Government partners

NGO Partners

Report Ref: WWT_2025_01

Socio-economic Baseline report (Lake Tseny)

Sarah Mandaharisoa, Joyeux Vohozanaka and Thierry Rabenandro

WWT Madagascar

April 2025

Funding Partners:

GLOBAL CENTRE ON BIODIVERSITY FOR CLIMATE

Global EbA Fund

Summary

This report provides an overview of the situation of the local community living in five villages around Lake Tseny under different indicators and according to their perceptions at the start of the "Following the Water" project. It reached 299 randomly selected households for a structured survey conducted by a senior household representative. The study thus includes socio-demographic aspects , natural resource management, as well as the community's livelihoods.

The population's dependence on natural resources is observed following the processing of data collected from households, particularly for fishing and logging. Also, livelihoods are seasonal and dependent on various climatic and social shocks for which households do not yet have effective strategies. A significant need for awareness-raising was noted to strengthen biodiversity conservation activities. This study provided a better understanding of needs and priorities and thus contextualized the approaches to be implemented locally. Thus, the activities would combine biodiversity conservation and the well-being of the population.

Funding

This report and the surveys were made possible thanks to funding from the Global Centre on Biodiversity for Climate .

About the authors

Sarah Mandaharisoa, Senior Research Officer of the socio-economic component of WWT in Madagascar; Joyeux Vohozanaka, Coordinator of the Tseny site and Thierry Rabenandro, Coordinator of the “Following The Water” project

Author contact(s)

Sarah.Mandaharisoa@wwt.org.uk , Joyeux.Vohozanaka@wwt.org.uk , Thierry.Rabenandro@wwt.org.uk

Suggested quote

WWT (2025). Socio-economic Baseline report (Lake Tseny). Wildfowl & Wetlands Trust (WWT), Antananarivo

Cover photo

An investigator conducting an interview in the village during the pre-test in Port-Bergé, © WWT (2025)

Denial

This report is partly funded by the UK Government. However, the views expressed do not necessarily reflect UK Government policy. The contents of this document, as well as any errors that may appear, are the sole responsibility of the Wildfowl & Wetlands Trust.

Errata

Every effort has been made to ensure the accuracy of the facts in this report. Any remaining errors are the responsibility of WWT. To notify us of an error, please contact us at the email address provided above.

i. Table of Contents

ii. List of figures

iii. List of tables

iv. Thanks

WWT MDG would like to thank the team of various state partners, including mainly the officials of the commune of Tsaratanana for giving permission to conduct the surveys at the target fokontany level, as well as the fokontany chiefs of Tsaratanana, Zafindrazaka , Ankazobe and Anjiajia who helped introduce the team of surveyors into the field and thus facilitated the implementation of the study.

Our sincere gratitude to our partner Madagasikara Voakajy for their involvement in the discussions for the implementation of the Baseline survey in the commune of Tsaratanana.

WWT also wishes to express its infinite thanks, its satisfaction in carrying out this study and its deep gratitude to all its funders.

v. List of abbreviations

AGR	Income Generating Activity
CCVA	Climate Change Vulnerability Assessment
FAO	Food and Agriculture Organization of the United Nations
FTW	Following The Water
HFIAS	Household Food Insecurity Access Scale
MGA	Malagasy Ariary
NBS	Nature-Based Solutions
NGO	Non-governmental organization
PAG	Development and Management Plan
TBE	Environmental Dashboard
TGRN	Natural Resource Management Transfer
VOI	Vondron'Olona Ifotony or Basic Local Community
WW	Wildfowl and Wetlands Trust

1. Introduction

1.1 Background

Wetlands are vital to humanity due to the ecosystem services they provide. Indeed, countless benefits are derived from wetlands, from food supply to shelter for various fauna and flora species. However, several recent studies show that this environment is highly threatened and the services provided are tending to decline (Mitchell, 2013). For Madagascar, the strong anthropogenic pressure on wetlands further weakens the ecosystem, thus confronting biodiversity conservation efforts with an increasingly vulnerable human barrier (CCVA Report Tseny, 2023).

Thus, it is deemed necessary to always consider wetland conservation with a holistic approach in which the livelihoods of the local community and the conservation of biodiversity are interdependent. Conservation activities carried out with and near the local community must therefore always take into account real local situations. Understanding the local situation is therefore essential because it would allow for optimizing the impacts of activities in general.

This study aims to gather information on several aspects of the current situation around Lake Tseny, where WWT Madagascar is operating, in order to maximize impacts and anticipate adjustments to be made. Aspects considered include natural resource management, livelihoods and income sources, household resilience and food security, as well as well-being, decision-making, and empowerment.

Based on a household survey representative of the local community, the results of the evaluation of each aspect will be presented in this report followed by general contextualized recommendations.

1.2 Context

WWT Madagascar and its partners are working towards the sustainable conservation of several wetlands in the Sofia Region, including Lake Tseny. Several research projects and activities have been undertaken and implemented as part of the conservation project, primarily aimed at ensuring the proper management of natural resources while taking into account the livelihoods of the local community.

As part of the "Following the Water" (FTW) project, WWT Madagascar is conducting research on the effectiveness of nature-based solutions (NBS) in addressing wetland degradation in Madagascar. This project aims to identify and understand the drivers of wetland degradation in order to provide sustainable solutions adapted to local contexts. To achieve this, a participatory and holistic approach, including biophysical, social, and economic components, will be implemented throughout the project.

Based on the literature, some nature-based solutions were selected based on their reliability and effectiveness in reducing soil erosion for this first year of project implementation. Local communities will mainly contribute to the implementation and evaluation of the pre-selected NBS. It is necessary to assess the impacts of the strategies promoted within the framework of FTW (NBS, good agricultural practices, etc.) because, on the one hand, NBS are intended to be integrated into household farming, and on the other hand, the community depends mainly on natural resources in its daily activities. Faced with these contexts, whether positive or negative, certain impacts require in-depth understanding.

In addition, for the complementarity of information, a monitoring of the Darwin project will be carried out in parallel within the framework of this Baseline survey, focusing mainly on fishing activities, the activity of the VOI (Local Baseline Community) and changes in habitats (lake and floating vegetation).

To monitor biophysical and socio-economic changes at the site level, a baseline situation must be documented at the beginning of the project. Thus, a baseline study was conducted among the community living around Lake Tseny before the implementation of project activities.

1.3 General objective

The objective of the Baseline survey is to collect quantitative data that will provide an understanding of the initial socio-economic situation (livelihoods, resilience and well-being) of the community living around Lake Tseny as perceived by the households surveyed.

1.4 Specific objectives

Use the data as baseline data for FTW as well as any future projects targeting the site on different aspects of conservation;

Assess the impacts of the Darwin project at the level of fishermen's cooperatives;

Identify avenues for future action for WWT to improve the socio-economic conditions of the local population.

2. Methodology

2.1 Study site and sampling

The study is taking place in the Commune of Tsaratanana, District of Port-Bergé and targets the fokontany of intervention of WWT Madagascar which are Tsaratanana, Anjiamarina , Zafindrazaka , Ankazobe, and Anjiajia . In order to achieve a minimum representativeness of 30% and taking into account the proportion of total households in each village, a theoretical minimum of 52 surveys per village was targeted during the survey (See Table 1, PAG VOI).

The Baseline survey was conducted in the form of structured individual interviews at the household level targeting the head of household for VOI members and non-members . Cluster random sampling is carried out for the selection of households at the fokontany level and sampling was done on the spot using itinerant random methods by choosing dwellings at a regular interval. In order to take into account the gender aspect, at least 40% of the respondents were women.

In total, approximately 299 people were interviewed, 58.19% of whom were women (see Table 1), including approximately 40% of female heads of households (single, separated, widowed). Table 1 summarizes the sample of these households.

Table 1: *Distribution of sampled households by village*

Village	Sampling	% of total population [1]	Women (% sampled)
Tsaratanana	159	31.8 (500 households)	54.72
Zafindrazaka	36	36 (150 households)	77.78
Anjiamarina	18		66.67
Anjiajia	32	26.67 (120 households)	40.63
Ankazobe	54	27.27 (198 households)	62.96
Total	**299**	**30.88 (968 households)**	**58.19**

[1] PAG VOI (Madagasikara Voakajy, 2022)

It should be noted that Zafindrazaka and Anjiamarina are considered a single village because they are part of a single VOI. Furthermore, the unavailability of some sampled households, particularly in Anjiajia , did not allow the investigators to obtain the minimum of 52 surveys per village.

Furthermore, the distribution of the survey at the fishermen level at the village level is represented in Table 2. The targeting and sample size of the fishermen is not defined prior to the field visit of the survey agents.

Table 2: Sampling for fishermen

Village	Number of fishermen included in the Baseline	Number of people surveyed who are members of fishing associations
Tsaratanana	66	42
Zafindrazaka	6	5
Anjiamarina	4	3
Anjiajia	10	7
Ankazobe	12	7
Total	**98**	**64**

2.2 Approach

Questionnaires were administered via Kobotoolbox during data collection. Each interview lasted between 45 and 60 minutes. On average, 6 to 7 surveys were completed per day per interviewer to ensure the quality of data collection, and 6 interviewers were recruited.

The interviewers were introduced to the local community with the support of the Fokontany Chiefs to build trust with the interviewee and avoid misunderstandings. In the case of separate hamlets requiring local guides, the latter did not attend the interview to maintain the confidentiality and sensitivity of the information shared.

Standard indicators and open-ended questions were asked during the baseline study. These standard indicators are useful for universal understanding of the local situation and interpreting the results. They were combined with open-ended questions to better capture the perceptions of the local community. Eight main themes were studied, including:

a) Access to basic services:

Questions regarding access to basic services and infrastructure were asked as binary questions (1=yes, 0=no) to each person surveyed. The number of observations for each response option was then calculated as a frequency or percentage.

b) Natural resource management:

Information on natural resource management was mainly collected using the "Likert" scale, which offers different response levels for each question asked (with 3 or 5 levels). These are generally responses of the following types: totally agree, moderately agree, neutral, partially disagree, totally disagree. The responses are totaled as a percentage and then represented in a histogram graph or in Likert representation (using the "Likert" package on R).

c) Livelihoods (agriculture, livestock, fishing)

For agriculture, the information collected is the landscape units used, the cultivated area as perceived by the person surveyed, the yield according to the local unit of measurement, and finally the conversion of this local unit of measurement into a standard yield, as well as the destination of the production.

For breeding, the different types of breeding and the number, as well as the destination of the breeding are asked directly from the people selected for the study.

For fishing, this mainly concerns information on the most caught species, their destinations and the trend in catches (decreasing or increasing).

d) Household income:

Respondents were asked to list and catalog their household income sources annually, then rank them in order of importance. The amount of household income was not calculated but estimated by the respondent in the form of an annual price range given the sensitivity of the information obtained. The types of household expenses were also inventoried.

e) Food safety:

Household Food Insecurity Access Scale (HFIAS) was used to assess household access to sufficient food and the frequency of food access problems. According to the FAO 1, this is the response of respondents to 9 questions assessing the occurrence and frequency of hunger over a 4-week recall. Responses are coded as 0 (no occurrence of hunger), 1 (experience of hunger 1 to 3 times during the 4 weeks), 2 (experience of hunger 3 to 10 times during the 4 weeks), and 3 (experience of hunger more than 10 times during the 4 weeks). The scores obtained are then added together.

The occurrence of hunger during the year (12 months) was also asked directly during the survey.

f) Resilience :

Resilience refers to the household's ability to adapt and cope with climate shocks and socio-economic events affecting the local community. Respondents were also directly asked about the effectiveness of the strategies implemented.

g) Well-being :

The level of well-being refers to the identification of household life priorities and their level of satisfaction with these life priorities. The Likert scale was also used for this assessment.

h) Empowerment:

Empowerment refers on the one hand to the empowerment and dynamism of existing groups, including the VOI, and on the other hand to decision-making at the household level, particularly for people who are not members of the VOI.

The obtained data are processed with descriptive statistics based on the means and frequencies of the observations.

[1] https://www.fantaproject.org/sites/default/files/resources/HFIAS_French_v3_2007.pdf

3. Results

3.1 Demographic characteristics of the villages

The baseline survey results reveal several crucial aspects of household characteristics. Among the respondents, 93 are VOI members and 203 are non-members .

The population is young, with a predominance of children aged 6 to 14. The households surveyed have an average size of 4.60 people. The population is composed of Tsimihety at 86.29%, Sihanaka , Betsileo, Merina, Sakalava, Antandroy and others. The majority of the population is native to the Region (57.19%), and a proportion having migrated for their livelihoods (24.41%) and marriage (18.39%). The demographic composition of the households surveyed is detailed in the following figures.

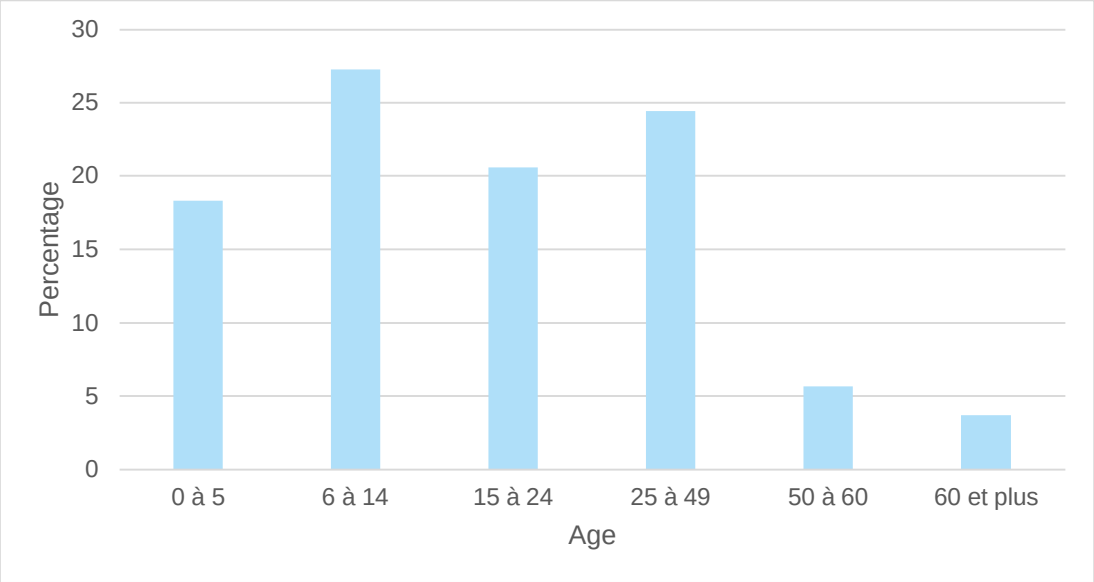

Figure 1: *Composition of the population according to age groups*

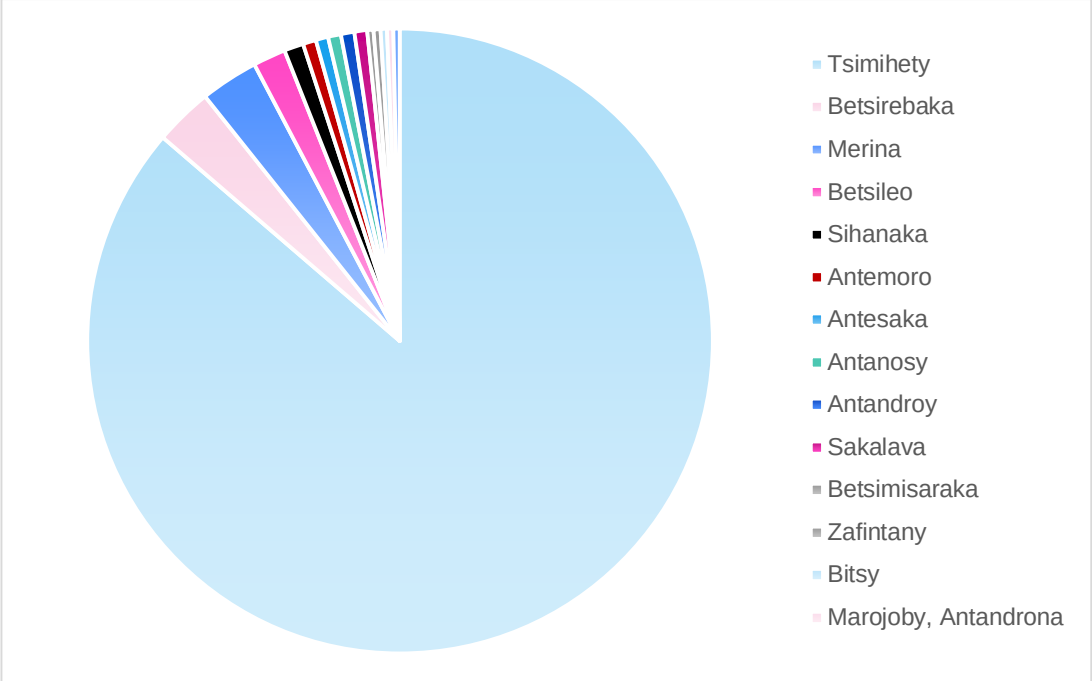

Figure 2: *Ethnic composition of the community living around Lake Tseny*

In terms of education level, in general, the local population only reaches primary level (5 years spent in school) with a higher average for men than for women. It should be noted that the majority of households have physical access to schools throughout the year. This allows us to say that the low school enrollment rate is not linked to physical access to school but rather financial or internal to the household (low motivation to continue, non-prioritization of education, etc.).

Information on household living conditions and economic resources was also identified during this study, such as year-round market access. This information provides a better understanding of factors external to households or their living conditions that may interfere with locally conducted activities, whether for biodiversity conservation or population well-being. Thus, Table 3 summarizes access to drinking water, sanitation, type of housing, and household assets. It shows that the local population experiences diarrhea and malaria at different frequencies depending on the water source used and access to basic health services, as presented in Table 3.

Table 3: *Health situation and access to infrastructure for five villages*

Features	Average result	Result by village				
		Tsaratanana	Zafindrazaka	Anjiamarina	Anjiajia	Ankazobe
Average annual frequency of diarrhea in young children	1.57	0.75	3.14	2.78	0.63	0.56
Average annual frequency of malaria	2.25	1.47	4.58	3.56	0.59	1.07
use : Coal (%)	51%	38%	2%	2%	5%	7%
use : Firewood (%)	41%	14%	10%	4%	5%	11%
Personal toilet possession (% household)	15.1%	11%	1%	0.7%	0%	2.3%
Shared toilet (% household)	26.1%	14.4%	2.7%	3.3%	1.7%	4%
use [2](% household)	45.5%	29.8%	4%	4%	1.3%	6.4%
Water source (in order of importance)	n / A	1 Public well 2 Lake 3 River 4 Private wells	1 River 2 Public wells	1 River	1 Public well	1 Private well 2 Public wells 3 River and lake
Access to health services	98.3	Yes (78.6%), less than an hour's walk	Yes (94.4%), more than an hour's walk	Yes (88.9%), more than an hour's walk	Yes (96.9%), more than an hour's walk	Yes (90.7%), less than an hour's walk

[2] Households without a toilet can use someone else's toilet

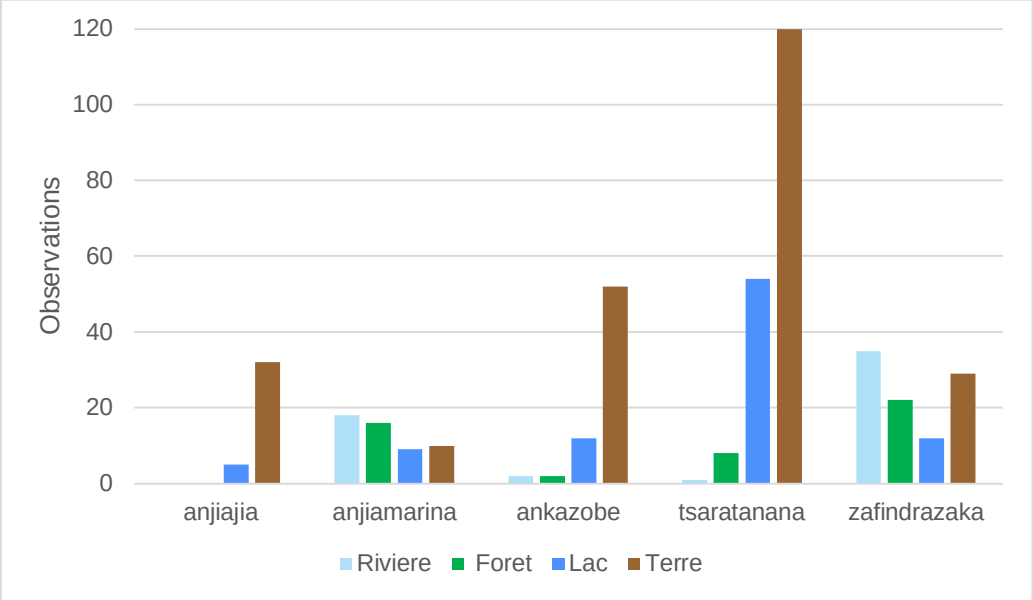

Figure 3: *Assessment of the use of each habitat*

3.2 Management of habitats and natural resources

The Commune of Tsaratanana mainly comprises 5 habitats including lakes, marshes, forest, rivers and arable land (crop land or "land"). In general, land and lake are the two main habitats used by the local community, representing 81.27% and 30.77% respectively. The segregation of habitat use at the level of each village is detailed in Figure 3.

The different levels of changes in area observed over the last 5 years, according to the study participants, are also represented below (see Figure 4). Forest cover has undergone a significant decrease according to the perception of the majority (69%). Other habitats consisting mainly of arable land have also greatly decreased according to 54% of respondents. This can be explained by the fact that the resources provided by these habitats no longer meet the expectations of the population (see the next section). Details on the representation of changes are detailed in Table 1 of Appendix 2.

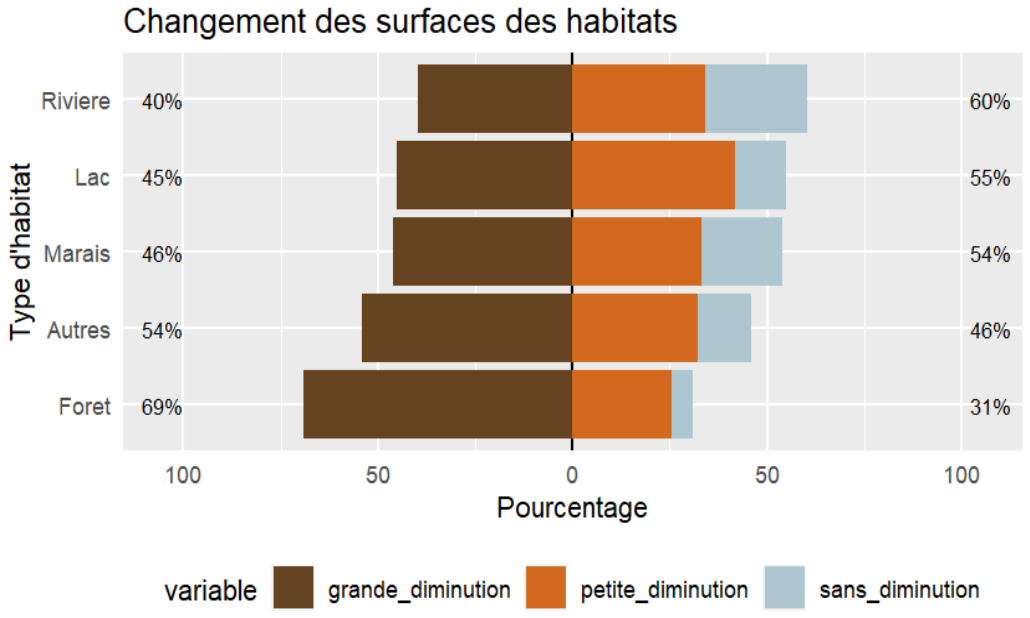

Figure 4: *Perception of habitat changes over the last 5 years*

3.3 Satisfaction with resource use

When it comes to forest resources, wood is the main resource exploited locally. However, few households are satisfied with their exploitation (11%). Some reasons for satisfaction, however, run counter to VOI regulations, such as cultivating crops in forests under the pretext that the conditions there are favorable for agriculture. Furthermore, 42% of people say that conservation activities have a positive and progressive impact on forest cover.

Furthermore, the reason for dissatisfaction is the strong anthropogenic pressure in the exploitation of the increasingly scarce woods. Fires and clearing, moreover, accentuate this loss of forest cover.

For the lake, positive changes in water quality were reported by 55.45% of households. The use of lake resources is satisfactory for 112 households, or 37.46%. Their satisfaction is linked to the significant income generated by the sale of caught fish. The permanent presence of the lake year-round and the proximity of the waters also favor this activity for some households.

Dissatisfaction, on the other hand , is mainly due to the decrease in fish in the lake. The reported causes are mainly non-compliance with the closure period and the use of non-regulatory equipment (small mesh nets). Respondents also reported the decrease in the lake water and its quality. Among households that practice fishing, 36% reported the threatening presence of molluscs that prey on fish eggs. Fishing regulations are restrictive according to 8% of the fishermen interviewed.

Figure 5 illustrates the benefits of having a clean lake as perceived by the local community. Thus, health and livelihood benefits are very important, with more than half of the respondents stating this. Positive impacts on biodiversity, cultural value, and well-being were also stated by at least 20% of respondents.

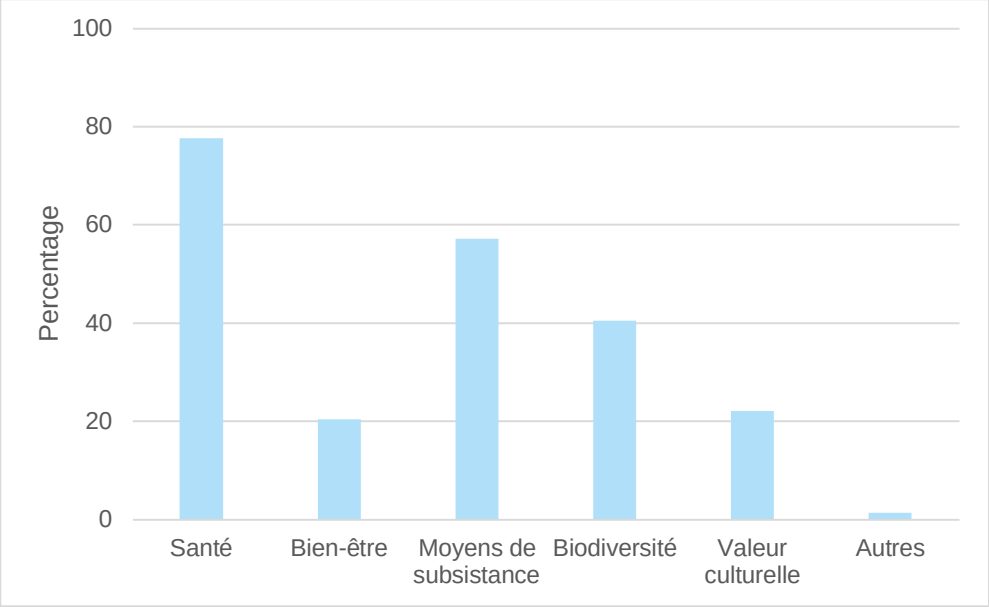

Figure 5: *Perceived benefits of lake cleanliness according to the local community*

3.4 State of floating vegetation

The surface area covered by floating vegetation has changed for both native species (phragmites and water lilies) and exotic species (water hyacinths) according to approximately 70% of those surveyed. It should be remembered that the spread of water hyacinths, an invasive species, is a sign of the disruption of lake biodiversity. More than half of those surveyed (approximately 53%) state positive impacts of activities carried out since the existence of the VOIs on reducing pressures on these lake vegetations. Indeed, threats are reduced since the presence of the VOIs. These threats can lead to an invasion of species or a reduction or even disappearance of species following overexploitation, fires and/or conversion to rice fields, etc.

Figure 6 below shows the number of people (in percentage) who rate the positive change in the coverage of floating vegetation as well as the level of threat. This is therefore not the percentage of the surface area

covered by lake vegetation species but the number of people observing a change in coverage and their assessment of the level of threat to these species.

In Figure 6, the “large change” level means an improvement in the situation resulting in an increase in the area covered (figure above showing the change in cover) and a decrease in the threat level (figure below showing the threat level of floating vegetation).

Thus, regarding the surface area covered by vegetation, more than half of the respondents (66%) state an increase in the surface area covered by native species and 57% note a reduction in the threats faced by these same species.

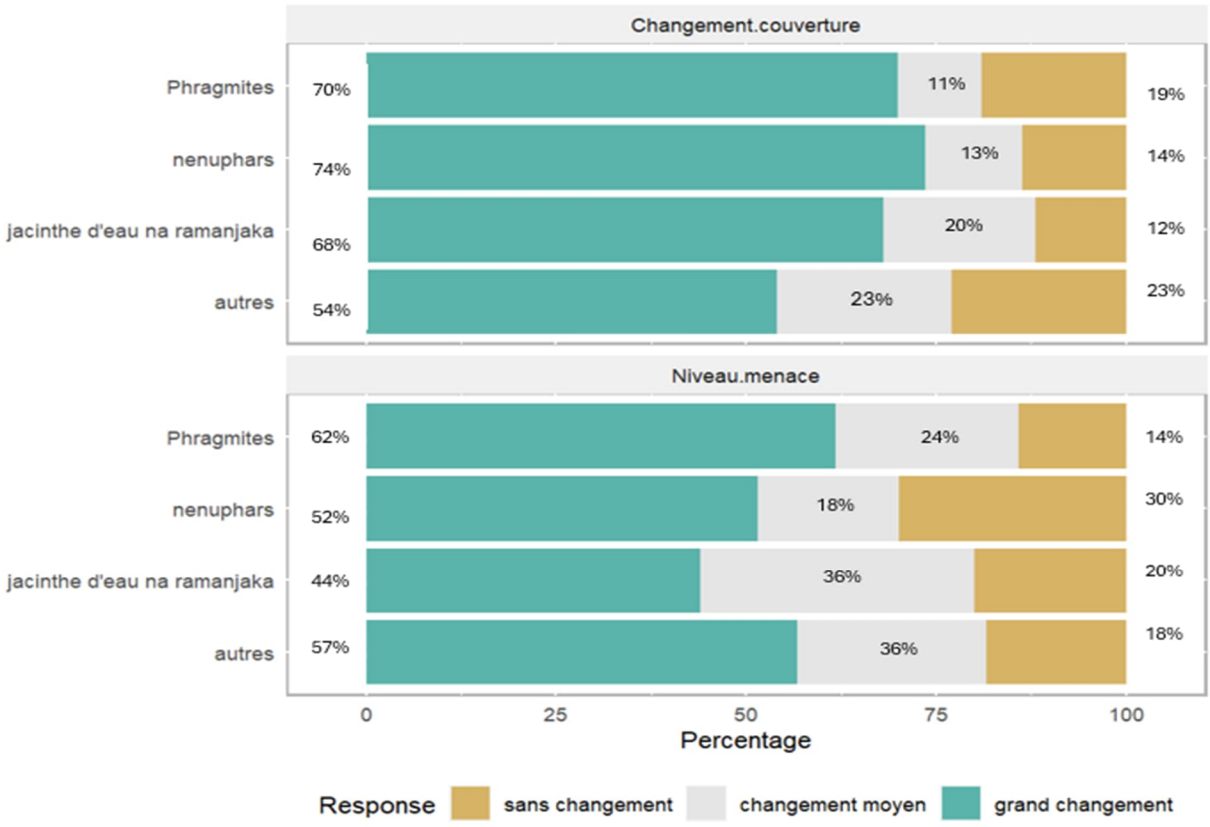

Figure 6: *Change in floating vegetation cover and threat level*

3.5 Training and awareness raising

Awareness-raising on sustainable natural resource management is still insufficient, so much so that only 11.37% of people say that a member of their household has already received training or awareness-raising on this topic. Radio broadcasts are one of the best means of dissemination at the local level according to the results obtained. These people retain, for example, awareness-raising on fishing regulations, the existence of endangered species and hard cores at the TGRN level, the damage caused by fires and clearing. For information, 74.27% of those surveyed admitted to knowing what a hard core is through awareness-raising by NGOs working locally.

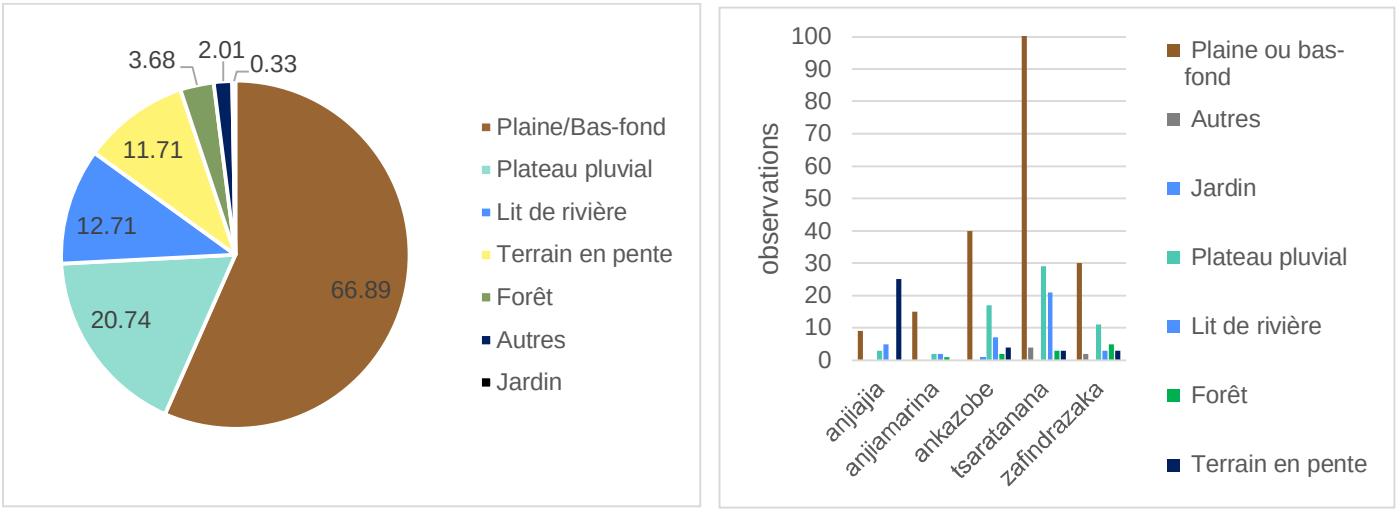

Figure 7: *Land use for agriculture in proportion (left) and by village (right)*

3.6 Livelihoods

a) Agriculture

The majority of households surveyed, 86.62%, make their living from agriculture. They cultivate mainly on rainfed lowlands with an average area of 1 ha, 4 ha and 10 ha depending on whether the households are poor, moderately poor or rich (Regional Analysis Report, Sofia Region [3]). Figure 7 shows the different landscape units used for agriculture. The majority of cultivated land is owned by households representing approximately 50.19% of the cases encountered. 26.64% rent all the land they cultivate and 22.39% are both owners and tenants (farm rent or sharecropping). It should be noted that it was difficult for those surveyed to estimate the area used. This made data exploitation difficult.

Most of the households interviewed (93.05%) had not received any training on agriculture, compared to 6.56% who had received training from NGOs working locally. Production techniques are still traditional, and the irrational use of chemical inputs, particularly insecticides, is common.

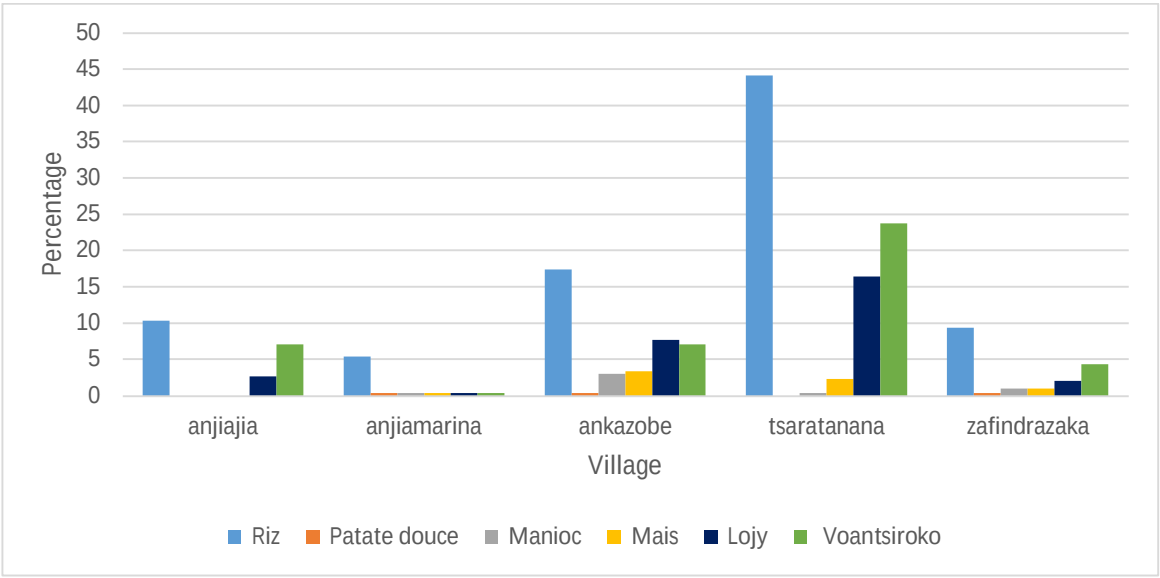

Figure 8: *Distribution of speculations by village*

[3] Poverty profiles villagers and regional study . Analysis according to the Means Approach of Sustainable Existence . https://capfida.mg/pi/www.capfida.mg/km/cosop/Rapports_regionaux/sofia.html

Table 4: Proportion of speculations and destination of productions

Speculation	Proportion (%) of respondents who cultivate it	Estimated average yield (T/ha)	Destination (% of respondents)
Rice	96.12	2	Self-consumption (83.39%)
Lojy	33.59	1.23	Sale (89.66%)
Voantsiroko	49.03	1.56	Sale (94.49%)
But	8.11	1.2	Sale (64.29%)
Cassava	5.41	5.01	Sale (80.95%)

The estimated yield as reported by the respondents, as well as the main destinations of these crops are presented in Table 4.

The yield was estimated using the locally used means of measurement (bags, kapoaka or 390 gram can of concentrated milk). Each local measurement was then converted into a standard unit of measurement of yield (kilogram per hectare then ton per hectare). The calculated average yield is generally lower than the regional average for rice, maize and cassava which is respectively 2.1 t/ha in 2013, 1.38t/ha and 15.46t/ha in 2010 (CREAM, 2014; TBE Sofia). Dry grains reach the regional average which is between 1.7 and 2.5t/ha. A large proportion of agricultural products is sold except for rice which is self-consumed up to 89% of the production.

These results are based on the estimation of the number of people surveyed per household. An approach involving direct weighing of crops and/or the development of a yield component would provide more accurate data on the yield per unit area of a given crop.

A reduction in yields over a 5- to 10-year period was noted by the households interviewed. According to the respondents, there could be several possible causes. They reported that soil characteristics have the greatest impact on yields, as do natural disasters such as floods, droughts, and sand encroachment.

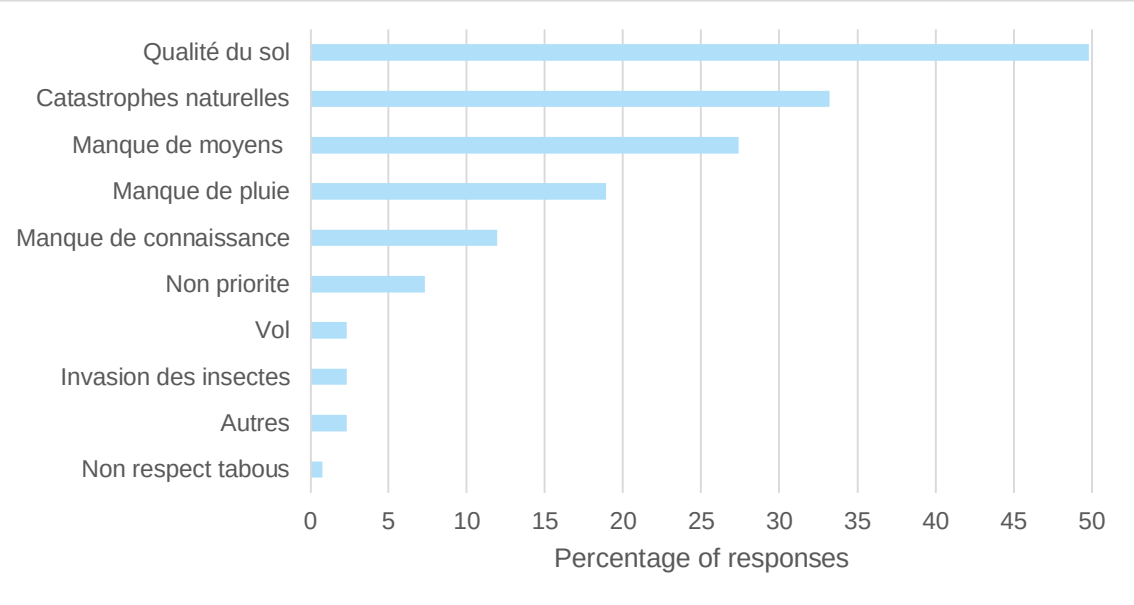

Figure 9: Causes of declining agricultural yields according to the perception of the local community

These disasters can also be one of the underlying causes of the destruction of soil structure . The histogram shown in Figure 9 below summarizes the causes of this drop in yield in order of importance according to the perception of the people surveyed.

As with yield estimation, comparing successive crop years would help confirm the causes of yield changes over time. However, information on the perceived causes of yield variation provides an understanding of producers' logic and therefore allows for the development of contextualized and tailored solutions.

b) Breeding

Livestock farming is the second most important source of livelihood for the local community, with 72.24% of households surveyed practicing it. Zebu farming is the dominant means of production (field work, transportation). Generally, small livestock are raised for sale, although livestock farming is extensive.

Table 5 summarizes the proportion of different types of livestock farming according to the number of livestock farming households but also the average size of each type.

Table 5: *Proportion of livestock activities and average herd size*

Breeding	Proportion (%) in relation to the number of breeders	Midsized
Zebu	66.67	6 (min 1, max 40)
Poultry	65.28	9 (min 1, max 60)
Pork	27.78	4 (min 1, max 30)
Goat	13.89	7 (min 4, max 12)
Sheep	2.31	5 (min 3, max 6)
Beekeeping	0.46	

By disaggregating the data by village (Figure 10), it is observed that the different types of livestock are present in Tsaratanana. Pig and sheep farming have not been recorded in Anjiajia and Anjiamarina , although these are not taboo in these villages and for the local community dominated by the Tsimihety .

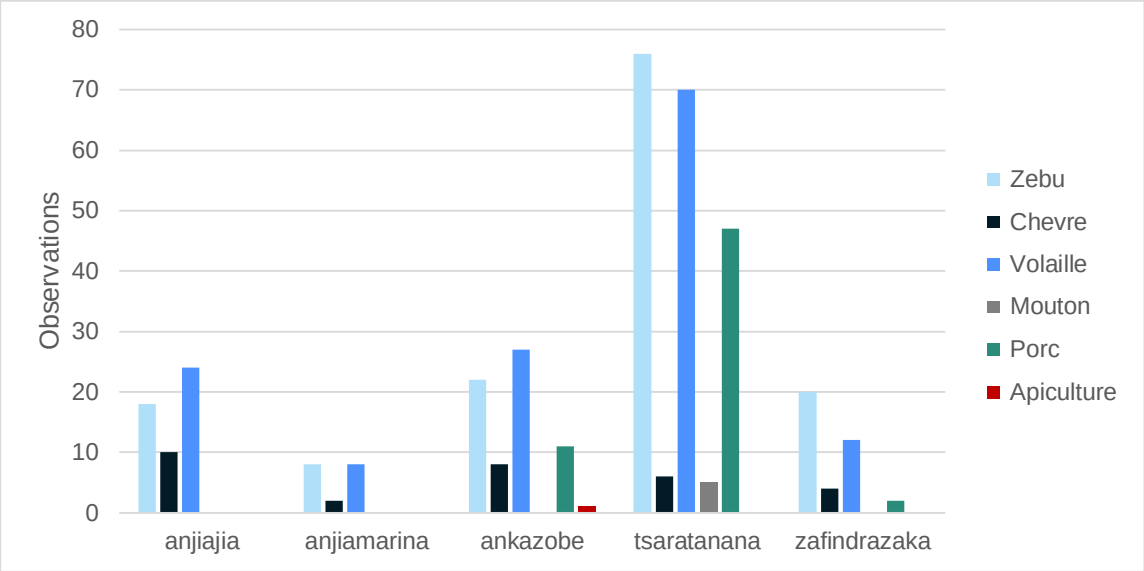

Figure 10: *Proportion of households carrying out different livestock activities by village*

c) Fishing

Of the 299 people surveyed, 98 also make a living from fishing (lakes and rivers), including 64 fishermen who belong to local fishing associations. These fishermen come mostly from Tsaratanana (66 fishermen).

In general, fishermen carry out their activity throughout the year (64.29% of fishermen). Fishing is only carried out during the dry season for 22.45% of respondents and only during the rainy season for 13.27% of respondents. These latter are households that do not live primarily from fishing but rather from agriculture.

Fishing techniques are still traditional using locally available equipment. The equipment used is summarized in Figure 11 below. Most fishermen combine two types of equipment, generally the canoe and the usual nets (small mesh). Other equipment used are traps or nets, locally called " treke " or " debadeba " depending on the shape, but also traditional harpoons. In total, 20.41% of those surveyed use nets that meet the required standards (larger mesh).

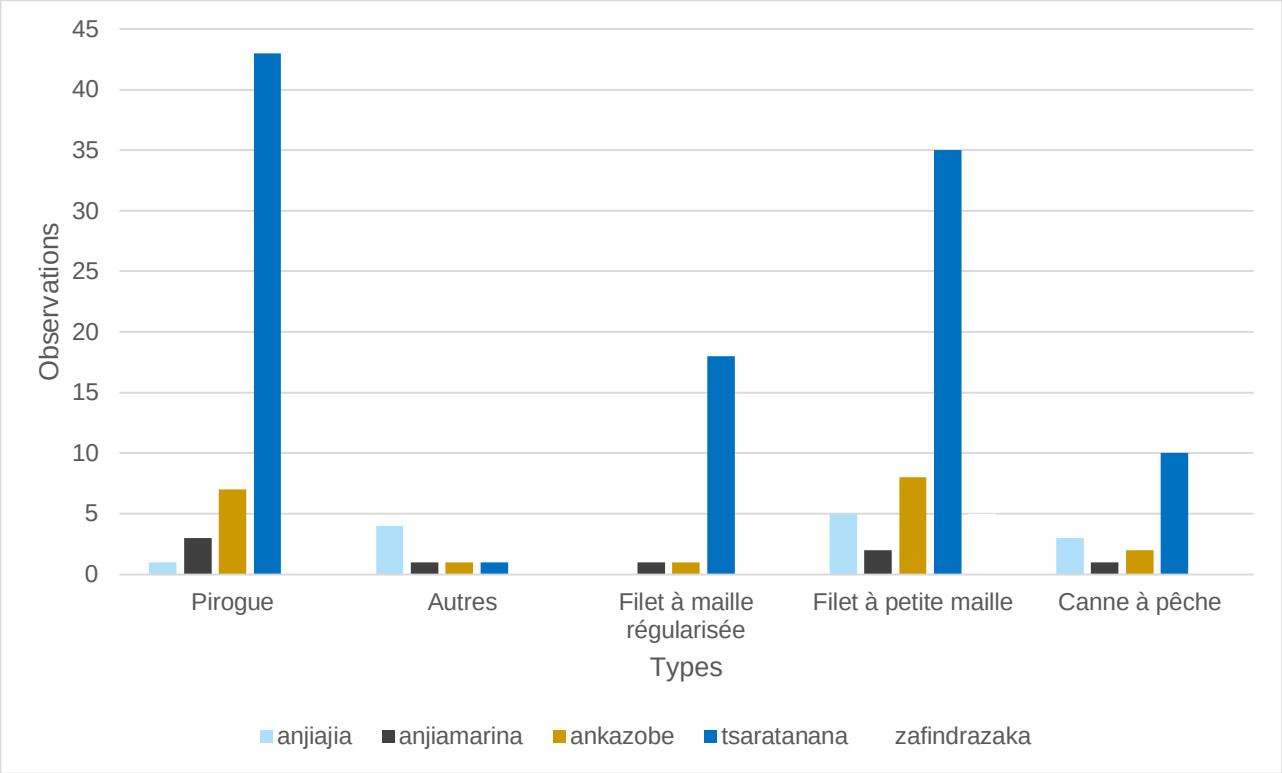

Figure 11: *Rate of use of different types of fishing equipment by village*

It is worth noting that 63.24% of respondents working in the fishing sector received training on fishing regulations. They recognized certain rules such as the release of *Paretroplus. menarambo* if this species is caught unintentionally, and the closure of fishing from December 15 to March 15.

Furthermore, the term "sustainable fishing" is recognized by only 17.35% of the fishermen interviewed. However, 50% of the fishermen surveyed expressed their willingness to adopt more sustainable techniques and follow the established regulations for fishing because they are aware of the importance of maintaining the fish population in the lake but also of the potential impacts on their livelihoods (see Figure 12).

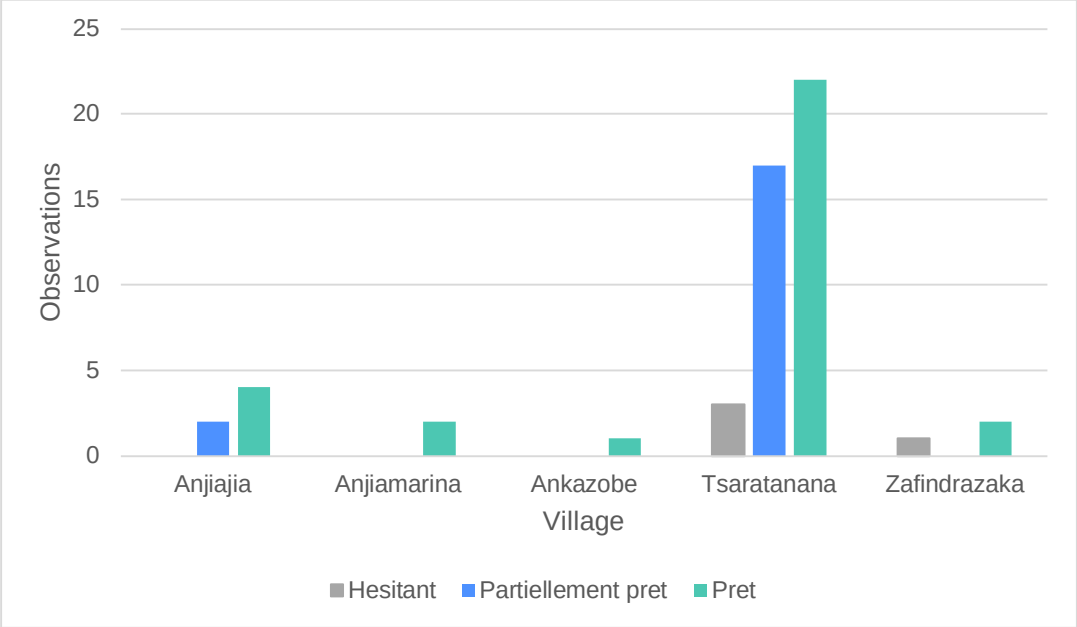

Figure 12: *Use of fishing equipment by village*

Table 6 : *Overall change in fish stocks in Lake Tseny*

	Percentage of people reporting changes in fish stocks (out of 98 fishermen surveyed)	
Changes observed during the periods	Last 5 years	Last 10 years
Decrease in fish stocks	71%	6%
Stock variation (decrease-increase)	6%	1%
Increase in fish stock	2%	1%

In addition, the respondents observed changes in the fish stock over time as presented in the following Table 6.

Currently, the most caught species are "tilapia" (*Tilapia zilii*), " Varilava " *(Sauvagela robusta)* , " fibata " (*C hanna maculata)* , and " barahoa " (*Oreochromis niloticus)* . A study conducted by Madagasikara Voakajy, among fishermen living around Lake Tseny, reports the abundance of these species in the fishermen's catches.

The majority of catches are sold at the local market. The socio-economic survey of fishermen in Lake Tseny reports that 61% of the fish collected are sold dried, 38% sold fresh, and the rest are consumed on their own (Madagasikara Voakajy, 2022). The same study states that most fishermen (67%) notice a decrease in the fish stock. Catches vary according to the seasons and species, as does the price. As an indication, a kapoaka (unit of measurement corresponding to a 350g can of condensed milk) of the Varilava species is sold between 500 and 1000 MGA, while fish (Tilapia, fibata and besisika) are sold between 2,000 and 5,000 MGA per " tady " (local unit of measurement for fish sold).

3.7 Household income source

This survey made it possible to determine the main sources of household income by directly asking for the list of household income. The main income-generating activities are agriculture with 74.58%, livestock with 30.10%, and the use of resources including fishing and the collection of raw materials used for crafts with 27.09% (see Figure 13).

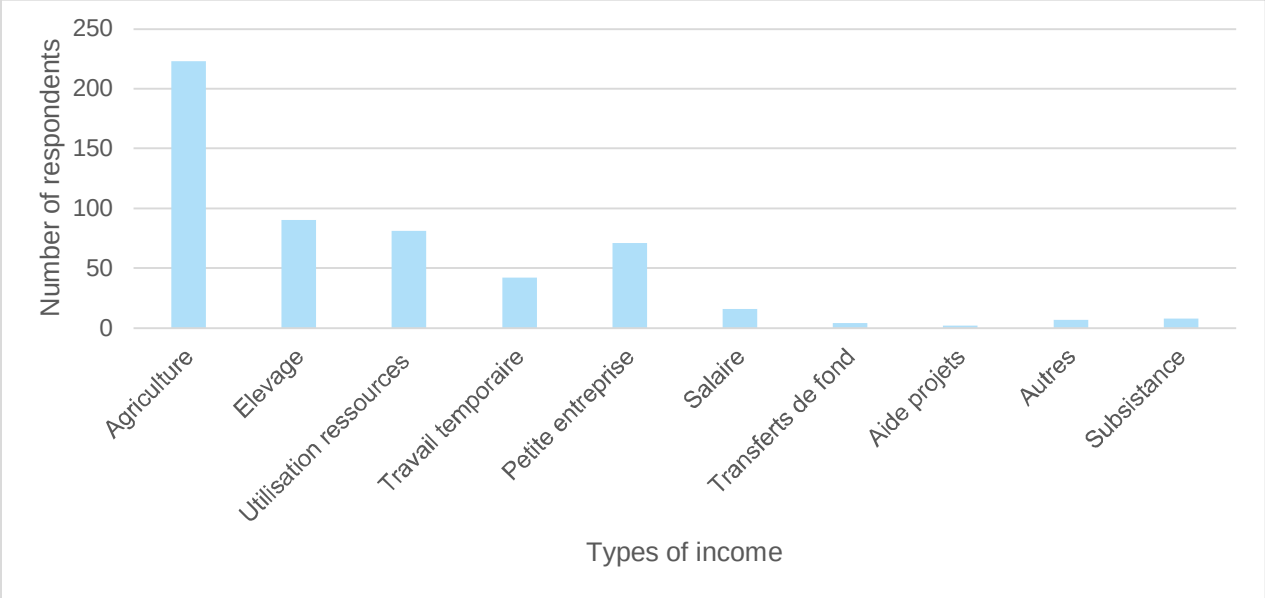

Figure 13: *Types of income of households surveyed*

Figure 14 shows that 40.47% of households have only one source of income. These households are either engaged in agriculture or the use of natural resources. For the rest, diversification varies between two or three sources of income, representing 38.13% and 3.34% of the households surveyed, respectively. Households with two sources of income are engaged in agriculture and/or livestock farming and/or the use of natural resources (fishing, basketry). Households with three sources of income generally have regular sources of income and receive assistance from projects and other family members.

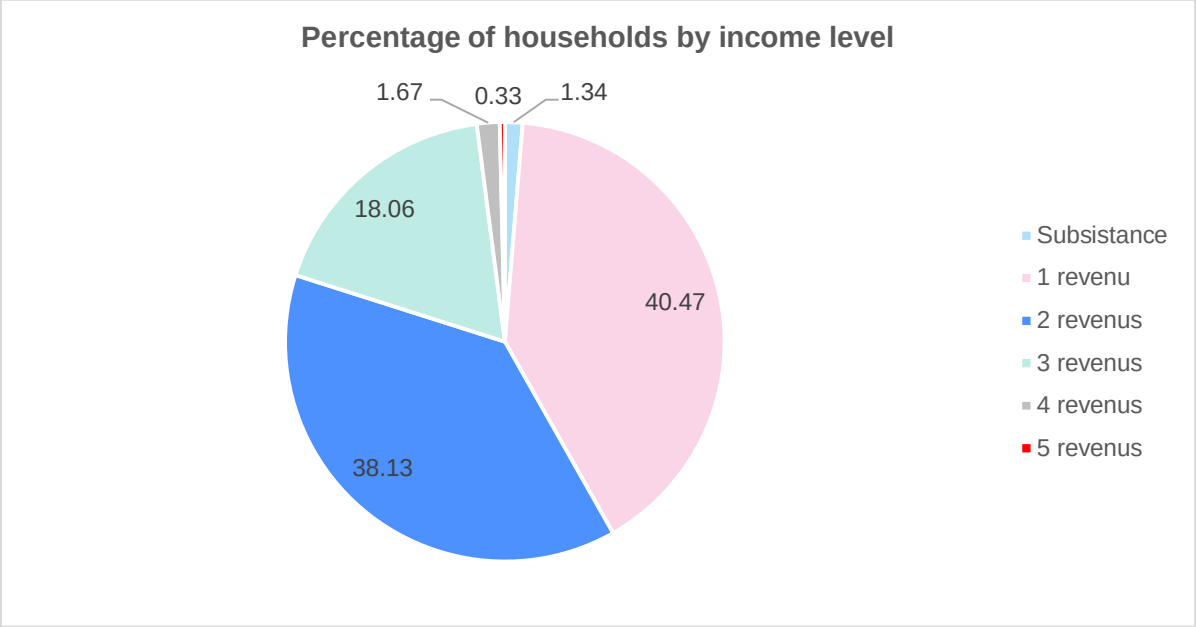

Figure 14: *Diversification of the number of incomes by households*

The average annual income earned from fishing was asked of those who fish as a means of subsistence. It was found that income from fishing is lower than that from agriculture and slightly lower than that from livestock farming. Fishing ranks third in terms of income generated for the local population in general.

The income estimation was a little sensitive hence a range of monthly income was collected and represented in Figure 15. At the end of the survey, fishermen earn between 250,000 up to 2,000,000

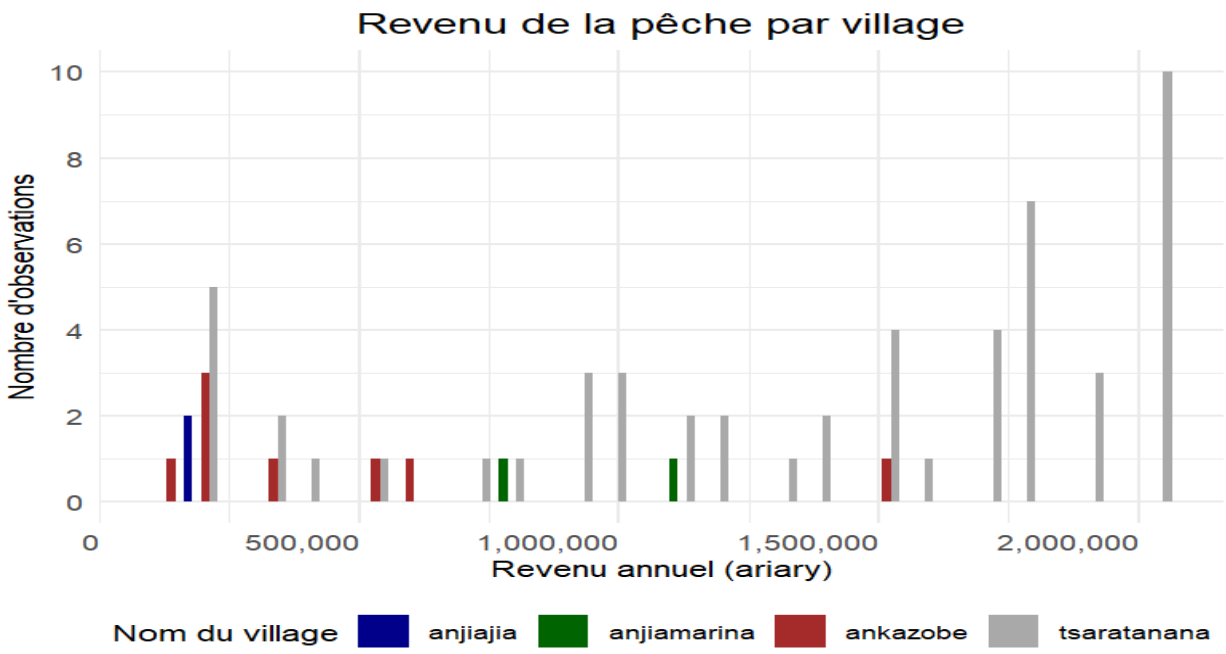

Figure 15: Annual income generated by fishing

MGA per year, depending on the season and the species sold. Indeed, the price varies from one species to another (for example: " patsa ", "tilapia", " amalona ").

The following Table 7 illustrates the fluctuation of the main sources of income throughout the year.

For the majority of households living in Tseny, food-related expenses constitute the main household expense followed by agricultural expenses with 48.49% of expenses including for example tillage and various agricultural inputs (See Table 8).

Table 7: Fluctuation of the main sources of income

	Jan	Feb	Mar	Apr	May	June	Jul	August	Seven	Oct	Nov	Dec
Agriculture												
Breeding												
Fishing												
Resource exploitation												

The intensity of the dark colors indicates the number of observations

Table 8: Prioritization of household expenditure

Types of expenses	Percentage (%)
Food	67.22
Agriculture	48.49
Education	30.10
Health	16.72
Breeding	10.03
Others	7.02
Fishing	4.68

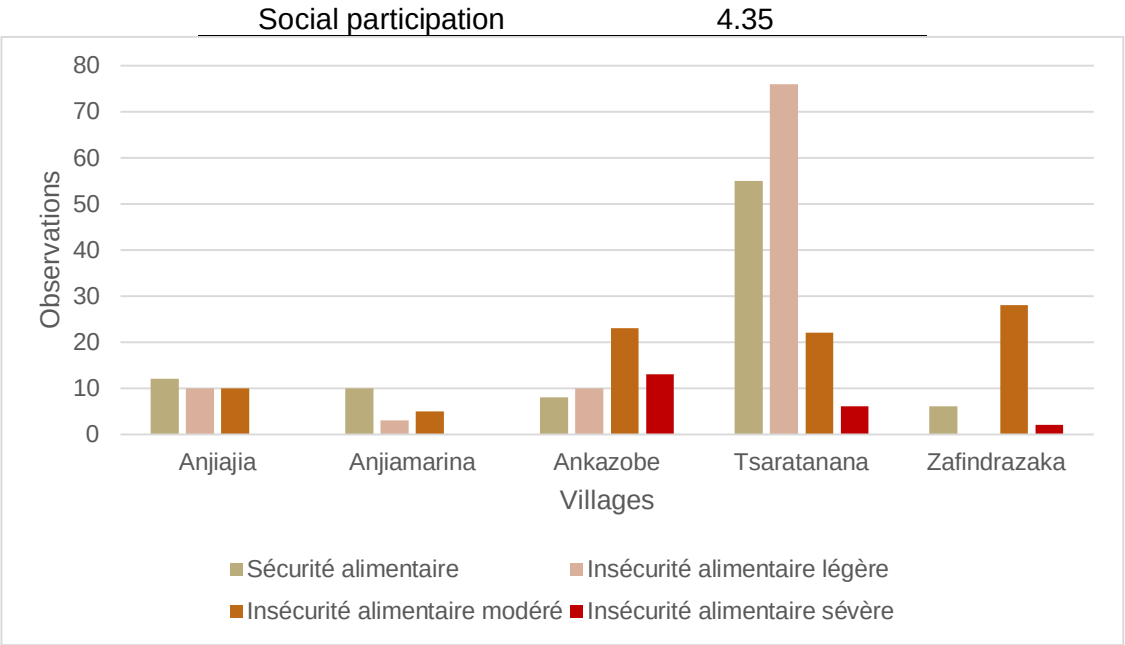

Figure 16: *Household food security status by village*

3.8 Food safety

The scores obtained with the HFIAS indicator allowed us to conclude that 30.43% of the households surveyed have optimal access to food; 33.11% are in mild food insecurity and 29.43% of households live in moderate food insecurity.

Only 7.02% of households have a severe food insecurity status (see Figure 16). Also, the figure shows that food insecurity is mainly present in the fokontany of Ankazobe; absent in the fokontany of Anjiajia and Anjiamarina . This can be explained by the problems of access and availability of food in the fokontany.

It is nevertheless necessary to mention that the recall period used in the HFIAS indicator coincides with the month of November. This month is mainly devoted to land preparation work and preparations for the following cropping season. In this case, household hunger experiences due to access and availability problems, as assessed in the HFIAS, are more frequent, especially since in rural areas agricultural commodities or the income generated by the sale of these commodities do not cover the annual needs of households.

Furthermore, the months of January, February and March are the months when the local population most frequently experiences hunger at the household level, with a peak in February according to 69.9% of those surveyed.

It should be noted that this Baseline study was conducted in December, when the experience of hunger is not very pronounced. Periods of food abundance at the household level occur from May to August.

3.9 Resilience

Resilience will address both resilience to climate shocks such as drought and flooding, as well as to socio-economic shocks such as the loss of means of production or the death of those responsible for livelihoods.

For climate shocks, community knowledge on adaptation strategies is still low as only 6.69% of households reported having been made aware of climate change, and 9.03% reported having received training on adaptations to climate shocks. Information shared on the radio and awareness-raising by NGOs are the main sources of this knowledge.

The most frequent climate shocks reported by households are presented in Figure 17 below. They show that drought is the most felt climate shock, followed by flooding. The latter often causes negative impacts such as silting up of cropland. These climate shocks have had negative impacts on the livelihoods of the local community.

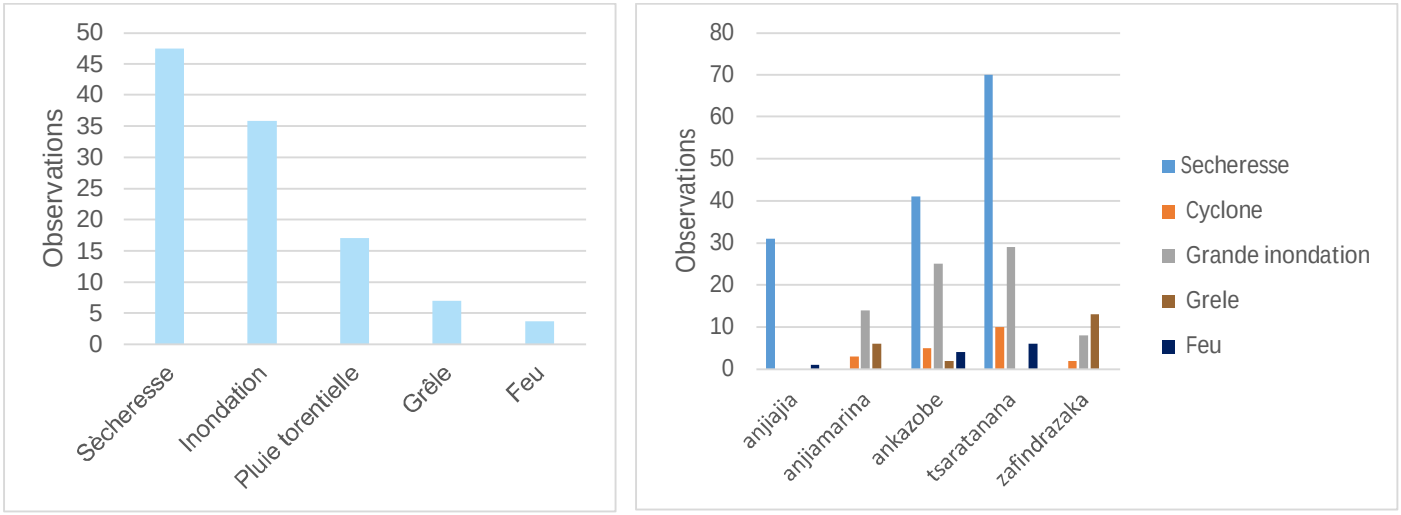

Figure 17: *Local perception of climate shocks in general and by village*

Economic losses mainly related to poor agricultural yields or reduced fish catches were the main events that impacted households with 55.18% of respondents. However, other situations such as illness and theft were also mentioned with 23.07% and 9.36% of households respectively. Other events reported concern compensation to be paid following stray livestock or other internal regulations, the renewal of fishing equipment, the closure of fishing, and separation from the spouse.

The frequency of socio-economic shocks according to the perception of the interviewees is summarized in Figure 18.

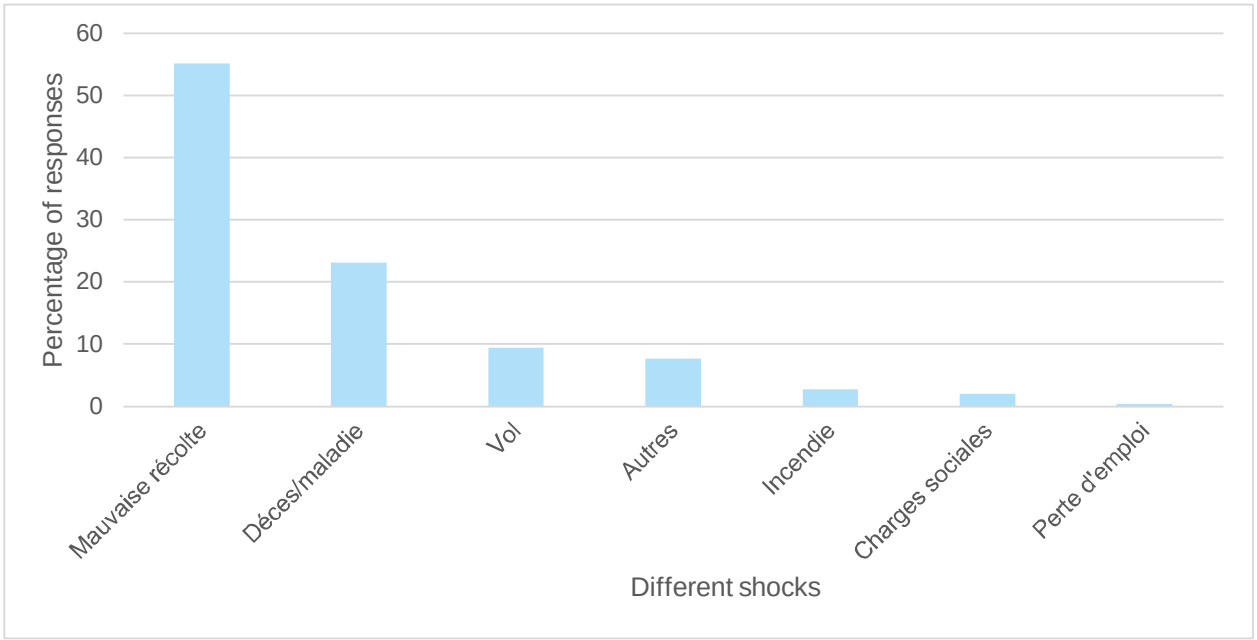

Figure 18: *Frequency of socio-economic shocks within households*

Strategies and means have been defined here following the FAO definition of a livelihood strategy (FAO, 2003), as being a range and combination of actions and choices that people make in order to achieve their survival objectives. These are short- and long-term plans established by the household to earn a living and cope with possible shocks or unforeseen events.

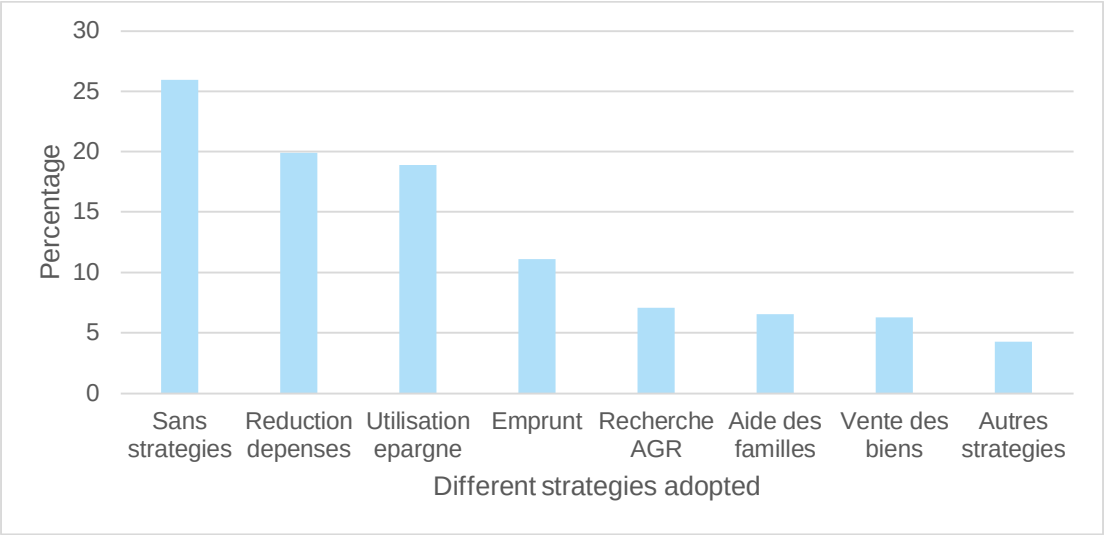

Figure 19: *Local community coping strategies to socio-economic shocks*

According to Figure 19, most households report that they lack strategies or related means to cope with socio-economic events affecting their households. This increases their vulnerability. Other households adapt by reducing their expenses or using savings when shocks are very severe. The search for other income-generating activities and borrowing are not very common within the local community.

3.10 Well-being and satisfaction level

The respondents were asked about their life priorities and their level of satisfaction with each priority.

In this regard, Figure 20 below summarizes the 5 priorities of local people. The height of each category in each bar is proportional to the number of people with the same answer. Thus, agriculture, money, and food are prioritized to the detriment of biodiversity and forests, which only appear among the priorities of 5 respondents (out of 299 people).

It should be noted that this is an enumeration of priorities and not a ranking and the details are shown in Table 2 of Annex 2.

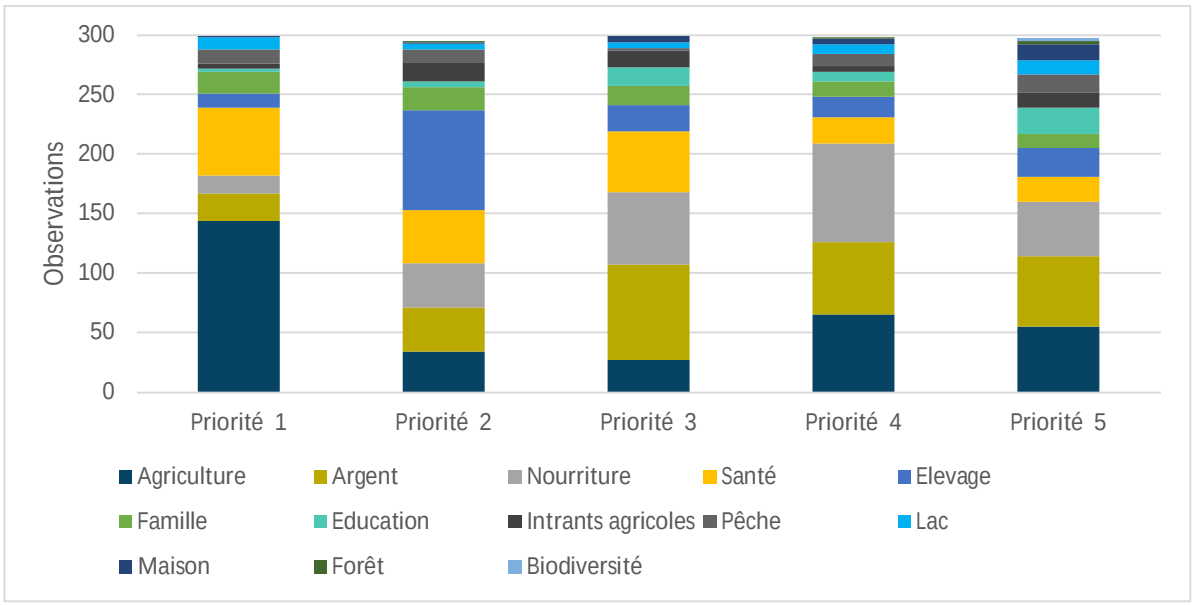

Figure 20: *Life priorities of the local community living around Lake Tseny*

The overall level of household satisfaction with each priority is summarized in Figure 21. Green colors denote satisfaction at two different levels while brown colors represent dissatisfaction at two different levels.

Thus, following a vertical reading of the figure, we can say that between 33% and 44% of the people surveyed are satisfied with their life priority (without distinction of category) against 17% to 26% who affirm dissatisfaction at different levels. The rest (in gray) are neither satisfied nor dissatisfied with their life priority.

Following a horizontal reading of the figure, we can say that priorities 1 and 2 are the most satisfactory with respectively 43% and 44% satisfaction against 21% and 17% dissatisfaction.

Figure 21: *Level of satisfaction of the local community with their life priorities*

3.11 Group Empowerment

This theme assesses the level of dynamism and decision-making at the group level, as well as their perceptions of the benefits of being a member of an association or group, particularly the VOI. This baseline study involved 93 members of local VOIs, 77 of whom are active members of their respective VOIs. It should be noted that the four existing local VOIs are mixed groups.

Figure 22 shows that, according to the respondents, they cannot really influence the decisions made in each VOI. The same is true for other non-members of the VOI. This can be explained by the fact that the operation of the VOI is generally governed by the regulations established and validated during the transfer of natural resource management. However, the positive impact of the presence of the VOI on community life was affirmed by approximately 86% of VOI members.

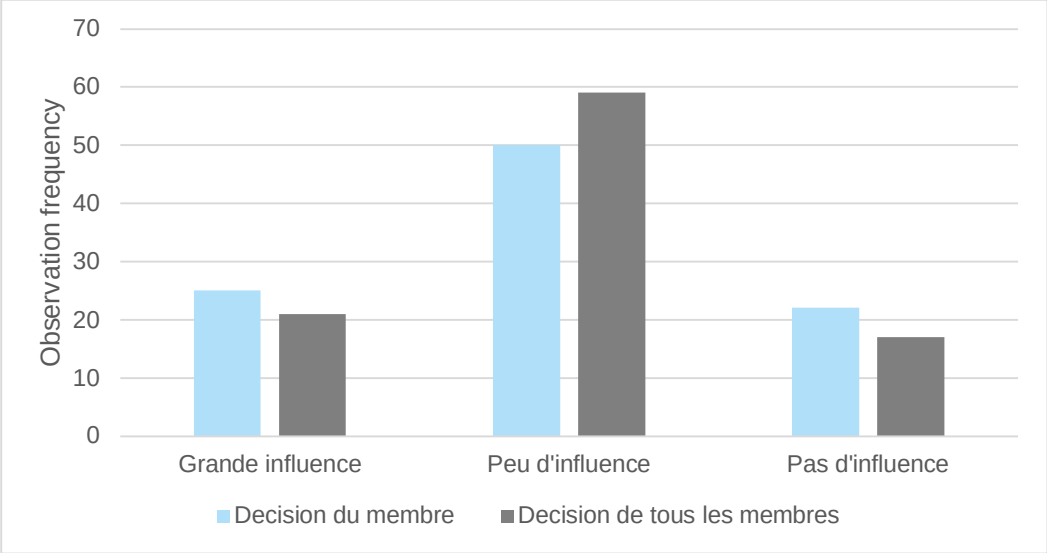

Figure 22: *Degree of influence in decision-making within VO I*

Additionally, approximately 71% of these VOIs shared that there are benefits to being a VOI member. These benefits include training; effective involvement in protecting local natural resources; and obtaining fishing nets that meet regulatory standards and reducing the amount of money paid for the exploitation of natural resources.

Furthermore, some respondents want more transparency in financial management at the VOI level as well as support for livelihoods in order to ensure the empowerment of VOIs and increased VOI membership.

In addition to the VOI, other groups exist locally, including the water users' association, the women's association, the youth association, and the association of people from different regions present locally.

The presence of fishing associations has an impact on community life, and approximately 65% of members state that all members, whether active or not, can influence decisions made within the association.

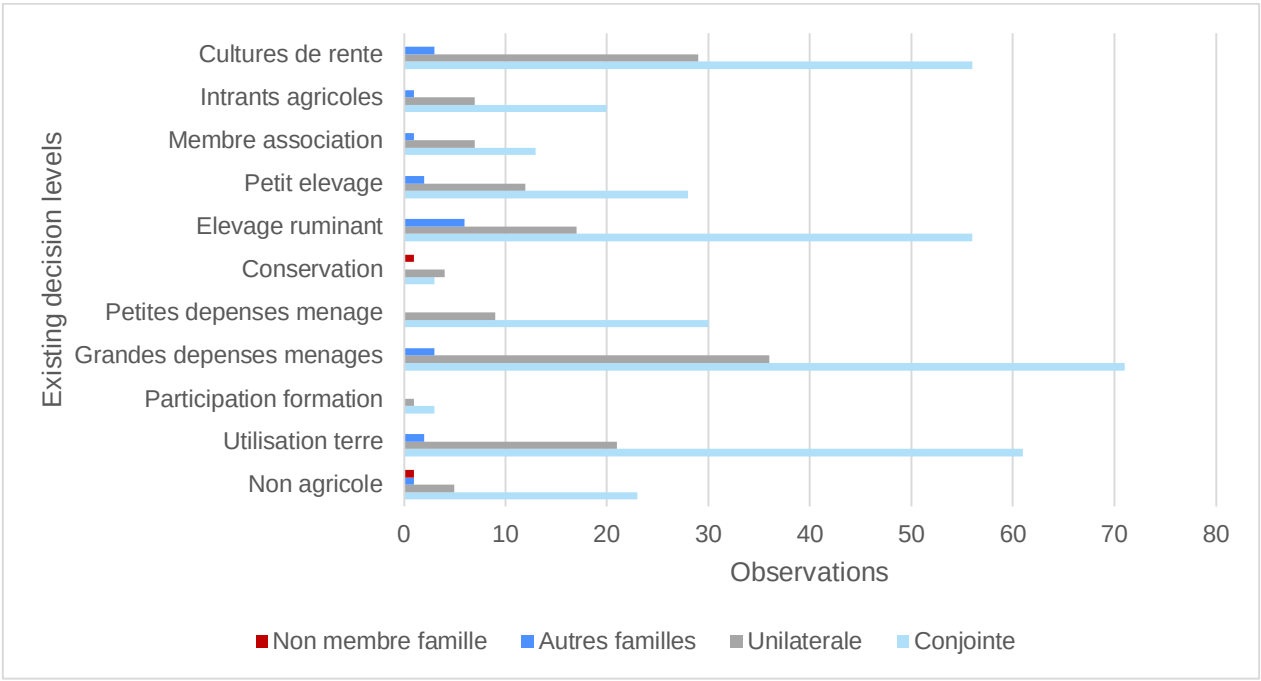

Figure 23: Decision-making at the household level

For women's groups, the people surveyed perceive that this association does not really impact daily life because it is only active for the celebration of International Women's Day (March 8).

For water and forest user associations, decisions are made by a limited number of decision-makers according to the people surveyed, but all members can put forward their ideas.

For households that are not members of the VOI, household-level decision-making was also assessed during this study. This would allow for better targeting of participants in the various activities implemented locally, thus optimizing the achievement of positive impacts. Thus, Figure 23 summarizes the level of decision-making at the household level around Lake Tseny,

Following the questions: "How do you participate in discussions before decisions are made?", "Can you make decisions on your own on certain aspects without consulting those responsible for the activities?", 69.09% and 40.85% of people respectively stated that they can contribute their ideas during discussions and that they can make decisions on their own without consulting their spouse.

3. Recommendations

Although this baseline study is limited to assessing the perception of the local community and did not undertake direct measurements, it allows us to describe and understand the initial situation in our intervention area. It allows us to identify courses of action that can lead to the effective involvement of the community in conservation actions while supporting their livelihoods and general well-being. However, quantifying the declarative statements of the people surveyed is essential to be able to measure the changes due to direct project interventions affecting the community living around Lake Tseny.

The main recommendations provided as a result of this study are summarized in the following paragraphs.

4.1 Natural resource management

The habitats present in WWT Madagascar's intervention villages are threatened by heavy exploitation of available natural resources, harming both their quantity and quality . For example, for the lake, a decrease in catches has been noted by fishermen, and a parallel deterioration in water quality. Conservation efforts must be reinforced with massive awareness-raising plans adapted to the local level. Measures taken, such as the closure of fishing, the ban on clearing and slash-and-burn cultivation in forests, must be explained to avoid confusion.

4.2 Raising awareness among the local community on biodiversity conservation

Given the low awareness at the local level, whether on wetland conservation or sustainable livelihoods, Massive and systematic awareness campaigns should be planned in advance of conservation activities. These awareness campaigns should take into account the low level of education of the local population and the dominance of young people native to the region. Participatory and playful approaches, addressing the causal effects of risks and disasters and/or the conservation of wetlands, will thus increase the consideration and involvement of the local population. Radio broadcasts are a channel for the wide dissemination of key messages on several themes.

Furthermore, in many cases, the local population does not take ownership of conservation activities and considers them as unfounded restrictions on their activities. Thus, interventions must always be established with the participation of the local community before and during implementation. Participatory assessments throughout projects are once again an effective approach to do this. This would allow for the adaptation of actions carried out on wetland conservation. In addition, coordination of actions with implementing partners as well as local authorities is also required in order to effectively target actions and combine efforts.

4.3 Sustainability of livelihoods: Resilience, sustainable techniques

Aside from awareness-raising, concrete actions will also need to be taken to ensure the sustainability of the local community's main livelihoods, namely agriculture and fishing. This involves, for example, establishing integrated pest management methods and managing crop residues for fertilization. This will lead to a reduction in risks and/or pressures on habitats and/or natural resources. In the long term, this will strengthen household resilience and improve their level of well-being.

4.4 Gender sensitivity

Consideration of marginalized and vulnerable populations, including, for example, immigrants and single women, is also a policy to be applied during activities carried out locally. However, beforehand, a social analysis is necessary in order to identify social imbalances (access to resources and benefits, role and place of individuals in society). If radically changing this imbalance is difficult or even impossible, it is however possible to empower vulnerable and marginalized populations. Small actions are feasible in this regard, such as identifying hours and workload, using resources available to all, creating gender-sensitive working groups or community discussion groups.

4.5 Limitations of the study

During the conduct of this study, the reluctance of the population of Anjiajia village restricted the sampling in the village, resulting in a decrease in the number of households surveyed. However, the efforts made by the team on site made it possible to have a sufficient number of respondents.

The study covered the census of the level of equipment of fishermen in general. Targeting members of fishing associations would have provided a more focused overview of the Darwin Project's activities.

Furthermore, it was very difficult to quantify statements such as cultivated area and harvest weight, and the proportion of species covered by lake vegetation during the survey. However, these are important and therefore require a more systematic, complementary approach that would enable comparisons after the interventions have been implemented.

4. Conclusion

This study allowed us to gain an overview of the current situation before starting our project. The information gathered helps us better understand the needs, opportunities, and challenges faced by the local population. The main results show that habitat changes have been observed by the local community, justifying all the conservation actions carried out in Tseny. Also, household dependence on natural resources is very high, indicating both the intensity of threats to these habitats and resources, as well as the vulnerability of the local community.

Based on these findings, it is necessary to consistently propose activities that properly combine conservation and support for the livelihoods of the local community. To achieve this, local consultations and assessments prior to the implementation of activities are essential to maximize conservation activities and ensure a sustainable improvement in the living conditions of the population. Subsequently, it is also necessary to regularly evaluate the impacts of activities to adjust interventions based on progress and results obtained.

In conclusion, this study has provided a solid foundation necessary to better design activities involving both livelihoods and natural resources around Lake Tseny. Close collaboration with the local community and the effective involvement of various local stakeholders will then be essential. It also provided an overview of the socio-economic situation in order to assess the evolution following the actions to be carried out within the framework of ongoing and future projects.

5. References

PAG VOI Tsaratanana, Zafindrazaka , Ankazobe and Anjiajia ,

Mitchell, S,A , The status of wetlands , threats and the predicted effect of global climate change: the situation in Sub-Saharan Africa , Aquat Sci 75, 95–112 (2013), https://doi , org/10 , 1007/s00027-012-0259-2 ,

CCVA report Tseny, 2022,

CREAM, 2013, Monograph Sofia Region, Center for research, studies and support for economic analysis in Madagascar , 232p, https://www , pseau , org/outils/ouvrages/mg_mef_monographie-region-sofia_2014 , pdf

R, M, Rocard de l'Or, Jelot F, Hernandez, Daudet Andriafidison, Raphali R, Anndriatsimanarilafy , Julie H, Razafimanahaka, Madagasikara Voakajy, Technical report of the socio-economic household survey tseny , 2022,

RABEFALY Rocard Michel de l'Or, HERNANDEZ Jelot Francinel , ANDRIATSIMANARILAFY Raphali Rodlis , RAZAFIMANAHAKA Julie Hanta, ANDRIAFIDISON Daudet, Madagasikara Voakajy, Socio-economic survey report at the level of fishermen, collectors/fishmongers of Lake Tseny, February - March 2022,

region environmental dashboard , https :// www , pnae , mg › tbe › region-sofia , html

Appendix 1: Presentation of the numerical results

Table 9*Habitat use and* ***level*** *change*

Types of habitat	Use (%)	Change of habitats		
		Non-existent	Little decrease	Great decrease
Forest	16.05	5.02	23.08	62.54
Lake	30.77	11.71	20.40	40.47
Arable land	81.27			
River	18.73	20.74	15.38	31.10
Marsh		13.38	21.74	30.10

Table 10. *Local community priority level*

	1st	2nd	3rd	4th	5th
Agricultural inputs	4	16	14	5	13
Agriculture	142	34	21	25	17
Money	18	25	50	35	39
Education	3	5	16	8	22
Family	18	19	16	13	12
Fishing	12	11	2	10	15
Food	15	37	61	83	46
Health	57	45	51	22	21
Home	1	1	5	5	13
AGR	5	12	30	26	20
Lake	10	5	5	8	12
Earth	2	0	6	40	38
Breeding	12	84	22	17	24
Forest	0	1	0	1	3
Biodiversity	0	0	0	0	2
	299	295	299	298	297

Appendix 2: Illustrative photos

Photo 1: Training of investigators in Port-Bergé

Photo 2, 3: Testing of questionnaires in the villages around Port-Bergé

The Wildfowl & Wetlands Trust (WWT) is one of the world's leading conservation organizations, dedicated to preserving wetlands for people and wildlife. Founded in 1946 by conservation pioneer Sir Peter Scott, WWT's vision is a world where wetland nature thrives and enriches life.

Our mission is to conserve, restore, and create wetlands, to preserve wetland flora and fauna, and to encourage everyone to appreciate the exceptional benefits that healthy wetlands provide to people and nature.

WWT has been present in Madagascar since 2010 and operates under an agreement with the Ministry of Foreign Affairs.

WWT Madagascar

Villa Rovamamy, Kotavy Street ,

Andohanimandroseza

Antananarivo 101, Madagascar

+261 32 62 154 16 / 34 47 192 84

enquiries@wwt.org.uk