The Climakers
Stories from the field

AFRICA SPECIAL EDITION

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THE CLIMAKERS

October/November 2022

Graphic Project ZOWART

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FORWARD

Despite the diversity that characterizes farmers in every corner of the world, they are united by a single and imminent challenge: climate change.

In particular, Africa is suffering more than other regions the effects of extreme weather events. Africa represents an area where climate change can amplify already endemic problems, to the point of crossing thresholds of habitability and survival. Heat waves have recently been documented on the African region and an increase in their intensity is expected in the future. Combined with prolonged droughts, this can lead to difficulties in the growth of crops, even to their total loss.

Farmers are experiencing climate change impacts and its effects on a daily basis, revealing the fragility and vulnerability of current food systems. Yet, inaction is not an option for those who work to keep people fed, and they have had to strive to find practical and feasible solutions.

It is in these practices that the potential of farmers lies. With their experience and knowledge, they are a valuable resource for their communities and a hope for environmental conservation and protection.
Indeed, African farmers contribute about 80 per cent of the food produced on the continent, which helps sustain the food security of about 1.37 billion people in Africa.

This volume collects all the successful responses implemented by the farmers by drawing on several workshops that took place on the African region, with the aim of providing an opportunity to disseminate farmers' experience in terms of resilience as well as contributing to shape global, regional and national policy strategies.

The solutions already exist in the knowledge and experience of those who have lived and worked on the land and with nature for generations, and thanks to farmers all governments have access to them. Now, we need to invest and scale them up. Investing in agriculture means having a healthy planet for healthy people.
For this reason, ahead of the forthcoming Climate Change Conference in Egypt (COP 27), The Climakers Alliance joined forces and focused their efforts on ensuring that agriculture is at the centre of the debate on climate change.

Beyond the climate crisis, the African region is facing a further serious condition resulting from the conflict in Ukraine. African countries are suffering a strong exogenous shock, characterised by soaring food, fuel and fertiliser prices. Shortages of staple food and agricultural inputs, coupled with increased difficulty in accessing markets, spells food insecurity as a dramatic emergency.

Agriculture plays a crucial role in Africa's economic and social development and it is imperative to promote those practices capable of achieving all three dimensions of sustainability, starting with those solutions grounded and deeply rooted in what farmers are already doing to improve adaptation and mitigation to climate change.

To this end, the central question was Please highlight the results of the best practice in terms of agricultural yield, social, economic and environmental benefits.

However, the main driver behind success lays in the partnership of all relevant actors in the food value chain, starting with the fundamental role of research and science. The CGIAR Research Program on Climate Change, Agriculture and Food Security, Scientific member of the Alliance, ensures from practice to practice that these actions are science-based. We are proudly sharing this knowledge to showcase how resilient and robust the agricultural community is.

FARMERS' ORGANIZATIONS

WORLD FARMERS' ORGANISATION

AACARI

SACAU

CEJA

EAFF

UMNAGRI

PAFO

IPNLF INTERNATIONAL POLE & LINE FOUNDATION

PRIVATE SECTOR ASSOCIATIONS

ISF International Seed Federation Seed is Life

CropLife International

UNIVERSITIES AND RESEARCH CENTERS

CGIAR

RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CCAFS

MEDIA PARTNERS

FARMING FIRST

MULTI-STAKEHOLDER PARTNERSHIPS

The Food and Land Use Coalition

TECHNICAL PARTNERS

TAIWAN ICDF

IDACA JA Group

CIVIL SOCIETY ORGANIZATIONS

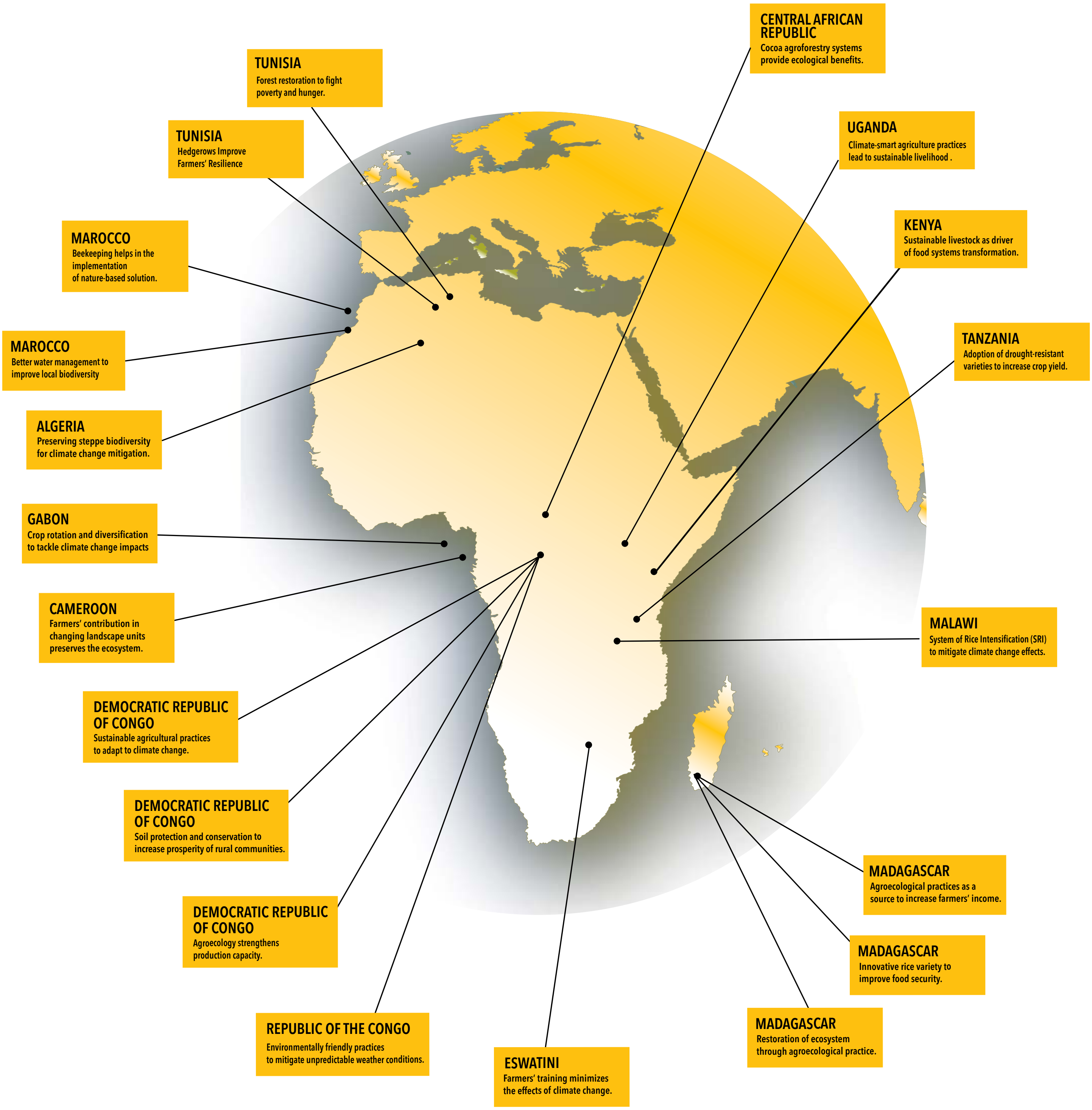
csayn Climate Smart Agriculture Youth Network

Procasur Harvesting Innovations, Spreading Opportunities.

INTRODUCTION

Farmers are the only economic actors in the world who are able to mitigate and adapt to climate change at the same time. None in the world is more vulnerable to climate change than the farmers and no other economic actor can do more in a short window of time to address it than the farmers: they are at risk because of extreme weather events, which threaten their production and revenues, especially in some areas that experience high levels of food insecurity already. At the same time, farmers must feed the planet, produce energy and clothes and ensure the survival of humankind. Although the agricultural sector is often identified as one of the causes of the climate change, farmers hold an important part of the solution. In fact, they have a unique practical expertise, a combination of formal education, traditional knowledge and experience from living and working on the land and with nature that allow them to be key actors in successfully tackling the climate change challenge. The Farmers Driven Climate Change Agenda promotes a bottom-up paradigm in the policy-making process on climate change in agriculture, where the Nationally Determined Contributions, NDCs, are based on the best practices that farmers have already identified as successful, built on new science-based solutions and are aligned with farmers' needs to achieve the economic, social and environmental viability of the wider agricultural sector. The Climakers are the members of the Farmers Driven Climate Change Alliance, namely the farmers of the world, who are leading this initiative and other stakeholders – including private sector, civil society, research centres, multilateral organizations – that are committed to provide bottom-up, pragmatic and successful solutions to climate change.

Stories from the Field



Algeria

PRESERVING STEPPE BIODIVERSITY FOR CLIMATE CHANGE MITIGATION

Presenter

Association La terre Verte Ain Sefra

Description

This project aims to contribute to the rehabilitation of fragile ecological systems: Stipa tenacissima and the Atlas pistachio (Pistacia atlentica) in the Ain Sefra region, for their conservation and multiplication, as they are emblematic species and the most threatened. Steppes with Stipa tenacissima (Alfa) - species considered as medicinal, pastoral and industrial plants - have lost 94% of their area since 1978 (Hourizi et al, 2017). The objective is to establish a pastoretum in a set-aside area, which will be planted in the same ecological conditions of the rangeland concerned by the rehabilitation. In addition, the seedlings, produced at the nursery, will be transplanted to the pastoretum in large numbers in order to create a favourable environment for the multiplication of living seeds, motivate biodiversity and mitigate climate change and degradation. The other quantity will be sent to the local communities associated in this project, for wide dispersion in the intervention area for the purpose of their conservation and preservation.

A micro-bank of seeds of Stipa tenacissima and Atlas pistachio treehas been established, with an inventory and database of all scientific and technical information on each taxon to support scientific studies.
Three hectares of Stipa tenacissima and 1,000 seedlings of Atlas pistachio are planted in the pastoretum and degraded rangelands to contribute to the multiplication and rehabilitation of steppe plant species "Stipa tenacissima and the Atlas pistachio tree".

Results

- A floristic inventory of "Stipa tenacissima and the Atlas pistachio tree" is elaborated on the region of Ain Sefra.
- A map of the distribution area of Stipa tenacissima and the pistachio tree of the Atlas was made.
- A data sheet of "Stipa tenacissima and the Atlas pistachio tree" is elaborated to constitute a scientific database.
- A strategy adopted and adapted by local actors to protect the areas of Stipa tenacissima and the Atlas pistachio.
- A micro-bank of seeds of Stipa tenacissima and the Atlas pistachio tree established.
- A production nursery of 12 m x 8 m established.
- 03 hectares of Stipa tenacissima and 1,000 seedlings of Atlas pistachio are planted in the pastoretum and degraded rangelands.
- Farmers (30), herders (20), women (10), members of associations (20) and agents of the institutions concerned (10) in the project area are trained and informed and become aware of the danger threatening local biodiversity and how to deal with it.
- Farmers (30), herders (20), women (10), agents of the concerned institutions (10) and members of the Associations (20) of the project area practice the plantation of Stipa tenacissima and the Atlas pistachio tree.
- The 03 green clubs of 75 schoolchildren are installed and are active.
- 30 farmers, 20 agro-pastoralists, 20 villagers or Bedouins and 75 school children are sensitised on the need to preserve biodiversity in the region (conference-workshop). The action of preserving steppe biodiversity for climate change mitigation is popularised and publicised.
- Information on the action and preservation of biodiversity and the environment in the steppe area in Ain Sefra.

Climate smartness[1]

In the Ain Sefra region, two elements that are key to the successful adoption of CSA practices and technologies over time were addressed. On the one hand, the exhaustive work of recognition and classification of the relevant species, its habitat, characteristics, etc., allows a greater appropriation of the endemic flora and fauna by actors engaged. This assumes that stakeholders are now more aware of particular socio-economic, cultural and environmental importance of these species for the region, therefore increasing their perceived value (N'Danikou et al., 2011). This also encourages changes in the behavioral patterns of producers and consumers, with implicit advantages to building up adaptation capacity in the community. On the other hand, a key element is co-design, ensuring the engagement and participation of local actors throughout the whole process of the initiative, making room for knowledge exchange opportunities integrating theory with practice. Understanding of the existing components of the agroecosystem and their interactions ease the analysis and decision-making processes facilitating the prioritization and implementation of adaptation and mitigation strategies by farmers. An example of this are the seed banks, a practice that materializes the different CSA outcomes, strengthening the supply of locally adapted planting material to ensure food security, and minimizing the need to acquire external inputs (adaptation), with potential reductions in the carbon footprint associated with the management of the farming system or restoration of a degraded habitat.

1 This is done in the framework of climate-smart agriculture (CSA) approach. Climate-smartness in agriculture means understanding impacts of climate change and variability along the agricultural activity, which includes planning of what crop to plant, when to plant, what variety to plant and what type of management practices are needed to reduce impact on the environment (e.g. emissions reduction), maintain or increase productivity (e.g. yields) while increasing resilience and improving livelihoods.

CAMEROON

FARMERS' CONTRIBUTION IN CHANGING LANDSCAPE UNITS PRESERVES THE ECOSYSTEM

CNOP-CAM

CONCERTATION NATIONALE DES ORGANISATIONS PAYSANNES AU CAMEROUN | NATIONAL CONSULTATION FORUM OF FARMERS' ORGANISATION OF CAMEROON

Presenter

BINI Michel from CNOP-CAM

Description

To prevent flooding during the rainy season, farmers clean the central hemispheres (water bed) and collectors by weeding regularly. They also build concrete water bastions (monks) to stop the water by creating waterfalls when they are full. This system allows water to infiltrate the soil, creating permanent moisture and having water available to water plants during the dry season. During the dry season, when water is scarce because the rivers dry up, farmers dug water wells that serve as a reservoir. These wells reduce the distance between plots away from the waterway and facilitate irrigation.

As a major resource for reducing emissions and addressing climate change, the soil is also an important asset. There are two types of measures developed by farmers in soil management: the simultaneous exploitation of different landscape units and the change of plot sites.

The exploitation of landscape units

One of the primary responses of farmers to ongoing climatic events in their country is to use more than one landscape unit to manage the risks of these events and minimise their adverse effects.

Change of site of plots

In response to the heavy consequences of climate deterioration, notably prolonged droughts and floods, some farmers take the option of changing landscape units. This is a strategy that requires a good availability of land for all, which is still not obvious because of the land pressure that is developing in the countries. This strategy is replaced by the simultaneous exploitation of landscape units and the relocation of crops, which are more developed by the farmers.

Results

- More than 3000 farmers have benefited from the implementation of these practices.
- Availability of products during all seasons.
- Small-scale farmers produce sustainably on the same areas and achieve good yields through agro-ecological methods.
- Fruit farming with medium-term crops.
- Sustainable provision of food.
- Development of improved fallow to ensure food security.
- Strengthening production capacities.
- Preservation of the ecosystem.

Climate smartness

The approach in this story is inspired in natural ecosystem dynamics. This recognizes the heterogeneity of the productive parameters within and specific area or landscape, as well as its variation from one area to another in order to project what in principle could function as a crop rotation but in a larger and more complex geographical/spatial scale. Nevertheless, preserving the same underlying concept related to boosting of biodiversity (beyond species of agricultural interest) and reducing the vulnerability to climatic hazards in strategic areas. As mentioned above, a key aspect to be considered is the availability of land, for this reason, it is imperative that permanent dialogue scenarios between all actors of the territory are ensured and operate under common governance. This, recognizing and framing the ecological, socio-economic, cultural and policy-institutional characteristics of each place so that sustainable planning and management of the territory can be carried out through participatory mechanisms and stronger cooperation agreements between public and private actors to continue harvesting successful experiences toward food security and adaptation goals. Finally, sustainable water management technologies and synergistic agroecological practices implemented, are likely to support more stable and multi-functional landscapes going beyond the achievement of food security indicators, materializing co-benefits around adaptation and mitigation outcomes, that can be further explored and evidenced, finding entry points to leverage he dignity and evolution of rural livelihoods.

COCOA AGROFORESTRY SYSTEMS PROVIDE ECOLOGICAL BENEFITS

Presenter

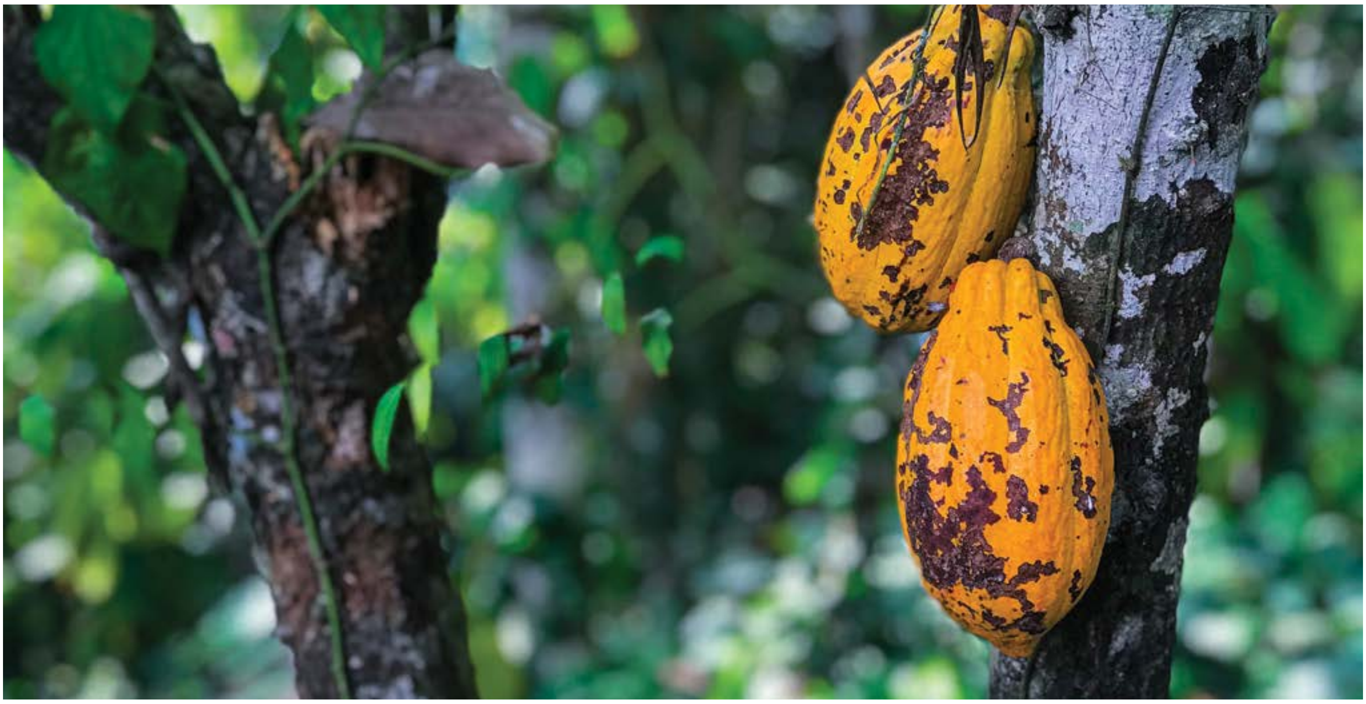
HAMADOU DAMALA from CNOP-CAF

Description

Central African Republic is one of the most vulnerable to climate change, characterized by increased temperatures, torrential rains, flood and drought.

Farmers have adopted agroforestry techniques at the landscape level through promoting good agricultural practices, the distribution of trees, or the deployment of certification. Agroecological intensification of cocoa production with the restoration of orchards based on agroforestry techniques helps increase production without deforestation or forest degradation. This practice is based on the co-construction of technical itineraries of the current practices of coffee farmers enriched with relevant experiences with associated species.

Agroforestry is used to protect remnant natural and fight deforestation and forest degradation, including restoring natural forests that have been degraded by cocoa production. A landscape-level approach places agroforestry in the broader context of environmental sustainability, resilience, climate change mitigation, and adaptation strategies. It also integrates various products besides cocoa, such as food, non-timber forest products, and timber. These agricultural techniques provide environmental benefits such as stable water supply, habitats for pollinators, improved soil quality, wildlife corridors, and control of pests and diseases such as the cocoa shoot virus.



Results

Cocoa agroforestry systems provide a wide range of ecological benefits: biodiversity conservation of flora and fauna, carbon sequestration, preservation and enhancement of soil moisture and fertility, contribution to pest control, microclimatic management such as rainfall stimulation, and many other benefits.
More than 100ha have been cultivated according to agro-ecological standards.

Climate smartness

This story from the field tells us about the multiple interactions and benefits of agroforestry systems on CSA outcomes. It is worth highlighting the importance of agroforestry systems in the diversification of farm production systems, which not only facilitates the operation and maintenance of ecosystem services in a territory, but also stimulates the possibilities of generating farmer-owned business where the different outputs and inputs of the agricultural activities can be used and recirculated within the same system. This allows unveiling action points where new efforts can be focused to implement potential activities adding value throughout the different stages of the value chains. In this sense, to achieve effective adoption of CSA practices, it is fundamental to maintain and stimulate educational processes from and for the community, across different fields of knowledge and multidisciplinary perspectives. Particularly in adequate spaces that enable effective dialogue for sharing traditional and scientific knowledge, catalysing actions to materialize these opportunities. This kind of local alternatives also entail mitigation avenues as they contribute to minimize GHG emissions resulting from the intensive use of external/synthetic inputs for cocoa or livestock management, which in turn reduce carbon footprint per unit of product.
At all events, agroforestry systems continue to be a potential practice to progressively modify and regulate micro-climate conditions in the agroecosystem. While in parallel it removes carbon from the atmosphere or fixing it both in the aerial biomass (notably in woody species) and belowground through the roots and the organic matter that is gradually accumulated in the soil, which will ultimately enrich its carbon stock.

Democratic Republic of Congo

SUSTAINABLE AGRICULTURAL PRACTICES TO ADAPT TO CLIMATE CHANGE

Presenter

CONAPAC

Description

The effects of climate change are evident in the activities of farmers. Climate change is reflected in rainfall patterns, which affect the agricultural calendar and disrupt farming activities. This results in lower yields and, therefore, lower incomes and keeps farmers in poverty. COVID 19 has affected the agricultural sector disruptively worldwide, with farmers asked to keep working to ensure food security and a burden on the entire food value chain to function properly while facing operational obstacles. Undoubtedly, the pandemic outbreak has coupled with climate challenges, increasing pressure on fragile agricultural systems.

The promotion of sustainable agriculture is part of the climate change adaptation process, consisting of:

- Promote conservation agriculture and the practices developed by UDPKIS: CONAPAC advocates conservation agriculture, which is practiced in particular by UPDKIS in the province of Tshopo, around Kisangani; it consists of the use of no-till farming, and in the forest without felling trees.
- Develop agroforestry, diversify the models starting from the one in Mampu.
- Share the experience of the natural regeneration and land clearing developed by WWF DRC.
- Train farmers in fire prevention and anti-fire brigades; and in firebreaks combining crops.
- Support for community forestry and the agricultural sedentarisation of the families concerned, search for financial means to support this change.
- Develop compost production, crop rotation with leguminous plants, and other organic matter production systems, and extension on these subjects.
- Develop perennial cocoa, coffee, oil palm, and strengthen the value chains of these critical sectors;
- Practice permaculture by some farmers.
- Cultivation of earthworms to use the waste as a sanitary plant protection product for coffee cultivation and as fertilizer.
- Choice of more environmentally friendly products, Abandonment of chemicals in favour of biological (e.g., biocontrol) or mechanical methods, less impact on the environment, Self-regulation of pathogens by the unrestored agro-ecosystem.
- Soil protection and conservation practices in the fields by terracing along the contour farming measured by the "A-triangle," reducing the speed of run-off water by diverting it to the field, improving the ridging system which is more pronounced with row seeding, ridging, judicious choice of cover crops, ploughing against the slope.
- Vermicompost, like conventional compost, has many benefits for agricultural soils, including increasing their ability to retain moisture and nutrients, improving their structure, and providing higher levels of microbial activity.

Results

The use of better agroecological practices has led to increased yields of agricultural products, increasing farmers' income. Additionally, these sustainable practices have positively influenced agricultural production with high output. For example, in Goma, potatoes increased from 1 bag for 2 to 3 bags before these good practices and from 1 bag to 6 to 9 bags afterward.

Climate smartness

There are several elements in this case that positively impact Climate-smart pillars. In addition to the abovementioned benefits on yield and income from implementing diverse CSA practices, it is important to highlight the diversification of the production systems that not only contribute to the yield increase found, but also allows farmers to better adapt to changing climate and market conditions by having a wider range of tradable products. In this vein, integrate a value chain approach also helps to improve farmers' livelihoods, for example, the progressive substitution of synthetic agrochemicals by local production and use of compost and vermicompost, represent both socio-economic and environmental advantages. These organic options often represent profitable sources of nutrients for crops while reduces the carbon footprint from manufacturing, transport, application and disposal of synthetic compounds. These alternatives, in combination with woody species within agroforestry systems are also beneficial for the biological activity of the soil that results in its short- to long-term health and therefore its ability to store carbon both in the soil and in aerial biomass. As a complement, contour farming techniques minimize soil erosion. Conservation agriculture and permaculture are also relevant to integrate additional crop management practices and approaches that allow producers and consumers to understand the different elements and interactions that make up the agroecosystem. Favouring the maintenance of various ecosystem services of interest to society, e.g., pollination, regulation of water cycles and provision of food, medicine and raw materials, just to mention a few examples.

Democratic Republic of Congo

SOIL PROTECTION AND CONSERVATION TO INCREASE PROSPERITY OF RURAL COMMUNITIES

Presenter

ZAWADI VIHUMBIRA Kahindo -Ligue des Organisations des Femmes Paysannes du Congo (LOFEPACO)

Description

COVID-19 emerged at a time when the agricultural sector in our region was facing climatic disruptions due to periods of uncontrolled drought and rainfall, especially in areas where market gardening and food crops were grown, which consequently experienced drops in agricultural yields following the rotting of certain crops still on the ground and diseases that attacked certain plants. While farmers were preparing to face these plagues by their resources, COVID-19 was declared and led to the restriction of certain activities, notably transport, the closure of certain borders, and the importation of certain phytosanitary products, mainly from Uganda. COVID-19 has amplified the effects of climate change to the great dismay of small-scale farmers. Among the practices we advocated were soil protection and conservation practices in the fields by building terraces along the contour farming measured by the 'A-triangle,' reducing the speed of run-off water by diverting it to the field, improving the ridging system, which is more pronounced with row seeding, ridging, and judicious choice of cover crops, while encouraging short-cycle crops as part of resilience. We also urged producers to combine farming with livestock for organic fertilizer production. The third practice was composting (in piles) and the production of biopesticides based on local materials.

Results

Following the adoption of the mitigating practices, farmers were able to put significant quantities of agricultural products on the market, thus maintaining a certain balance in food security. Although there was an increase in the prices of some agricultural products (in 2020 when COVID-19 was declared), significant improvements were noted from the year 2021 onwards as agricultural markets were flooded, especially in the first two quarters.

Climate smartness

This case outlines how climatic and non-climatic shocks can trigger potential changes in the way the food system operates. Through the CSA lens, the practices implemented have contributed to preserve or enhance soil health. This is an important first step to ensure a sustainable agricultural production, as these interventions boost soil´s biophysical and chemical characteristics - making efficient use of soil´s water - while contributes to increase crop yield and quality under adverse environmental conditions. Another element that reinforces farmers´ resilience are the knowledge sharing actions, particularly those that enable diversification of the farm system by integrating livestock as an alternative, local and sustainable, source of fertilizers that is directly linked with complementary CSA practices such as composting and biopesticides. These alternatives, not only help to reduce production costs, but also to increase adaptation capacity and resilience of the agroecosystem by minimizing overall carbon footprint and environmental impact, as has been recognized in Life Cycle Assessment (LCA) studies in the agricultural context (Van der Werf et al., 2020; Jian et al., 2021). This implies positive effects on provisioning, regulation and support ecosystems services, maintaining key dynamics such as food and fresh water provision; erosion and pest and diseases regulation; soil formation and nutrient cycling, among others.

Democratic Republic of Congo

AGROECOLOGY STRENGTHENS PRODUCTION CAPACITY

Presenter

Mélanie Ekutchu – farmer from COPACO PRP

Description

Climate change has severely affected the country, having as major impacts:

- Decreased rainfall, droughts, environmental degradation, deforestation.
- Flooding of crops, disruption of agricultural calendars, lower water levels in some rivers which dry up due to deforestation and human pressure; extinction of some animal species.
- protected areas devastated by poachers; appearance of certain crop pests (locusts).
- Economic and social effects, such as:
  1. Loss of small producers due to lower yields.
  2. Decreased willingness to produce due to environmental risks, lack of savings by small farmers.
  3. Low income due to loss of production; poor quality of production materials; difficult access to basic social services (health, education, etc.).
  4. Rising food prices due to lower production, leading to food insecurity.

As a result, farmers have started to introduce resilient crops, agro-ecological methods and organic insecticides. In addition, they have integrated the technique of crop rotation, crop association, planting of cover crops and reforestation into their strategy to cope with climate change.

Among the practices to bear in mind are:

- COPACO's agro-ecological centre, which serves to share experiences, notably the production of good quality seeds, good agricultural practices, etc.
- Phytosanitary measures, using tobacco as an insecticide, insect repellent, fungicide and acaricide by applying 0.1 litre on 10 m^2 for 05 days with a sprayer or a branch. Repeat regularly to control aphids, caterpillars, mites, viruses, leaf curl etc.
- Crop succession.

Results

- Small-scale farmers produce sustainably on the same areas and achieve good yields using agro-ecological methods. COPACO's farmer agroecology allows each farmer to cultivate 2ha during his lifetime by subdividing it into 8 plots cultivated by rotation. The production resulting from this practice is shared between self-consumption and sale.
- Practice of fruit growing with medium-term crops.
- Sustainable provision of food; development of improved fallow to ensure food security.
- Strengthen production capacities, preserve the ecosystem, make organic food available and keep farmers healthy.

Climate smartness

Education plays an important role to collectively overcome local agricultural challenges under changing climate conditions. In this case, COPACO serves as an agroecological lighthouse, contributing to small-scale farmers to disseminate their knowledge and experiences across the community. Under the food security perspective, the results presented depict how transition to sustainable production, turns out to be not only a healthy and profitable pathway, but also implies benefits for biodiversity and the environment. The latter is interlinked with the strengthening of the adaptive capacity of the agroecosystem and the farmers in socio-economic terms. To reveal mitigation benefits in this initiative, it is important to consider direct and indirect interactions and effects related to the functioning of the different production system in the study area. For example, a transition from conventional to sustainable/agroecological pests and diseases management approach, integrating both traditional and scientific knowledge, has the potential - along with other agronomic practices addressed such as crop rotation and intercropping - to trigger reductions in the agricultural carbon footprint, by reducing emissions associated with the manufacture, transport, application and disposal of synthetic pesticides.

Republic of the Congo

ENVIRONMENTALLY FRIENDLY PRACTICES TO MITIGATE UNPREDICTABLE WEATHER CONDITIONS

Presenter

NTADY Séraphin, from CNOP Congo

Description

In Congo, unpredictable weather has led producers to be afraid of engaging in agricultural production because of the lack of meteorological warnings on rainfall and consequent decrease in production.
As a consequence, farmers suffer from low income due to loss and poor quality of production. In this context food prices have risen, exacerbating the food security problem and causing the decline of the agricultural sector's contribution to the country's GDP.

The use of green manure, farmyard manure and vegetable seed for the production of improved plants adapting to climate disturbance as well as the mulching system for maintaining soil moisture are some of the solutions adopted by farmers to tackle climate change. All these processes are environmentally friendly. For example, production of organic fertilizer by processing Echinochloea for market gardeners. This practice makes it possible to increase soil fertility and crop profitability through the production of organic fertiliser of sufficient quality and quantity and to meet a need expressed by market gardeners. In response to the effects of climate change on the soil, farmers have opted for traditional fertilisation techniques. These techniques are based on the indigenous knowledge of the farmers as well as their experience in agricultural activities.
Other techniques used by farmers include the use of chicken manure for soil fertilisation as a healing measure to amend soil leached by flooding and erosion. Chicken manure helps to supply the plant with major nutrients such as nitrogen, phosphorus and potassium. Nitrogen promotes vegetation, accelerates plant growth and gives the leaves a good green colour. Phosphorus promotes the development of roots and bulbs and accelerates the ripening of vegetables. Potash makes the plant vigorous, which makes it more resistant to drought and disease attacks. Manure is also a source of microelements such as magnesium, zinc, copper, sulphur and boron. Chicken manure does not only provide nutrients. Its decomposition produces humus, which is very useful for the consistency of the soil, which becomes loose and permeable to air and roots. Farmers have also adopted the use of certain plants as fertiliser or pesticides: tobacco and chilli.

Lastly, in response to the effects of climate change, some farmers are collecting household waste to make their own compost. Every morning, when they leave their houses for the fields, each farmer carries the rubbish to the field. This rubbish is stored in a corner; it will be transformed into organic fertilizer and used to fertilize the soil. Organic fertilizer is more recommended to farmers because it is natural and free. It contributes to the preservation of the environment.

Results

- Development of market garden crops using organic fertilisers.
- Increase in market garden productivity for 269 farmers by increasing the quantity of organic manure produced by 45 pig farms made available to market gardeners.

Climate smartness

There are several elements that make this story meet the CSA outcomes. First of all, ensuring the food security of the community against the adverse effects of climatic conditions has been an essential objective, however, the achievement of food provision and access was designed in such a way as to integrate sustainable management practices that ultimately avoid any health risks for farmers, consumers and the agroecosystem. Thus, the proper use and processing of animal manure and biomass in general, constitute an alternative source of nutrients compared to synthetic fertilizers and pesticides. A key element that enhances the resilience of the agricultural production systems (that also applies in other contexts and sectors) is the possibility of recirculating the available local material/biomass. In this case, composting processes are central to generate interesting opportunities for producers, since it enables the configuration of cooperation and innovation networks, which empowers farmers and make them active agents in the process of transforming the conventional production model. The above, through the scaling of truly sustainable business models that are capable to incorporate circular economies in value chains and that represent alternatives with lower energy demand in their processes. This directly affects the mitigation outcome, since the correct preparation and application of organic fertilizers - and in this case the short distance of transport of inputs and products - has the potential to reduce GHG emissions, while contributing to the enhancement of soil´s fertility characteristics, including its capacity to preserves the carbon pool, along with other benefits above mentioned.

FARMERS' TRAINING MINIMIZES THE EFFECTS OF CLIMATE CHANGE

ESNAU
Eswatini National Agricultural Union
GROWING THE NATION

Presenter

Mr. Sengeto Dlamini from
Eswatini National Agricultural Union

Description

Climate change has disrupted the planting calendar for most crops in the country due to weather patterns. Farmers now find it challenging to prepare schedules for their planting activities. Due to this change, some farmers have significantly lost on investments made on farming; for example, bean production in the country has been deficient since the 2018/2019 growing season to unpredictable rainfall patterns and excessive rains when the crop is at flowering stage. Many farmers have made massive losses due to hail storms, cyclones, drought, and frost. A lot of Livestock valued at over SZL 4 million died due to the El Niño drought that hit the region in 2016.

The Eswatini National Agricultural Union organizes and facilitates training on commodity production. Good Agricultural Practices (GAP) have been promoted as part of this training to farmers, including Conservation Agriculture; Mixed Farming; Agro-forestry; Tunnel farming; Inter-cropping. Farmers are trained on how to reduce post-harvest losses to make sure that farming enterprises get maximum returns and that farming households get adequate food. The adoption of Conservation Agriculture (CA) technology to minimize the effects of climate change has been promoted as well. Conservation Agriculture is a method of farming that aims to keep the land in its natural state as long as possible. Farmers have been encouraged to keep the three basic principles of CA, namely observing minimum tillage, soil cover, and multiple-cropping. It has played a significant role in bringing back hope for farmers amid these climate changes. Farmers have also been trained about the use of technologies to beat climate change, including tunnels (especially in vegetable production). Farming tunnels have been seen as the breakthrough for vegetables in dealing with climate change. They protect the produce from adverse weather conditions and prolong the farming season, increasing productivity. Livestock producers are encouraged to control the stocking rate to improve grazing land management and reduce soil erosion due to over-stocking or over-grazing.

Results

Engaging in CA principles ensures a sustainable environment for production because the land is used conservatively to allow for long-term production. Even the production costs in CA are lower than in conventional agriculture because fewer chemicals are used. This adds to the ability of the farmer to become more sustainable in terms of production, and it ensures healthier produce than in conventional agriculture. The principle of multiple-cropping in CA allows a balanced diet for households through inter-cropping and crop rotation. Farming tunnels create and prolong suitable production seasons; this allows more production and more income to the farmer. With more income, the farmer can create a sustainable enterprise for themselves and a consistent supply throughout the value chain.

Climate smartness

As well described in the results section, this story highlights the direct positive effects on food and nutritional security for the country's population. In the same vein, the benefits in the adaptation capacity/resilience of farmers and the agroecosystem are diverse. For example, CA practices, farming tunnels and stoking rate management are in favour of the continuous enhancement of the physical-chemical and biological characteristics of the soil, as well as of the efficient use of available water. In terms of mitigation, soil conservation actions turn out to maintain one of the most important terrestrial carbon sinks both in organic and mineral matter. Nevertheless, in order to materialize these benefits, it is still important to strengthen and scale out the initiatives that the farmers' unions facilitate through sharing knowledge and experiences in sustainable farm management, generating training spaces and methodologies in order to maximize their socio-economic and environmental benefits.

Gabon

CROP ROTATION AND DIVERSIFICATION TO TACKLE CLIMATE CHANGE IMPACTS

Presenter

Phil Philo Abessolo Ndong from CNOP-GABON

Description

Climate change has significant environmental, economic and social effects in Gabon. The following are the most important ones:

Environmental effects:

- Extinction of species.
- A decrease in water resources.
- An increase in extreme weather events such as torrential rains, storms and prolonged droughts
- An increase in forest fires during the dry seasons.
- Outbreak of certain crop pests (locusts).

Economic effects:

The direct impacts of climate change on family farming relate to crop behaviour, soil changes and yield reductions. At the crop level, there are phenomena of shortened vegetative cycles and early flowering, due to the rise in temperature. Crop yields are severely affected. Predictions of agricultural productivity are completely distorted and the risk of food insecurity is high.
Indirectly, climate change also affects agricultural labour, agricultural commodity prices, the functioning of farmers' organisations and the availability of arable land. Rural youth, discouraged by the manifestations of repeated climatic hazards, will migrate to the cities in search of gainful employment.

Social impacts:

Climate change affects people's basic health needs: fresh air, clean water, sufficient food and secure housing.
Lack of drinking water can jeopardise hygiene and increase the risk of water-borne diseases (cholera, diarrhoea) that already kill several people a year. Water scarcity leads to drought and famine.
This results in an increased rate of malnutrition and undernutrition, currently causing many deaths per year.

Farmers have accordingly adapted implementing the following solutions:

Crop relocation:

This involves relocating crops from one landscape unit to another within the same area. This strategy is developed by producers to manage water stress in crops. Thus, having noticed that celery suffers from lack of water on plots located on dry land, far from the watercourse or wetland,some producers in the DRC have had to move the crop to wetter landscape units close to the river to meet its water requirements.

Crop rotation:

Crop rotation is done according to different plant families. It goes from plants that consume the most nitrogen, to those that consume potassium, and then to those that consume phosphorus. This is the system of alternating crops in plots according to their needs. Producers also practice the use of kitchen scraps, burying the remains of the crops as natural fertilizers.

Crop association:

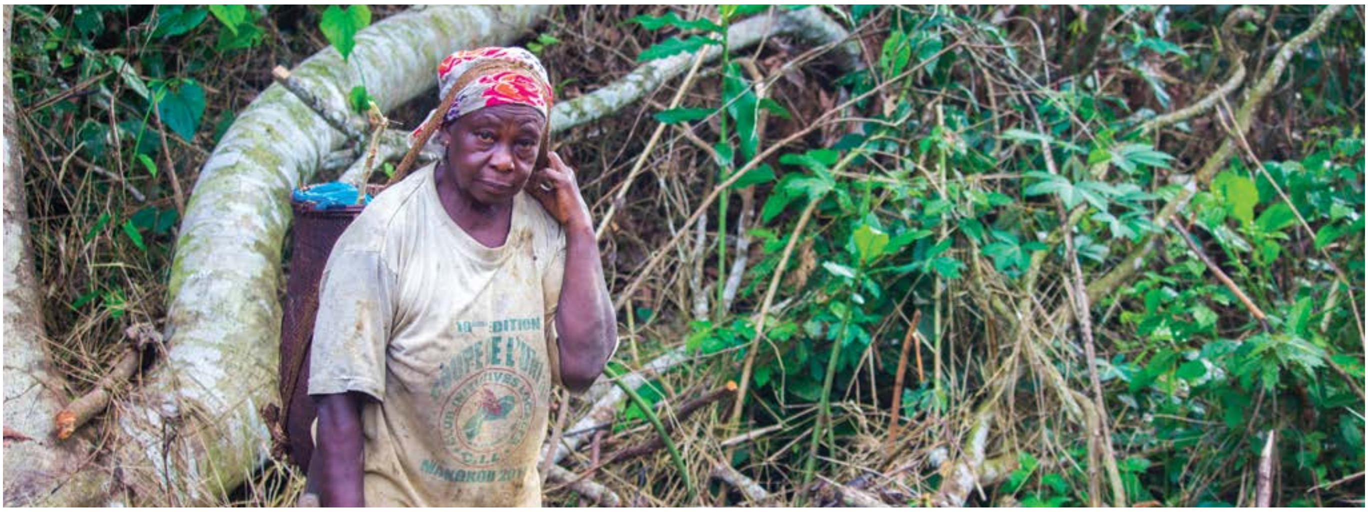
To minimize the devastating action of insects, producers have adopted techniques of combining crops in the same plot. For example, lettuce is usually grown with celery. Maize is grown with beans, cassava with groundnuts, etc. Combining these crops allows celery to grow quickly after the lettuce has been removed. Producers also combine nightshade, amaranth, cabbage, green beans, mint, leeks and chives. Producers also use scarecrow devices to chase birds away from the field by using soil on the terminal bud of the maize stalk to control caterpillars.

Results

- Better yields in manioc production are obtained in forest areas.
- 1000 people have benefited from the implementation of these practices.

Climate smartness

In the face of the socio-economic and environmental challenges related to extreme whether events in Gabon, this experience brings several exemplary climate-smart interventions. Crop rotation and association addressed are sustainable soil and water management options that allow crop and nutritional diversification, reducing yield gap without increasing the use of external inputs. An adaptive process of communities in different countries is to find analogue cultivation areas that present more favourable ecological parameters under changing climate conditions. In this sense, it is important to facilitate the engagement of the different regional stakeholders in the agricultural sector so that these movements can be carried out in a coordinated and planned manner so that any potential alterations on the agroecosystem or change in the agricultural frontier are avoided (Sloat et al., 2020) or compensated under the guidelines of local and national development or adaptation policy frameworks. Another key element is the awareness around the importance of diversifying agricultural production. This resonates with high quality and nutritious food supply for households, as well as the strengthening of the adaptive capacity of farmers and farms, by reducing the risk of pests and diseases outbreaks, and improving the efficient use of soil nutrients in both time and space. This avoids triggering rapid changes that could reduce soil fertility and health through erosive processes caused by water or wind. Intercropping and crop rotation are then pragmatic strategies for enhancing soil biological activity, which is interlinked to the process of mineralization and accumulation of soil organic matter and therefore soil carbon reserves, particularly when more and more producers are willing to adopt these practices as a standard on their farms.



Kenya

SUSTAINABLE LIVESTOCK AS DRIVER OF FOOD SYSTEMS TRANSFORMATION

Presenter

Kenya Livestock Producers Association (KLPA)

Description

Climate change is a threat to livestock production because of the impact on the quality of feed crop and forage, water availability, animal and milk production, livestock diseases, animal reproduction, and biodiversity. Livestock contributes an estimated 14.5% of GHG emissions, further exacerbating climate change. Therefore, the livestock sector is supposed to be a key player in the mitigation of GHG emissions while safeguarding global food security. Furthermore, measures to mitigate the COVID pandemic, unfortunately, affected movement of livestock and livestock products, livestock inputs (feeds, supplements, and veterinary products), closure of livestock markets, and disrupted livestock trade along historical trade corridors. The livestock sector witnessed a massive loss of incomes and increased unemployment, creating adverse ripple economic impacts across the region. Conventionally, market closures in response to transboundary zoonotic diseases have often resulted in a reduced supply of livestock and livestock products accompanied by higher prices for the end consumer. However, the Covid pandemic radically reduced market demand for meat and milk due to a sudden loss of income for urban households alongside the closure of restaurants, institutions, and entertainment outlets that account for significant consumption of livestock products, especially dairy and meat.

KALPA has adopted the following practices to reduce the impact on the environment:

- In pastoralist systems, there is a continuing shift from big livestock such as cattle and camels that need significant fodder and feed quantities to small livestock such as goats and sheep. Small livestock also requires lower water quantities compared to cattle. The small livestock is fast maturing and easy to sell.
- Preference of Browser feeds compared to grazers since trees are less affected by droughts compared to grass.
- Adoption of improved and climate Smart fodder and forage seed varieties.
- Establishment of water pans for rainwater harvesting during the rainy seasons and storage for use during the dry seasons.

Results

- Reduced load on grazing ecosystems and enhanced land and water conservation.
- Increased incomes to farmers and lower losses during droughts.
- Increased food security and nutrition.

Climate smartness

The practices presented in this case are viable CSA strategies since they contribute to proposing alternatives to maintain the country's food security despite the climatic and market shocks that producers face. In this sense, diversification with small ruminant species can minimize the land area destined for cattle production, with certain benefits related to the reduction in the volume of water necessary for its production, in addition to the possibility of conserving the physical-chemical characteristics of the soil by reducing erosive processes generated by extensive livestock farming. These factors make it possible to strengthen the adaptive capacity of farmers by making better use of natural resources and can generate additional mitigation opportunities. According to FAO (2017), the intensity of emissions from small dairy and meat ruminants is less than of cattle beef production, since beef produces a global average (considering different on-farm and supply chain management practices in diverse agro-ecological conditions) of 295 Kg CO2-eq per Kg of protein, while in small ruminants it is 201 kg CO2-eq per Kg of protein. Other adaptation and mitigation advantages can be explored when the different sources, types and amounts of feed are considered for these two types of livestock, as there is the possibility of diversifying the diet of small ruminants with trees and other local forage species.

Madagascar

AGROECOLOGICAL PRACTICES AS A SOURCE TO INCREASE FARMERS' INCOME

Presenter

FANJANIRINA Heriniaina from FIFATA

Description

Increased temperatures and rainfall patterns directly affect crop yields, and indirect effects are due to changes in water availability for irrigation (lack of rainfall for an extended period). Climate change will have varying effects on irrigated crop yields.
Higher temperatures decrease yields of valuable crops while leading to an increase in weeds, pests, and various crop diseases.
Changes in rainfall patterns increase the likelihood of short-term crop failure and long-term production decline.
Intensification of cyclones and floods.

In light of this, the following impacts are noted:

- Decreased productivity and food insecurity.
- Delay in the agricultural season (rice cultivation).
- Difficulty in finding seeds suitable for climate change.
- Decreased yield of agricultural products and decrease in farmers' income.

Below are listed the practices to face the effects of climate change:

- Adoption of agroecology techniques (animate and train farmers on agroecological practices; train farmers as nurserymen to supply young plants to farmers – reforestation; set up farmer field schools and agroecology demonstration plots as a showcase and technical dissemination tool for farmers - soil conservation techniques, crop diversification, tree cultivation, etc.

- Environmental protection and combating the effects of climate change through reforestation and afforestation (easy storage of the products; manufacture of composters, liquid basin, lombricompost, development of the plot (contour farming), plantation of young plants, embocagement (planting hedges around fields), alive hedges, use of the improved fertilizers as compost, by introducing the diversification of vegetable, crop rotation.

- Reduce forest exploitation in all forms and reduce air pollution.

- Practise cover cropping (use of mulches). Farmers use artisanal boreholes, solar water pumps, and motor pumps to water crops.

Results

The agroecological practices lead to increased yields and lower production costs for the farmers. Crop diversification improves and preserves the soil. Even if the results are not immediate, this practice could lead to sustainable improvements in farmers' income, as agroecological products are sought after in the market and sustainable preservation of the environment. It also shows to yield stability for perishable products. Furthermore, the practices strengthen cohesion and exchange between members. They stimulate joint reflection in the search for the best practice (at the level of the farmers' group).

Climate smartness

Agroecology enables a holistic and integrative approach that contributes to strengthening food security and sovereignty from the plot to the landscape scales through the diverse set of practices contemplated in this case. All of them converge on some relevant points, the care and enhancement of biodiversity that has co-benefits in ecosystem services such as regulation and purification of water, pollination and protection against pests and diseases, which strengthens the resilience of farming systems. At the same time, this group of interventions has positive advantages in carbon capture and emission reduction, on the one hand through carbon sequestration in tree biomass and soil organic matter and on the other, reducing the intensity of emissions per unit of product due to the use of alternative energies and organic agricultural inputs with less environmental impact.

Madagascar

RESTORATION OF ECOSYSTEM THROUGH AGROECOLOGICAL PRACTICES

Presenter

RAKOTOVAO Baritia Sitrakiniaina from FEKRITAMA

Description

The farmer's members of Fekritama, who are spread in 23 regions of Madagascar, have experienced significant difficulties in the practice of their respective sectors. Climate change is an essential factor that blocks farmers from carrying out their daily tasks; the climate and the lives of farmers are interdependent. They encounter difficulties, especially in producing their agricultural and livestock products and marketing.

The water sources are exhausted, the rivers have become dry, and it isn't easy to find something to drink and use at home since only 15% of the Malagasy people benefit from water and electricity in Madagascar; the others, primarily the farmers, use water from natural springs and rivers. Additionally, family farmers are the primary victims of the confinement caused by COVID.

The farmers suffer the lack of income because they have no access to marketing because of the total confinement they cannot sell in due time products, which causes overproduction. Still, especially the spoilage of their products, for example, vegetables become stale if they are not sold for a few days. The farmers cannot afford to pay for refrigerators to ensure the conservation of vegetables. The COVID-19 pandemic caused the destruction of the environment because production no longer seemed profitable for farmers because of the confinement, so they cut down the trees in their villages to make charcoal and firewood to sell at the market.

For 33 years of existence, the Confederation Fekritama has managed to reforest more than 25,000 trees in 23 regions of Madagascar. The FEKRITAMA Confederation has a strategic plan elaborated according to the needs and aspirations of the farmers. The protection of the environment is part of the strategic axes of Fekritama since the activity of the farmers depends totally on the climate.

Fekritama contribution to the improvement of the environment in Madagascar:

- Sensitization and incitement of the beneficiary entities to renounce the practice of overgrowth and vegetation fires.
- Promote the valorization of the biodiversity channels; in economic terms while being concerned about their preservation and their perpetuation.
- To help farmers to manage their natural resources sustainably through the transfer of natural resource management.
- To support the peasant organizations of the base to practice the reforestation and the installation of green space.

Results

The practice will restore the natural environment, thus promoting a productive and sustainable ecosystem for farmers. It aims to create a rich ecosystem capable of providing the necessary elements for agricultural production. It consists of restoring and improving the environment for cultivation (or livestock on pasture) through agroforestry, reforestation, and assisted natural restoration of forests, particularly natural pastures, several species of which have tended to disappear in recent years. From a social point of view, the project will provide institutional and technical support and guidance to rural producers in creating and developing potentially exploitable value chains in the area to ensure the income sources of local communities in the restoration process. It will orient the society towards a common and healthier approach, leading to the integration of everyone towards sustainable development.

Climate smartness

The interventions mentioned in this case reveal the importance of maintaining and boosting diversity in agroecological food systems. Maximizing on- and off-farm biodiversity, especially considering tree species brings with it a series of productive and nutritional benefits that result in socio-economic and environmental well-being for the community. This implicates greater food and income sources, creating market opportunities which in turn reduces the vulnerability of farmers to climatic and economic shocks. The use of local species with economic but also ecological importance are central in this case, in complement with the participatory design and execution of restoration plans and activities (either through reforestation or agroforestry). This increases not only the level of ecological resilience of the farms, but also strengthens local knowledge and potential ways of transmitting it by farmers, allowing them to find new opportunities to make sustainable use of available resources and ecosystems services. This case also materializes mitigation opportunities due to the integration or reincorporation of the tree stratum at different scales, which contributes to the fixation of atmospheric CO_2 in plant biomass.

Madagascar

INNOVATIVE RICE VARIETY TO IMPROVE FOOD SECURITY

FTM / CPM

Presenter

RANDRIAMIRADO Honoré from CPM Régionale Itasy

Description

The effects of climate change can be summarised as insufficient rainfall, increased temperature, and drought affecting several regions of Madagascar. For example, the cultivation period is reduced, some fields are suddenly flooded, others are dried up or silted up, and some water sources have become waterless. Cyclones hit Madagascar hard, leaving human, animal, and crop victims. Using resilient, adapted varieties (the rice variety X265) is a best practice to cope with climate change. Additionally, environmental protection is paramount for mitigation, i.e., overcoming bushfires and deforestation, restoring forests, and reforestation. In addition, protection of the soil against erosion is necessary. The exploitation of renewable energies is seen as complementary and can reinforce or increase the benefits of the leading practice if implemented together. Madagascar is sunny all year round, so the exploitation of solar energy can reduce the use of fossil fuels that pollute the atmosphere. Madagascar also has water sources that can be used to build dams to extract electricity. All this is already being exploited in Madagascar but on a small scale.

Results

The X265 rice variety has been shown to bring several benefits to the farmer's communities of Madagascar. Respectively, it has been proved to be resilient to climate change. This rice variety can withstand and produce yield without much water. When rainfall is abundant, this variety can yield an average of 4.5t/ha if cultivation techniques are followed. When rain is insufficient, the yield reaches 3.7t/ha if the practice follows the farming techniques. Thanks to this variety, the level of food insecurity has decreased. Economically, members can continue their farms independently of external support (e.g., microfinance, banks). Furthermore, members have been trained on making organic fertilizers (compost) and how to use organic manures.

Climate smartness

The adoption of high-yielding local varieties and adapted to climate-related stresses is a key strategy to transit to sustainable productions systems. In addition to the above-mentioned benefits directly linked with food and nutritional security, and the economic stability of farmers. There are co-benefits in adaptation derived from the efficient use of natural resources as well as from the recognition of the need to implement practices together, as a group, as it is the case of compost/organic fertilizers and the protection of the environmental dimension through the forest restoration. Utilization of crop residues such as rice straw could bring economic and job opportunities by developing communal compost production stations. In addition, the diversification of agricultural systems through the introduction of new crops and species also lies in the use of various local varieties adapted to the mentioned climatic risks in the country. In parallel, this strategy can help to reduce vulnerability to pest and diseases outbreaks, enhancing the resilience capacity of farmers, which at the same time suggests the possibility of an overall reduction in the carbon footprint associated with the use of synthetic fertilizers and pesticides, and progressively increase carbon stock in the soils.

Malawi

SYSTEM OF RICE INTENSIFICATION (SRI) TO MITIGATE CLIMATE CHANGE EFFECTS

Presenter

National Smallholder Farmers Association of Malawi (NASFAM)

Description

Climate change has in recent years, among other problems, led to unpredictable weather patterns - making it difficult for farmers to plan on an ideal crop to plant with regard to the amount of rain and duration it requires to mature; prolonged dry spells - affecting the development of crops which leads to losses; and floods - affecting both crop fields and displacing households. This made the work of most farmers difficult, including rice farmers who were used to practicing traditional farming methods in the Karonga district. With reduced rainfall amounts and periods, it proved a challenge for most farmers to realize meaningful harvest from their fields using traditional methods. This led to food insecurity and loss of income. Business-minded farmers needed a solution to the problems.

In around 2014, NASFAM introduced the System of Rice Intensification (SRI) in the area to help farmers mitigate the effects. The System of Rice Intensification (SRI) method requires that a farmer use younger seedlings, singly spaced, and typically hand weeding to avoid injuring the crop if other tools are used. The method demands less water, less seed, but results in increased yield if all procedures are followed. With SRI, farmers plant in lines following specified spacing, and the yield is quite high because the crop does not scramble for sunlight, air, and soil nutrients. The seedlings are transplanted while they are mature enough to withstand the heat/water stress.

To ensure maximum benefits from the SRI method, farmers are encouraged to first ensure they use certified seed. Certified seed has more vigour than recycled seed. In addition, they are encouraged to apply animal manure and other composite manure to boost soil fertility and moisture retention. Soil with high moisture retention benefits the crop more in prolonged droughts.
Crop rotation is another promoted practice to ensure farmers avoid common pests and dieses that would negatively affect their crop. In places where land rotation is a problem, they are urged to keep the land idle for a considerable period (enough to destroy the cycle of common pests and diseases). This helps minimise chances of recurring pests and diseases from one crop to another.

Malawi

Results

The notable advantage of this method is that the crop demands less water, allowing it to produce more even in seasons when the rainfall amount drops below what the rice planted in the broadcast field would require. Since 2017, Mkandawire and others have more than doubled their rice yield.

In June 2021, Mkandawire reported having harvested 1.5 tonnes of rice from the same land he had been using before. He attributed the increase to the use of SRI. The increased harvest meant increased food security, increased income, providing him additional disposable income. It also offered him an opportunity to invest more into his farming business as he reported to have bought two ox and two calves and an oxcart.

Climate smartness

The introduction of SRI brings different benefits that allow the farming system to be more resilient to the climate risks while promoting sustainable yield increase by 20–50% and better quality. As mentioned previously SRI methods are less resource intensive (especially reduction in water requirements by 30–50%) (Styger and Uphoff, 2016) hence minimizing the production costs and reliance on synthetic and external inputs and scares resources. In the case of certified seeds - a key input - worth mentioning that is a process that can be achieved or complemented through local/national farmers seeds banks or participatory improvement projects, in a joint effort between farmer cooperatives and public-private partnerships. SRI also focuses on soil health, proper planting spacing, intermittent water application and organic fertilization improve soil fertility and water retention capacity, that are linked to a lower exposure to biotic and abiotic stresses. Emissions of greenhouse gasses such as methane (CH_4) and Nitrous oxide (N_2O) can be minimized and overall carbon footprint reduced according to reductions in synthetic fertilizers and pesticides compared to conventional paddy rice production (Vermeulen et al. 2012; Gathorne-Hardy, 2013).

Morocco

BETTER WATER MANAGEMENT TO IMPROVE LOCAL BIODIVERSITY

Presenter

Al-Amal Women's Association for women's development Senada Hociema

Description

The climate has shifted from semi-arid to arid causing drought and therefore a lack of water.
As a result, during these drought periods, farmers are increasing their reliance on groundwater, and digging deeper wells, from 120 to 200 meters deep to find water for the plantation. This practice resulted in drought relief component aimed at responding to the challenge of adapting to climate change and more effectively managing extreme natural phenomena.

Results

- More than 20 different aromatic and medicinal plants planted.
- About 100 people who have benefited from this agricultural practice.

Climate smartness

As it is expected that climate change in arid and semi-arid regions will place additional challenges to water management for agriculture. Therefore medium- to long-term strategies at farm and watershed/river basin/aquifer levels are essential to participatory develop climate change adaptation plans and programs. This can help to integrate scenarios where complementary water management practices are implemented in scenarios where depletion of groundwater is a limiting factor for agricultural production. In this sense, access to water should be complemented by CSA practices that help farmers to move towards more efficient use of water. For example, development and selections of climate change resilient varieties (drought resistant crops), soil conservation practices (for preserving moisture), development of climate sensitive cropping calendars, rainwater harvesting systems/reservoirs, improved irrigation schemes and efficient irrigation systems such as micro sprinklers or drip irrigation systems, among other practices and technologies. As most of these on-farm/landscape options are well known, it is important that the efforts promoted in the policy and institutional frameworks, are harmonised to strengthen adaptation capacity of the sector, including national level initiatives such as improved weather forecasting capacity and Early Warning Systems just to mention a few.

Morocco

BEEKEEPING HELPS IN THE IMPLEMENTATION OF NATURE-BASED SOLUTION

Presenter

Unión Apinectardev

Description

Today, two-thirds of the mountain terraces are abandoned. Yet the argan tree is at the heart of the agricultural ecosystem of the Argan Biosphere Reserve. The decline of the Argan tree leads to a decrease in the income of village families, who support the community and its livestock, and the development of "maladaptive" behaviors, which highlight the effects of climate change as social inequalities around access to water. This is compounded by low agricultural yields in the area (and a lack of forage grown in very small orchards), offset by overgrazing in the absence of effective collective grazing management. This is weakening the very degraded soils.

Farmers look to the future and focus on projects, investments, changes in business models and changes in behavior. These are all actions that need to be taken now to limit possible damage and build a more resilient, supportive and environmentally friendly society. Create projects that preserve biodiversity and contribute to the development of people's living conditions.
One example comes from the beekeeping project. Beekeeping helps reduce people's exposure to the consequences of climate change by providing income to fight poverty and protect forest resources. In Morocco, threatened by desertification and biodiversity loss, this project supports local populations in the attempt to create jobs and stop the migration to bigger cities.

By offering training courses, the APINECTARDEV Union teaches the good methods of conservation of the species to its members, in order to stop the threat of extinction and preserve the bees. This method allows to prepare an extension programme on a farm. It opens the way to modern methods of beekeeping, queen breeding and selection.

Results

The beekeeping project aims to encourage and support a system of sharing the roles and benefits of natural resources between the components of biodiversity, bees and humans. It also contributes to promote a more sustainable food system by reversing the loss and degradation of the ecosystem in combination with the enhancement of the main products of this ecosystem: argan oil, honey, vegetables and fruits.

Climate smartness

Beekeping is a successful story as it contributes directly and indirectly to the food and nutritional security of the producers and inhabitants of the biosphere. This production system does not only allow households to diversify their income sources, but it also has the possibility of generating alternative by-products other than honey such as pollen, royal jelly, beeswax, propolis, etc. that together allow generating marketing opportunities to reinforce the beekeeping value chain. It is generally recognized that bees provide one of the most significant ecosystem services for agricultural systems - pollination - that, in addition to being the dominant taxon determining pollination in Argan and other crops (Ajerrar et al., 2020) and therefore directly influencing Argan yield in the region, is also responsible for facilitating the pollination of wild species that in turn fulfill complementary roles in the ecosystem. Apiculture also allows triggering other positive cycles in the food system. For example, when bees play such as an important role for the success of agricultural production, then it is necessary to rethinking the use of any pesticide or input in the pest and diseases management plan, capable to threatening the health of hives, other insects and even humans. Another element in strengthening resilience and exploring mitigation opportunities in this study revolves around the educational component, seeking to facilitate farmer to farmer knowledge exchange (incentivizing dialogue between farmers and consumers), and improving the local knowhow; hence, increasing the possibility of integrating synergistic practices for sustainable beekeeping and complementary agricultural production in this and other projects of the union.

Tanzania

ADOPTION OF DROUGHT-RESISTANT VARIETIES TO INCREASE CROP YIELD

ACT
Agricultural Council of Tanzania

Presenter

Timoth Mmbaga from Agricultural Council of Tanzania (ACT)

Description

Among the effects of climate change in Tanzania include:

- Long drought.
- Increase in crop and livestock diseases.
- Soil erosion.
- Disappearance of water sources.
- Frequent wildfire and deforestation.

Impact of the climate change in Tanzania include:

- Low production and productivity in agriculture.
- Food shortage and high food prices.
- Increased temperature.
- Frequent floods.
- Frequent conflicts between farmers and pastoralists.

The best practices implemented to adapt to and mitigate the climate mentioned above change effects and impacts include:

- System of Rice Intensification (SRI) in rice production. This technic uses a small amount of water.
- Conservation farming.
- Use of drought and disease-resistant varieties.
- Agroforestry.
- Water source protection.
- Awareness campaigns and knowledge sharing.

Results

The use of SRI, Conservation farming, and disease and drought-resistant varieties have increased the yield and benefited about 150,000 farmers in ACT Project areas. SRI is now widely adopted in many parts of the country and has increased productivity. Conservation farming (minimum tillage) has increased production in semi-arid regions, especially maize and beans, to enhance food security and resilience in many communities.

Climate smartness

This case depicts an integrated approach to manage agricultural systems, by implementing diverse climate-smart practices as a whole. The interventions mentioned are capable to not only minimize yield gaps and avoid crop failure due to climate change impacts. These also play an important role in the sustainable management of water, soil and biodiversity, focusing on preserve the different elements and interactions that translate into the health and stability of the country's agroecosystems. It is worth to highlight that any efforts focused on expanding ¨awareness campaigns and knowledge sharing¨ are essential to transform conventional production model, based on monoculture systems, highly dependent on external inputs and with a significant environmental footprint. SRI, Agroforestry, minimum tillage etc., encompass potential benefits for climate change mitigation, on the one hand related to GHG emissions reduction - from the soil and crop management activities e.g., tillage, pest and diseases management, fertilization -, and on the other to carbon sequestration when woody species are integrated and soil carbon content increased over time.

Tunisia

HEDGEROWS IMPROVE FARMERS' RESILIENCE

Presenter

Exploralis, Project HedgeGrow

Description

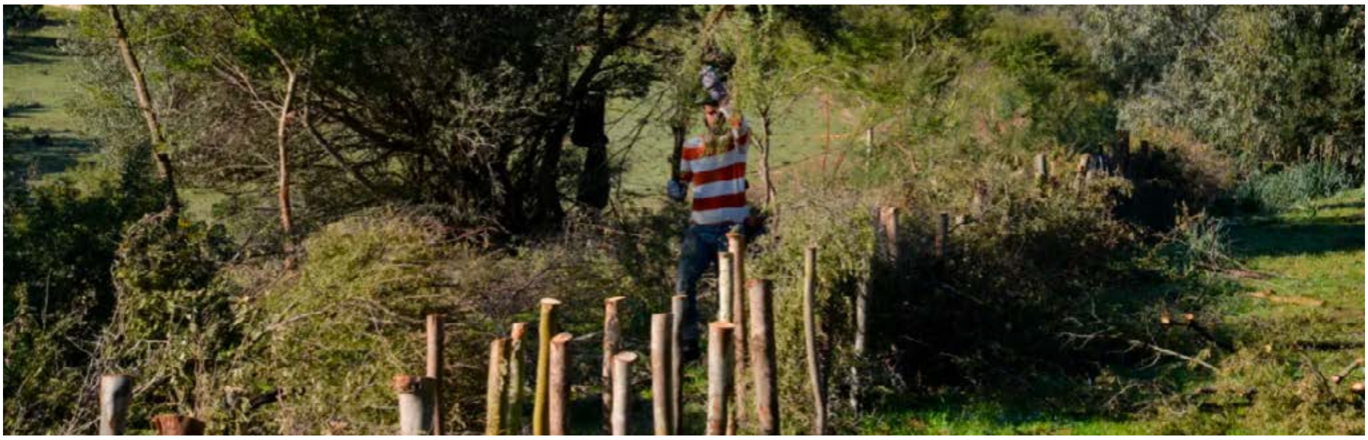
Climate change is threatening the agricultural sector in Tunisia with increasingly extreme weather conditions. Heat reaches new records every year, but also drought, frost, gusts of wind, floods and other conditions very damaging for the farmer.

Exploralis through the HedgeGrow project promotes multi-functional hedgerows as the most accessible and sustainable solution to climate change and other threats facing agriculture today.

Hedgerows are an age-old practice that farmers can strategically integrate into their farming system to build resilience. Different types of hedges meet different needs, such as anti-erosion hedges, windbreaks, melliferous hedges, defensive hedges etc.

As part of the project, farmers planted 300 metres of hedge made up of various productive and drought-resistant native trees. They also installed dry hedges, animal shelters, water catchments and swales to encourage the growth and self-sufficiency of the hedge and to attract and study biodiversity.

Through the pilot hedge and communication and education work in the field and on social networks, they have drawn attention to the multiple benefits of multi-functional hedges, such as reducing water evaporation from the farmland, protecting crops from wind gusts and frosts, promoting endangered auxiliary biodiversity in agricultural areas, preserving the soil by limiting water and wind erosion, and providing shade for workers and livestock.
The RCW, an innovative practice that consists in valorising the pruning of hedges by shredding and spreading it around the trees and on the agricultural soil in order to preserve and regenerate it. The proper use of RCW improves soil quality for better water absorption and preservation.



Results

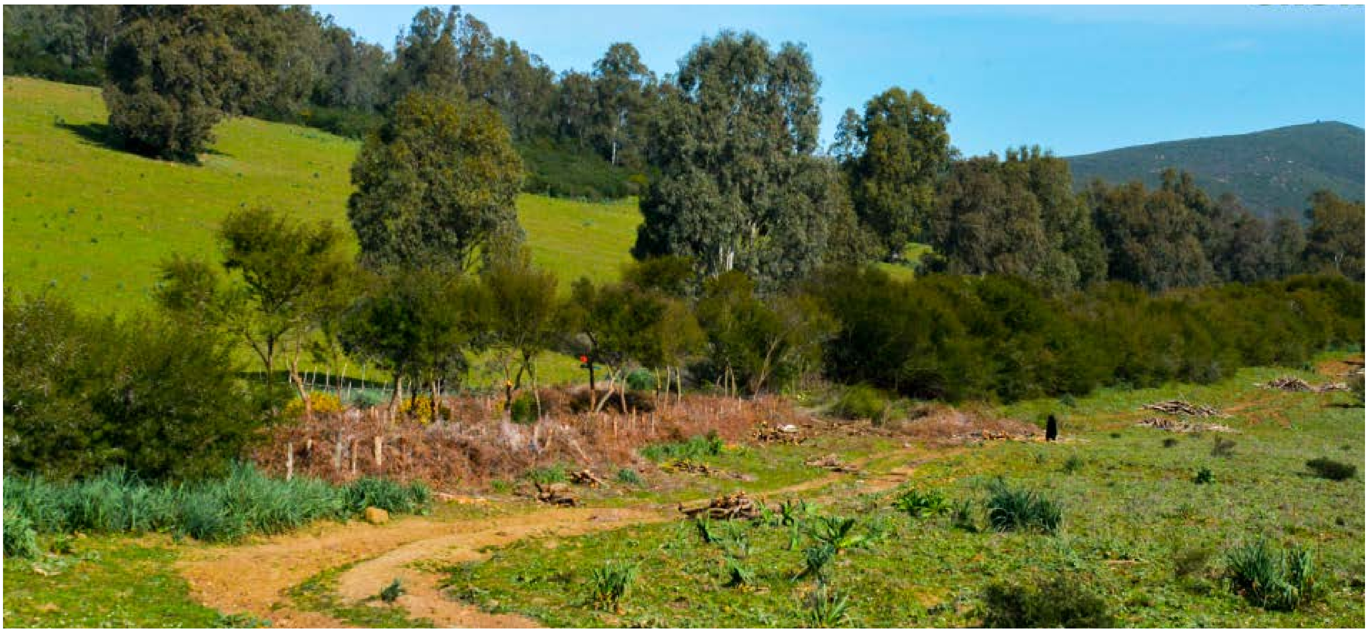
Within the framework of this project, theoretical and practical training on hedgerows to 15-farm managers and 15 workers has been provided.

Research on the subject has been carried out and educational materials are being finalised to share with as many farmers and decision-makers as possible in the country.

The benefits of hedgerows on agriculture have already been proven in several scientific studies around the world, it remains to educate and convince farmers to adopt this approach and to develop local knowledge on the subject in relation to the choice of trees, the strategic location of the hedgerow and its economic valorisation.

Climate smartness

Hedgerows are an essential component on the farms and the landscape, as mentioned above most of the ecosystem services can be enhanced: provisioning (e.g., Food, raw material), regulating (e.g., climate regulation, erosion control, pest and diseases regulation etc.), and support (nutrient cycling, soil formation). This directly benefits crop and livestock production and stability, providing a buffer effect against changing and extreme climatic conditions. Among the several economic and environmental advantages such as the medium- to long-term increase in soil´s physical and bio-chemical characteristics that are decisive for the maintenance of its fertility, there are co-benefits in terms GHG emissions reductions and carbon capture - in above and belowground biomass maintaining soil carbon stock - (ORC, 2020). As it has been recognized by the project, education and training on the implementation and potential benefits of the integration of native hedgerows species and the use of RCW in the agroecosystem is crucial to increase the effective adoption of this practice, in a way that responds to the biophysical and economic conditions of the farmers.



Tunisia

FOREST RESTORATION TO FIGHT POVERTY AND HUNGER

CAPTE
Collectif d'Acteurs pour la Plantation et la Transition Environnementale

Presenter

Association les Amis de CAPTE

Description

In Tunisia 75% of arable land is desertifying, less than 500m3 of water/year/inhabitant is available, monoculture is a dead end. All these conditions jeopardize the food security of the inhabitants.

Agroforestry is one of the solutions adopted to adapt to climate change.
Agroforestry is the beneficial and sustainable association of trees and people, trees and crops, trees and animals.
Specifically, the carob tree has great potential as an agroforestry crop with lower water consumption, more suitable and compatible with mixed and extensive orchards. Regarding the carob tree, actions to help improve and structure the sustainable carob tree sector in Tunisia in collaboration with Mediterranean research institutes and with the support of Tunisian private companies have been undertaken. In this sense, advocacy activities and dissemination of good agricultural practices have been carried out. Another widespread practice is "Farmers regenerate naturally" (FMNR), a practice to accelerate the regeneration of agroforestry systems and a technique to effectively fight poverty and hunger through land and vegetation restoration. Through the restoration of vegetation, FMNR addresses multiple problems simultaneously, including: land degradation, soil infertility and erosion, biodiversity loss, food insecurity, fuel wood, building timber and fodder shortages and dysfunctional hydrological cycles.

Other complementary practices adopted include:

- Meteil (a seed combination of legumes, cereals and crucifers that produces higher quality and quantity of fodder with better disease resistance).
- Research on the improvement of carob rootstocks.
- Trials of inoculation with mhycorises to improve the micro-organic life of the soil.
- The practice of organic mulching.

Results

- Currently, more than 50 partner farmers in the governorates of Bizerte and Kef have joined the partnership with the association.
- More than 15,000 trees and shrubs, forestry, agroforestry and fruit trees have been planted.
- More than 30 hectares of meslin have been sown.
- More than 250 people have attended training and awareness-raising sessions.

Climate smartness

Agroforestry systems play an important role in African rural landscapes and provision of livelihoods for farmer communities. Integration of trees, crops and animals in farming systems are critical to achieve food and nutritional security of household members. Similarly, Agroforestry is a CSA practice linked directly or indirectly to almost every single category of ecosystem services (provisioning, regulating, supporting and even cultural), supporting steady and diverse food provision for humans and animals. Using local and climate-adapted species (e.g., carob) facilitates the attainment of synergies mong all system´s components, making efficient use of resources such as soil macro- and micro-nutrients, water and sunlight, and recycling biomass and energy at multiple scales over time. In parallel, FMNR known as a low-cost land restoration technique, among other environmental benefits helps to alleviate fuel/wood shortage, and in terms of socio-economic and technical dimensions, contribute to overcome major agricultural constraints described above. These positive effects are complemented with CSA practices such as Meteil and mycorrhiza inoculation that not only enable a better plant/crop nutritional status, hence greater potential to tolerate biotic and abiotic stresses in their environment. But also contribute to reduce the reliance of external agricultural inputs e.g., fertilizers and pesticides, that complements the carbon sequestration capacity of agroforestry systems with GHG emissions reductions along the manufacturing and application of these external inputs therefore, reducing the carbon emission per unit of produce (emissions intensity).

Uganda

CLIMATE-SMART AGRICULTURE PRACTICES LEAD TO SUSTAINABLE LIVELIHOOD

Presenter

MUWONGE DAVID-NUCAFE

Description

Global warming by 2 degrees Celsius could shrink Uganda's coffee-growing areas to almost less than 30% of the current area. Drought is the most crucial cause of crop failure in coffee in Uganda. The mitigation measures for using irrigations were previously prohibitive in terms of cost, and the COVID 19 made it even harder to get the needed funds to install irrigation. Climate change is manifested in more severe and more frequent drought events, which lead to loss of flowers and thus lower productivity when this occurs at the flowering stage. Other interventions have also been challenged due to the COVID 19 situation effect on access to inputs such as fertilizer since most are imported, longer sales cycles due to shipment challenges, etc.

Climate-smart Agriculture practices adopted by the National Union of Coffee Agribusinesses and Farm Enterprises (NUCAFE) are:

- **Farm level demonstrations:**

1. Irrigation using Solar powered pumps.
2. Soil and water conservation methods.
3. Use of shade trees and agroforestry practices.
4. Sustainable intensification 3 x1 meter planting.

- **Value chain level:**

5. Eco friendly coffee processing using solar energy.
6. Coffee Crop Drought Indexed Insurance, De-risking Coffee Farming.

- **Bankable Business planning:**

7. Formation of a Business wing to attract long term Capital to invest in climate change mitigation in medium and long-term.
8. Strategic partnerships and Advocacy for climate resilience.

Results

Farmers benefits from the coffee industry. This leads to sustainable livelihoods, consumer satisfaction and societal transformation. Smallholder farmers are empowered and organized by using the farmer ownership model to assume more roles and functions within the value chain. This body has registered significant landmarks as a champion in offering exceptionally high-quality coffee to high end market off takers and in advancing much resource constrained smallholder farmers into the profitable nodes of the coffee value chain for enhanced profitability.

Climate smartness

This is an interesting story of a comprehensive CSA approach as it integrates different actions that cover different stages of the value chain, including on-farm production with practices that take care of the water and the soil, integrating an essential element in sustainable agricultural production, as are the trees, in agroforestry systems. In addition to the direct benefits for food security and climate change adaptation at on-farm production, the transition to clean energy sources by integrating solar energy during the production and processing stages, increases farmers' resilience by minimizing the use and dependency on fossil fuels, with potential co-benefits in mitigation through the reduction of overall carbon footprint in the agricultural system. Mainstreaming of Drought index insurance and De-risk agricultural value chain approaches provide strong support to strategic and climate sensitive planning, contributing to greater stability and projection capacity of the agricultural business models of farmers, and encouraging the emergence of opportunities for diversification of livelihoods, thus strengthening the adaptive capacity of the territories.

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