a *machamba* in the first campaign, followed by confiscation at the opening of the second, is a well-known technique for clearing a forest or old fallow without labor costs! In short, cultivating in a plot that is not one's own means working for the neighbor. This hinders farmers in their investments in labor and means of production (planting fruit trees for example).*

Corn likes rich, moist soils. In Ribáuè the dry season is harsher and longer than in Gurué. The mountain, its forest soils and its perennial rivers therefore provide favorable conditions for **maize to grow**. The **humus-bearing soils** are also lighter and easier to work. First field observations and interviews tend to show that *Vernonanthura polyanthes* **an invasive species** (local name: "*Nampathamalapa*") taking over the landscape, **is really appreciated by the farmers**



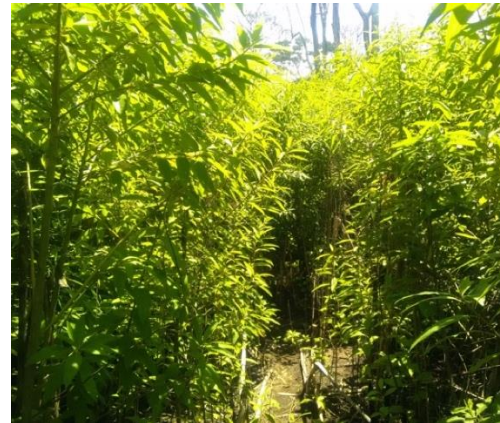
as this plant, by occupying all the space, smothers the regrowth of native shrubs and therefore facilitates the work of the work of opening fallow land. In addition, it provides an easily decomposable organic matter which fertilizes the soils (role of green manure). However, if the farmer saves time in plot preparation and weeding, he loses time at the end of the season when he has to harvest dry maize and transport it back to his home or to the city for sale. Although this study is only beginning, it already foresees the existence of several subtypes in this category of producers based on:

- The profitability of the "mountain corn" cropping system, beyond a certain threshold of intensification and production,
- Strategies to promote the work done in the mountains,
- Strategies for harvesting / selling corn.

Thus, we can observe a whole gradient of evolution between the producer who only produces maize in the mountains to meet his food needs, and the producers who are gradually specializing in growing tomatoes out of the irrigated season (see further actual evolution).



The invasion Vernonia polyanthos taking its rights on the fallows in the mountain.



Crossing a fallow plot full of Vernonia polyanthos in Massedo's area. Even if it is an ecological disaster, this plant facilitates the work of opening plots and weeding. It provides an easily perishable organic matter which moistens the soil. Producers like it!

Figure 11 : Photos of fallows in the mountains (Margaux Béringuier)

- **The tobacco producer**

This producer has been established in the region for some time. He often practiced cotton cultivation before converting to tobacco after the end of the war. He usually has **one or two large machambas** in the Mithupa's valley including access to the river. In addition to tobacco, he cultivates the minimum necessary for his food (cassava, sorghum, corn), peanuts, rice and horticultural crops (cabbage, leaves...). The producer reasons his crop rotations in order to **make the most of the fertilizer residues applied to tobacco**. The logic (arbitrage of priorities between crops) seems quite complex and more surveys of other such growers would be needed to clarify it.



If he can sell a few vegetable crops and a little corn here and there to cover the family's daily expenses (oil, soap, notebooks, etc.), **the bulk of the producer's business strategy is focused on tobacco**. However, since the product is sold to the company in April, **the producers' income is spread very little over the year**.

On the other hand, tobacco is **also a very demanding crop in terms of work** (especially during the harvest and drying time between December and April). When purchasing, the producer reimburses all of the inputs that the company has provided to him. As the price falls steadily, **the labor productivity of this cropping system is declining**. This explains why **more and more producers are abandoning cultivation to turn to corn**, which at least has the merit of being able to be eaten. The tobacco farmers who persist in the region are **generally elderly**, too old to now cushion a turning point that would involve parting with what they have always known and practiced. **It is quite possible that these farmers are, in fact, only a very small minority today**. More quantitative surveys carried out in the zone in phase two of the diagnosis would reveal this.



A tobacco machamba.



A tobacco dryer, constructed with bamboos.

Figure 12 : Photos of tobacco production in Mithupa's valley (Margaux Béringuier).

- **The busy city dweller**

Even today **there are many people looking for *machambas* in Mithupa's valley**. They are city dwellers, generally from the city of Namigonha, teachers, nurses or traders of agricultural products. To minimize their living costs, they themselves cultivate cassava, sorghum, corn, beans and peanuts in small *machambas* to cover their needs. **The production strategy is essentially geared towards self-consumption**.

This type of producer does not have a home in the valley. **The return trips to the *machamba* are therefore real expeditions!** These farmers only come to Mithupa during the periods of peak of agricultural work (December sowing, cassava harvest in August / September, groundnut harvest in March / April ...) and live for several days or even weeks in the *machamba*. Thus, on the way to Mithupa, depending on the season, many families traveling could be met. Some, loaded with pots and pans, go to the *machamba*, others, loaded with bags of groundnuts or corn, leave to return to the city. The trip from Ribáuè to Namigonha is done by local taxi (*chapa*) at a cost of 50Mt per passenger.

The long trip to the *machamba* results in that these producers are not likely to seek to venture into the mountains. **They are therefore content to cultivate in the valley**.



A dynamic typology in constant evolution

If agrarian history of the region has conditioned the evolution of a limited number of “archetypes” of farmers, the physical, economic and social environment in which these producers operate is still continuously changing. For this reason, it would be absurd to consider these “archetypes” of farmers as “frozen” entities. Far from it, **these producers continue to evolve to adapt themselves to their changing environment.** Figure 13 summarizes the dynamics of evolution of local agricultural production strategies by emphasizing the processes that explain the transition from one strategy to another.

A valley producer who has land tenure problems has no choice but to turn to the mountains. He then begins to **produce corn there for his self-consumption**. The corn, after drying, is conserved on the plot and harvested as needed. **The producer thus adapts his working time to his needs.**

Over time, the farmer **intensifies what already exists: the maize production system.** He manages to enlarge his *machamba* and therefore produces more. Surplus of production is sold on the market (Ribáuè city). **First, the producer transports the corn to town himself** on his head. But beyond a certain production level, he no longer manages to transport everything on its own. Therefore, **he begins to pay workers (*ganho-ganho*)** to help him. However, the cost of this labor, compared to the price of corn is very high. The profitability of the bag of corn therefore decreases.



Figura 14 : Photo of a tomato nursery, to transplant in the mountain (Margaux Béringuier).

That’s why, at that point of his trajectory, the producer often switches to a **strategy of diversification in the mountains.** In particular, he begins to **invest in bean seeds** that he also sowed in the mountains. He also exploits more the potential of his plots at high altitude and **takes advantage of the banks of rivers to make a second cycle of corn the same year** (in minimal quantity however as the work task would be very high). From there, there is only a short step to **digging small irrigation canals to convey water over larger areas.** He then **reinvests the money earned from the sale of the bean in tomato seeds**, a crop that makes the work much more profitable. In fact, **irrigation makes it possible to sell tomatoes in December**, when each basket can then be sold for 1000Mt (against 200Mt for the *lata* of corn).

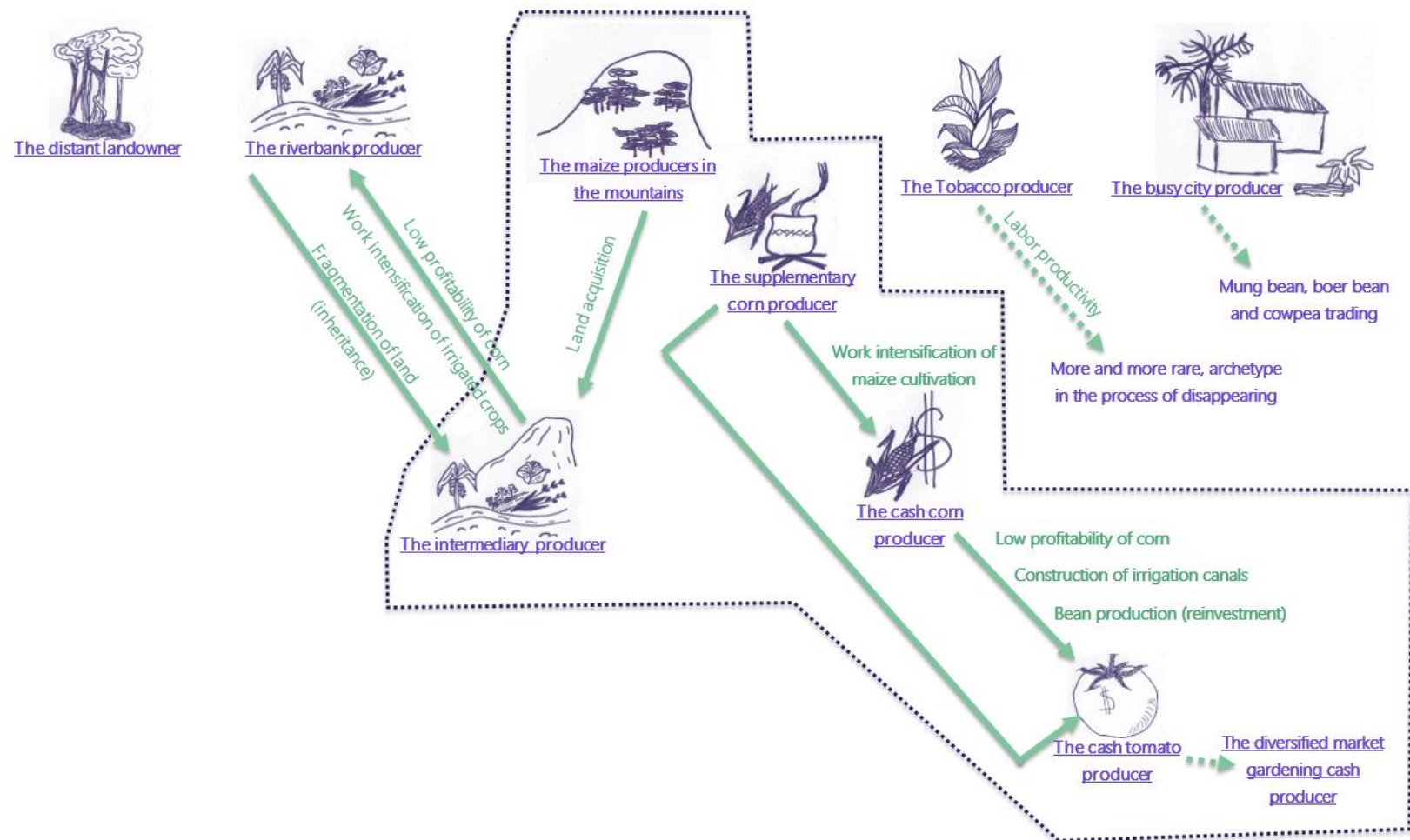









Figure 13 : Diagram summarizing the dynamics of evolution of local agricultural production strategies by emphasizing the processes that explain the transition from one strategy to another.

How are these types of producer's dependent on the natural resource?

In the context of our study, a typology of producers does not make sense if we do not try to explain **the link between each producer and the natural resource**. Considering that the "resource" is the mountain forest of Mounts Ribáuè and M'Pàluwé, with all the "sub-resources" that it contains (land, fertile soils, perennial rivers, wood reserves, game, grasses, medicinal products, mushrooms, etc.) it is therefore necessary to understand:

- Why the producers described above are dependent on this resource?
- How this dependence is self-sustaining?

If, once again, the understanding of these complex dynamics is only at the beginning, the surveys carried out so far have already made it possible to identify interesting trends (Table 5).

Type of producer		What does forest bring to him?
 <p><u>The distant landowner</u></p>		No direct benefit from forests but contribute indirectly to land pressure: through immobilization of land at the bottom of the valley
 <p><u>The riverbank producer</u></p>		<ul style="list-style-type: none"> • Construction timber (including bamboo), • Firewood, • Possibly wood for charcoal making, • Food and medicines.
 <p><u>The maize producers in the mountains</u></p>	 <p><u>The intermediary producer</u></p>  <p><u>The supplementary corn producer</u></p>  <p><u>The cash corn producer</u></p>	As above plus : <ul style="list-style-type: none"> • Humid and fertile forest soils, • Light soils, easy to work, • Reduction in working time when opening <i>machambas</i> (<i>Vernonanthura polyanthes</i>), • Production of a lot of biomass on fallow land (<i>Vernonanthura polyanthes</i>) => physical and chemical soil fertility
	 <p><u>The cash tomato producer</u></p>	As above plus : <ul style="list-style-type: none"> • Access to perennials rivers which (with irrigation canals) make it possible to produce tomatoes out of season => market opportunity.





 <p><u>The Tobacco producer</u></p>	<ul style="list-style-type: none"> • Bamboos collected in the forest to build his tobacco greenhouse for drying.
 <p><u>The busy city producer</u></p>	<p>Majority of them don't go into the mountains due to the distance. A minority however would cultivate the tomato there.</p>

Table 5 : Why are these producers dependant on forest ressources ?

4_ Next steps

As said in the introduction, this work represents an intermediate report of a first exploratory diagnostic phase. Below is a small summary of the steps to follow :

⇒ Complete the « exploratory phase » : 3 weeks

Objectives :

- Complete the understanding of the dynamics that influence local agricultural trajectories,
- Explore other regions (see Table 2)
- Develop a pre-typology of local producers
- Make a sampling plan for phase two of the diagnosis

⇒ Data processing and reporting of the "exploratory phase" : 1 week

Objectives :

- Present the synthesis of the dynamics including a pre-typology
- Identify unresolved questions
- Present the sampling plan for phase two of the diagnosis

⇒ Second phase with extra- interviewers for quantitative surveys : 1 month

Objectives :

- Establish a typology of producer
- Characterize each type of producer (in particular by collecting quantitative data) to arrive at a detailed understanding of the dynamics

⇒ Data processing and reporting : 2 weeks

Objectives :

- Format the results of the research,
- Present the typology of producer and its link with the dynamics of deforestation,
- Propose agricultural support measures for project support



5_References

Darbyshire, I., Timberlake, J., Osborne, J., Rokni, S., Matimele, H., Langa, C., Datizua, C., de Sousa, C., Alves, T., Massingue, A., Hadj-Hammou, J., Dhanda, S., Shah, T., & Wursten, B., 2019. The endemic plants of Mozambique: diversity and conservation status. *PhytoKeys*, 136, 45–96. <https://doi.org/10.3897/phytokeys.136.39020>

Kew Botanical Garden, 2018. Draft TIPPA's Data Sheet. Ribaue massif.

Ministério da Administração Estatal. 2014. *PERFIL DO DISTRITO DE RIBAUE PROVÍNCIA DE NAMPULA*.

Montfort, Frederique. 2019. *Identification and description of landscape elements of the Ribaue Mountains (Mount Ribaue and Mount M'paluwe)*. Nitidae.

Montfort, Frederique. 2020. *Historical and future deforestation analysis of Ribaue Mountains (Mount Ribaue and Mount M'paluwe)*. Nitidae.

Montfort, Frederique. 2019. *Land Use and Land Cover Map of Ribaue Mountains (Mount Ribaue and Mount M'paluwe)*. Nitidae.

6_Annex

Ficha de inquérito Ribawé A

Data:

Observações gerais (circunstancias do inquérito):

SEÇÃO A : Introdução, apresentação e consentido

Bom dia e obrigada por aceitar conversar comigo. Me chamo Margaux, sou francesa e trabalho para uma organização que se chama Nitidae. No meu trabalho tento de encontrar produtores de Riabawé/Mecuassee para conversar com eles e entender como eles trabalham : o que eles fazem nas machambas deles ? Como eles trabalham? E porquê (para comer? Para vender?) ?

Queria fazer algumas perguntas sobre as suas machambas, as plantas que capina(m) e os animais que cria(m). Acho que vamos precisar mais ou menos de uma hora. Todas as informações que você(s) vai/vão me dar vão ficar confidenciais e não estarão difundidas. Pode então ficar a vontade e falar livremente. Não é também uma obrigação de responder à todas as minhas perguntas e, se quiser, a gente pode interromper o inquérito a qualquer momento.

Está pronto para trabalhar comigo ?

Como você se chama?	
Quantos anos tem?	
Nome do bairro + posto adm:	
Ponto GPS da casa:	INQ_

SEÇÃO B: “Trajetória de exploração”

O senhor nasceu aonde? Quando e porque mudou para qua?



SEÇÃO C: Machambas

GRUPO1

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):

GRUPO3

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):

GRUPO2

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):

GRUPO4

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):



SEÇÃO C: Machambas

SEÇÃO C: Machambas

GRUPO5

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):

GRUPO2

Localização geográfica + no ecossistema:

GRUPO6

Localização geográfica + no ecossistema:

Como conseguiu a machamba?

Uso atual:

Associação de cultura:

Rotação (incluindo pousio):

SEÇÃO D : Produções do agregado agrícola

Agora queria fazer algumas perguntas sobre as plantas que cultiva(m) nas sua(s) machamba(s) e os animais que cria(m).

D.1. Culturas alimentares

Quais são, para você, os produtos da machamba mais importantes para alimentar seus filhos?

Ordem	Cultura	Data sem.	Data colh.	Período cons.	Quant.

D.2. Culturas de renda

Quais são as culturas que ajudam mais em casa para comprar seu sal, sabão...?

Ordem	Culturas	Formas	Período Vendas	Quantidades vendidas	Compradores	Preços



D.3. Outras produções agrícolas??

.....

.....

.....

.....

D.4. Criação de animais

Você(s) cria(m) animais? Quais? Quantos? Você(s) costuma(m) vender? Quantos? Para quem? Qual mês(es)? A qual preço? (ou: Qual seria o preço deste animal se o vendesse hoje?).

Espécies	Nº de animais criados/ano	Nº de animais vendidos/ano	Comprador(s) ?	Período de venda	Preço unitário

SEÇÃO E : Mão de obra e material

Quem trabalha nas machambas?	<input type="checkbox"/> Papai, <input type="checkbox"/> Mamãe, <input type="checkbox"/> filhos grandes, <input type="checkbox"/> filhos pequenos, <input type="checkbox"/> Ganho-Ganho
Que trabalho faz o GG? Que mês?	
Como é pago?	<input type="checkbox"/> Dinheiro, <input type="checkbox"/> Produto:.....
Material+ insumos usados (sementes, fertilizantes...)	

SECTION F : Outras fontes de renda familiar

Nos falamos das suas produções agrícolas. Agora queria saber se o seu agregado familiar tem outras fontes de renda...

Membro(s) da família	Serviço(s)	Quando se trabalha?	Onde se trabalha?	Renda (Mt)

SECTION G : Dinâmicas de intrusão na floresta

Para o que? (machamba, lenha, madeira, cogumelos, mel, Medicamento...)

Desde quando? Por que não antes?

+ VALUE floresta