ADVOCACY PAPER

PROMOTE AGROFORESTRY FOR SUSTAINABLE ECONOMIC, SOCIAL AND ENVIRONMENTAL DEVELOPMENT

Awareness document for climate change mitigation in Clima de Mudanças project, based on a case study conducted in the province of Zambézia (Mozambique)

ICEI Mozambique

FEBRUARY 2025

ICEI

SUMMARY

GLOSSARY

CISAF	Agroforestry Systems Research Center
CNV	National Volunteer Council Mozambique
CRI	Global Climate Risk Index
CSO	Civil Society Organization
CTV	Centro Terra Viva
DDS	Dietary diversity score
ETR	Annual Report on Ecological Threats
EU	European Union
FAO	Food and Agricolture Organization
FEWS NET	Famine Early Warning Systems Network
FHI	Family Health International
GFSI	Global Food Security Index
GHI	Global Hunger Index
ICEI	Istituto Cooperazione Economica Internazionale
IEP	Institute for Economics & Peace
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
INE	Mozambique National Institute of Statistics
LDN	Land Degradation Neutrality
MDD-W	Minimum Dietary Diversity for Women
ND-GAIN	Notre Dame Global Adaptation Index
NGO	Non-governmental Organization
RUTF	Ready-to-use therapeutic food
SAFS	Successional Agroforestry System
SDG	Sustainable Development Goal
SOFI	State of Food Security and Nutrition in the World
UNCCD	United Nations Convention to Combat Desertification
UNICEF	United Nations Children’s Fund

WB	World Bank
WFP	World Food Program
WHO	World Health Organization
WW-GVC	WeWorld-GVC

INTRODUCTION

Mozambique is one of the countries in the world most affected by climate change and biodiversity loss, which has a direct impact on agriculture, food security and the livelihoods of the rural population, especially in the provinces of Zambézia and Nampula, where more than two-thirds of the population work in agriculture.
With the increase of extreme climatic phenomena (droughts, storms, cyclones, floods...), the population is increasingly vulnerable and has few resources to resist the impact of these events, both in the socio-economic structure and, mainly, in agricultural production.

Objectives of the document

This advocacy document aims to sensitize civil society organizations and government entities for the dissemination and implementation of the model of successional agroforestry systems (SAFS) at the national level, based on the experience of ICEI (International Economic Cooperation Institute) in the implementation of systems with communities since 2016.

Throughout the document will be demonstrated the benefits (in terms of social, economic and environmental sustainability), starting from the analysis of the results of the Ethaka project, and deepened in a case study focused on the effectiveness of resilient and sustainable agricultural systems (agroforestry) in Zambézia.

It is important to note that the content and opinions contained in this advocacy document are the result of the process of analysis, interpretation and reflection on the information collected in documentary and field research, including the report on the case study activity on resilient agriculture in vulnerable coastal ecosystems (agroforestry) in Zambezia, carried out as part of the Clima de Mudanças project led by WW-GVC..

Figure 1. Beneficiary in its agroforestry fields

Document structure

This document will focus on four themes, which are closely interlinked and demonstrate the important impact and benefits of the SAFS model, namely food security, soil regeneration, climate resilience and income-generating activities.

The global situation in relation to these four themes will be briefly discussed, analyzing some indicators developed by international organizations to monitor these aspects. Followed by an analysis of the context in Mozambique and, in particular, in the province of Zambézia, focusing on the case study carried out under the activities implemented by the ETHAKA project on the agroforestry succession system model.

Finally, there are proposals for policies and practices to be implemented to extend the SAFS approach at national and regional level, and improve knowledge and practices

1. ANALYSIS OF THE GLOBAL AND MOZAMBICAN CONTEXT

This chapter will explore the situation at a global level, and in Mozambique, with regard to the four themes that will be addressed in detail in this document: food security, soil regeneration, climate resilience and income generation.

1.1 Food Security

The Global Hunger Index (GHI), adopted and developed by the International Food Policy Research Institute (IFPRI), is a statistical tool that measures hunger and malnutrition in different countries. **In 2024, the global WHI score is 18.3**[1]**, indicating a moderate level of hunger in the world.**

[1] Values below 9.9 show a very low incidence of hunger, while between 10 and 19.9 the value is moderate. Values between 20 and 34.9 indicate a situation of severe hunger, while the values between 35 and 49.9 are alarming levels. Above 50, the problem of hunger is considered extremely alarming.

Figure 2. GHI score in Mozambique (source IFPRI 2024)

According to this indicator, **Mozambique is positioned at the level of 27.5 in 2024, occupying the 107th position among 127 considered countries**, which indicates a level of severe hunger at the national level. **Mozambique's GHI score is based on the values of four indicators: 24.8% of the population is undernourished, 36.7% of children under five years have stunted growth, 3.8% of children under five years have severe emaciation/malnutrition, and 6.6% of children die before their fifth birthday.**

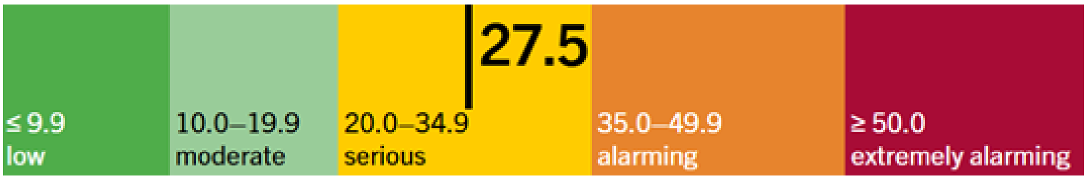


Figure 3. GHI score in Mozambique (IFPRI source 2024)

As confirmed by data from the United Nations Food and Agriculture Organization (FAO), between 2021 and 2023, Mozambique recorded high rates of undernutrition and malnutrition, especially among children aged 0-5 years. This situation is exacerbated by the poverty of the rural population, the lack of resilience to the impacts of climate events and the resulting low productivity and variety of agricultural products, as well as limited access to markets.

The critical situation in Mozambique reflects the situation of the wider African context in which Mozambique fits. In fact, **the Global Food Security Index** (GFSI)[2], created by the Economist Intelligence Unit with support from the FAO, analyses the availability, accessibility, quality and stability of food in more than 100 countries, showing that **in Africa one in five people starves in 2023** (58% suffered from moderate or severe food insecurity), which represents a significantly higher proportion than in other regions, and the proportion of the population affected by hunger continues to increase in Africa. If these trends continue, it is expected that by 2030 there will be around 582 million chronically undernourished people, half of them in Africa.

[2] Values range from 0 to 100, where 100 is a good level of food safety and 0 is a serious state of food insecurity

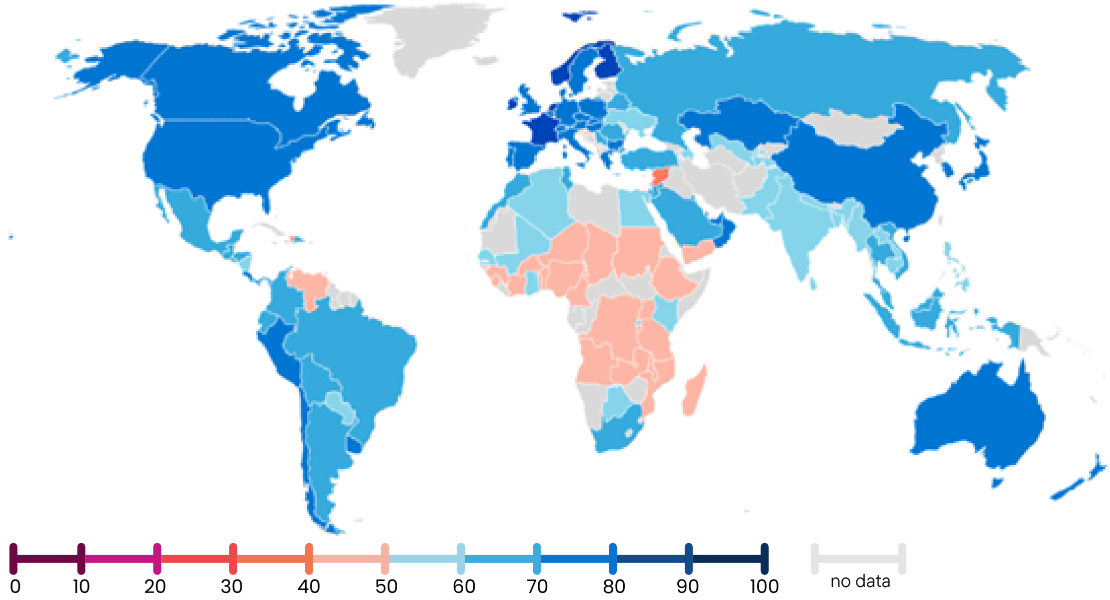


Figure 4. Global food security index in the world

The **State of Food Security and Nutrition in the World 2024** (SOFI) also confirms this information: it is an annual report that presents data on hunger, malnutrition and the impacts of climate change on food security, jointly developed by the FAO, the International Fund for Agricultural Development (IFAD), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP) and the World Health Organization (WHO)

A relevant indicator, which captures a crucial aspect in monitoring progress to end malnutrition, is the **Minimum Dietary Diversity** (MDD)[3]: developed by FAO, this indicator captures a crucial aspect of nutrition, namely the diversity of foods we consume and the quality of diets, which are two of the pillars of a healthy diet, because they help prevent all forms of malnutrition and support health, growth, development and well-being.

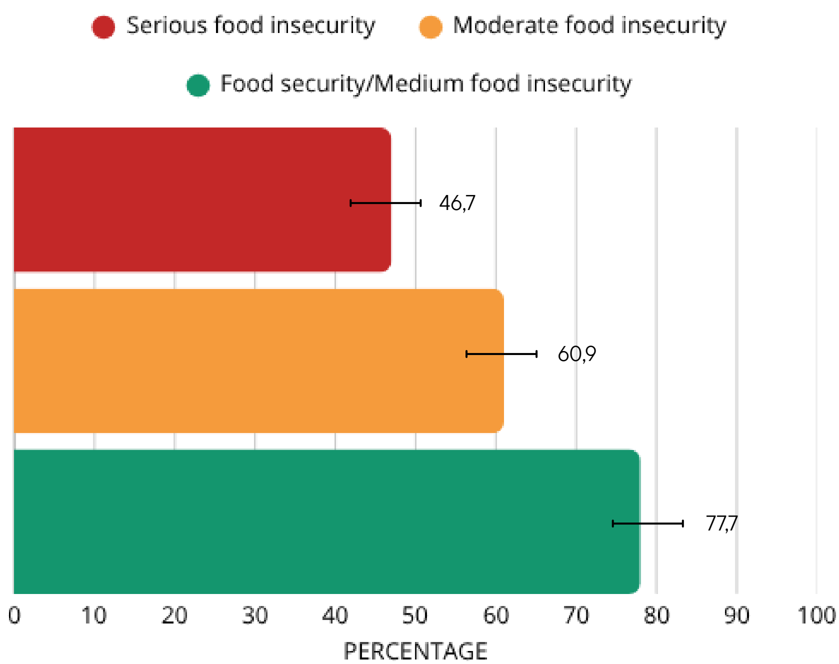
In particular, the MDD-W is the proportion of women of reproductive age (15-49 years) who consumed at least five of the ten defined food groups in the previous 24 hours. The ten food groups are: 1) grains, roots and white tubers and bananas; 2) legumes (beans, peas and lentils); 3) nuts and seeds; 4) dairy products; 5) meat, poultry and fish; 6) eggs; 7) dark green leafy vegetables; 8) other fruits and vegetables rich in vitamin A, 9) other vegetables, and 10) other fruits.
The higher the proportion of women in the sample that reaches this threshold, the greater the chance for women in the population to consume diets that have sufficient vitamins and minerals..

It is assumed that greater severity of food insecurity is associated with lower dietary diversity among women aged 15 to 49 years. In fact, in the report on State of Food and

[3] https://www.fao.org/newsroom/detail/new-sdg-indicator-on-minimum-dietary-diversity-adopted-by-un-statistical-commission/en#:~:text=Now%2C%20countries%20and%20the%20international,of%20various%20forms%20of%20malnutrition.

Nutrition Security (2024)[4], referring to 28 countries, including Mozambique, it is assumed that less than 50% of women with severe food insecurity reached the MDD-W, while more than 77% who were in food security or slightly unsafe reached the MDD-W. This association was carried out after controlling the income level, schooling, gender, urban-rural residence and country of residence of the respondents. However, in this combined sample of data from 28 countries [5], 21 of which were low- and middle-income countries, the greater severity of food insecurity suggested a general lack of access (or availability) to all food groups, healthy and unhealthy.

Figure 5. Percentage of the population of women aged 15-49 in 28 countries achieving minimum dietary diversity for women, by food safety status [6]



According to the Global Diet Quality Project (2022)[7], a collaborative project between Gallup, Harvard University and the Global Alliance for Improved Nutrition (GAIN) , which aims to collect data on the quality of diet at a global level and provide tools for monitoring the quality of diet in several countries, shows the situation in Mozambique on the quality and variety of diet.

[4] https://openknowledge.fao.org/server/api/core/bitstreams/39dbc6d1-58eb-4aac-bd8a-47a8a2c07c67/content/state-food-security-and-nutrition-2024/ending-hunger-food-security.html#gsc.tab=0

[5] The 28 countries include 16 countries in Africa, 7 in Asia, 3in Latin America and 1each in North America and Europe. Of these, 21 are low- or middle-low-income countries and 7 are high- or middle-high-income countries, based on the World Bank's income classification for fiscal year 2024. The countries are Benin, Bolivia, Burkina Faso, Cameroon, Ecuador, Egypt, Gabon, Ghana, Kenya, Mozambique, Nigeria, Senegal, Sierra Leone, South Africa, Turkey, Uganda, United Republic of Tanzania, United States of America and Viet Nam, and also Afghanistan, Albania, Armenia, Honduras, Kyrgyzstan, Malawi, Palestine, Tunisia and Uzbekistan

[6] Sources: FAO elaboration based on data from the Food Insecurity Scale collected by FAO and data from the Diet Quality Questionnaire collected by the Global Diet Quality Project, both in the Gallup World Poll in 2021 and 2022

[7] https://www.dietquality.org/countries/moz

By submitting a diet quality questionnaire, women were asked to answer some questions about the foods and beverages they had consumed the previous day during the day or evening, whether they had at home or elsewhere.

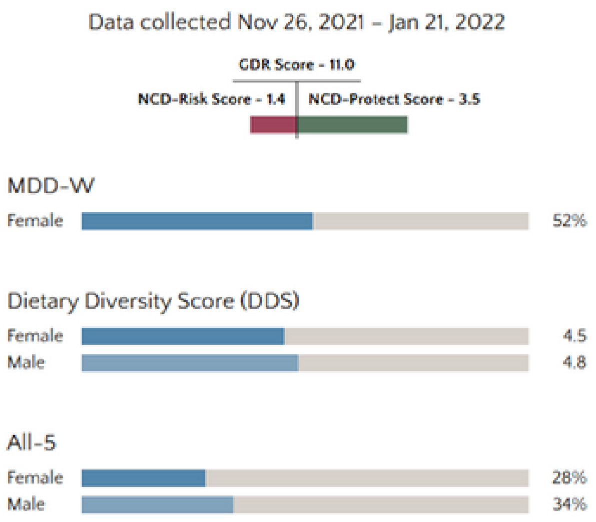


Figure 6. Mozambique values disaggregated by sex (Global Diet Quality Project 2021-2022)

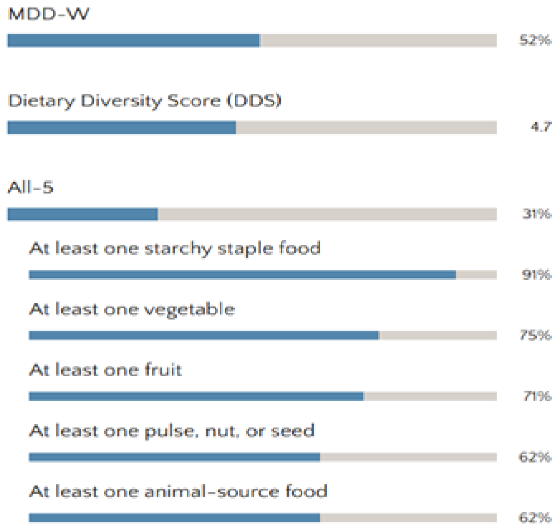


Figure 7. Total values of Mozambique (Global Diet Quality Project 2021-2022)

As shown in the two graphs above, it identifies some important data in terms of % of the population that consumed on the previous day or night. According to data collected between November 2021 and January 2022:

In addition to the score data of the Global Dietary Recommendations (GDR) and its two components (NCD-Protect and NCD-Risk)[8], **it is noted that the MDD-W is 52%** indicating that 52% of women aged between 15 and 49 consume 5 out of 10 food groups. If we compare this data with the wider African context, it is possible to see that Mozambique is in line with the data from Gabon, Namibia, Zimbabwe, Mauritania, Cameroon and Somalia, which are intermediate compared to other countries on the continent: there are countries such as South Africa, Senegal, Morocco, Egypt, that have a good MDD-W (about 70%), and countries with a low MDD-W (about 40% or less) such as Guinea, Tanzania, Ivory Coast, Madagascar, Liberia, Niger, Botswana and Ethiopia (which is the lowest overall score with 24%). On the other hand, if we relate the number of Mozambique with the world context, it is clear that there are countries with a much higher MDD-W, such as Tunisia (the only country in Africa with more than 80%) and Switzerland (which has the highest number globally, 91%), USA, Bolivia, Uzbekistan, China, Indonesia (between 80 and 90%).

[8] GDR is based on the food consumption of nine food groups that protect health against non-communicable diseases (NCD-Protect, which is about 3.5 out of 9 for Mozambique, meaning a higher score indicates the inclusion of healthier foods in the diet and positively correlates with compliance with global dietary recommendations) and eight food groups to limit or avoid (NCD-Risk, which is about 1.4 out of 9 for Mozambique, meaning that people have low consumption of these risky food groups, so they can meet global dietary recommendations) during the day or night before, that are associated with compliance with the WHO global dietary recommendations. A higher score in Global Dietary Recommendations (GDRs) reflects compliance with the WHO's global dietary guidelines.

These comparisons at the African and global level also remain valid for the Dietary diversity score (DDS), which indicates the number of food groups consumed on the previous day or night in ten food groups used in the MDD-W indicator (see above). On a scale of 0 to 10, where the high score indicates the inclusion of multiple food groups in the diet, Mozambique occupies almost the half of the ranking, with a score of about 4.7 (4.5 for women and 4.8 for men). A good value, considering the world's highest score is 7 (Switzerland)

Finally, this report shows the proportion of the population that consumed all five groups of food typically recommended for daily consumption in food-based dietary guidelines worldwide (All-5): **overall, All-5 for Mozambique is about 31%, in particular 28% for women and 34% for men.** In this case, at the continental level, Mozambique is among the countries with the highest level, behind only Tunisia (46%), Morocco and Egypt (37%). In fact, many other African countries are below 30%, reaching the lowest value in the world in Ethiopia (9%). Worldwide, it is in an intermediate position, as the highest value seems to be 64% of Tajikistan

1.2 Regeneration of soils

Soil regeneration refers to the process of recovering soil fertility, restoring its ability to sustain native ecosystems in each region and ensure ecosystem services, as well as agricultural productivity in a sustainable manner. Nevertheless, as we will see in the following, the global trend is soil degradation, with a reduction or loss of the biological and economic productive capacity of the soil.

Globally, in accordance with the United Nations Convention to Combat Desertification (UNCCD), by using the soil degradation neutrality indicator, which measures soil degradation based on plant cover, land productivity and carbon stored in soil, soil degradation is directly linked to factors such as climate change, intensive grazing, intensive farming, deforestation and urbanization. To phase this situation, UNCCD recommends the agro-ecological transition as a resilient and sustainable food system to promote soil regeneration, among other benefits.

In particular, it should be noted that between 2015 and 2019, at least 100 million hectares of productive land are degraded every year, putting the world's food and water supply at risk. In addition, **it should be noted that sub-Saharan Africa is experiencing soil degradation at a much faster rate than the global average, with an increase of 7.14% to 14.5% between 2015 and 2019.**

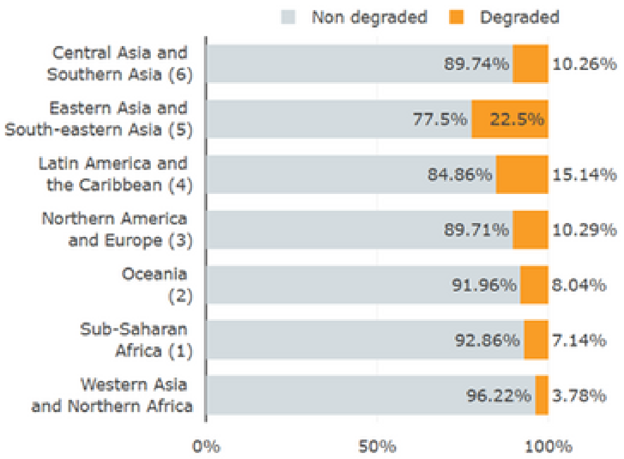


Figure 8. Proportion of degraded land in 2015 (source: UNCCD)

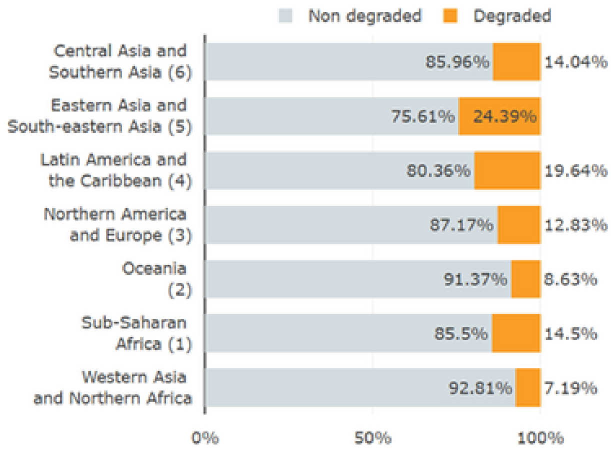


Figure 9. Proportion of degraded land in 2019 (source: UNCCD)

Regarding Mozambique, a study carried out by the Francesca Nitidae NGO within the framework of the Laurel project[9], which covers the period from 2000 to 2016, was concluded by analysing satellite images and measuring vegetation indices, that **25% of the national territory has a decrease in soil productivity and only 3% an increase.** More than 2/3 of these changes are related to human activities, such as deforestation in Zambezia, while climate change (such as temperature increase, drought and desertification, extreme weather events, floods etc...) are the main factor for soil degradation in the southern provinces (Maputo, Gaza, Inhambane).

1.3 Climate resilience

Climate resilience refers to the ability of an ecosystem and/or community to anticipate, prepare for, and respond to the impacts of climate change.

Through the **ND-GAIN** (Notre Dame Global Adaptation Index), developed by the Notre Dame Global Adaptation Initiative of the University of Notre Dame of Indiana in the United States of America, which assesses a country's vulnerability to climate change and its ability of adaptation, using data on health, infrastructure, food security and water availability, **Mozambique ranks 153rd out of 187 countries with a score of 39.2**[10].

[9] Laurel Project: https://www.nitidae.org/en/actions/laurel-planification-territoriale-pour-ameliorer-la-resilience-des-paysages-au-mozambique
[10] Taking into account that the rating varies from 0 (low readiness and high vulnerability) to 100 (high readiness and low vulnerability to climate change)

Specifically, **it has a score of 0.479 for vulnerability** (where a value of 0 indicates no vulnerability and a value of 1 indicates maximum vulnerability) **and a value of 0.262 for adaptive readiness** (where a value of 0 indicates the absence of adaptive capacity and a value of 1 indicates maximum capacity). These classifications confirm the lack of capacity and preparation of institutions in Mozambique, as well as communities to cope with the impacts of climate change and extreme weather events, which are increasingly frequent in Mozambique.

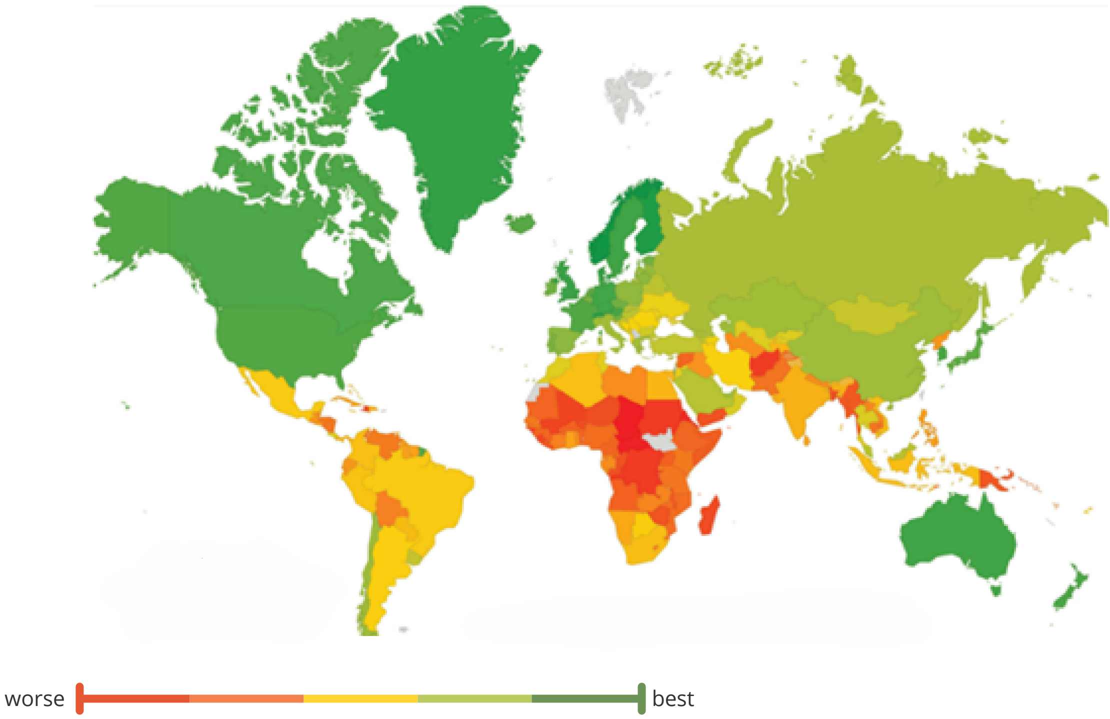


Figure 10. ND-GAIN index, August 2024

Through the analysis of **the Annual Report on Ecological Threats** (ETR) of October 2024, of the Institute for the Economy and Peace (IEP), which analyzes ecological threats at a global level, by assessing factors such as food insecurity, the water risk, population pressures and natural disasters, it is noted that there is an increase in ecological threats due to climate change, population growth and conflicts, showing a strong correlation between ecological degradation, poverty and conflict incidence. It can be seen that the countries at greatest risk are the 50 countries hosting 1.3 billion people and in fact these countries are mainly located in Africa, including Mozambique, where extreme ecological risk intersects with low social resilience, making them vulnerable to instability, to conflicts and humanitarian crises.

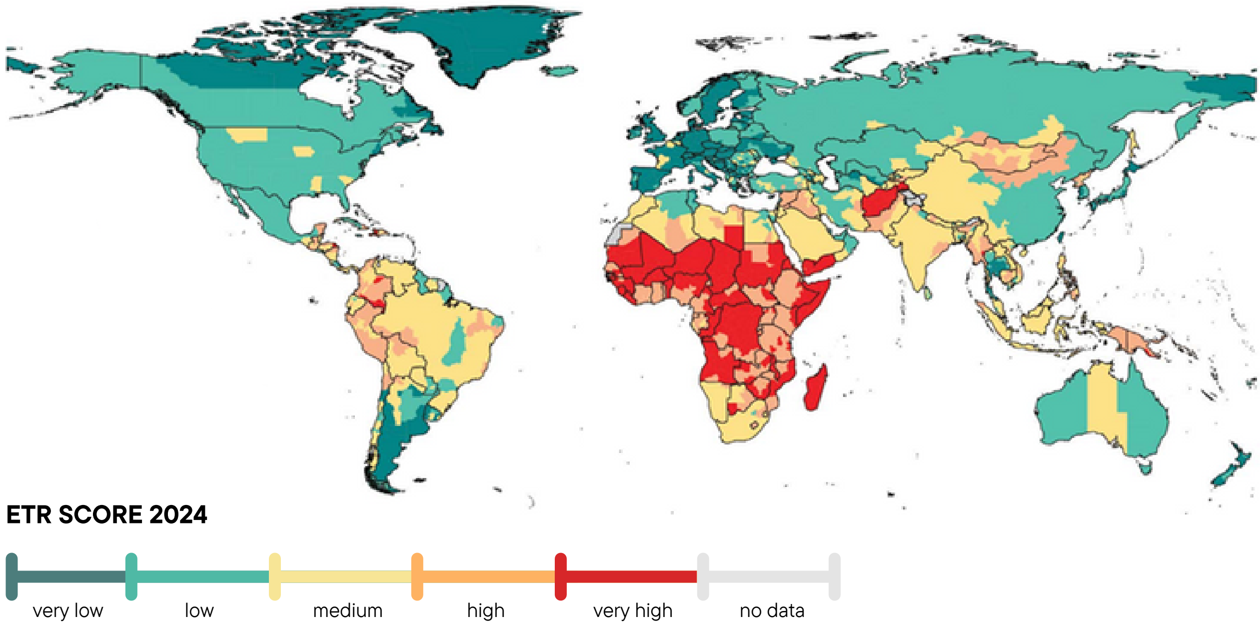


Figure 11. ETR 2024: Impact of ecological threats

At the same time, **Germanwatch's Global Climate Change Index** (CRI), an independent organization focused on development, environment and human rights, ranks countries according to the impact of extreme weather events (such as storms, floods and droughts) and therefore their exposure to these phenomena and their vulnerability, using historical data. In the 2021 report, the countries most affected by extreme weather events in 2019 were Mozambique, Zimbabwe and the Bahamas.

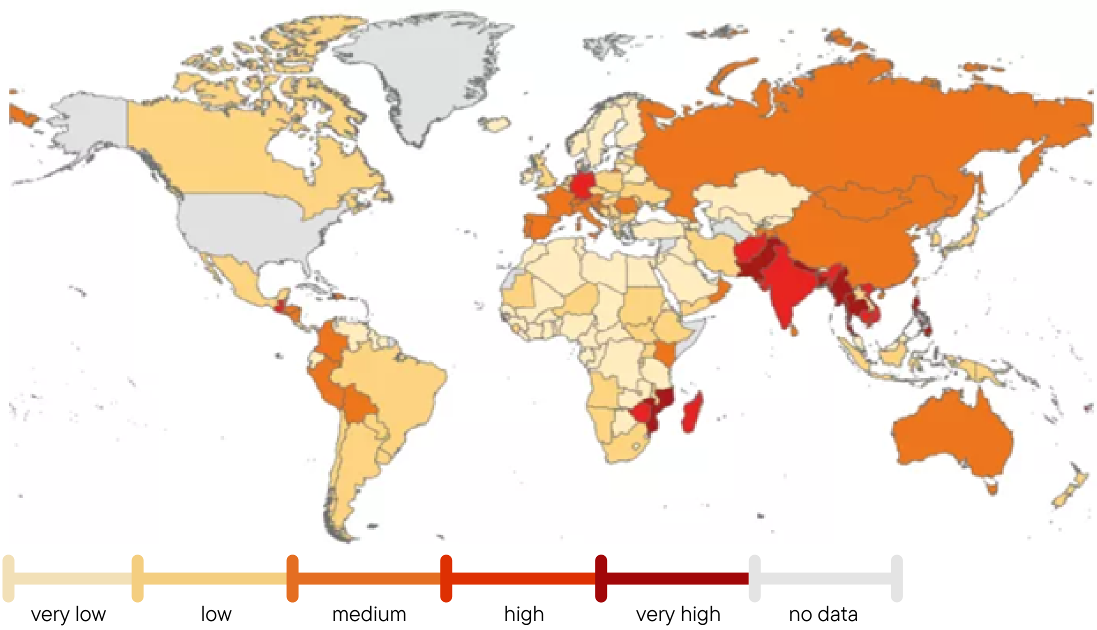


Figure 12. Global Climate Risk Index

1.4 Poverty and income

After an analysis of the factors that make up food and environmental poverty, we will now delve into the issue of economic poverty.

Based on data from the World Bank's Poverty and Inequality Platform, **692 million people around the world live with less than $2.15 per day** (poverty line) **in 2024.**

As far as Mozambique is concerned, according to 2019 data, **74.5% of the population lived below the poverty line.** On the other hand, the data show that the provinces of Zambézia and Nampula have the highest poverty rates in the country.

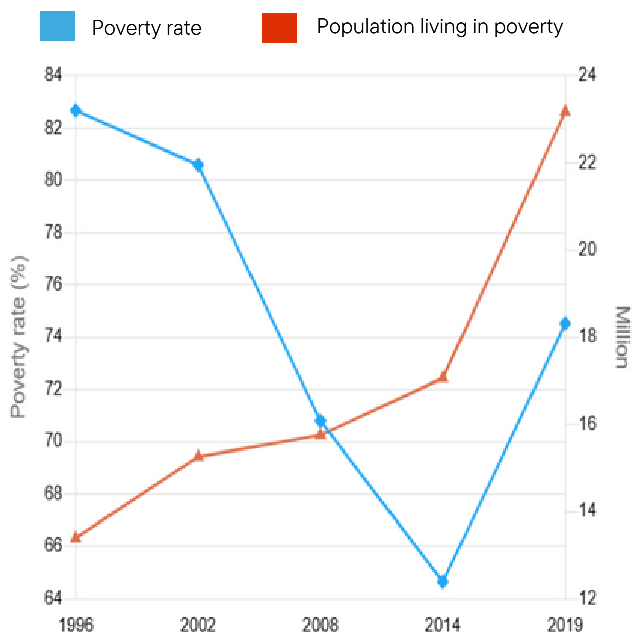


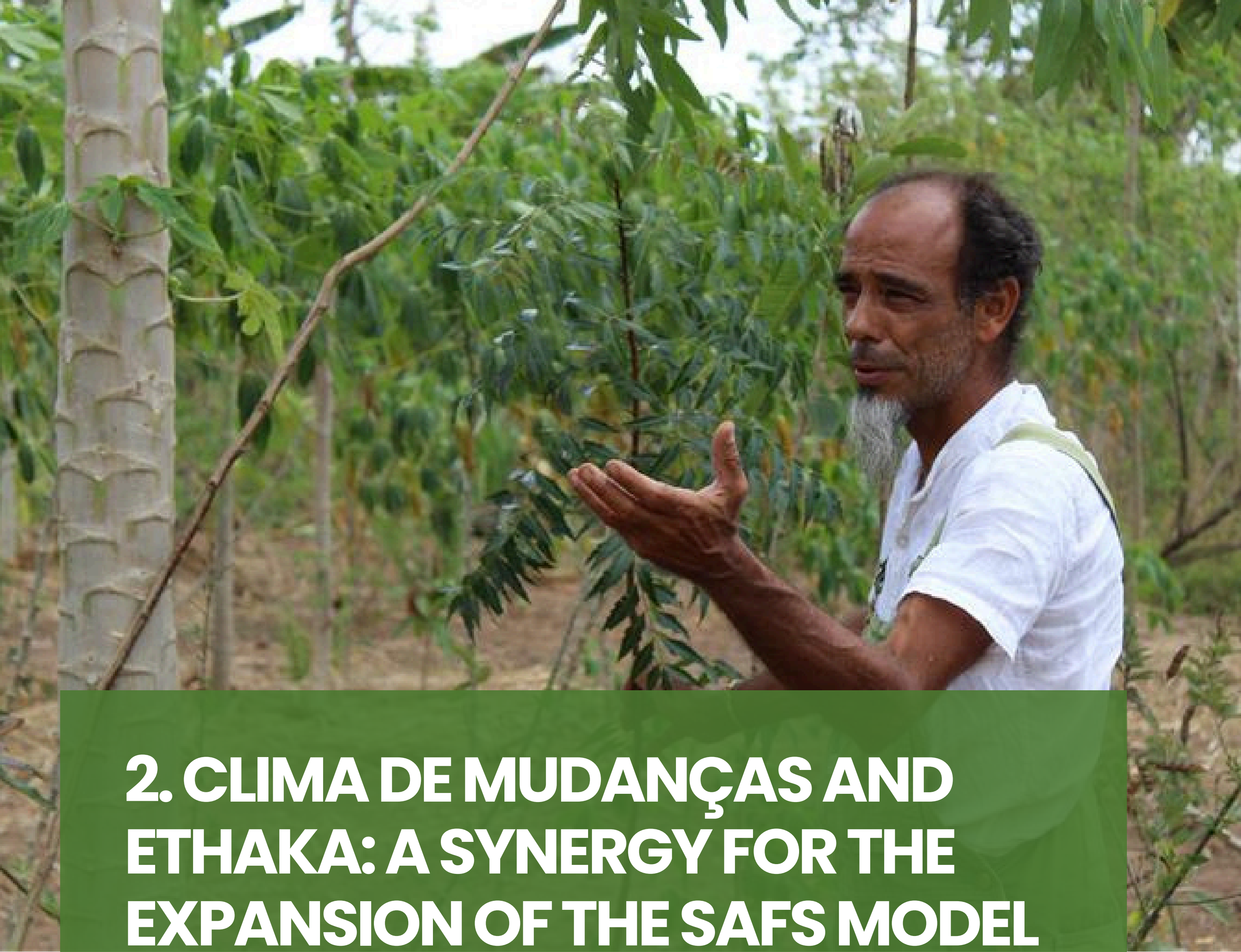
Figure 13. Proportion of population and population living in poverty at $2.15 per day (1996-2019) (source: WB 2024)

Indeed, according to data from the World Bank, Mozambique's GDP per capita in 2023 was recorded at 602.92 USD. This figure represents about 5% of the world average. In terms of annual GDP, Mozambique recorded USD 20.62 billion in the same year, representing 0.02% of the world economy. Specifically, the GDP of the agricultural sector which was 996,205,110.56 USD

Compared to US per capita GDP in 2023, it was recorded at 65,020.35 USD, equivalent to 515% of the world average. And the GDP was worth 27,360.94 billion USD, representing 25.95% of the world economy.

PFinally, the main source of income for the Mozambican population is agriculture, which employs almost 90% of households and 87% of the female labour force (AICS, 2018)[11]. Yet it is a subsistence sector, characterized by low incomes due to inadequate agricultural techniques and poor storage and post-harvest processing.

[11] https://www.aics.gov.it/oltremare/voci-dal-campo/mozambico-le-donne-protagoniste-dellimprenditoria-sociale-a-magude/#:~:text=L'agricoltura%20%C3%A8%20un%20settore,87%25%20della%20forza%20lavoro%20femminile1.



2. CLIMA DE MUDANÇAS AND ETHAKA: A SYNERGY FOR THE EXPANSION OF THE SAFS MODEL

2.1 Analysis of the needs of Zambézia Province

Available data indicate that **the provinces of Zambézia and Nampula have the highest poverty rates in Mozambique, with 62% and 65%** of the population below the poverty line respectively, demonstrating a direct link between the level of poverty and forest cover loss (BM 2018).

In fact, according to a report by the National Statistics Institute (INE), gathering data from 2019 to 2022, in 2022 deforestation fell 31% compared to the previous year, to 209,464 hectares.

The peak of deforestation was recorded in 2021, with 303,689 hectares, 264,999 hectares of semi-deciduous (tropical) forest, 29,258 hectares of semi-evergreen forest and 99 hectares of mangrove, among others. In this four-year period counted by INE, **only the provinces of Niassa,** in the north of the country, **and Zambézia,** in the center, **added up a deforestation of 180,279 and 167,367 hectares, respectively.**

A significant part of this deforestation has been recorded in the Miombo forest, a genus of tree that includes a large number of species and a forest formation that makes up the largest tropical forest ecosystem in Africa, shelter, wood, electricity generation and tourism (INE, 2022).

On the other hand, FEWS NET (2020-2021) identifies a condition of stress and food crisis in the provinces of Zambezia and Nampula, due to both natural causes, as extreme weather events (droughts and tropical cyclones/storms) and erratic rainfall, as anthropogenic practices (61% of the selected communities are affected by uncontrolled fires or practice crop cutting and burning techniques) that produce serious environmental damage.

To address the need for poverty reduction, as well as the causes of forest cover loss (such as conversion of forests into agricultural fields), and also to ensure greater food availability and resilience to climate change, the Ethaka project focuses onIn the improvement of production practices through the promotion of agricultural techniques such as agroforestry systems (SAF) and agroecology, accompanied by alternative income-generating activities (such as livestock, beekeeping and fish farming). These agricultural techniques will respond to communities where livelihood diversification is scarce, making local communities economically and food dependent on the vulnerability and low productivity of traditional agriculture.


Figure 14. Beneficiaries harvesting fruits in agroforestry fields

According to the International Fund for Agricultural Development (IFAD), more than 70% of the population depends primarily on agriculture as a source of income and the agricultural sector employs 80% of the country's workforce (2013). Communities are highly dependent on natural resources and a range of environmental services generated by forests, such as the natural regulation of water supply and the protection of soils from erosion. Sustainable agricultural practices, such as SAFS, take this interdependence into account and seek to increase productivity while strengthening the food and environmental resilience of communities and preserving natural resources.

2.2 Focus on our projects: Clima de mudanças and Ethaka.

The project **Clima de mudanças: a way to create and strengthen an environmentally conscious generation in Mozambique**, funded by the EU, led by WW-GVC - We World - GVC and implemented in collaboration with ICEI - Institute for International Economic Cooperation, CTV - Centro Terra Viva and CNV - National Volunteer Council of Mozambique, aims to consolidate good environmental governance in Mozambique, particularly in the provinces of Cabo Delgado, Nampula, Zambézia and Maputo.

The project aims to strengthen civil society and promote the active participation of citizens, especially young people, in protecting the environment by training civil society organisations (CSOs) to improve their capacities for managing, monitoring and defending environmental issues, and aims to create a national network of environmental CSOs, facilitating communication, collaboration and coordination between organizations, raising awareness and educating citizens on priority environmental issues such as climate change, sustainable management of natural resources and conservation of biodiversity. To achieve the ultimate goal of ensuring that civil society organisations (CSOs) and young people actively participate in policy debate, decision-making and oversight of sustainable management of natural resources at national level, with a particular focus on rural and marginalized areas, where environmental rights are most violated.

To support some of the project's activities related to advocacy, information and dissemination of primary data, a case study on the benefits of FAS in Zambézia was conducted as part of the Ethaka - A sustainable model of agricultural production and consumption for climate resilience and food and nutrition security.

Figure 15. Beneficiaries prepare agroforestry lands for sowing

The Ethaka project is being implemented in 4 districts of the provinces of Zambézia and Nampula (the two most populous and poorest areas of Mozambique), led by ICEI, in partnership with the Oikos Institute and the Mani Tese Association, together with institutional partners of the project: Municipality of Milan (Italy), the Provincial Environment Service of Zambézia, the Provincial Directorate for Agriculture and Fisheries of Nampula, and the academic institutions Zambeze University and Lúrio University) and the NGO Helvetas.

The objective of the project and the starting point for the elaboration of the case study is to respond to the limited availability and lack of agricultural and food diversification caused by

several factors, including agricultural systems and low-productivity lands, poor crop diversification and few income-generating activities, as well as poor food conservation and processing capacity, making agricultural systems particularly vulnerable to extreme weather events, which are very common in the country's coastal areas, with repercussions at the economic and social level and in the nutrition and health of the population.
Other factors are related to regulatory-institutional aspects and technical assistance services inadequate for the planning of resilient and sustainable agricultural models, mainly due to the lack of awareness of institutions on the issue and limited knowledge and skills on the subject. Finally, there are factors such as inadequate food and hygiene habits to meet nutritional needs, due to the limited knowledge and skills of women on production needs and varied diets, weak institutional support for malnutrition, poor agricultural diversification and low awareness of hygiene and health aspects.

Figure 16. Beneficiaries in agro-forestry areas

To this end, the Ethaka project aims to improve food security and climate resilience of farmers' families by promoting a sustainable agricultural model based on agro-forestry systems (SAF) and agro-ecology, with which the project aims to increase agricultural production in quantitative and qualitative terms, diversify crops and integrate income-generating activities, as well as reduce post-lossharvesting through training and introducing appropriate technologies for the conservation and processing of agricultural products; finally, it aims to promote access to nutritious and safe food by focusing on the needs of pregnant and lactating women and children under five.

The collaboration between the Ethaka and Clima de Mudanças projects aims to maximize the impact of interventions and promote lasting change in the agricultural and environmental sectors in Mozambique, through sharing knowledge, experiences and resources, enabling the development of an integrated approach that responds in an integrated way to the challenges of food and economic security, climate resilience and sustainable management of natural resources, and enhancing the capacity for action of government institutions and civil society, Thus contributing to the achievement of the Sustainable Development Goals, in particular SDG 2 (Zero Hunger), SDG 13 (Climate Action) and SDG 15 (Life on Earth).

3. FOCUS ON THE AGROFORESTRY MODEL

The Sucessional Agroforestry System (SAFS) is based on concepts and methodologies of Syntropic Agriculture, developed from the research and successful results achieved by the Swiss researcher Ernst Götsch over more than 40 years in Brazil. Syntropic Agriculture is a practice that respects, imitates and accelerates the natural processes of plant development and soil regeneration. Götsch depends on mixed cultures in which the plants strengthen and support each other. In addition, an important role is played by mulch, organic matter that rots the soil and adds new nutrients through composting. Everything happens in a virtuous circle that respects nature and benefits man.

3.1 What is SAFS? [12]

The Successional Agroforestry System is a branch of agroecology, an agronomic technique designed especially, but not only, for tropical environments, to preserve soil fertility, underlining the importance of balance between organic composition and biomass production that naturally contributes to the fertility of tropical soil.

In Mozambique, the practice of indiscriminate felling of forest trees to free up space for small and large farmers is widespread, leading to deforestation. In addition, this process is accompanied by the practice of "cutting and burning" used after felling, which leads to soil degradation by reducing the available organic matter and other crucial biochemical properties for a fertile soil, such as the presence of microfauna or adequate carbon/nitrogen, compromising long-term fertility. With the degradation of soils, farming communities are forced to move in search of other lands and continue to repeat this cycle in high areas with a high environmental impact.

Figure 17. Beneficiaries in their agroforestry field

The successional agroforestry system is a permanent consociation practice that combines trees and herbaceous plants for food and forest production, improving soil fertility. Techniques such as pruning, mulching, minimal soil disturbance and the formation of vertical layers of vegetation ensure optimal microclimates with adequate levels of light, humidity and temperature for a continuous humification process that improves the efficiency of the water cycle and ensures an adequate and stable soil organic matter content. A good crop mix between different synergistic species of trees and herbaceous plants also helps to control pathogens and insects.

Soil fertility and the consociation of different forest and agricultural species ensure a balance between biomass and food security, similar to the natural cycle of a tropical forest.

Thus, the SAFS principles and methodologies offer significant benefits for both communities and the environment.

[12] This information is taken from a document on agroforestry prepared by ICEI in 2024

3.2 High production in a small space without competition between crops

In a young forest, one square meter can contain more than 20 different species and five productive strata can be observed simultaneously.

Based on a forest, SAFS systems combine plant species that occupy different substrates and have roots that anchor different nutrient horizons in the soil, minimizing competition between plants. Trees play a vital role in SAFS, pumping moisture and nutrients from deep soil substrates inaccessible to agricultural species through their roots and processes such as evaporation and dry leaf loss. Natural forests in tropical and subtropical regions are made up of different species of plants, shrubs and trees that often form symbiotic relationships with each other or fungi, promoting better growth conditions.

SAFS is based on the principles of ecological succession, which consists in imitating the natural dynamics of forests, promoting soil regeneration and biodiversity, and fostering climate resilience.

Figure 18. Beneficiaries in agro-forestry areas

These principles are based on respecting the time of maturation of plants and the benefits that each species or component offers over time.

Natural succession teaches us that one species creates another. In this case, there is no competition, but mutual help and cooperation. The SAFS method applies this principle to food production: for example, shrubs or beans can be grown together with vegetables, since their deep and strong roots can provide fertilizers without competing with the vegetables but rather complementing them.

These types of SAFs bring not only environmental, but also nutritional and economic benefits through the recovery of degraded areas, integrating cultivation with other activities and ensuring the resilience of fields to extreme weather events

3.3 Types of SAFS

Over the last years of work, ICEI has developed 4 typologies of successional agroforestry systems, with the active participation of local communities organized in committees:

a. Standard SAFS

Figure 19. Standard SAFS

Each square metre is associated with several plant species based on local vegetation, landscape observation and local customs. Crops such as peanuts, ginger, pineapple, sugarcane, cassava, corn and sesame/sesame are planted. It is also planted a line of trees, including fruit species/ biomass such as cashew, tangerine, mango, eucalyptus, acacia, and perennial plants/ biomass such as umbila, chanfuta, pau-ferro, black stick, margosa, leucaena, albizia, etc. After a few months of implementation, the consortium of plants grows and forms several productive layers.

These systems are implemented in demonstration fields in various communities to allow farmers to observe and receive training on the functioning of the SAFS model, adapted to the needs of the communities and the requirements of the places where they are implemented.

b. Horticulture SAFS

This type of SAFS system focuses on improving horticultural performance and includes perennial/biomass lines, fruit/biomass lines and horticultural links. In this approach SAFS is implemented an irrigation system using pumps powered by solar energy. For better complementarity between systems, the ICEI has implemented SAFS pisciculture combined with SAFS horticulture, allowing nutrient-rich water from fish tanks to be used to irrigate SAFS horticultural, improving its fertility

Figura 20. SAFS Horticultura

c. Fish farming SAFS

Figura 21. Fish Farming SAFS

Fish farming SAFS are created from fish tanks, combined with an irrigation and agroforestry system to grow fruits and vegetables all year round, not just during the rainy season, as is the practice in Mozambique. Plants growing around the tanks benefit from water enriched by fish waste, which is a powerful fertilizer.
The agricultural products and leaves that fall naturally from the agroforestry system are used as food for the fish, and the shade of the trees protects the fish from high temperatures that can impair their growth. In addition, this system helps prevent erosion and improves soil fertility around the pools.

d. Beekeeping SAFS

ICEI implemented the concept of "islands" in heavily deforested areas as part of the approach. These islands are circular areas with a diameter of 1.5 m, where a combination of fruit trees, perennial trees, biomass trees, wild flowers and traditional crops is planted. The goal of these islands is to provide an abundance of flowers throughout the system, covering a large area at a lower cost than single-line systems. SAFS are always accompanied by community nurseries and traditional seed banks. These islands also create good conditions for honey production.

Figura 22. Beekeeping SAFS

3.4 Main advantages of SAFS

The introduction of the SAFS approach allows for greater resilience to natural hazards through the restoration of degraded areas, soil regeneration and reduction of erosion and flooding. In addition, the ecological balance of the system is ensured, allowing effective control of pests and plant diseases, avoiding the use of chemical pesticides and promoting soil fertility. This also allows for the enhancement of biodiversity through cultivation methods that mimic natural forest regeneration and the integration of agricultural and forestry crops.

The SAFS approach also offers economic advantages for farmers, facilitated by a constant harvest due to consociation of different species with different production cycles, as well as the monitoring of alternative income-generating activities. And finally, it promotes the improvement of food security by increasing the quantity and quality (diversification) of agricultural products for the population.

In short, the introduction of SAFS in communities as an alternative to traditional agriculture promotes sustainable development at economic, environmental, food and social levels.

3.5 SAFS: work for and not against nature

The SAFS approach involves combining agricultural and forestry crops, recovering resources and incorporating ecological concepts into agro-ecosystem management. Through a dynamic and selective pruning and the introduction of profitable plant species, the farmer accelerates the processes of vegetation succession. In a short period, usually 2 or 3 years for heavily degraded soils, the SAFS approach allows the elimination of external (chemical) inputs producing the required biomass on site. This method also promotes the development of a diverse ecosystem, including trees, spontaneous flora, microbial fauna, insects, fungi and animals. As a result, soil fertility improves and the ecosystem becomes able to generate ecosystem services, control pests and resist natural events such as droughts, fires, floods and storms.

Figure 23. Beneficiary collects fruits from his field SAFS

The SAFS method refutes the idea that deforestation is necessary for food production.

3.6 Possible obstacles

Despite the benefits found in its application, the diffusion of SAFS encounters some obstacles, such as the lack of technical knowledge at the community level for the management of these systems; limited access to inputs, which makes it difficult to access suitable seeds and seedlings; cultural resistance, as barriers related to the adoption of new practices replacing traditional ones.

3.7 ICEI Model

For ten years now, ICEI has adopted the above model in its projects: ICEI introduced the SAFS system for the first time in Mozambique with the 'Eco-Islands' project (2016-2018) in the district of Pebane, in the province of Zambézia, that is part of the Environmental Protection Area of the First and Second Islands. After several years of direct intervention in the field, and inspired by the positive results of similar initiatives in other countries (Brazil in particular), we came to the conclusion that this approach is the most appropriate solution for an agricultural model that addresses both ecosystem conservation, regeneration and adaptation climate change, on the one hand, and the nutrition and food security needs of rural farmers others, along with the income potential in the farm generation. For these reasons, this system continues to be implemented by ICEI in other projects such as Ethaka, MangAction and Triple Resilience, and many others to come. In particular, with the introduction of SAFS in these projects, it is intended to bring benefits to a basin of about 80,000 people between 2022 and 2027 in Mozambique, and in particular in the provinces of Zambézia, Nampula, Sofala and Manica and in the districts of KaNyaka and Matola in the province of Maputo

The peculiarity of ICEI’s intervention is, in particular, the development and application of the SAFS through its adaptation to the Mozambican ecosystem of dry miombo forests, as well as to local traditions, knowledge and culture and farmers' willingness to adopt it. Always with the ultimate goal of contributing to economic, social, environmental and nutritional development through SAFS.

"If you want to grow beans and corn, plant also sugarcane and some orange trees, as well as many other species. This means planting them all together, at the same time and in the same place. In this combination of corn, beans and other species, we can also plant banana, elephant grass, cassava, yam, malagueta pepper, sapote, leucena, mulungu, sapucaia, mango and even black pepper on the tall trees of the future. Each specie will contribute to complete the consortium and for all the others to prosper best. None of them grows or produces less because of the presence of the others, on the contrary, each one depends on the other to reach the optimum development stage"

Ernst Götsch

4. RESILIENT AGRICULTURE IN VULNERABLE COASTAL ECOSYSTEMS (AGROFORESTRY) IN ZAMBEZIA

As mentioned above, in order to support some of the activities of the Climate of Change project related to awareness, information and dissemination of primary data, a case study was conducted on the benefits of SAF in some communities in Zambézia, where ICEI is implementing the Ethaka project, with the aim of supporting public awareness and political training and promoting the adoption of sustainable agricultural models at national and local levels, illustrate the main benefits of its application, as well as developing awareness campaigns on climate resilience and food security.

What was analyzed, studied and reported in the following paragraphs aims to use empirical research, field-based for defense purposes: the application of SAFS in communities involved in the Ethaka project highlights its effectiveness and main benefits in terms of food security, soil regeneration, resilience to climate change and introduction of alternative sources of income.

4.1 Case study methodology

The data presented in this document aims to empirically demonstrate the environmental, economic, social and food sustainability effects of SAF.

Below, we want to explain the method used to collect and analyze the most relevant data in this document: in particular, it was examined the methodology used to compile the data on MDD-W, nutrition, soil analysis, farm diversity score and income.

Overall, it is possible to say that the data reported in this document were collected on 8 communities of Zambezia in particular the districts of Maganja da Costa and Namacurra, and are related to a period between June 2023 and April 2025.

In particular, **Minimum Food Diversity** (MDD-W) was measured with data collected through questionnaires [13] sent to a sample of 40 women between 15 and 49 years old in February 2024 and April 2025 in the districts of Namacurra and Maganja da Costa.
Resuming what was said in the first chapter, the MDD-W evaluates the percentage of women between 15 and 49 years (reproductive age) who consumed in the last 15 days at least 5 out of 10 predefined food groups. For the basic calculation, the percentage of the population that meets the three parameters of MDD-W (considering the previous 15 days) was considered:

a. consumed at least five of the ten predefined food groups;
b. consumed eggs and/or dairy products (category n. 4 and 6);
c. consumed foods rich in vitamin A.

Data collection and analysis was done using Kobo Toolbox and Excel, collected at the provincial level (Zambezia) and then divided by district

The MDD-W is a tool to monitor the link between food produced (agriculture) and individual consumption (nutrition). It also provides information on dietary patterns and which food groups are predominantly consumed at the population level (or absent from the diet). This indicator is therefore relevant for measuring the impact of food security programmes, particularly in the good nutrition component.

Subsequently, to establish the positive relationship between FAS and nutrition, we used the **indicator of malnutrition prevalence** (weight per height> +2 or <-2 standard deviations from child growth norms) **in children under 5 years by type** (waste and overweight). The evolution of acute and moderate malnutrition among children aged 0-5 years in Maganja da Costa and Namacurra was measured by questionnaires and anthropometric measures in a sample of 400 children in February 2024 and in a sample of 157 children in April 2025, Thus assessing the trend of malnutrition in relation to the progress made in the implementation of the SAF in these two districts of Zambezia. In particular, this indicator assesses the overall malnutrition of children (0-5 years), then disaggregated by acute and moderate malnutrition, as well as by district.

[13] Conducted in accordance with the FAO Guidelines on Minimum Dietary Diversity for Women: A Measurement Guide. (FAO/Family Health International (FHI) 360, 2016)

Malnutrition is calculated according to the following criteria:

1) upper middle arm circumference measurement (MUAC);
2) weight and height for children under 5 years old
3) body mass index (BMI) for children over 5 years.

Once the data are collected, they are analyzed and processed in Excel.

For **soil analysis**, two soil samples were collected, first in June 2023 and then in July 2024, at two different points of each plot of 585m2 of each CDR considered where agroforestry succession systems are implemented. These soil samples were submitted to a laboratory for physical-chemical analysis of the soil by private entities.
These samples and analyses continued to be collected every two years until the end of the project. The objective of this analysis is to monitor the soil fertility and, consequently, the nutritional value of the food produced.

Regarding the **Farm Diversity Score** indicator, developed by the international NGO People in Need within the framework of the IndiKit initiative, this indicator identifies the average number of types of crops grown by the target families during the last season/year. It is useful to capture the diversity of cultures in the 8 beneficiary communities of Ethaka: it is important to detect food diversification, ensure access to nutritious foods and support the diversity of local agro-ecosystems. The data were collected through a questionnaire in a sample of 66 households in June 2023 and 64 households in July 2024: to calculate the value of the indicator, the total number of crops cultivated by each participating family was counted and all individual scores were summed and divided by the total number of respondents. Once collected and analyzed, the data were divided by district.

Finally, regarding the **income data**, these were collected through questionnaires submitted to a sample of 66 people belonging to the 8 communities benefiting from the Ethaka project, in three different agricultural stations: in June 2023 (data refers to the agricultural season 2021-2022, when SAF was only at the beginning of its implementation), May 2024 (data refers to the agricultural season 2023-2024, when SAF is already implemented and in its period of growth and expansion) and April 2025 (the data refers to the end of the agricultural season 2023-2024 - from July to October - and the beginning of the season 2024-2025 - February-March).
Again, the data was collected, analyzed and processed with Kobo Toolbox and Excel, as well as being disaggregated by gender and district.

4.2 Results

The results obtained with the case study and further analysis were divided into four themes, considered in the previous chapters to contextualize the situation in Mozambique and the region.

As you can see below, SAFS has an impact on each of the topics that will be addressed and they are connected to each other, in the sense that the improvement of each one is interconnected with the improvement of the next. This idea strengthens the system concept and reinforces the benefits of its implementation for rural and vulnerable communities in Mozambique.

4.2.1 Food security and sovereignty

The implementation and maintenance of Successive Agroforestry Systems (SAFs), as part of the Ethaka project, has proven to be an effective strategy for promoting food security and sovereignty in rural communities. These systems, by integrating sustainable agricultural practices and biodiversity, provide a series of benefits that ensure the health and well-being of beneficiary populations, reducing dependence on external inputs and increasing the nutritional quality of food.

Figure 24. A beneficiary watering a SAF field

- ***Soil fertility and reduction in the use of external agricultural inputs***

One of the main gains observed with the implementation of SAFS is the decrease in the use of external agricultural inputs, such as chemical fertilizers and pesticides. By adopting agroforestry practices that use plant diversity, soil cover, thickening and bedding methodology, farmers are able to improve the quality of the soil in a natural way. The use of constant pruning and soil enrichment with organic matter guarantee fertility without resorting to the purchase of inputs. This model significantly reduces production costs, making agricultural activities more affordable and sustainable in the long term.

Consequently, the laboratory analyses carried out throughout the project, which it will be seen in more detail later, confirm the increase of soil fertility in the SAFS.

With more fertile soils, food production is richer in essential nutrients for the health of communities. Foods grown on healthier soils offer better nutritional conditions for the population, surpassing those from impoverished soils or that depend on chemical inputs, often harmful to health.

- ***Impact of SAF on the diet: diversification of crop production and diversified feeding***

The diversification of agricultural production in SAF and access to a varied diet are crucial objectives in the Ethaka project. Households that were primarily dependent on certain foods - such as corn, cassava and rice, plus beans and dried fish - now have access to a wide range of products including butter beans, boar beans, gergelim beans, nhemba beans, peanuts, Tomatoes, carrots, peppers and various fruits such as mango, papaya, banana, citrus and avocado.

Figure 25. Demonstration and training meeting

Food diversity not only enriches families' diets, but also contributes to food security by reducing dependence on a limited number of crops, making communities more resilient to food crises.

The following data shows the progress made by the direct beneficiaries of the project as a result of food diversification,

- For the diversification of production in SAF, which ensures greater diversity, quality and quantity of food available
- Through awareness campaigns to change eating habits in families: within the framework of the Ethaka project, cooking demonstrations are held to teach families how to prepare nutritious meals with food grown on their SAFS farms. These demonstrations, conducted by nutrition facilitators and the project’s technical team, promote simple and nutritious recipes such as sweet potato porridge enriched with malambe, moringa and margosa seeds, as well as juices and gnocchi. These activities aim to improve the nutrition of families, with a special focus on pregnant women, breastfeeding mothers and children under 5.
- The advice to go to health centers in case of disease

Figure 26. The beneficiary takes care of his agroforestry field

Through the analysis of Minimum Dietary Diversity for Women (MDD-W), it is possible to capture the improvements in diet and thus the impact of SAF on diet diversification and food security.

The food diversity survey carried out in February 2024 and April 2025 showed that there were improvements in the food diversity of families directly affected by SAF activities.

In the province of Zambezia, it is observed that in February 2024 (which represents our baseline):

- **8% of the sample consumes 5 food groups**
- **5% meets the 3 criteria:**

(i) 5 food groups; ii) have consumed eggs and/or dairy products (category no. 4 and no. 6); and iii) having consumed foods rich in vitamin A.

Subsequently, analyzing data from April 2025, there is a general improvement: in particular, in the province of Zambezia, it goes

- **from 8% to 23% of women who consume a number 5 food groups**
- **from 5% to 20% of women who meet the above 3 criteria.**

Disaggregating the data by district, as shown in the chart below, it is observed that in Namacurra, in February 2024

- **7% consume a number of 5 food groups**
- **2% meet the 3 criteria:** (i) 5 food groups; ii) have consumed eggs and/or dairy products (category no. 4 and no. 6); and iii) have consumed foods rich in vitamin A.

In April 2025, an improvement can be observed: in particular, there is an increase

- **from 7% to 12% of women who consume 5 food groups**
- **from 2% to 12% of the sample that meets the 3 criteria mentioned above.**

Instead, in Maganja da Costa in February 2024,

- **8% of them consumed 5 food groups**
- **8% meet the 3 criteria:** (i) 5 food groups; ii) had eaten eggs and/or dairy products (category no. 4 and no. 6); iii) have consumed foods rich in vitamin A.

Comparing them with the data collected later in April 2025, there is a clear improvement in the MDD-W indicator:

- **increases from 8% to 43% of women who consume a number of 5 food groups;**
- **goes from 8% to 36% of women who meet the 3 criteria seen above.**

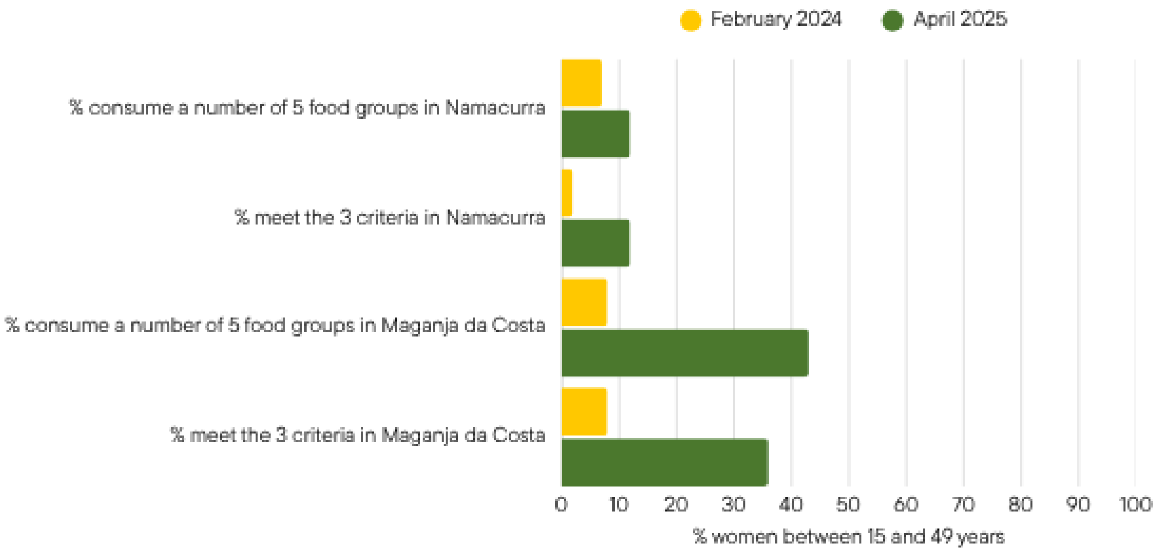


Figure 27. MDD-W disaggregated by district (Maganja da Costa and Namacurra)

Staying in **Maganja da Costa**, it is noted in particular that there was an **increase from 40% (baseline) to 79% (April 2025) in the consumption of Group 8 foods** (rich in vitamin A). It is also worth noting that the percentage of women who consume foods of animal origin (meat and/or fish, eggs, dairy products) has increased from 96% to 100%

Table 1. Food groups in the diet table

Lines in the questionnaire	Food group
A = Cereal & Bread & similar products, white wheat, mash made from wheat or rice torado or prepared in oils	GROUP 1 - GRAINS, ROOTS AND WHITE TUBERCLES, AND PLANTAINS
B = White tubers and roots	
C = Legumes	GROUP 2 - LEGUMES (BEANS, PEAS AND LENTILS)
D = Nuts and seeds	GROUP 3 - NUTS AND SEEDS

E = Milk and dairy products	GROUP 4 - DAIRY
F = Meat (beef, pork, sheep, goat, donkey, rabbit, chicken, duck, other birds, insects)	GROUP 5 - MEAT, POULTRY AND FISH
G = Fish and other seafood	
H = Eggs	GRUPO 6 - EGGS
I = Green leaf vegetables	GROUP 7 - DARK-GREEN LEAFY VEGETABLES
L = Vegetables that are yellow or orange inside	GROUP 8 - OTHER FRUITS AND VEGETABLES RICH IN VITAMIN A
M = Fruits that are dark-yellow or orange inside	
N = Other Vegetables	GRUPO 9 - OTHER VEGETABLES
O = Other fruits	GRUPO 10 - OTHER FRUITS
P = red palm oil	RECOMMENDED CATEGORY
Q = oils and fats	RECOMMENDED CATEGORY
R = Spices, condiments	RECOMMENDED CATEGORY
S = Salted and fried snacks	RECOMMENDED CATEGORY
T = Other drinks and food like tea without sugar, coffee without sugar	RECOMMENDED CATEGORY

- ***Impact of SAF on nutrition***

Through an analysis of the impact of SAF on the nutrition of children aged 0-5 years in particular, it was found that it has a direct and positive effect on these children beneficiaries of the project

In terms of data, in February 2024 there was a **severe malnutrition rate of 5% in Namacurra and 1% in Maganja da Costa.**

There is a marked improvement in data collected in April 2025, as **both districts have reduced their rate of severe malnutrition to 0%.**

In relation to the percentage of children aged 0-5 years in a situation of moderate malnutrition, there is an important improvement **in Maganja da costa**: in fact, it goes **from 32% of children in a state of moderate malnutrition in February 2024 to 14% in April 2025**

Therefore it is possible to conclude that the agroforestry systems implemented in the Ethaka project have demonstrated the multiple benefits they offer to rural communities, particularly with regard to food security. Diversification of production, improvement in the nutritional quality of food, reduction of production costs and positive impact on children's health are just some of the results achieved. These systems not only promote community resilience, but also ensure a healthier and more sustainable future for future generations.

4.2.2 Soil recovery and regeneration

- ***Impact of soil degradation***

Small and large-scale agriculture in Mozambique often involves felling trees in primary or secondary forests, contributing to a reduction of forest cover.

This process of deforestation is often accompanied by the practice of "slash and burn", post-harvest: these practices further degrade the soil, reducing the content of organic matter and stable humus and other important biochemical properties, crucial for soil fertility. Communities that practice traditional agriculture are thus forced to move and repeat this harmful cycle in new areas, intensifying the environmental impact.

Along with these practices, there is also a tendency to grow a single crop, which does not guarantee the diversification of organisms in the soil or the nutrition of communities. Thus, a degraded soil results in lower fertility and therefore tillable soil and, consequently, poor agricultural production, which affects the nutritional status and health of Mozambican communities, as well as their economic capacity that is strictly dependent on agriculture. Finally, a degraded soil is more vulnerable to natural disasters.

- ***SAFS and soil regeneration***

Successional Agroforestry Systems (SAFS) have demonstrated a significant impact on the regeneration and recovery of degraded soils, which is crucial for long-term agricultural sustainability.

According to analyses carried out in August 2023, the soils in the fields that would be used for the implementation of SAFs showed clear signs of degradation due to unsustainable agricultural practices, such as recurrent burning and monoculture cultivation.

The introduction of SAFS radically changed these practices and started a process of soil regeneration. The change in agricultural practices, such as the adoption of polyculture and the planting of native and fruit trees, promoted considerable improvements in soil quality.

The diversity of cultivated species, with different types of roots, allows the cycling of essential nutrients, improving the soil structure and reducing the need for external inputs. Pruning practices also play a crucial role, as the soil cover resulting from the decomposition of organic matter contributes to the formation of humus, an essential element for soil fertility. By applying these methods, farmers can achieve better results without resorting to the use of harmful chemicals.

Figure 28. Beneficiary in your agroforestry field

- ***SAFS and soil fertility: laboratory analysis***

Laboratory analyses carried out over time confirm the improvement in the main characteristics of the soil, such as its acidity (pH), electrical conductivity (EC), residual density (Dr) and water retention capacity (residual and current humidity). These changes indicate that the soil, previously acidic and of low fertility, has become more neutral and with greater capacity to retain essential nutrients for plants.

Below there is the table that analyzes each of the soil analysis indicators and how each evolved during the implementation of the SAFs, but in general we can conclude that the indicators demonstrate the success of SAFS for soil recovery, once the results of soil analysis reveal:

- a significant increase in the availability of nutrients such as potassium (K), calcium (Ca) and phosphorus (P), essential elements for healthy plant development;
- the increase in cation exchange capacity (CTC), an indicator of soil's ability to retain nutrients;
- the PH is now in its favorable value, the humidity rate is close to ideal;
- an increase in organic matter (O.M.) indicating a general improvement in soil fertility, essential for sustainable agricultural production. In addition, the reduction of the need for chemical inputs reflects the effectiveness of the agroforestry model, which allows natural soil regeneration;

Several factors contributed to this result of the soil analysis. These include: natural nutrient cycles, soil cover, increased soil permeability, soil decompaction, erosion reversal, lignin production and others, in particular, the production of nutritious food continues to be harvested.

Table 2 - Data on the analysis of soil components to determine soil fertility

Indicators	Range of values		Comments
	Jun 2023	Jul 2024	
P: Phosphorus	**[3 - 93 ppm]**	**[8 - 172 ppm]**	P. increased. The increase in phosphorus (P) indicates that this nutrient is more available to plants. Phosphorus is an essential element for plant growth, due to its importance in processes such as photosynthesis, energy transfer and root development. The P. increased. , demonstrating the availability for plant growth
Mg^{++}: Magnesium	**[0,75 - 1,50 cmolc/kg]**	**[0,45 - 1,20 cmolc/kg]**	The available magnesium in soil refers to chlorophyll, the pigment responsible for photosynthesis. According to the values of the first analysis, the levels are good. In the second analysis, Mg^{++} decreased in all fields. The decrease of Mg^{++} provided the increase of Ca^{++}, creating more balance in the system. In this sense, it can be considered that the soil management is being effective in correcting the imbalances at the level of the soil, since the plants present in the fields also do not demonstrate a lack of nutrients.
K^{+}: Potassium	**[0,11 - 0,87 cmolc/kg]**	**[0,95 - 2,31 cmolc/kg]**	The levels of potassium in the soil is a necessary indicator for the good development of plants in the soil. In the first analysisthe levels were good. Still, in the second analysis, the presence of K^{+} in the soil increased in all fields. This increase is an important indicator to ensure soil fertility and plant nutrition.
M.O: Matéria orgânica	**[0.12 - 0.54%]**	**[0,54 - 0.77%]**	The organic matter indicates soil fertility and in the first analysis, O.M. was very low. Nevertheless, with the introduction of SAFS, the O.M. increased in all fields. An increase in organic matter means that the soil is becoming healthier and able to support plant growth. It is a vital aspect for sustainable agriculture and land management.
Ca^{++}: Calcium	**[0,50 - 1,25 cmolc/kg]**	**[0,75 - 1,50 cmolc/kg]**	Calcium is fundamental for the healthy development of plants and, in the result of the first analysis, the availability of calcium is low, thus preventing the development of the plant. In relation to the following analysis, there was an increase in the amount of Ca^{++} present in the soil, which once again confirms the improvement of soil fertility.

EC: Electrical conductivity	[30 - 153 µS/cm]	[110 - 637 µS/cm]	The EC allows us to evaluate the salinity of a soil. Initially the soil was not salinized, although in two communities presented a high value, considering that from 2000 µS/cm the soil begins to be slightly salinized. With the introduction of SAFS, conductivity increased, improving soil conductivity without risk of salinization. In general, the higher the conductivity, more salts and nutrients are present in the soil. However, very high EC values may indicate an excessive level of salts, which can be harmful to plant growth.
V: Base saturation (VSB)	[80 - 89%]	[84 - 95%]	Base Saturation is the % of soil CTC that is occupied by basic cations compared to total CTC. According to the first analysis there is a high availability. Still, the V% increased. A higher V% means that a larger proportion of the negative charges in soil colloids is being occupied by basic cations, which is usually associated with more fertile soil.
PH: Hydrogenionic potential	[5,62/5,31 - 6,70/6,35]	[5,62/6,67 - 7,58/7,27]	Soil pH is a crucial factor for plant health and the availability of nutrients in the soil. Initially, the soils were acidic; after the introduction of SAF, the pH is close to 7, so it can be proven that the soil has a more neutral PH and more favorable to the proper development of plants.
Dr: Residual density	[2,35 - 3,09 g/cm3]	[1,85 - 2,72 g/cm3]	This indicator refers to soil compaction and its ability to retain water and nutrients. Initially, only one of the fields had a high compression, compared to the low compression of the others. With the introduction of SAF, DR decreased, reflecting various soil changes such as increased organic matter, improved soil structure and lower soil compaction.
T: Total Cationic Exchange Capacity" (CTC)	[2,63 - 4,37 cmolc/kg]	[2,81 - 5,78 cmolc/kg]	The CTC evaluates the capacity of soil to retain and exchange cations, which are positively charged ions such as calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^+) and sodium (Na^+). In the first analysis, the analyzed soils have a very low CTC, demonstrating the difficulty in retaining nutrients in the soil. In the second analysis, it is assessed that CTC increased. When the CTC of a soil increases, it means that the soil has a greater capacity to retain essential nutrients for plants, such as calcium (Ca^{2+}), magnesium (Mg^{2+}) and potassium (K^+).
Granulometry			This parameter confirms the composition of the soil: coarse sand, fine sand, silt or silt and clay. As it can be confirmed in the analyses, the soils are mainly composed of fine and coarse sand. Comparatively, in the initial analyses, the soil was composed mainly of fine sand (FS) and, in the second analysis, the fine sand (FS) remains as majority, but also increases the % of coarse sand (CS) and silt (Si). So it can be seen that the soil characteristics are changing.

CH: Current humidity	[1 - 34%]	[0,50 - 4,49%]	This indicator refers to the amount of water present in the soil at the time of measurement. It can be seen that the humidity levels were very low in all fields, except for 2 which had good current humidity levels. Still, in the second analysis, RH increased, meaning that there is a greater amount of water present in the soil. One of the factors for this increase is changes in soil composition that allow the soil to retain more water.
RH: Residual humidity	[0.68 - 4.63%]	[1,63 - 3.54%]	RH refers to the moisture that the soil retains when available water is drained. And initially, analyzing the results we considered that the RH was very low in all fields, ie had low capacity to retain water. In the second sampling, RH increased, meaning that there is more water present in the soil. One of the factors for this increase is changes in soil composition that allow the soil to retain more water.

Tables 3 - 4. Examples of the amount of inputs that were generated by the agroforestry production system

Table 3 - Nevura			
Analysis	**1a.**	**2a.**	**Dif.**
Ca	0,75	1	0,25
mg/dm3 **Kg/ha**	0,25 50,1	200,4 2	50,1 **100,2**
K	0,34	1,94	1,6
mg/dm3 **Kg/ha**	1,6 625,6	391 2	625,6 **1251,2**

Table 4 - Unilicungo			
Analysis	**1a.**	**2a.**	**Dif.**
Ca	0,5	1	0,5
mg/dm3 **Kg/ha**	0,5 100,2	200,4 2	100,2 **200,4**
K	0,11	2,31	2,2
mg/dm3 **Kg/ha**	2,2 860,2	391 2	860,2 **1720,4**

Kg/ha. that the system produced of these elements.

In short, the implementation of Agroforestry Systems, as demonstrated in the Ethaka Project, represents an effective approach to recovering degraded soils, promoting biodiversity and producing high-quality food without dependence on chemical inputs. The long-term sustainability of these systems is evident, since they guarantee soil regeneration, species diversity and the ability to market the products generated in an environmentally responsible way, as it will be seen below

In addition, the results obtained can be corroborated by studies from organizations such as SEMIL, Synergia and Embrapa, which highlight the benefits of SAFs in soil regeneration and biodiversity promotion. In this way, SAFs not only contribute to the food security of communities but also represent a viable and sustainable alternative for modern agriculture, with positive impact on both the environment and local economy.

4.2.3 Climate resilience

Successional Agroforestry Systems are an effective strategic approach to mitigate the effects of climate change and increase the resilience of agricultural production systems. Crop diversification, associated with improved water infiltration in the soil, contributes to the adaptation of agricultural systems, making them more resistant to extreme weather events.

- ***Benefits of soil decompaction***

During the implementation of the project, the soil was decompacted after the demarcation of the beds for planting. This process involved the opening of 80 cm wide and 50 cm deep ditches along the entire length of the bed, with the objective of improving the water infiltration capacity, favoring the growth of plant roots and ensuring soil stability. Although decompaction has required a significant effort, its effects are long-lasting, providing continuous benefits for soil recovery as agroforestry systems consolidate over time.

- ***Benefits of species diversification, especially trees***

The diversity of planted species, which includes dynamic trees, fertilizers, fruit plants and long-lived species, combined with pruning practices and increased organic matter in the soil, ensures sustainability and abundant production over more than 100 years, according to ecological succession.

The presence of trees and the accumulation of organic matter favors the capture of CO_2 from the atmosphere and its fixation in the soil, which contributes significantly to the reduction of greenhouse gases.

In addition, the presence of trees in SAFS plays an essential role in protecting the soil against erosion, reducing the need for fertilizers, since the decomposition of biomass

Figure 29. The beneficiary harvests the fruits of his agroforestry field

fertilizes the soil naturally.

During the implementation of the project, bio-pesticides were also produced with and for communities from natural products. The high density of trees in the systems allows a constant pruning, which results in the increase of organic matter in the beds and the improvement of nutrient retention in the soil, directly benefiting the agricultural crops.

- ***Promotion of biodiversity***

Another significant benefit of SAFS is the promotion of biodiversity, both through the variety of cultivated plant species and the attraction of pollinators and wildlife. This agroforestry model works as an ecological corridor, allowing the regeneration of degraded areas and the restoration of natural biodiversity in the region.

CURIOSITY

- ***Focus on the impact of Cyclone Freddy: the effectiveness of the SAFS system***

Faced with the challenges posed by climate change, SAFS present themselves as a robust solution to mitigate the effects of global warming and adapt agricultural systems to these challenges. The combination of agricultural crops with trees and, in some cases, animal husbandry creates a more resilient and sustainable production system.

The effectiveness of this approach was evidenced during the impact of Cyclone Freddy, which affected the province of Zambezia in March 2023. The cyclone brought heavy rain for six consecutive days and strong winds.

After the cyclone passed, fields cultivated with traditional agricultural methods suffered severe damage due to the absence of trees, which would act as natural barriers, and soil compaction, resulting in flooding of the fields and total loss of crops.

In the SAFS system the diversity of tree species, which act as natural barriers, together with the stratification of vegetation at different levels, significantly reduced wind intensity and minimized its impacts on plantations.

Figure 30. Situation of non-agroforestry fields after cyclone Freddy

The soil decompaction, carried out in the initial phase of the project, contributed to greater soil permeability, allowing better absorption of rainwater and reducing flooding and damage to culverts. The diversification of species in SAFS ensured that not all plants were affected in the same way, allowing families to continue having food available as opposed to traditional fields.

Figure 31. The situation two weeks after the passage of Cyclone Freddy.

In addition, the recovery capacity of ecosystems in SAFS was remarkably superior to that of traditional fields, which faced long periods of recovery. The fast and efficient regeneration of SAFS demonstrates the importance of this approach in strengthening the resilience of productive systems. Therefore, SAFS not only promote soil recovery and biodiversity, but also play a crucial role in preserving ecosystems. They are strategic allies in mitigating the effects of climate change, since they contribute to carbon sequestration, protection of water resources and improvement of soil fertility. In this way, the SAFS are configured as a sustainable solution of great relevance for coping with current climate challenges.

4.2.4 Income generating activities

The ETHAKA Project has contributed significantly to the promotion of income-generating activities through the implementation of Successional Agroforestry Systems (SAFs).

- ***Introduction of different types of SAF and diversification of sources of income***

These systems were structured in several typologies, aiming at the productive diversification and improvement of the quality of life of rural families, as seen previously in cap. 3.

As part of the interventions carried out:

- in Namacurra, four SAFS camps were implemented, totaling an area of 4,200 m², plus 2,000 m² dedicated to fish farming.
- in Maganja da Costa, four SAFS camps were established, covering an area of 2,400 m², plus 800 m² for fish farming

- the project built 15 fish farming tanks and distributed 16 beekeeping kits to 32 beneficiaries.

With the implementation of SAFS and the distribution of beekeeping kits, the project now benefits 245 people, creating new sources of income for families that previously depended exclusively on subsistence agriculture.

According to the information collected in the surveys carried out at the communities, it was possible to verify that the introduction of the different typologies of SAFs, together with apiculture and resulting in the emergence of new economic activities in communities.

Figure 32. Beneficiaries in SAFS fish farming tanks

Among the sources of income generation, it should be highlighted:

- beekeeping
- fish farming
- sale of agricultural surpluses
- livestock

It is also worth noting that many families are now producing yield crops, such as rice and sesame/sesame, which generate a significant revenue of up to 1,500 MTN per bag.

This impact is particularly notable, since before the start of the project agricultural production was predominantly geared to household consumption, and income sources were mostly external, coming from wage labor and commercial activities.

Based on data collected before the start of the project, it was observed:

- **an increase of 16% in food crop production in Namacurra.** Specifically, **the average production per producer increased from 1,221 kg to 1,253 kg,** with emphasis on rice and sesame crops, which generate revenue, as well as food crops such as corn, beans, peanuts and tomatoes.
- **an increase of 87% in the production of food crops in Maganja da Costa.** Specifically, **the average production went from 692 kg to 1,014 kg per producer,** with a notable increase of 87%, covering food and yield crops such as corn, beans, peanuts, tomatoes and okra.

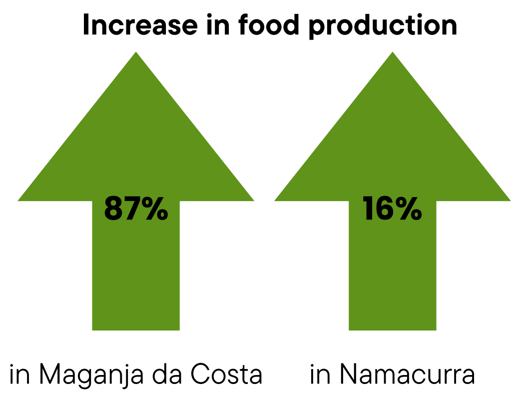


Figure 33. Increase in food production

Additionally, after the passage of cyclones through the region, it was possible to observe that although there were losses in vegetable crops, recovery was significantly faster in areas with SAFs, with an increase of 18% in production compared to traditional especially in Maganja da Costa.

Another relevant factor is the increase in cultural diversity. Using the Farm Diversity Score indicator, it is observed that in the initial stages of FAS implementation (June 2023), beneficiaries cultivated only 13 - 15 types of crops, focusing on cereals, tubers, roots and some vegetables. Based on data collected in July 2024, this diversity has increased significantly since the introduction of SAF:

- **the beneficiaries of Maganja da Costa have gone from 13 to 20 varieties**
- **the beneficiaries of Namacurra have gone from 15 to 26 varieties**

These new crops have generated nutritional benefits, promoting nutritious recipes and increasing income, as in the case of sesame and fruits. Timber and fruit trees, in addition to contributing to food production and yields, also play a crucial role in the natural fertilization of the soil through pruning.

Each demonstration field of the project included planting more than 100 trees of different species, including fruit and timber, such as cashew tree, orange tree, mango tree, tangerine tree, guava tree, moringa, eucalyptus, among others. These trees not only contribute to the diversification of production, but will also ensure future income from the sale of wood when SAFS reach its mature stage.

- ***Impact of SAF on the income of ETHAKA beneficiaries***

In addition to the diversification of sources of income, the introduction of SAF system allowed an improvement in the income of the beneficiaries of the Ethaka project

Figure 34. Fruits harvested from agroforestry fields

Comparing the data collected respectively in June 2023 (referring to the agricultural season 2021-2022) and in May 2024 (referring to the agricultural season 2023-2024), it is observed an **increase of the average income of men and women from 12.320,5 MTZ to 13,722 MTZ** and a **much larger increase in the average income in Maganja da Costa from 11,736.5 MTZ in June 2023 to 17,783.5 MTZ** (in particular, absolute female income more than tripled, from 4,207 to 13,778 MTZ - an increase of 227%). This shows that the June data, referring to the 2021-2022 agricultural season in which the SAF had not been implemented yet, had a good increase once detected in May 2024 as it refers to the 2023-2024 season, when the SAF begins to have its first development.

Finally, it is possible to further validate this trend of income growth in proportion to the progress of the SAF system by analyzing data from April 2025, referring to the last months of the agricultural season of 23-24 and the first months of the 2024-2025 season.

These figures show a further increase in income in Namacurra: indeed, there is an overall **growth in the average income of men and women from 13,722 to 23,832 MTZ**, in particular, there was a strong increase in the absolute income of women from 9,022 to 21,486 - an increase of 138%).

This shows how, as the implementation of SAF and its productivity progress, there is an increase in the income of the beneficiaries of this project.

In short, SAFS have proved to be an effective tool in promoting income-generating activities, contributing to economic diversification, increased agricultural production and ecological recovery in rural communities of Zambézia.

By integrating sustainable and regenerative practices, SAFs not only improve families' food security and quality of life, but also strengthen rural communities' resilience to climate and economic challenges, making them more self-reliant and sustainable.

4.3 Conclusions

The Ethaka project, focused on the implementation of Successional Agroforestry Systems, has demonstrated remarkable advances in several areas, standing out as an innovative and effective **solution to promote food safety, environmental regeneration and income generation** in Mozambique's rural communities. The results obtained so far reflect the transformative potential of SAFS, being a sustainable alternative for agricultural development in rural and challenging contexts.

- **The diversification of agricultural crops,** promoted by SAFS, has been one of the central pillars for improving food availability in communities. With the inclusion of varieties such as corn, cassava, beans, vegetables and fruits, there was a significant increase in food supply, which resulted directly in reducing child malnutrition and improving living conditions. These diversified agricultural practices have contributed not only to food security but also to the nutritional health of rural families.
- In terms of **environmental recovery**, SAFS have demonstrated effectiveness in the regeneration of degraded soils. Areas previously affected by compaction and low fertility showed visible improvements in soil properties, such as increased organic matter and reduced compaction, key elements for the recovery and maintenance of fertility over time.

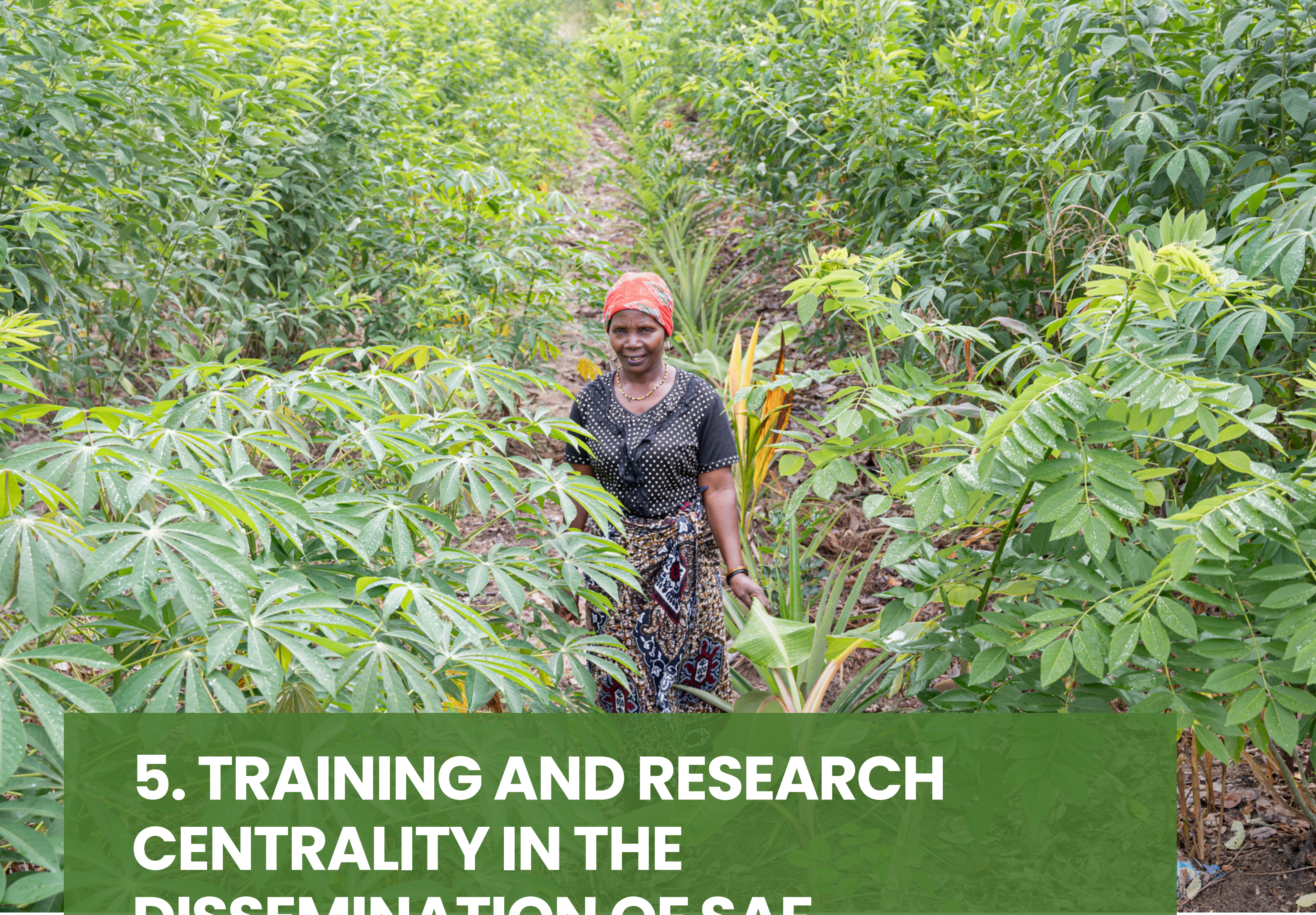
Biodiversity has also been enriched, with the increase in the diversity of local fauna and flora, and carbon capture by trees contributed to climate change mitigation.

- In addition, the SAFS have shown **remarkable resilience to climate change.** The retention of water in the soil and the diversification of crops have allowed farmers to maintain production under adverse climatic conditions, such as drought and heavy rains, recurrent characteristics in the province of Zambézia. This feature makes SAFS an effective strategy for increasing food security and resilience of rural households to the impacts of climate change.

Figure 35. Beneficiary with fruits harvested from agroforestry field

- The introduction of complementary activities such as beekeeping and fish farming has been an important **additional source of income for families.** The economic diversification generated by these activities, together with high-value crops such as rice and sesame, has contributed to the financial diversity of communities.

However, it is important to highlight that in order to ensure the continued success of SAFS, **regular maintenance and implementation of appropriate technical knowledge by communities are necessary**. Technical training and continuous monitoring are essential for the effective management of systems throughout their life cycle. Although some level of technical involvement is required, the initial investment in SAFS is very low compared to the long-term benefits they offer. Over more than 30 years, farmers can achieve sustainable yields, making the SAFS model not only an environmentally sustainable solution but also a viable long-term economic strategy.



5. TRAINING AND RESEARCH CENTRALITY IN THE DISSEMINATION OF SAF ACCORDING TO ICEI: THE CISAF

- ***The potential of SAFS***

The Successional Agroforestry Systems offer an innovative and sustainable solution for future agriculture. Their ability to regenerate soils, improve biodiversity, mitigate the effects of climate change and promote low environmental impact agricultural practices makes them a viable and necessary alternative to the current challenges of agriculture in Mozambique. From an economic point of view, SAFs ensure food security and financial stability for rural communities, as well as promote the diversification of sources of income and reduce dependence on monocultures.

In order for this model to expand effectively, it is essential to create sustainable local markets that enable the marketing of agroforestry products such as honey, vegetables and medicinal plants. Partnerships with local organizations and the improvement of transport and storage infrastructures are essential to ensure that these products reach the market effectively and fairly, generating economic opportunities for the communities involved in the project.

From a social point of view, SAFS have the potential to significantly improve the quality of life of rural communities through the availability of fresh and nutritious food, which not only combat malnutrition but also promote communities' self-sufficiency, encouraging the transmission of knowledge and the involvement of new generations in agroecological practices. Furthermore, the connection between environmental protection and economic development creates a virtuous cycle in which growth and conservation reinforce each other.

Figure 36. Beneficiaries in their agroforestry field

The expansion of the SAF model to the entire country will require a joint effort of political advocacy, scientific research and international cooperation. The institutional recognition of SAFs as an effective strategy for environmental recovery and food security will be crucial to securing the necessary government support. The active participation of researchers and cooperation agencies will also be essential to finance and expand this model in other regions of Mozambique

- ***Challenges in the implementation of SAFS***

To ensure the effective implementation of Successional Agroforestry Systems (SAFS) in Mozambique, it is crucial to address the challenges associated with their implementation and identify concrete strategies to overcome them. Despite the growing recognition of the agroecological benefits of these systems, there are still obstacles that limit their adoption on a large scale.

One of the main challenges is the lack of institutional recognition of SAFS as a priority strategy within the country's agricultural and environmental policies. Without solid government support, its expansion is dependent on isolated initiatives and projects funded by international organizations, which compromises long-term sustainability. To overcome this barrier, it is essential that SAFS be formally integrated into public policies, ensuring financial incentives, subsidies and technical support for farmers interested in the transition to more sustainable systems. The creation of specific regulations can facilitate this process, making SAFS a viable alternative within national guidelines for sustainable agriculture and climate change mitigation.

Another relevant challenge is the difficulty in marketing agroforestry products. Although the SAFS promote productive diversification, many farmers face problems in placing their products on the market due to lack of logistic infrastructure, marketing networks and access to credit. Without efficient production flow channels, the economic benefits of SAFS may be limited, discouraging their adoption. To overcome this barrier, it is necessary to strengthen the value chains associated with SAFS products by promoting partnerships with the private sector, cooperatives and fair trade organizations. In addition, investments in infrastructure such as roads and storage centers are fundamental to ensure that agroforestry products reach markets efficiently and competitively.

Overcoming these challenges requires an integrated approach that combines efforts of policy advocacy, scientific research, community empowerment and sustainable market development. Only with a comprehensive strategy it will be possible to transform the SAFS into a viable and widely adopted alternative, contributing to environmental regeneration, food security and economic strengthening of rural communities in the country.

Figure 37. Beneficiaries in agro-forestry areas

- ***How ICEI responds to these challenges: the CISAF***

Within the scope of dissemination and implementation of SAFS, which can help overcome the various challenges in Mozambique due to its numerous benefits (as seen in previous chapters), ICEI is developing the CISAF - Center for Research in Agroforestry Systems: a strategic initiative that aims to strengthen research, technical training and dissemination of good practices in the agroforestry sector.

CISAF arises from the need to consolidate the knowledge generated over the years about SAFS, offering a space dedicated to experimentation, innovation and training of farmers, technicians and local institutions, as well as to the promotion and implementation of this system. In fact, it will also contribute to the objective of expansion of Successional Agroforestry Systems throughout the country. Through CISAF, therefore, the objective is not only to improve the implementation and management of existing agroforestry systems, but also to promote solutions for global challenges of food security, sustainable development and adaptation to climate change.

Thus, the CISAF, located in the province of Zambézia, will be the center responsible for training, awareness and dissemination of the importance of these innovative systems, while ensuring the sustainability and expansion of the model.

Figure 38. CISAF Project

To this end, the following main objectives have been established:

- **Training and Capacity Building:** CISAF should consolidate itself as a centre of excellence at provincial and national level, providing continuous training and extension activities for district, provincial and national technicians, academics and university students, promoting the domain of Agroforestry Systems. Training should be integrated with innovative practices, ensuring the technical and theoretical qualification of the parties involved, focusing on the dissemination of knowledge about sustainable agriculture and integrated management of natural resources.
- **Applied Research:** CISAF should encourage research and experiments to adapt the SAFS model to different contexts, ecosystems and specific needs, promoting the development of technical solutions and local strategies for sustainable management of natural resources. Continuous innovation will be key to replicating the model in other regions of the country.
- **Promotion and Dissemination:** To ensure that the environmental, social and economic benefits of SAFS are recognized, involvement in awareness campaigns and exchanges of good practices, as well as dissemination events will be essential, in order to encourage the adoption of the model as a sustainable and viable solution. The integration of environmental and economic perspectives is fundamental to engage all social and political actors.
- **Community Adoption:** In order for the SAFS model to spread effectively, it is necessary to promote community adoption. The CISAF should work with rural farming communities to encourage sustainable changes in behaviour, focusing on agricultural practices that respect the environment and promote social well-being, improving the living conditions of farmers and the general population.

- **Reforestation and Conservation:** CISAF should be a catalyst in the preservation of biodiversity and reforestation of degraded areas, focusing on the recovery of natural ecosystems and the protection of indigenous species. This action will not only ensure the environmental resilience of the regions involved, but also contribute to food security and sustainable rural development.

In terms of management, the CISAF will have the collaboration of two committees: a scientific one, which will take care of the technical aspects and research on the SAFS, and another management one, in charge of the general administration. The composition of these committees will be based on training in agroforestry issues and advocacy, providing a broad and strategic approach.

In addition, CISAF should promote partnerships with legal authorities from the agriculture, environment and forests sector, universities, research institutions and humanitarian organizations, in order to increase the impact and ensure the sustainability of the project.

6. CALL TO ACTION: BE PART OF CHANGE

Environmental protection and adaptation to climate change pose global challenges, but it is in local communities that we can make a difference. We all have rights, but more importantly, we have duties towards our environment and future generations. The Successional Agroforestry System offers an innovative solution that can not only mitigate the consequences of climate change, but also contribute to Mozambique's sustainable economic, social and food development without compromising agricultural progress.

To ensure the successful implementation and expansion of the Sucessional Agroforestry System (SAF), it is essential that different sectors of society contribute in a coordinated and effective manner.

- **Government and local authorities:** SAF should be integrated into agricultural and environmental policies by promoting financial and tax incentives for farmers who adopt sustainable practices. In addition, it is essential to strengthen technical assistance, invest in research and ensure land security to facilitate the transition to agro-forestry models.

- **Non-governmental organizations (NGOs):** NGOs can play a key role in training and empowering farmers, mobilizing resources and raising community awareness of the benefits of SAFS. In addition, they can promote cooperative networks between farmers and researchers for the exchange of knowledge and good practices.
- **Farmers and local communities:** they are the protagonists of this change. The adoption of SAFs can improve the resilience of their production, increase soil fertility and ensure greater food security. By sharing experiences and collaborating with other institutions, they can strengthen the implementation of these practices and drive sustainable development in their regions.

The implementation of SAF requires a joint effort. Each actor has an essential role in creating a more sustainable and productive future for Mozambique.
To make SAF become a reality and expand successfully, it is critical that everyone, governments and local authorities, communities, academia, civil society organizations and the private sector, engage and take an active role. The transition to sustainable agricultural models cannot be achieved without a collective effort and committed leadership.

This document serves as a basis for action and reflects the environmental, food and economic sustainability objectives that SAF can achieve. Its national and regional expansion depends on the adoption of public policies, the dissemination of scientific knowledge, the creation of incentives and international cooperation to ensure access to financial and technical resources.

Change begins with each of us. Join ICEI and be part of a sustainable and prosperous future where agriculture and the environment coexist in harmony.

Figure 39. Beneficiaries cultivating the SAF field

This advocacy document was prepared within the project:

Clima de Mudança: a way to create and strengthen an environmentally conscious generation in Mozambique

CLIMA DE MUDANÇAS

Implemented by:

Cofinanciado pela União Europeia

WeWorld GVC

ICEI

Centro Terra Viva
Estudos e Advocacia Ambiental

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OPTIMIZE
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And within the project:

Ethaka - a sustainable agricultural production and consumption model for climate resilience and food and nutrition security.

ETHAKA

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AGENZIA ITALIANA PER LA COOPERAZIONE ALLO SVILUPPO

ICEI