THE CLIMAKERS

Stories from the field

VOLUME 2

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October 2021

Graphic Project ZOWART

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FORWARD

Unprecedented fires and heat waves to droughts and floods, the climate crisis is straining the ability of food producers to rear crops and livestock as well as safeguard marine resources. In addition, the pandemic has exposed weaknesses in the food system. COVID-19 has affected farm workers and their families, while crops have not been harvested and hunger has increased. Our food systems are under pressure.

In this scenario, farmers play a significant role by ensuring the sustainability of agro-ecosystems, landscape management, and the transmission of locally- and traditionally-rooted knowledge, cultural heritage, and social values. They are at forefront of the fight against climate change and for this reason is not possible to relegate agriculture to the bottom of the international climate agenda.

It is important to raise awareness of the commitment and care taken by farmers in carrying out their daily work, transforming the products that the earth and nature offer and turning them into comestible food. This second volume of Stories from the Field aims to disseminate what has already been done by farmers to tackle climate change and draw on their experience to provide concrete examples of best farming practices to increase agricultural sector's resilience and mitigation potential.

This collection represents a great source for leveraging farmers' knowledge to benefit the community and once again serve the common interest in a healthier environment and more sustainable, resilient, and inclusive food systems. It reflects the relevance of agriculture that, while suffering the direct consequences of climate change, mitigates the greenhouse effect and reduces its emissions, produces renewable energy and biomass, limits the consumption of water and pesticides, and has a key role in the absorption of carbon dioxide.

Agriculture provides several opportunities to counter climate change, such as trapping of carbon in soil through practices like cover cropping, low- or no-till cultivation and crop rotation which could globally store up tons of carbon dioxide per year.

Farmers worldwide should be an active voice in shaping our earth's future. It is unimaginable to engage in any conversation or build coalitions around food systems without the active involvement of farmers as equal partners. But for this to happen, we need radical changes to the way food systems work. The Climakers Alliance members, decided to raise the voice of farmers worldwide about their role in the food systems sustainability and struggle to fight climate change by asking them:

How does your effort to fight climate change contribute to the wider challenge of promoting more sustainable food systems?

Farmers are the main stakeholders in the food systems, but they are not alone in this challenge. The transition to sustainable food systems is a joint effort of the entire value chain and will also depend on innovative tools and approaches being developed and deployed worldwide. To be sustainable, these innovations must provide income, create jobs, and include poor and vulnerable communities while reducing levels of hunger and malnutrition and minimizing greenhouse gas emissions. This is why it is vital that processes remain science-led: farmers and their partners have been sharing their solutions to deal with climate change and promoting more sustainable food systems while CCAFS, 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

PRIVATE SECTOR ASSOCIATIONS

UNIVERSITIES AND RESEARCH CENTERS

MEDIA PARTNERS

MULTI-STAKEHOLDER PARTNERSHIPS

TECHNICAL PARTNERS

CIVIL SOCIETY ORGANIZATIONS

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.

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SAINT LUCIA
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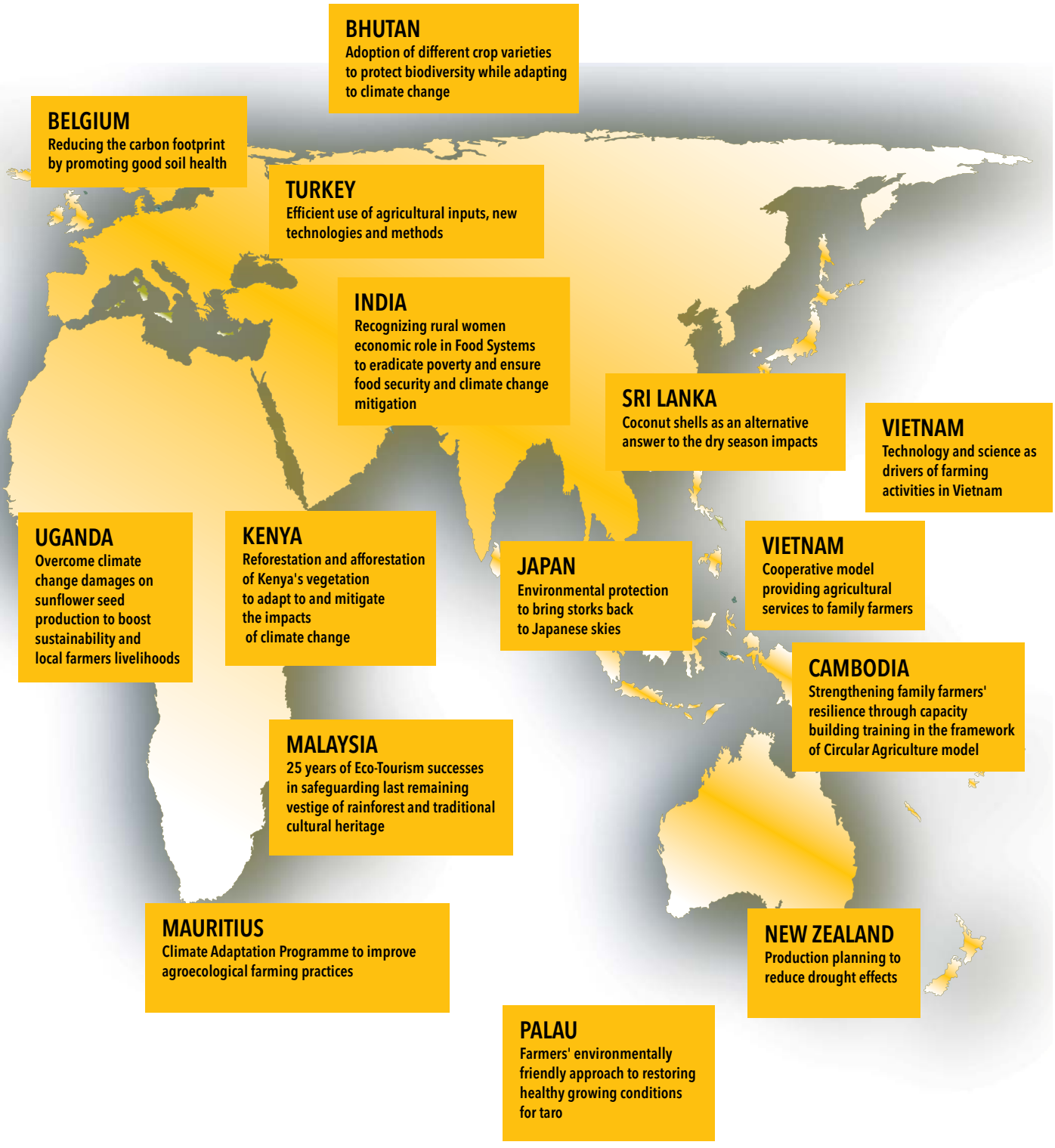
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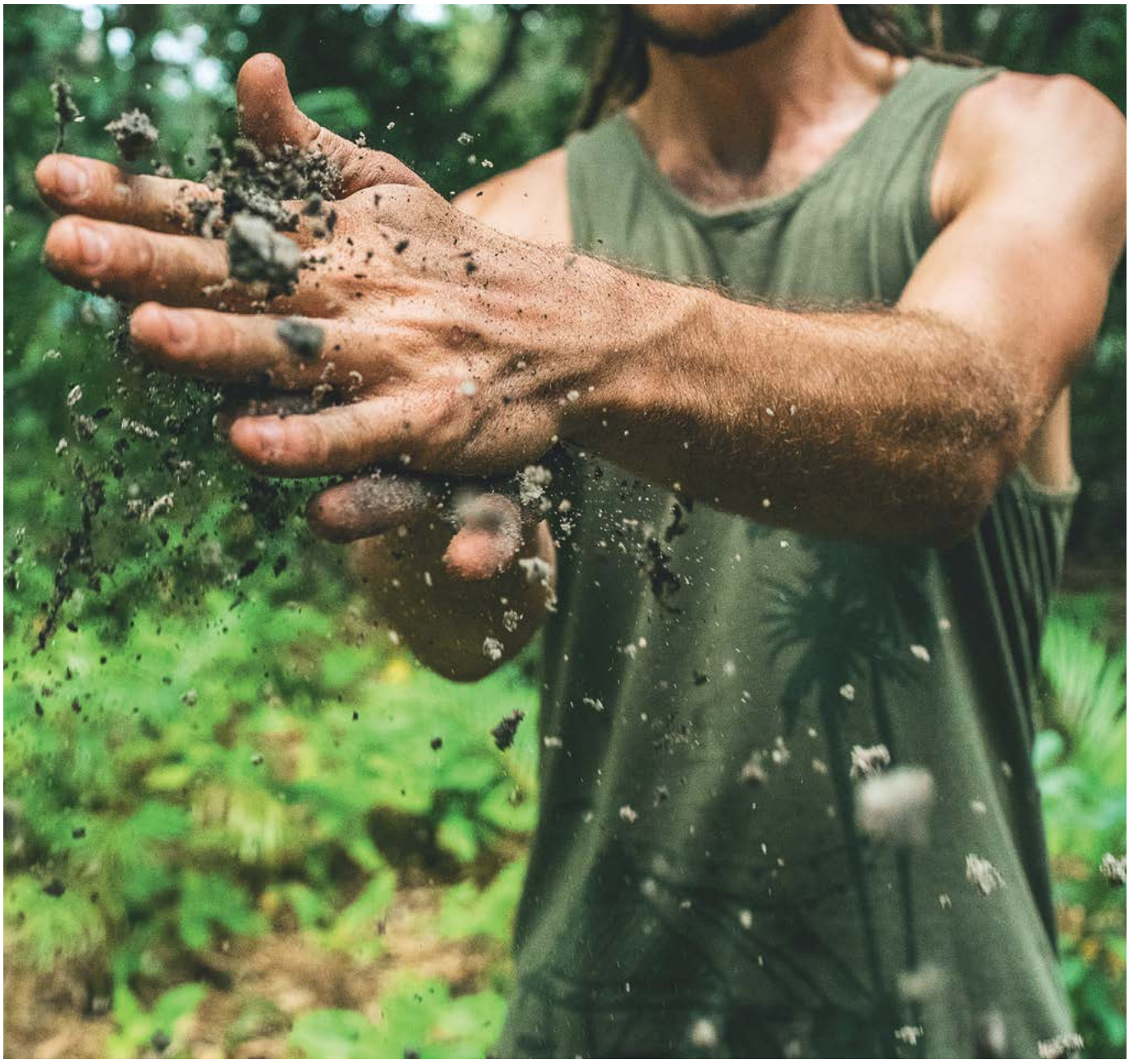

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BELGIUM

REDUCING THE CARBON FOOTPRINT BY PROMOTING GOOD SOIL HEALTH

Presenter

Boerenbond, Belgian Farmers Union

Description

For several years now and more frequently, farmers in Flanders (Belgium) have been faced with extreme weather conditions such as drought or extreme humidity. This affects harvests and increases risks on the farm level.

In addition, COVID-19 has directly effects on the income of a number of farms, making the fight against climate change more complicated as it can be expensive.

Climate change causes more unpredictable weather conditions with sometimes negative consequences for yields and higher risks for farmers. Initiatives taken in response of climate change have seen in 2021 Boerenbond become a partner in the CO2 Claire platform, the first Flemish platform where carbon storage on agricultural land will be exploited by local companies who want to reduce their impact on the climate. In this way, carbon farming is promoted and enhanced. A similar practice, promoted by the non-profit association Boerennatuur (Farmers Nature, which is supported by Boerenbond), aimed at increasing carbon storage in agricultural land, involves processing wood chips in agricultural soil. Likewise, it is important to a farmer that all the efforts he or she has made to improve carbon storage are actually financially compensated.

Results

1. Different weather conditions and increased risks raised awareness about the importance of good soil quality. More farmers are looking how to improve the soil organic matter and carbon content of the soil.
2. Adoption of practices that improve soil health increase carbon storage in agricultural soils, contributing to climate mitigation and adaptation.
3. Climate mitigation helps to preserve harvests and the income of the farmers.

Climate smartness[1]

Joint initiatives among farmers and local actors facilitate the implementation of innovative actions to tackle climate change. It is estimated that 80% of carbon sinks in terrestrial ecosystems is present and the soil, being after the oceans one of the largest carbon pools. Therefore, putting in practice offsetting schemes that contribute to carbon capture and storage in the soil, bring positive effects not only in mitigation, but also in adaptation. Organic matter in soil enhances its physical structure, including porosity, hence increasing its capacity to retain water under drought conditions and

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.

facilitating the infiltration under water excess situations, hence reducing the potential negative impacts to crops. Additionally, in the medium- to long-term, organic matter content can improve the chemical and biological properties of the soil, resulting in greater soil fertility and health thereby maintaining or increasing crop yields. Planting trees in plot or farm perimeter has synergistic effects in soil fertility and increase carbon capture potential, contributing to expand the scope of the goals in the partnership with CO2 Clair platform.

BHUTAN

ADOPTION OF DIFFERENT CROP VARIETIES TO PROTECT BIODIVERSITY WHILE ADAPTING TO CLIMATE CHANGE

Presenter

Lhap Tshering, family farmer

Description

Bhutan has been witnessing series of climate change impacts, such as

1. Melting of glaciers at an alarming pace.
2. Erosion of fertile land caused by floods due to incessant rainfall and Glacial Lake Outburst Floods (GLOFs).
3. Erratic rainfalls causing landslides.
4. Extreme weather, such as hail and windstorms, which destroys the flower buds of the fruit trees and shatters them, rendering the tree branches barren

Field evidences have also shown that shifts in cropping pattern are taking place across agroecologies, thus indicating that farming in Bhutan is quite stressed. Farmers suffer crop loss and crop damage due to unusual epidemics that have appeared as a result of changes in weather conditions. Extreme weather events such as untimely rains, droughts, and windstorms have great consequences on irrigation systems, as water is drying up or shrinking compared to the past. Paddy fields often remain uncultivated due to insufficient water availability. Statistics also show apple and mandarin production have started to decline, which could be attributed to biotic and abiotic stresses.
Specifically, COVID-19 has further compromised an already burdensome picture with the increase of agricultural input costs and consequent rise in production costs. There has also been a complicated market access due to closed borders followed by a deterioration of agricultural products caused by forced closures and restrictions.
Farmers reacted quickly and have implemented and adopted several measures to ensure that their production does not suffer from the devastating effects of climate change. These include

- The promotion of modern high-yield crop varieties through technologies. This strategy is one of the short-term measures supported by the government to adapt to the impacts of climate change.
- The cultivation of varieties that can tolerate both biotic and abiotic stresses.
- With the monsoon becoming more erratic and given the short growing season for Bhutan, short duration crop varieties have been adopted, sustainable land management technologies such as hedgerow plantation or fodder tree plantation at the periphery of the field.
- Irrigation schemes and improved drinking water connectivity.
- Adoption of biogas plants and manure briquettes.
- Improved grazing techniques and adoption of winter fodder production.
- Reforestation programmes with climate-resilient plantations.

BHUTAN

Combined with these solutions comes the need to improve the weather information and forecasting system in order to avoid crop losses resulting from extreme weather events.
Finally, the Department of Agriculture, in close coordination with the Department of Disaster Management, should develop a robust sustainable crop insurance policy and contingency plans to protect farmers during disasters.

Results

1. Areas which were considered high altitude and lacking productivity are being harvested with different varieties of vegetables, thereby increasing self-sufficiency, and improving livelihoods.
2. Farmers have other sources of income (vegetable cultivation) rather than depending only on livestock production, as in the past (especially for the highlanders).
3. Less stress on pasture lands and forests due to fodder cultivation.
4. Reduced conflicts and more coordination in the community due to improved irrigation facilities. Earlier farmers had to watch over water sources during rice plantations and many conflicts arose.
5. Increased income source for the farmers.
6. Improved diet variety.

Climate smartness

An integrated approach through the implementation of sets of CSA practices to address climate change impacts is key to ensure and improve farmers' livelihoods. The practices implemented in this case are a clear example of food and nutritional security, particularly in high-altitude areas where the harvesting of diverse range of vegetables increase farmers' self-sufficiency and diversifies their diets and income sources by reducing the dependence on livestock production only. The adoption of high-yielding, short-cycle and stress-tolerant varieties are at the frontline of short-terms strategies that farmers can implement to avoid crop failure or reduced yields, while represent an escape to challenging climate-related conditions. Adaptation is strengthened when the practices are complemented with irrigation systems, making efficient use of water and maintaining or increasing crop yields. In this case, Nepalese agricultural stakeholders can cooperate to improve weather information systems and forecasting, that are essential for planning adjusted cropping calendars. Additionally sound crop insurance policies and contingency plans supported by the Department of Agriculture in close coordination with the Department of Disaster Management can increase farmers' adaptation capacity. The implementation of biogas plants and manure briquettes along with reforestation programs are directly contributing to reduce GHG emission as alternative energy source and increase carbon capture through the use of woody species respectively.

CAMBODIA

STRENGTHENING FAMILY FARMERS' RESILIENCE THROUGH CAPACITY BUILDING TRAINING IN THE FRAMEWORK OF CIRCULAR AGRICULTURE MODEL

Presenter

Lhap Tshering, family farmer

Description

Cambodia is located in Southeast Asia (SEA) where the climate is hot and humid. In the last three decades, the weather pattern seems to have changed and presents late rains that cause many problems for agricultural production. Natural resources and agro-ecological systems have been degraded accordingly: lakes, rivers, groundwater, soil quality are becoming poorer and poorer along with the alarming disappearance of some wildlife species, biodiversity and forest.

Climate change has put increasing pressure on farmers, especially small-scale farmers in Cambodia, with limited appropriate technical farming skills, lack of capital to expand agriculture appropriately and difficulty in creating a stable and direct link from farms to markets.

In response to the challenges arising from climate change, CFAP has provided its members with training and capacity-building courses increasing their skills in animal husbandry, technical cultivation of vegetables, technical cultivation of rice and rice seeds, vaccination, water use and management, soil improvement as the story of Som Lida demonstrates.

Som Lida is a farmer with two children who lives in the village of Chensa. He owns 1 hectare of rice cultivation and about 700 square meters of vegetable cultivation. He and his family grow vegetables and rice following agro-ecological practices. As a member of CFAP, he received training on vegetable cultivation, compost production and botanical pesticides to improve his vegetable and rice production, using organic fertilizer made by his family and the farming cooperative. Lida's family grows rice and vegetables not only for home consumption, but also with commercial purposes.

Also, the farmer cooperative addresses funding problems to expand members' business, by engaging in the following activities: collect rice straw from the field to make compost to sell and to improve production of vegetables or rice as well as diversify cultivated crops in order to provide more stable incomes. In addition, CFAP encourages its members to produce compost from chicken farm waste and from resources that can be found in villages in order to obtain more organic, healthy and nutritious food while respecting the environment.

Another virtuous example in which CFAP has supported its members includes the following case. Sambo Meanchey Agricultural Cooperative became a member of CFAP in 2017 and thanks to the support received, it has progressed from selling quantities of 300 kilograms of lemon grass

and other vegetables to selling 8-10 tons per day in the harvest season or about 1000 tons of lemon grass per year. In addition, the cooperative has contracts to sell 30 liters of lemongrass oil per month, 500 tons of paddy rice, and 360 tons of rice seeds per year.

Results

1. Self-composting can help reduce fertilizer expenses, as well as produce safe and healthy food.
2. The adoption of compost and organic fertilizers has no harmful effects on the health of consumers and on the health of food producers while growing rice and vegetables.
3. The introduction of new agricultural technical skills has increased the yield about three times or more compared to old practices. Since 2002 onward, CFAP has promoted agroecological practices by training farmers and provided advisory support on how to use manure and compost that farmers can find easily.

Climate smartness

This case is an example on how farmers' association can enable the implementation of practices by building capacities and offering inputs and services such as credit, transportation, and market opportunities to their members. In addition to the above-mentioned benefits, from the use of organic inputs in agricultural production, biodiversity in farm systems can also be positively impacted, as the risk posed by the permanent use of synthetic fertilizers and pesticides is reduced, hence ecosystems services such as pollination, soil formation and nutrient cycling, as well as pest and disease regulation (e.g., natural predators) may be stabilized. Benefiting adaptation and resilience capacity of farmers. Additionally, reductions in the carbon footprint associated to the manufacturing, transport, application, and disposal of conventional synthetic inputs compared to local inputs can be achieved. In this sense, value addition opportunities can be seized, for example, the utilization of crop residues as rice straw represents economic options and boost the development of communal composting generating labour opportunities and reducing the reliance to external inputs. While strengthen the social network and development of new business in the region.

CANADA

THE AGRICLIMAT INITIATIVE TO IMPROVE WATER MANAGEMENT AND LIMIT SOIL LOSS

Presenter

Sarah Delisle from l'Union des producteurs agricoles (UPA)

Description

Like many northern regions, Quebec's climate is changing very rapidly. The main impacts expected in Quebec vary according to the season:

- During the summer, rising temperatures will increase water demand for plants and animals.
- Heat waves will be more common, potentially exposing animals and crops to heat stress more often, with consequences for their productivity, fertility and even survival in some cases.
- High temperatures could also be detrimental to spring cereal yields and to the productivity of several cool-climate vegetable and fruit crops (crucifers, autumn strawberries, etc.).
- Increased precipitation expected in autumn, winter and spring, is likely to worsen soil erosion and water quality degradation.

The Conseil pour le développement de l'agriculture du Québec (CDAQ), together with the Union des producteurs agricoles (UPA), has set up the "Agriclimat " initiative. Deployed throughout the province of Quebec, the Agriclimat project has involved a large number of farmers in order to develop tools and training to help agricultural businesses improve their resilience, strengthen food security and preserve biodiversity as well as to draw up a detailed picture of the major risks for farmers and the best ways to prevent them. Producers highlighted the importance of interventions to improve soil health and priority actions have been identified.
First, reducing tillage, planting cover crops and adjusting machinery to limit compaction are actions to be considered as a starting point. Secondly, to significantly improve water management in the field, drainage, levelling and hydro-agricultural developments are interesting solutions, when applicable.

Lastly, to complement the fight against climate change at the field level, producers stressed the importance of establishing effective riparian buffers to limit soil loss caused by erosion and to stabilise riverbanks.
The Agriclimat project, improving the ability of farmers to combat climate change, contributes to the balance and resilience of agricultural production. Resilient businesses help not only biodiversity, but also revitalize farming villages by providing jobs and quality local products. Training, webinars and documentation were used to circulate information and encourage producers to adopt the proposed practices tailored to the reality of their farm.
Nevertheless, the aforementioned situation deteriorated considerably during COVID-19. Several production sectors have been affected by restricted access to inputs and markets to sell of their products. In other cases, one or more links in the food chain have been destabilised to the point of making the financial situation of many producers precarious. Many have used patience and creativity to change their cropping patterns and adjust input use.
The agricultural stakeholders worked hard to stay in close contact with the producers and to support them in their respective actions and projects. Agronomic support, particularly in projects related to the fight against climate change, was deployed and adapted by the organisations offering advisory services.

Results

1. These actions improve soil water retention and limit the effect of water stress on plant productivity. They also aim to promote water infiltration into the soil and reduce the risk of soil erosion. In addition, these actions reduce greenhouse gas emissions, improve water quality and increase carbon sequestration.
2. These actions allow to avoid water accumulation and to favour infiltration to limit soil surface erosion. In addition, a reduction in greenhouse gas emissions and an improvement in the quality of the soil stem from these measures.
3. These actions also improve water quality, biodiversity and carbon sequestration.

Climate smartnes

From the CSA perspective, this case address three major and interrelated elements (soil health, water management and biodiversity conservation) that ensure direct and indirect benefits to adaptation and mitigation while reaching sustainable yield increases. Additionally, attention should be drawn to the seeds and animal breeding systems, to articulate research community or governmental programs that emphasize in the development of local seed varieties and animal breeds adapted to heat stress, drought, and at the same time to thinner snow layers during winter, strengthening food and nutritional security and adaptation capacity of local farmers. The proposed soil and water management practices (including water efficient irrigation and storage systems) not only deliver benefits in terms of soil physical-chemical and biological characteristics, but also contribute to reduce emissions from fossil fuel consumption and promote carbon sequestration in healthy soils. Planting riparian forest, and shrubs and trees as windbreaks typically provide shade for animals in summer and protect crops in place during winter —as snow is a natural insulator against extreme cold—, harbours auxiliary species such as pollinators promoting biodiversity. If these practices are implemented on a community basis, it facilitates shared maintenance activities during the establishment stage. Where possible, it is relevant to direct efforts to adequately measure and monitor the mitigation and adaptation benefits of the practices —integrating decision-support tools and methodologies— in order to inform National policies such as National Determined Contributions (NDCs) and National adaptation Plans (NAPs) processes or other initiatives, in articulation with private and public institutions involved in these areas.

INDIA

RECOGNIZING RURAL WOMEN ECONOMIC ROLE IN FOOD SYSTEMS TO ERADICATE POVERTY AND ENSURE FOOD SECURITY AND CLIMATE CHANGE MITIGATION

Presenter

INDIAN COOPERATIVE NETWORK FOR WOMEN (ICNW)

Description

India's climate change has profound effects, ranked 4th among the list of countries affected from 1996 to 2015. Climate change hit India hard, causing substantial economic and social losses due to severe floods, cyclones, heat waves, droughts and landslides causing death and destruction. Rain-deficit monsoon, unseasonal rains, increasing Green House Gases have disturbed the crop cycles. Drastic climate changes affected crop growth and yields severely increasing pest or insect population, by devastating overall productivity.

Indian cooperative network for women (ICNW) took up the counselling and advocacy work, by supporting rural women through financial inclusion in cooperatives. Gender in agriculture is important in order to eradicate poverty, ensure food security, promote theirs and family wellbeing.

In response to climate disasters, rehabilitation measures were distributed: community-based kitchen were mobilized and food packets were distributed to relief victims of extreme weather events, women were involved in the promotion of kitchen gardens as it helps them grow enough food for household (surplus used at home or sold for income). It addresses not only food security, malnutrition issues but also generates incomes in these crises. Animal husbandry is a second important source of income for farmers. Traditionally, farmers stored animal dung in pits, acting as a good fertiliser for the soil. The ICNW supports this traditional method of the compost pit which plays a double role during the crisis (ensuring organic food). Also, ICNW members are involved in the agriculture, particularly in the processing sector such as cultivation of crops like paddy, groundnut, sugarcane etc. which help women farmers to develop bargaining power within the family farming structures and to nurture collective responsibility. ICNW also provided alternative skill training which facilitated women in processing / preparation of agro products and other processing such as dried vegetables, peanut balls, puffed rice, leaf plates, rice snacks etc.

ICNW developed support services by providing employment programs to procure bananas, tamarind & chilies from villages, sell them to rural markets and nearby fairs and rear livestock and dairy production to ensure continuous income.

Results

The success of the ICNW experiment demonstrates how farmers women learned to make their own decisions through collective consciousness and demonstrated their process of self-help and self-management despite being marginalized and vulnerable. ICNW strengthened not only their economic roles by improving their existing skills but also provided them with new skills. The innovative and inclusive programme has enabled the poor women farmers to lift themselves

out of hunger and poverty. By joining the cooperative, women have been included in an empowering environment to participate at all levels in governance, whether in the event of pandemics or devastating annual cyclones or floods.

Climate smartness

This case depicts a model to increase farmers' adaptation capacity to manage, avoid and withstand climate risk and hazards. Women's empowerment in cooperatives leads to diversification of income sources, economic growth and poverty reduction while promoting gender inclusion and equity. Kitchen gardens play a key role in ensuring food and nutritional security with co-benefits in health, marketing opportunities, and in rescuing and maintaining agro-biodiversity. Home gardens and compost pits are simple yet powerful practices with synergistic effects, as crop residues from home gardens can be used as inputs for the compost pits and the compost produced can be recirculated as organic fertilizers, hence reducing the level of dependency of external inputs. Additionally, water efficient irrigation systems (e.g., drip irrigation) and rainwater harvesting techniques (storage thanks made of different materials) are essential to maintain or increase productivity. Likewise, diversification with livestock (poultry, pigs etc.) can balance family diets, women's economic conditions and decision-making. These practices can also be scaled-up by implementing them in a community basis, increasing the options to generate new revenue opportunities, such as establishment of biodigesters (at different scales) as an alternative energy source for cooking—with potential reductions in methane emissions—or strengthening food processing and value addition (dried vegetables, peanut balls, puffed rice, leaf plates, rice snacks, and milk by-products (ghee [clarified butter], yogurt, butter, etc.). Nevertheless, this requires constant education and technical support either through ICNW or in collaboration with agricultural sector stakeholders.

JAPAN

ENVIRONMENTAL PROTECTION TO BRING STORKS BACK TO JAPANESE SKIES

Presenter

Yosuke Ota by Central Union of Agricultural Cooperatives (JA-ZENCHU)

Description

Climate change has affected agriculture in Japan: natural disasters such as heavy rain and typhoons caused by high temperatures bring serious losses to farmland, global warming damages rice plants, abnormal fruit coloration and a high incidence of pests and diseases have been observed. Rice, a typical local cultivation, often does not mature properly presenting immature white grains. This is due to the average daily temperature exceeding 27 degrees during the ripening period. In addition, areas suitable for rice and fruit cultivation gradually shift northwards.
All these factors have contributed to the storks' extinction in Japan. Moreover, the use of pesticides and chemical fertilizers, the reformation of wet paddy fields into well-drained paddy fields, the building of concrete river embankments, and other circumstances caused the disappearance of many creatures that were sources of food for storks. People wished fervently to see the storks flying in their skies again.

Therefore, a series of initiatives to return these storks to nature began, focusing on efforts to preserve their natural habitats. For example, in order to nurture an environment in which living beings can flourish, paddy fields are flooded in the winter (winter flooding), organic fertilizer is used right from the seedling stage, pesticides are either completely eliminated or used in smaller amounts (and only those that are not toxic to fish) to practice safe cultivation of crops. Specifically, wetlands and biotopes have been created to serve as hunting grounds for storks even during the dry season, when there is no water in the rice fields; rice fields that have been abandoned are being converted into hunting grounds for storks; organic farming without the use of pesticides or chemical fertilisers is spreading among rice and vegetable producers in the region in an attempt to promote coexistence between man and nature. Based on a set of specific standards, JA Tajima has worked to disseminate farming methods that can help feed storks. In order for storks to become part of the natural ecosystem throughout Japan, we must create an environment conducive to biodiversity and increase the number of people and regions supporting such efforts. To this end, JA Tajima will promote an ecosystem-building style of agriculture, in which safe crops are grown with a low impact on the environment.

In May 2021, the Ministry of Agriculture, Forestry and Fisheries (MAFF) launched the strategy "MeaDRI" to tackle climate change and to transform into sustainable food system. By 2050, MAFF aims to achieve

- Zero CO2 emission from fossil fuel combustion in agriculture, forestry, and fisheries.
- 50% reduction in risk-weighted use of chemical pesticides by dissemination of the Integrated Pest Management and newly developed alternatives.
- 30% reduction in chemical fertilizer use.
- Increase in organic farming to 1 million of hectares (equivalent to 25% of farmland).
- At least 30% enhancement in productivity of food manufacturers (by 2030).
- Sustainable sourcing for import materials (by2030).

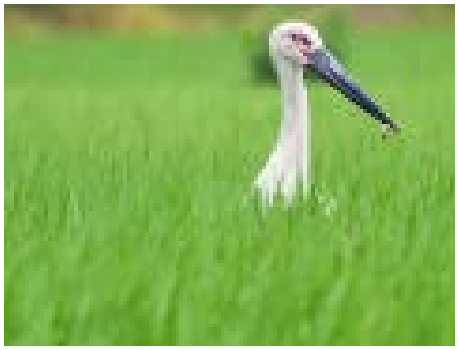
Results

Main results of the best practice are:

1. Improving resilience of farmers and sustainable soil health and water resources.
2. Preservation of biodiversity and environment in rural areas.
3. Increase added value of rice products and farmer income.
4. Recognition of the multi-role and contribution of agricultural cooperatives.

Climate smartness

JA-ZENCHU´s story embodies a holistic approach in adaptation and mitigation to climate change impacts in the food system. Intervening specific degraded agroecosystems through nature-based solutions, contributes to regenerating the broken interactions among the different organisms and elements that compound it, in this case the natural habitat of storks. This means that other positive effects are triggered across the purpose of ¨return the storks to nature¨ by harnessing abandoned rice fields to make artificial nesting towers, wetland, biotopes coupled with organic farming agroecosystem. The story around storks added value to rice products in the food security outcome, benefiting farmers' income. Likewise, introduction of organic agriculture has the potential to preserve the health of storks, their preys and humans, as well as the biodiversity of soil and water —closely related to crop yield and carbon stocks— therefore, enhancing biophysical resilience/adaptive capacity. Indirectly, may help to reduce carbon footprint from manufacturing, transportation, application and disposal of conventional fertilizers and pesticides. Cooperation is an adaptive capacity that enabled farmers associations, local residents, NPOs, universities, and other organizations to joint efforts to restore this natural habitat and boost sustainable agriculture. Aligning this type of stories with MeaDRI targets may imply new areas of opportunity for enhancing cooperation at the local level and contributing to inform national adaptation and mitigation targets outlined in Japan's Nationally Determined Contributions and National Plan for Adaptation to the Impacts of Climate Change.



KENYA

REFORESTATION AND AFFORESTATION OF KENYA'S VEGETATION TO ADAPT TO AND MITIGATE THE IMPACTS OF CLIMATE CHANGE

Presenter

Daniel M'Mailutha, farmer by Kenya National Farmers' Federation (KENAFF)

Description

Climate change raises average global temperatures and sea levels triggering major social, environmental and economic disruptions. Effects such as drought, increased temperatures and floods negatively impact lives, with human health increasingly put at risk.

The impacts of climate change in Kenya's agriculture sector and farming communities are manifested through: extreme weather events that cause flooding, drought, landslides, strong winds, rising sea levels, seasonal weather variations, increased temperatures and gradual change in precipitation patterns. These impacts cause acute and chronic threats to agro-based livelihoods and lead to the destruction of fragile ecosystems. This is resulting in reduced yields and loss of income for farmers, food shortage and malnutrition, reduced quality of products and earnings in addition to growing postharvest losses.

Kenya National Farmers' Federation (KENAFF) has evolved a response to these phenomena that are impacting the social economic fabric: the KENAFF Farm Forestry and Afforestation Initiative, which aims to conserve agrobiodiversity and re-forest degraded lands to slow down the impacts of climate change globally. The initiative also envisages preserving soils and water locally as well as educates smallholder farmers, women, and the youth on the importance of planting trees to mitigate climate change, to provide them with improved nutrition from tree products and help reduce poverty in the country. The Initiative supports the Government of Kenya (GoK) to realize its goal of achieving 10% forest cover through planting about 2 billion trees between 2018 and 2022. KENAFF iterates that the only pathway to achieve and exceed this target and, indeed, protect Kenya's natural capital and combat climate change runs through farmers. To this end, KENAFF decided to support the government in achieving and exceeding the target over the next ten years and in perpetuity. The Federation targets to deploy her elaborate grassroots to national structure (ward to Sub-County to County and national levels) in forty-four counties of Kenya to establish a framework to conduct KENAFF National Tree Planting Weeks twice every year. KENAFF also proposes a comprehensive action package. This involves the implementation of complementary practices: ecosystem-based adaptations, hybrid options and engineered solutions that include behavioural change measures, institutions and policy frameworks, as well as market-based solutions.
For example, capacity building to promote learning, information sharing and awareness creation to influence behavioural change; lobbying for policies that put safety nets in place to support resilience and recovery after climate change events; improving awareness and access to climate information to promote learning and build resilience to climate change.

Climate-smart agricultural practices and sustainable land management practices such as soil testing, conservation tillage, on-farm forestry, soil conservation, etc. are promoted as well.

Other practices may include, but are not limited to, conservation agriculture (CA) to address declining soil fertility and the negative effects of climate change; drought, disease and pest resistant crops that are well adapted to local condition. Farmers are being mobilised to identify alternative livelihoods such as small ruminant farming and biofuel production to reduce domestic and international carbon emissions.

Results

Implementation of the KENAFF Farm Forestry and Afforestation Regreening Initiative is improving the resilience of agricultural systems and mitigating the impacts of climate change. Planting trees on farms prevents environmental degradation, improves agricultural productivity, increases carbon sequestration, generates cleaner water, and supports healthy soil and healthy ecosystems while providing stable incomes and other benefits to human welfare.
Through the initiative, local communities are provided with a sustainable supply of wood products. Livelihoods of women and the youth are improved through the sale of tree seedlings, tree products like fruits from established tree nurseries.
Promotion of afforestation and farm forestry is improving vegetation cover in Kenya hence reducing pressure on woody resources.
Tree domestication is increasing the livelihoods of farmers as a profitable enterprise with a higher likelihood of realizing genuine livelihood. By aggregating into wood production, farmers are easily linked to traditional wood value chains leading to enhanced commercialization of farm forestry thus increasing income levels and improving rural livelihoods.

The KENAFF Farm Forestry and Afforestation Initiative is also contributing to more sustainable food systems through: conservation and restoration of agrobiodiversity and re-forestation of degraded lands; preservation of soils and water locally; enhancing improved nutrition security from tree products such as fruits; and reducing poverty levels in the county.
The initiative contributes to Food and Nutritional Security (FNS) through the promotion of farm forestry that contributes to direct provision of tree foods such as fruits and leafy vegetables and staple crop production, and the provision of rich and nutritious fodder for livestock. Besides, the initiative contributes to raised income levels, improved resilience, and livelihoods of local communities through farm forestry that provides them with opportunities to participate in various enterprises like: establishment of tree nurseries for sale; as well as production and sale of timber, fruits, fodder, and fuelwood.

Climate smartness

KENAFF has leaded a very comprehensive initiative that clearly address climate-smart outcomes. Entering new agricultural-related business and production models integrating trees allows diversification and income increases, directly benefiting farmers' food accessibility and poverty alleviation, reaching overall food and nutritional security goals.
This initiative also integrates a strong adaptation component, when farm forestry and afforestation activities are implemented, these practices have the potential to preserve and restore biodiversity dinamycs enhancing the supply of regulating, supporting and provisioning agroecosystem services, such as pollination (particularly important for fruit crops), pest and diseases regulation, erosion and water regulation, soil and nutrient cycling, and food and raw materials (wood), among others. These services are essential to increase farmers' capacity to avoid, manage and overcome climate risk and hazards targeted in the project. Integrating trees in the food system generally stands for mitigation opportunities in the medium- to long-term, by enhancing the removal of Carbon from the atmosphere and storing this green-house gas into trees biomasss and soil organic matter. A vibrant participation of KENAFF farmers and national stakeholders in capacity-building and awareness increase in technical and educational espaces —emphazising in women and youth— for sharing information and exchanging experiences, is important to extend the initiative to more Kenyan counties as envisioned by the Federation.

MALAYSIA

25 YEARS OF ECO-TOURISM SUCCESSES IN SAFEGUARDING LAST REMAINING VESTIGE OF RAINFOREST AND TRADITIONAL CULTURAL HERITAGE

Presenter

Koperasi Pelancongan Mukim Batu Puteh Kinabatangan Berhad (KOPEL)

Description

For a millennia the indigenous 'Orang Sungai' (people of the Lower Kinabatangan) have been living off the rainforest for food, medicine, household commodities and products of trade. This world changed dramatically from the 1960's onwards, with the advent of mechanised extraction of the forests timber resources. The ensuing rapid reduction of traditional forest resources forced many local people into a spiralling trap of dependence on timber as the only remaining viable source of trade. With the final conversion of large tracts of lowland forests of the Lower Kinabatangan throughout the 1980s into permanent agricultural crops, many local people were then forced to poach timber and other forest products to eke out an existence. These situations led the communities to think and plan the process of protecting the last remaining vestige of rainforest and traditional indigenous cultural heritage.

The MESCOT Initiative was started in 1996 by a group of about 30 visionary and dedicated individuals from the different villages of Batu Puteh to create an alternative medium of income generation for the people of the area, while in the process of protecting the last remaining vestige of rainforest and traditional indigenous cultural heritage. The core and catalyst activity chosen by the MESCOT group was Eco-Tourism. It was hoped that this activity would be the key to raising income in this poor and remote rural community, increase the economic value of a depleted forest resource, and, in the process, raise funds to support the protection and restoration of the last remaining wetland forests and wildlife of the area. MESCOT's scope was broadened in 1998 when drought and induced forest fires ravaged parts of the remaining natural forests surrounding the villages of Batu Puteh. With the support of citizens, the forest restoration work has since developed to be a core activity of MESCOT driving the future of the village run co-operative set up to manage these activities. The MESCOT Initiative has planted more than 100,000 trees. The vast majority are fast growing pioneer species, such as Mytrogyna sp, and Nauclea spp, which also double with leaves, flowers and fruit that wildlife eat.

Apart from the fast-growing pioneer species, the initiative targets specific trees that provide fruit for special wildlife such as orangutan and hornbills. All planting material is propagated in the MESCOT Nursery from seed collected by the MESCOT team in the surrounding rainforest. Trees are nurtured in the nursery from 4-6 months before being transported in the forest sites for planting.

Along with the MESCOT initiative, hidden in meander-belt forest on the fringe of the pristine Tungog Lake, the Tungog Rainforest Eco Camp (TREC) offers a unique insight into the secretive life of a Borneo Rainforest.
Staying at the camp supports the lake restoration (Salvinia removal) and orang-utan habitat restoration projects (Tree planting) through the MESCOT Initiative. TREC is a birdwatcher's paradise. Wild fruit trees surround the eco camp and daily attract up to five species of hornbill, orang-utan, macaques, and a host of other rainforest birds.
TREC has numerous eco design features built in to ensure zero waste, zero chemicals, a zero-energy spreadsheet and maximum water conservation.

However, the number of tourist arrivals have significantly been impacted by the pandemic situation. Thus, Kopel's income also has been tremendously affected. As a limited number of incomes generated, continuity of the MESCOT initiative will be obstructed and this will somehow affect the communities' income as a whole.

To mitigate those effects KOPEL's seeks external funding to sponsor the MESCOT initiative for forest habitat restoration and tree planting activities. For example, recently Kopel's has awarded grant for the KOPEL COVID-19 Kinabatangan Conservation Project Relief 2.0 from the Yayasan Hasanah.

Results

From a rural community that relies on natural resources such as logging, hunting, fishing, agriculture for survival of life, they latter transformed into an environmentally conscious community that eventually attract tourists and becomes one of their source of incomes through the establishment of KOPEL Berhad.

KOPEL under the projects with MESCOT has also employed 40 people on a salaried basis, and over 100 on a rotational, part-time basis. Additionally, the co-operative supports 20 families in the homestay program, 60 people involved in the village boat services, 10 nature guides, 30 elders and youth in the village culture group, which focuses on ethno-tourism, and four coordinators. The local community has also benefitted from training and capacity building in educational workshop, business and management skills and communication and marketing skills.

Climate smartness

In the last decades, a significant evolution of eco-tourism and agrotourism initiatives have worldwide, as in the case of MESCOT, these initiatives entail economic diversification strategies —in the face of climate and social related impacts— with a strong environmental component. Having alternative income sources enable households and communities to generate local employment and secure food and nutritional security while sustaining rural livelihoods. Home gardens may play a synergistic effect by supplementing diets and contributing to rescue and grow local varieties that also preserve local cultural heritage. More than 100,000 trees planted and a functional plant nursery, are practices that not only contribute to the restoration of wetland forest benefiting wildlife by providing feeding alternatives and a habitat, but also, to restore overall ecosystem function and resilience capacity. This, in the context of agrotourism initiatives enhance cultural ecosystems services in the territory, such as aesthetic values, recreation, mental and physical health, and spiritual and religious values. Actions that play a part in protecting the last remaining vestige of rainforest and traditional indigenous cultural heritage. In terms of the contribution of this initiative to climate change mitigation, a lower carbon footprint can be expected in eco-tourism projects compared to conventional tourism, considering the type of infrastructure or services that each one could offer, leading to lower GHG emissions per capita. These potential benefits can be boosted if the effort invested in planting forests are added, increasing the project carbon sequestration capacity. The integration of Life Cycle Assessment (LCA) tools and analyses, in cooperation with national stakeholders (e.g., Universities, government or NGOs) could better inform the mitigation potential adding value the services and products of sustainable eco-tourism.

MAURITIUS

CLIMATE ADAPTATION PROGRAMME TO IMPROVE AGROECOLOGICAL FARMING PRACTICES

Presenter

F.A.L.C.O.N. Association

Description

EFFECTS:

1. Rise in atmospheric temperatures by 0.74 – 1.2 °C.
2. Higher frequency and intensity of cyclones, torrential rains, and flash floods.
3. A mean rise of 2.1 mm/yr in sea levels & coral reefs bleaching.
4. Prolonged periods of the intermediate dry season, the transition period between winter and summer.

IMPACTS:

1. Irregularities in rainfall patterns have led to higher competition for water directed to agricultural, tourism, domestic and industrial use.
2. Frequent flash floods have led to major consequential farm produce and economic damage for farmers.
3. Disruptions in the dry and wet seasons have led to significant interference in the crop growing cycles, thus slowing the access of fresh produce to consumers and also causing major economic losses for planters.
4. Higher stress levels and death rates of livestock have been noticed by high ambient temperatures and humidity.
5. Increased usage of fertilisers and pesticides to restore a reasonable harvest against the harsh weather patterns and poor biodiversity, thus leading to major farm cash outflows and increased health hasards to consumers.
6. Importation of food to meet the local demand for fresh produce that have been damaged by poor weather, thus leading to high import Bill; 7. Bleaching of Coral reefs have led to increased risks of beach erosion, floods in coastal households, affect tourism activity and destruction of marine biodiverisity thus affecting livelihoods of fishermen.

Furthermore, following the COVID-19 pandemic, the higher atmospheric temperature and tiredness together with breathing difficulty associated with vaccines & masks render it difficult for farmers and agricultural stakeholders to engage in activities like tree planting and sensitisation campaigns.

In response to the above-mentioned climate change impacts, Climate Adaptation Programmes in Mauritius as a Small Island Developing State include:

1. Encouraging planting of coastal mangroves to fight against cyclonic conditions, to boost fisheries, to encourage water conservation against decreasing precipitation and intensified droughts; and to minimise water pollution in lagoons to enhance reef resilience to rising temperatures.

2. Transitioning towards agroecological farming practises to promote biodiversity and to minimise use of pesticides.
3. Existing Government policies include the smart cities project that champions the use of sustainable infrastructure and green energy; introduction of a ban on plastic bags; and the launch of the Mega National Cleaning and Embellishment Campaign ''Moris Nou Zoli Pei''.
4. EU is currently financing more than 20 projects related to the environment in Mauritius. Financial aids have been directed to academia such as University of Mauritius and agricultural institutions to improve local food research, with a budget of 3 million euros and Rs 4 million euros for a reforestation programme in a natural reserve in Black River.
5. Crop Insurance Scheme to planters and livestock breeders affected by natural calamities.
6. On-going coral reproduction trials in the coastal regions of the island.
7. Encouraging food processing to minimise post-harvest loss as a result of climate change & COVID-19 and to increase shelf life of farm produce.
8. Digitilisation of order-taking for farm produce and delivering the orders at specific delivery points to minimise contacts with consumers in times of COVID-19.
9. Providing free sanitary tool kits (Medical masks, hand sanitiser) to farmers for undisrupted agricultural activities.
10. Agricultural meetings are done via zoom platforms for farmers versed with technology while those who do not have access to media & internet, meetings are arranged in well ventilated spaces while respecting social distancing.

Results

Some results of the best practise include:

1. Better thriving environment for fish and other marine organisms, thus contributing to better income for fishermen.
2. Agroecological farming have increased biodiversity that led to minimal use of synthetic fertilisers and pesticides, thus allowing farmers to enjoy better profit margins and also made it possible for consumers to have access to organic produce.
3. Special agricultural schemes have motivated planters and breeders to continue their production patterns despite harsh climatic conditions.

Climate smartness

Restoration of coastal mangroves and transition to agroecological production are essential actions to progress in the protection of degraded coastal ecosystems, understood as the basis for securing sustainable livelihoods, food and nutritional security and local and healthy food to Mauritius habitants. Use of organic fertilizers and pesticides contributes to biodiversity conservation at different levels, while minimizes carbon footprint and represent greater profitability margins (it is ideal to integrated water efficient irrigation systems for water shortages). Actions towards biodiversity lead to ecosystem services enhancement. In the case, mangroves increase ecosystem services related to moderation of extreme climatic events, while regulate local water cycles and water purification, hence improving resilience capacity of the agroecosystem. Mangroves have the potential to sequester and store carbon in biomass and sediments, opening collaboration opportunities with The International Blue Carbon Initiative, a global program focused on mitigating climate change through the conservation and restoration of coastal and marine ecosystems, which provide scientific, technical, financial incentives, and policy mechanisms to for conservation and sustainable management. Complementary practices with mitigation cobenefits are biogas production, to convert the methane from livestock into an alternative household energy source, increased awareness campaigns to sensitize locals on food waste as a major contributor of greenhouse gas emissions an learn on composting technics, either at the household or community levels, with potential to produce solid and liquid compost.

NEW ZEALAND

PRODUCTION PLANNING TO REDUCE DROUGHT EFFECTS

Presenter

Federated Farmers of NZ

Description

Over the last 2 years, there has been widespread drought with farmers particularly affected and exposed to these anomalies in 2021. Areas of the North Island in 2021/22 expect to see a third year of drought. While stocking rates have remained low and feed stocks have been managed conservatively, cash flow has been poor for 3 seasons.

As a strategy for coping with extreme weather events, farmers have put in place solutions for extreme wet and extreme dry, so as not to be unprepared. First, they rationalise feed by ensuring that more is stored than what is needed for a typical season. They try to incorporate alternative feed options into the farm system, including different types of crops and pastures, grain feeding infrastructure, and reduce reliance on a single type of feed (which is typically laurel bales/ silage here). In the 2020 drought, shortages of these bales that would normally cost $70-80 per bale for medium and good quality resulted in a price increase to $150 per bale for poor quality.

Farmers are encouraged to go through (and maintain) a Major Rural Adverse Event plan which would also help them to be better prepared for other adverse events like earthquake or volcanic eruption.

Results

There is greater awareness of stock availability, caution against stocking too high, looking at options to increase on-farm feed supply and relying less on the summer season.

From an environmental point of view, moving towards a more diverse range of pastures and crops and reducing on-farm stocks many of benefits including reduced methane production and reliance on buying feed from elsewhere (and transporting it).

Farmers are able to be more financially resilient to major climatic events. Although overall their cash flow and some earnings in high productivity years may be reduced, their drought resilience in particular will go a long way in their financial resilience allowing them to continue to be good employers of farm staff, have their children attend local schools, and contribute to the wider employment that comes from serving the farm and farm products.

Climate smartness

This case depicts relevant socio-economic and environmental impacts of climate change, but also boosts actions to increase adaptation and resilience capacity of agricultural systems. The actions addressed, not only underline the value of diversification practices for animal feed, but also the importance of integrating improved farm planning to design strategies —both in space and time— that consider local geography and climate hazards, for a more efficient and sustainable management of water, soil, energy, crops/livestock, on-farm infrastructure etc. Therefore, maximizing the use of resources and profitability, and strengthening farmers´ capacity to manage, avoid and withstand climate risks. Increasing the farm or regional area dedicated to agro-silvopastoral systems may represent additional advantages

for food security, adaptation and mitigation. Integrating trees in farm planning can provide products for human or animal consumption. Likewise, they can generate to generate microclimate conditions that buffer negative impacts of extreme weather events, while progressively enhance soil fertility. Considering the use of recommended species and adequately spaced, under different arrangements (shelterbelts/windbreaks, fodder banks, scattered trees in pastures etc.) among other factors, in line with the objectives and plan of each farmer, help to prevent possible trade-offs. A timely technical advice and constant monitoring is key. The improvement of animal feeding/diets can achieve co-benefits in emissions by reducing methane emission from enteric fermentation of ruminant livestock. Trees integrated in the farm system also represent GHG sinks by increasing carbon sequestration in above- and below-ground biomass.

PALAU

FARMERS' ENVIRONMENTALLY FRIENDLY APPROACH TO RESTORING HEALTHY GROWING CONDITIONS FOR TARO

Presenter

Technical Mission of The Republic of China (Taiwan) in Palau

Description

Dramatic changes are being experienced everywhere, including the island of Palau. This area is suffering from

- Heavy rainfall that has compromised the functioning of the water infrastructure.
- Rising surface temperatures that rapidly dry out land deposits, creating a compact accumulation of sediment.

Farmers are consequently unable to adequately maintain the watercourses impacting on yield and general farm conditions. They are discouraged by the unhealthy farming environment and low harvesting productivity, leading them to abandon taro cultivation completely.
Nevertheless, several practices have been identified and implemented, aimed at effectively improving traditional water systems on farms and restoring healthy taro growing conditions. Activities include:

- Establishing partnerships with technical agencies, taro farmers and youth groups in the district.
- Site assessment with partners.
- Conduct a baseline survey of the water system.
- Cleaning and maintaining water courses.
- Development of collective plans for the management and maintenance of water systems.
- Conduct monitoring and evaluation surveys.
- Development of an action plan to address identified problems, such as adoption of integrated agricultural technologies and climate change adaptation measures such as intercropping and polycropping practices; crop rotation; cover crops and mulching; biological management of pests, diseases and weeds; recycling and composting of wastes.
- Monitoring and evaluation surveys.

The strategy adopted intends to strengthen traditional ureor beluu practices by soliciting a partnership with the Koror state government, Ngermid and Meyuns youth groups, and members of the larger NgaraMaiberel women's association. This approach will reinforce unity within the community and help promote taro cultivation as a culturally valuable activity that supports the traditional matrilineal system, which is deeply rooted in food production (taro cultivation). Local primary schools are also involved in the project. There, a calendar is planned, designed and published that will spread the cultivation and consumption of taro as a culturally significant part of the social structure, impart the health benefits and reveal the integration of traditional knowledge and the latest agricultural techniques to the wider public.

Results

By the end of the project, about 36 more taro patches will have been restored. In addition, taro cultivation enables the farmers involved in the project to increase their income by selling their produce to local caterers, the national hospital and various shops in the hamlet.

Climate smartness

Despite climate change poses challenging socio-economic and environmental scenarios to SIDS, it has also unveiled the opportunity to move towards a more sustainable production model. Improving traditional Taro irrigation systems and sustainable soil management practices, contribute to re-establish crop production and progressively increase crop yield, while retain sediments that reduces impact of soil runoff on coral reefs (Koshiba et al., 2013). Farm income diversification through polycropping or crop rotation lead to an efficient use of water and soil nutrients, preserving soil fertility that coupled with cover crops, composting, and crop biological management practices reduce the dependency to external inputs such as synthetic fertilizer or pesticides that pose additional risks to human and environmental health. The local demand of organic agricultural inputs and alternative management strategies, stimulate entrepreneurial opportunities or farmer associativity to seize current and potential market opportunities in collaboration with local stakeholders (e.g., the Koror State Government, Ngermid and Meyuns Youth Groups, local elementary schools and other members of NgaraMaiberel Women's Association, etc.). Generating a knowledge-based and circular economy around Taro farming —increasing the options to engage youth population—, minimizing waste and maximizing the use of scare resources in the sector that ultimately strengthen adaptation capacity and will reduce GHG emissions per unit of food produced contributing to mitigation outcome. Additional co-benefits on mitigation are achieved taking into account that the above-mentioned practices have the potential to gradually enhance or balance physical-chemical and biological characteristics, such as soil organic matter content hence promoting soil capacity to store carbon.

SAINT LUCIA

CONSTRUCTION OF HOOP GREENHOUSES IN RESPONSE TO HEAVY RAINS AND FLOODS

Presenter

The Saint Lucia Marketing Board, Grace Farmer's Association, Belle View Farmer's Association, Black Bay Farmer's Association

Description

In the context of Saint Lucia, the most prevalent effects of the climate change include severe drought conditions and severe flooding conditions. These effects always affect farmers and farming practices. Short-term crops can be wiped out and strong winds often break off the branches of more established fruit trees. These strong winds are associated with the increased frequency and intensity of hurricanes during the hurricane season. In an area with undulating terrain like Saint Lucia, it is very easy to lose the top layer of soil in this way. When the top layer erodes, it is very likely that landslides and road blockages will occur, leading to clogged drains, flooding and impassable roads. Crop loss affects farmers' harvest yields and their profits. Each farmer therefore has to bear his own losses, causing the cost of production to be higher.

To protect against the effects of more frequent heavy rainfall, the Taiwan Technical Mission has constructed hoop greenhouses across the island. These hoop green houses will assist in protecting the short-term crops from wind and rain damage that can harm the leaves and also the plants' ability to photosynthesize. They also reduce the effects of rain, which causes premature loss of plant flowers, thus preventing the plants from producing fruit. During heavy rains, the growing crops can be covered so that the losses are minimized. In addition to this, different crop varieties are grown to determine how they fare in the local rainy season and the dry season. Some of the varieties have a shorter growing cycle, which means they have a faster turnover, other varieties have a higher tolerance to heat and stress conditions. Finally, some varieties of watermelon have a thicker skin that prevents them from splitting easily. All of these measures ensures that the farmers have higher marketable yields.

Lastly, three sets of weather stations have also been installed in different parts of the island, an instrument that uses internal sensors to determine and record the weather and make it available digitally via a laptop computer. The data provided by the weather stations will help farmers make more informed decisions about growing their crops and minimise losses due to changing conditions. So far, it has been possible to successfully prevent crops from being damaged by pests and diseases using weather station data analysis.

Also, during COVID-19, the project facilitated collaboration between various actors in the food value chain. A partnership was initiated with the main supermarket in St Lucia to give farmers the opportunity to sell their products and present the new varieties to the public. This was done through trials and tastings of fresh products over several months. In addition, the farmers were put in touch with the National Marketing Board to provide it with supplies for several months, which ensures a market for the farmers during the COVID-19 pandemic

Results

In terms of agricultural yield, these are the results obtained: farmers observed that the hoop greenhouse has had a higher yield and sweeter fruits. The damage ratio of short-term crops can drop by 25 to 30 percentage. This is because the retention properties of the flowers during heavy rains and the heat generated in some cases keep the level of pest and other insect attack very low. The hoop greenhouses are also quite helpful in protecting the fruits during heavy rains and prevent them from splitting in some cases.

In terms of economic benefits: farmers can achieve a much higher commercial yield and, as a result, earn more than they would have done without the new varieties. The best estimate shows that farmers could increase their income by up to 1.9 times more than before. In addition, the types of varieties chosen also help the farmer to stagger planting and produce a variety of crops for a wider range of customers/markets by expanding sales channels. Research shows that farmers could increase their income by up to 20% compared to before.

In terms of the environmental benefits: the hoop greenhouses enable the slow filtration of rainwater and minimise topsoil runoff, in combination with the additional use of permeable plant cover. By doing so, the soil biodiversity is protected. About 600 farmers are benefitted from the implementation of this practice.
As a result, the efficiency of production/distribution chains in Saint Lucia has improved and imports have decreased. Through planned production, watermelons, melons, cantaloupes, peppers, tomatoes, lettuce and cabbage are flourishing. These crops are the most imported crops on the island of Saint Lucia that farmers traditionally grow and the aim is to enhance self-sufficiency and food security in the near future. In addition to this, the hoop greenhouses allow for greater resistance against the damaging effects of soil erosion, the fall of flowers and the loss of fruits and vegetables due to cracks and splits; the fruits are better protected until harvesting. The other aspect of the project includes a marketing component that enables farmers and farming communities to maintain their primary means of income and livelihood.

Climate smartness

This story is a clearer example of the adaptation and mitigation strategies that can be implemented to strive to ensure food security when joint and coordinated efforts from different stakeholders have a common purpose. Maintaining or increasing crop yields directly benefits farmers´ income, as is well described above. Likewise, an important aspect that increases household and farm resilience capacity, is the short- to long-term benefit of these practices in preserving or improving the environment and ecosystems services —in relation to sustainable management of soil, water and biodiversity— that enable the adequate conditions for farmers to carry out their agricultural activities successfully. Therefore, some spillover effects on mitigation can be outlined in the avoided crop losses and soil erosion or degradation, in both cases the carbon and even the water footprint can be reduced when available productive resources are used efficiently and sustainably, hence maximizing farm productivity. It is also worth mentioning that associativity and cooperation unlock common barriers to implementing climate-smart practices when, for example, in the case of hoop greenhouses could be a practice that cannot be afford by small-scale farmers limiting their implementation and reducing their capacity to withstand to climate-related hazards. In the same vein, education, and technical, financial and agroclimatic services should be integrated in broader regional adaptation and mitigation plans supported by participatory decision-making processes that can better integrate agriculture and climate change in the design of national policies.

SAINT LUCIA

ENHANCING BIODIVERSITY WITH CLIMATE SMART AGRICULTURAL PRACTICES

Presenter

National Fair Trade Organization in St. Lucia

Description

The most significant effect that climate change has had on St. Lucia are

1. Annual tropical storms.
2. Severe droughts.
3. Flooding.

Since 2018, the island has experienced four tropical storms and two severe droughts. The passage of each storm causes the banana crop to topple and break, depriving smallholder farmers of their livelihoods for a long period of time and resulting in a replanting programme almost every year. Income and food security also suffer.
To mitigate the effects of climate change, several measures have been instituted. These include

a. The introduction of a drought-resistant variety by the Taiwan Technical Mission.
b. The introduction of a shorter variety (Tai-Chiao No.2) which is more robust against tropical storm winds
c. Extensive desilting of the main interception channels and field drains to mitigate flooding.
d. Adoption of global GAP and climate-smart agriculture, such as soil and water conservation measures.
e. A programme to develop resilience. This has involved planting a range of tree crops that act as windbreaks to protect banana plants from strong winds.
f. Creating buffer zones along all waterways.
g. Promoting crop diversification and a polyculture system to minimise risk.
h. Finally, to alleviate drought, the introduction of irrigation systems in the main banana-growing regions.

Results

1. Where wind breaks were established, damage was less after the passage of tropical storm.
2. The desilting program prevented flooding.
3. The diversification program assured an income and protected livelihoods during the gestation period.
4. The shorter variety (Tai-Chiao No.2) suffered less damage as compared to the regular varieties.
5. The soil conservation measures reduced soil loss, minimized chances of land slippage.

Moreover, by institutionalizing of these measures, access to the international market with minimal disruption income, livelihoods and food security are assured. Adoption of a poly cropping system offers diversity, thereby it enhances the range of crops available for consumption at the household level and healthier diets are assured as well. Through Global GAP and climate smart agricultural practices, biodiversity is enhanced. The buffer zones and windbreak program help to build resilience.

Climate smartness

From the food and nutritional security perspective, the use of drought-resistant and shorter varieties contributes to minimizing the physiological stress and mechanical damage resulting in limited yield or complete harvest loss. Crop diversification with annual (watermelon, honeydew, cantaloupe, bell peppers, tomatoes, lettuce, cabbage etc.) and perennial crops that have been traditionally grown by farmers but at the same time the most imported, may represent viable options to increase medium-to long-term self-sufficiency in food production. Likewise reduce farmers´ risk to suffer economic losses due to low-selling prices, market fluctuations or climate-related impacts, expanding their target markets. Cropping calendars is essential to avoid these issues, allowing better planning and staggered harvests for banana and secondary crops throughout the year. In this sense, from early stages in the crop value chain, such as farm design or seed and varieties selection, begins to be at stake and strengthen the adaptation capacity and food security of farmers. Efficient and sustainable management of soil and water, along with the inclusion of tree crops (serving as windbreaks or buffer zones) are aligned with CSA goals, presenting benefits in climate change mitigation through carbon capture in above- and below-ground biomass. Public and private sectors play an important role in stimulating the adoption of these practices by facilitating the consolidation of local and sustainable agricultural value chains and markets that can increase farmers adaptation capacity, while discount carbon emissions from the food system by reducing food imports. Then, connecting farmers´ produce with main domestic supermarkets and the tourism sector was valuable to recognize these circular economies, as occurred during the closure of the country´s borders due to COVID-19 pandemic.

SRI LANKA

COCONUT SHELLS AS AN ALTERNATIVE ANSWER TO THE DRY SEASON IMPACTS

Presenter

Dayananda Ulugedara, farmer

Description

Sri Lanka has suffered many effects of climate change. These include floods, landslides, cyclones, droughts, etc. Many people have been permanently displaced and many of them live in poverty because of the effects of climate change. On top of this, a great number of people suffer a shortage of drinking water.
In the last decade we have observed that when one part of the country experiences flooding, at the same time, the dry area experiences drought.

As an agricultural organisation, the worst climate change effect experienced is drought. Coconut lands in the dry zone have been severely affected because of this adverse event. These lands have been completely drained due to the rainy season not arriving timely. The newly grown plants and trees were completely dead. At the same time, last year flood arrived again, which completely destroyed vegetable cultivation as the fields were completely under water for more than a week.
Since the climate change effects have become more often, government implemented the following strategies
Resettlement of people from areas "prone to landslides": The area prone to this threat is the central hilly part. The government identified the most dangerous areas, people were evacuated and relocated to better places.
Drinking water projects: These projects have been implemented mainly in the dry zone, where rainfall has decreased drastically in the last decade.
Creation of water reservoirs: Due to the decrease in rainfall, the harvest has also decreased significantly. Farmers who used to cultivate Yala, Maha and Middle season, had to settle for a single season. Therefore, the government identified the need to create water reservoirs. One of the recent major water reservoirs in this initiative is the 'Daduru Oya' project in the Northwestern Province, which was commissioned in 2014.
Disaster Management Centres: This is the government authority that deals with issues related to natural disasters before and after. As a result, forecasts of natural disasters are foretold, and timely action is taken.
Organic cultivation: lot of incentives are given to farmers to switch to organic production
While, as farmers we have used the available and existing resources to limit the damage of the drought. We placed coconut shells near the roots of the coconut trees and dug large pits every third one, filling them with the coconut shells. These coconut shells absorb water and do not dry out. In the dry season, they gradually give water to the plants.

Results

With the governmental incentives for local and organic agriculture production, farmers are starting to recultivate abandoned lands. As a result, village farmers can engage in more agricultural activities. This will ensure food needs at the village level. One of the inputs used in organic cultivation is compost fertiliser.

The farmers themselves can produce this, and thus, the village economy can be strengthened. Since 2006, with the cooperation of AFGC (Asian Farmers Group for Corporation), farmers have implemented a program to educate farmers on producing quality organic fertilizer and applying it in the field for better yields.

Climate smartness

This story reflects the different scales where climate-smart actions may take place to address climate adaptation and food and nutritional security. At regional scale, in the central hill area of the country, resettlement of communities has numerous socioeconomic and environmental challenges, however, ensuring the protection of the life for their inhabitants is a priority, therefore, forecasting from Disaster Management Centres is an important adaptation strategy against extreme climate events. Drinking water projects and water reservoirs can operate both at regional and farm scales and are essential to ensure household well-being, agricultural production and food security. Water reservoir ideally coupled with water efficient irrigation techniques, and coconut husk integrated to the soil in the roots zone, can reduce farm vulnerability to drought conditions, sustaining crop productivity or even allowing one or more additional harvests within the year depending on the species cultivated and volume of water stored. This may entail increases in income and food accessibility.

At the farm level, organic production is expected to protect biodiversity -soil microbiota, pollinators, terrestrial and aquatic vertebrates etc.- as well as contribute to healthy production. Potential reductions in crop maintenance costs are attained with the use of quality and well managed organic fertilisers produced within either the farm or the community. Additionally, organic management practices can potentially reduce GHG emissions (carbon footprint) associated to manufacturing, transportation, application and disposal of synthetic fertilizers or pesticides under a conventional management.

TURKEY

EFFICIENT USE OF AGRICULTURAL INPUTS, NEW TECHNOLOGIES AND METHODS

Presenter

The Central Union of Turkish Forestry Cooperatives, Since 1997

Description

Warmer and less rainy periods than in previous years began to be recorded, accompanied by an increase in extreme weather events. These ranged from floods to more frequent and damaging severe storms. This led to a reduction in agricultural and drinking water resources. There has been an escalation in the severity of droughts, a deterioration in water and soil quality, a reduction in biodiversity and an increase in diseases and pests.

In agricultural production, the problems of harvesting-threshing, tillage (hoeing, pruning, etc.), fertilisation, spraying, yield and quality, water supply for irrigation, and plant diversity have intensified. The direct consequence of this trend is the migration of the rural population to the cities, the abandonment of the young population in agriculture. While the population decreases in the countryside, the population increases in the cities. Economic and social problems intensify in the cities, along with employment and livelihood problems.

Farmers have identified best practices for climate change adaptation and mitigation. These involve

- New technologies have been adopted.
- New and neglected varieties were used.
- Emphasis was placed on better food storage with integrated applications.
- An attempt was made to reduce waste.
- Crop rotations.
- Avoid excessive fertilizer application.
- Establishment of agroforestry system.
- Attention was paid to crop yield and livestock productivity (choosing regionally appropriate foods, rotational grazing exercise, managing fertilizer to reduce methane and nitrogen oxides, cover fertilizer storage facilities, optimizing soil fertilizer applications).
- Improved marketing mechanisms have begun to be implemented.
- Attention was paid to risk management, including financial insurances.

Each farm business developed different opportunities for energy conservation and fuel exchange among which conducting a farm-based, fully fuel-powered energy assessment to identify energy saving opportunities such as ensuring that all heating and cooling systems work well, using timers, sensors or variable speed drives in ventilation, heating, cooling and lighting systems, replacing fossil fuel-powered equipment with electric pumps and motors or using renewable energy sources.

Results

Significant improvements in agricultural production are achieved. Farmers make sure to use inputs in accordance with technical recommendations when using medicines and fertilisers, especially when it comes to water. Good yield results are obtained as a consequence of the rational use of agricultural inputs. The costs of production for the producer decrease and their income improves. Environmental damage caused by the excessive and incorrect use of inputs is reduced.

Climate smartness

The Union has identified several changes in the food system dynamic that are interlinked with food and nutritional security, adaptation and mitigation at different levels. For example, as a result of the increasing demand of organic agriculture from consumers began this marked is growing. This, in part due to the increase of social (producers and consumers) awareness around healthy food, and the conservation of biodiversity. Therefore, farmers' organizations began to build technical capacity and engaged experts on these thematic areas to support their integration in agricultural production in accordance with consumer's needs. All the above-mentioned practices target food security, as these contribute to increase yield and farmers´ income. Moreover, numerous connections can be made in terms of their benefits to adaptation, just to mention few, biodiversity protection and diversified and organic systems are key, as they contribute to various ecosystem services, such as supporting (soil formation, nutrient cycling) and regulation (pollination, water regulation and purification, pest and disease regulation, erosion control etc.). Through soil organic matter content, agroecosystems contribute to significant reserves of carbon, hence practices aimed to keep or restore soil health, share mitigation benefits. Additionally, renewable energy technologies recognized as suitable for farmers, such as geothermal, wind, solar, biogas (from crop waste management) can diversify energy sources with possible economic benefits, and greenhouse gases reduction compared to fossil fuels.

UGANDA

OVERCOME CLIMATE CHANGE DAMAGES ON SUNFLOWER SEED PRODUCTION TO BOOST SUSTAINABILITY AND LOCAL FARMERS LIVELIHOODS

Presenter

Kule Yona by Kyempara Farmers Cooperative Society Limited

Description

In Uganda, most parts of the district have been adversely affected by the negative impacts of climate change, which brings a lot of uncertainty especially in the field of agriculture. Over the years, this has resulted in reduced crop production and to an extent is also affecting the livestock sector.

Rainfall is critical for crop production and its reduction leaves farmers vulnerable. In particular, moisture stress affects sunflowers, main promoted crop, and this has also led to food shortages throughout the district, increasing dependence on food assistance for survival and to meet daily food needs.

As a way of addressing climate issue of drought that has always hit Kasese and cause low yields, farmers have begun to

1. Promote recommended agronomic practices like early seed bed preparation, early planting that are key in avoiding climatic hazards.
2. Promote access and use of quality agricultural inputs including organic fertilizers (compost fertilizers and farmyard manure) through credible suppliers.
3. Observe soil and water conservation measures as a way of improving and/or maintaining soil fertility. Special attention will be put on agro-forestry and irrigation where applicable.
4. Promote of GAP such as Crop rotation like soya beans and ground nuts, mulching, compost manuring, crop waste recycling and use of cover crops.

Results

The efforts and practices adopted in the crop cultivation are ensuring that the sunflower enterprise is economically viable for the cooperative and the farmers. There is a demand for edible sunflower oil and derived products such as seed cake for animal feed. These services include access to quality inputs, extension services and timely payments for farmers' produce. The Kyempara Farmers Cooperative Society will provide affordable produce and ensure year-round availability of its products. Local farmers will also save the cost of delivering sunflower products to the factory.

Similarly, more local landowners will be able to grow sunflowers and KFACOS will be able to buy their produce. This will stimulate the local economy and improve the cash flow livelihoods of community members.

More than 30 job opportunities will be created directly and more than 5000 indirectly as farmers, distributors, sales agents and field mobilisers.

Target of 5,000 acres of minimum sunflower production/acre, 800kgs/1 acre, 1,000 tons per season and 2,000 tons per year will be respected. Note: The target has been divided into two seasons each year; in the first-year season A - 1030 farmers will produce 824 metric tonnes, season B - farmers will produce 1000 metric tonnes and in the second-year season A - 1335 farmers will produce 1080 metric tonnes and season B - 1370 farmers will produce 1096 metric tonnes. In two years, therefore, a total of 4,000 metric tonnes will be achieved to enable the processing machine to work at full capacity during the project implementation period.

Climate smartness

This story put into perspective how the association and joint effort towards a common purpose can trigger multiple opportunities across the different stages in the sunflower value chain. The input supply and on-farm production, considers the use of organic fertilizers as an environmentally responsible and healthy option for crop nutrition. This complemented by soil and water management practices such as mulching and crop rotation (and eventually agroforestry systems and irrigation), essential practices to maintain biodiversity, balanced water cycles in the agroecosystem and sustain soil formation and fertility in the long term, which minimizes moistures stress that limit sunflower yield. Early planting may also have a synergistic effect if it is linked with agroclimatic information advisory services. In the harvesting and storage stage, adequate warehousing conditions lead to reductions in postharvest losses, and where applicable make efficient use of energy and other resources. These practices may also represent co-benefits in terms of GHG mitigation, as atmospheric carbon has the potential to be stored in and above- and below-ground biomass including soil organic matter. Finally, in the marketing stage, the demand for by-products from sunflower production is a positive indicator not only about the potential market orientation and requirements, but also on the type of educational, technical and financial services required to fulfil the cooperative´s projections. Alliances with key stakeholders in the sector contribute to expand and consolidate reliable commercial networks increasing the resilience capacity of the cooperative, under fluctuating marketing conditions and especially those that can be affected by climate-related risks and hazards.

UGANDA

INNOVATIVE METHODS AND PARTNERSHIPS TO TACKLE CLIMATE RELATED SHOCKS

Presenter

YOUNG FARMER'S FEDERATION OF UGANDA

Description

Uganda is experiencing significant impacts of climate change in agriculture, water and the health sector. The impacts range from unprecedented rainfall patterns to extreme flooding in settlements over 1400m above sea level. Reduced groundwater supply and rainfall intensity, increased pest and disease infestations, rising surface temperatures of up to 2 degrees per decade (IPCC Fifth Assessment Report (IPCC AR5) directly affect the subsistence agriculture sector, which hosts/employs the largest proportion of Uganda's population (70%) and contributes about 25% of the country's GDP. Fragile ecosystems, including hilly and mountainous areas, forests, riverbanks, lakes and grasslands, are facing encroachment and degradation.

Moreover, the restrictions and the standard operating procedures deployed because of COVID-19 affect our operations for-example, public gatherings have been discouraged has they accelerate the spread of the virus.

In line with inspiring young farmers, creating role models and exposure, the young farmers' federation created an online food security competition that gives young farmers a chance to showcase their innovation using videos.

The winners are granted in-kind tokens to motivate them and make their farms better. Furthermore, a farmer video library platform where farmers can watch framing videos from all around the world to understand the different techniques and modern farming technologies that can be adopted on their farms has been created.

The fight to combat climate change has also involved the private sector through a PPP (private, public partnership) model in which the government works hand in hand with private institutions to promote tailored solutions to the negative effects of climate change, for example the Climate-smart Agriculture Support Project that was implemented in 2016-2020 between the government of Uganda and the world bank. The project aimed to improve agricultural productivity and provide an effective response in case of emergency crises. Other projects such as "Water for Production" through the Ministry of Water and Environment or the Uganda Clean Cooking Supply Chain Expansion Project and many others were implemented to control the rate of climate change.

At a more grassroots level, the public is made aware of the negative effects of climate change through various programmes of non-governmental organisations, private institutions, farmers' organisations, cooperatives or rotational clubs. In particular, farmers are encouraged to use modern cultivation methods, including improved technologies, to promote crop production resistant to rising surface temperatures, with low water demand, low susceptibility to pests and diseases, and short gestation periods. In unfavourable cases, the use of mobile irrigation kits is supported by the fact that most farmers in Uganda are smallholder farmers. Precision farming, where only the necessary fertilisers and chemicals are used, can generate higher returns on investment and reduce pollution levels in the agricultural sector.

Results

The use of improved cultivation methods has seen farmers increase yields from around 40 kg/acre to 200 kg/acre in bean production. The use of soil testing methods has reduced the immense amount of fertiliser, applied only when necessary for the crop. Furthermore, the planting of fodder trees has improved the air quality of the community and also provided feeds to the animal. The zero tillage aspects also enhanced the biophysical properties of the soil with an increase of carbon sequestered in the soil.

Diversification of farming methods has enabled young farmers to continue farming even in difficult times. The switch to irrigation rather than rainfed agriculture has ensured food security for the community and increased household income. The higher availability of water for production and home consumption, coupled with use of clean and renewable energy, has consequently improved the health and livelihoods of the rural women and the community at large.

Climate smartness

This story browses to different initiatives and climate-smart practices that have been promoted in collaboration with multiple stakeholders at different scales, particularly the farmers, implementing practices that take care of three key important elements to reinforce sustainability of agricultural production systems, named, soil health, sustainable water management, and biodiversity conservation. This through practices such as soil testing methods, zero tillage, irrigation systems, planting trees for animal feed, etc., contributing in an integrated manner to CSA outcomes: food security indicators e.g., yield, income, food availability; biophysical and social adaptation capacity e.g. agricultural and biological diversity conservation, efficient natural resources and agricultural inputs management. This may lead to co-benefits in GHG emissions reduction attributable to a gradual balancing in soil physical-chemical and biological characteristics such as soil organic carbon content that comprises one of the major carbon sinks in terrestrial ecosystems, also considering the carbon sequestration potential of biomass accumulated in trees. The Young Farmer's Federation of Uganda also has explored interactive spaces (exposure visits for sharing experiences) and the use ICT tools to create online events for increasing awareness and education about sustainable practices —for example farmer video libraries as a e-extension platform— through their 36000 members. The continuous work and interaction of actors from the perspective of youth and gender, stimulates the development of the social fabric and strengthens the resilience and adaptation capacity under changing climate conditions.

USA

SISTERS CREEK SIMMENTALS INTRODUCTION OF NO-TILL DRILL TO ALLOW FARMERS TO WORK WITH DIFFERENT SEED MIXES AND REDUCE SOIL EROSION

Presenter

Lynda Atkinson, farmer by Sisters Creek Simmentals

Description

Due to rising temperatures, episodes of drought and altered soil moisture are increasingly frequent. This affects water and energy cycles and land-air interactions, hampering agricultural production.
Practically, seeding is carried out on land that has not undergone any preliminary intervention, this is why this practice is also called "direct sowing". In fact, seeds are planted in the soil in a single step, with seeders specifically designed to be able to work well on compact soils and with crop residues (sometimes abundant) on the surface.

As a result, efforts have been made to spread the use of no-till drills and different forage strategies. Winter cover crops, with turnips, radishes, legumes are now the standard. Animal rotation is also used more, with manure distribution.
The introduction of a no-till drill has allowed farmers to work with different seed mixes and offered the opportunity to try alternative forage mixes to feed livestock, enhance soil health and combat climate change.

Results

1. Increase in organic matter and soil fertility.
2. The reduction of soil erosion.
3. Increase in yields.

Climate smartness

This story accurately depicts two relevant elements for sustainable agricultural production. In one hand, practices that promote soil health are relevant not only to properly maintain soil biophysical and chemical characteristics that preserves soil's long-term fertility. On the other hand, diversification in terms of cultivated species and the integration of animal production systems produce synergistic effects in the biodiversity of the agroecosystem. These integrated schemes increase farmer resilience to adverse and severe climatic conditions while reducing market fluctuations with implications in farmers' income. Likewise, the introduction of water efficient irrigation systems and leaky dams contribute to an integrated water management in the system, increasing the availability or efficient use of scarce resources. These climate-smart practices can also entail co-benefits in terms of carbon footprint reductions related to efficient use of energy during planting and irrigation. Therefore, reducing the need for external inputs such as synthetic fertilizers and pesticides (with the implicit energy and emissions from their manufacturing, transportation, application and disposal). These factors could represent detrimental effects in supporting and regulating ecosystem services, such as soil formation and nutrient cycling, pollination and pest and diseases regulation, that may later compromise the viability of healthy and environmentally responsible food production.

VIETNAM

MARKET ANALYSIS TO INCREASE LOCAL FARMERS' RESILIENCE

Presenter

Vietnam Farmers' Union (VNFU)

Description

Climate change has become a prominent issue, negatively affecting socio-economic and environmental activities in many world regions, increasing the frequency and intensity of natural disasters. Currently, Vietnam is still an agricultural country, with about 70% of the population being farmers. Most of the land is located in rural areas, where people's lives depend mainly on natural resources and self-reliance. Moreover, agricultural and forestry production in Vietnam is still mostly small-scale with negligible scientific and technological investment. It means that agri-forestry production is still heavily dependent on natural conditions and complex ecosystems.

Despite such threats, an approach for establishing sustainable forest and farm product-based enterprises has strengthened the resilience of local farmers through a structured process of market analysis and development approach initially around the cinnamon value chain. They have then started to diversify products. They have also started to diversify into additional and alternative value chains to gain further resilience. This development process over the past three years has drawn heavily on the determination of its cooperative members. The starting point for this cooperative was 4 small farmer groups growing cinnamon amongst many other crops, with 3-11 households/ per group. They sold product individually at low and precarious prices. Their natural resource management was rudimentary, and they faced various difficulties (some linked to climate change as described above). In 2015, the Viet Nam Farmers Union (VNFU) started to work with the Forest and Farm Facility (FFF) Programme, a partnership between FAO, IIED, IUCN and Agricord. Three years later, there is a remarkably different situation. In 2017 they worked together to establish a single formalised cooperative and have now started to diversify their income streams from other forest and farm resources. This practical development of a functional cooperative has proved that smallholder farmers can rapidly develop climate resilient business models coping effectively with climate change.

Results

- The VNFU-FFF has built trust and cooperation among forest and farm growers and cooperative members, working in groups is better than individual and increase solidarity in the community.
- Promote cooperation and linkage within and outside cooperative and community to mobilize more resources for production and business.
- A $3.5 million cinnamon processing factory was built which create jobs for more than 100 local labors, 75% women & youth. Increase 15-30% income for farmers.

VIETNAM

Climate smartness

The VNFU story clearly captures how cooperative work can unlock the potential of agriculture to be well positioned to enhance rural livelihoods and enable their members and the agroecosystem to adapt and withstand climate-related risks and to certain extent market constraints. The benefit in this model goes beyond the economic wellbeing of farmers communities and open the opportunity to speed up the transition to sustainable food system as it facilitates the mobilization of financial, educational and technical services that usually are the main bottlenecks for individual farmers. Likewise, it is possible to efficiently and effectively scale actions to address and overcome environmental challenges and trade-offs associated to agricultural production, preserving biodiversity functions while materialize practices and projects toward reducing greenhouse gases emissions and carbon capture.

VIETNAM

TECHNOLOGY AND SCIENCE AS DRIVERS OF FARMING ACTIVITIES IN VIETNAM

Presenter

Vietnam Cooperative Alliance (VCA)

Case 1

Hop Tien Agricultural Cooperative

Description

Vietnam is an agricultural country and is assessed by UNDP as one of the top five countries in the world that are directly vulnerable to climate change. The negative evidences of climate change in Vietnam are becoming more and more evident: sea levels have risen, as well as drought and saltwater levels in the Mekong Delta; more and more floods have affected the northern and central mountainous areas; extreme weather events such as prolonged hot weather are becoming more and more serious, negatively affecting agricultural activities.

The rise of sea levels has resulted in a reduction of arable land, changing crop structure, crop distribution and production techniques, leading to the appearance of foreign organisms and increasing disease. In addition, frequent weather changes have damaged crops and livestock production.

In recent years, the Ninh Binh province has been frequently affected by storms and tropical depressions; extreme weather events such as prolonged hot weather, severe cold, epidemics and erratic rainfall have been seriously threatening agricultural production. Specifically, climate change has shortened the growth time of many crops, reducing productivity by about 300-500 kg/ha of rice, 100-200 kg/ha of peanuts and soybeans.

In response to these threats, Hop Tien Agricultural Cooperative has started promoting the application of science and technology to actively respond to extreme weather. Such an approach has included:

- The application of innovative new farming methods to increase plant resistance, paired with the usage of organic fertilizers, preventing pests and diseases with biological products.
- Changes in the farming structure in line with climate change events, with the direction of specialized agencies. By way of example, if an area under rice cultivation was not efficient, the crops have been replaced by fruit trees, and aquaculture.
- A new focus on promoting internal resources, mobilizing resources from members, investing in infrastructure of canals, ditches, machinery, warehouses and working offices, to ensure the quality of successful service to serve its members and customers.
- The reinforcement of research and testing to bring new seedlings that are resistant to climate change into cultivation Examples include salt-tolerant rice varieties and water-tolerant crops.

VIETNAM

Results

The results of this innovative approach have mainly concerned:

- **An increase of rice yields** by 15-20%, compared to the previous years before the introduction of new rice varieties, reaching 67 quintals/ha. In addition, cultivated maize products have reached 450 kg/acre (360m2).
- The production of **quality agricultural products**. Several products have been produced safely and organically, such as glutinous rice, which is realized with 100% organic fertilizers and without herbicides. Glutinous rice is grown in an entirely mechanised process. This technique also includes dosing the water so that the rice plants grow and develop properly, avoiding pests and diseases.
- An **increase of the economic value of the cultivated area**. The revenue of the cooperative in 2020 reached over VND 7.5 billion (an increase of VND 2.9 billion compared to 2015), with profit reaching 225 million VND, and it is estimated that in 2021, revenue will reach 8.7 billion VND. This increase of value has also made possible thanks to the conversion of some rice-growing areas to short-term vegetables crops such as young cucumber, mushrooms, sweet corn, cherry tomatoes etc., bringing about 3-4 times more efficiency than rice cultivation.

Climate smartness

This story captures the importance of the integration of science and technology for sustainable food production. At the same time, strengthens the social fabric by engaging the farmer's members in conducting research around climatic factors. Crop management practices —for example, testing stress-tolerant seeds or recently developed machinery for sowing and other farm activities— allow an active and timely response to climate risks and impacts. Explicit food security and adaptation outcomes are addressed when yield increase and produce quality objectives are attained, and when alternative and diversified cropping systems are explored to better adapt farmers and farming systems to changing climate and market conditions. In complement, seek for building a model of safe agricultural production, towards organic, environmental-friendly, high-economic value and more efficient use of natural resources, provide opportunities to improve rural livelihoods, and overcome ongoing and future agricultural challenges linked to environmental degradation, poor soil health and nutrient depletion, lack of employment possibilities and rural-to-urban migration, abandonment of the land and farming, rural ageing, loss of traditional knowledge, and deepening of gender and social inequality, among other events, that are expected to be exacerbated due to adverse changing climate conditions.

VIETNAM

COOPERATIVE MODEL PROVIDING AGRICULTURAL SERVICES TO FAMILY FARMERS

Presenter

Vietnam Cooperative Alliance (VCA)

Case 2

Long Hiệp Agricultural Cooperative

Description

In recent years, climate change and salinity intrusion are a very serious problem affecting local agricultural production. Rainfall is predicted to increase, more intensive tropical storms occur, sea levels are expected to rise by 33 cm by 2050 and 1 meter by 2100. Such a rise will affect 5% of land area, 11% of population and 7% of agriculture. These are some of the impacts of climate change in the community:

- Less rainfall, less fresh water.
- Longer dry season, salt water penetrates into wide field.
- Cultivate 1 crop instead of 2 or 3 crops as before with low yield.
- Backward irrigation system.
- Lack of qualified seedlings.
- Lack of young people working in agricultural sector due to migration.

From the above situation, the cooperative orients its activities to both production and adaptation. The solutions have been implemented and adjusted in order to suit the farming characteristics and the situation of climate change and salinity intrusion. First, experimental production models have been initiated:

- One rice crop + one shrimp farming crop.
- One rice crop combined with shrimp farming + one crop of brackish water shrimp positive result (farmers' income improved).

Cooperative's responsibilities:

- Providing input materials and technical support to members, applied organic process.
- Providing salt-tolerant rice seeds with good quality by working with institutes and colleges.
- Marketing and sales 100% outputs for members.
- Investing rice processing and packaging system.

VIETNAM

1. Support for input supply: fertilizers, pesticides for members; an average of over 70 tons of organic fertilizers/year (provided 100% for members and 30 hectares for neighboring households in the locality) with the payment method of end-of-season payment and cash payment.
2. Output product support: Marketing and sale products for members with a price higher than the market price and support the transportation of products from members to the cooperative.
3. Support for certification of organic production: the cooperative's rice products are registered for protection under the name "Hat Ngoc Rong" (Dragon Rice Seed).
4. The rice production capacity: 300 tons/year.
5. Using organic fertilizers in production process, so it does not affect the environment.
6. Improving farmer members' income.

Climate smartness

This story represents an integrative approach of different climate-smart practices that emphasize in increasing food security and adaptation capacity in context-specific realities. For this, the experimental approach plays an important role in providing agricultural solutions tailored to the socio-economic and environmental conditions of local communities. It is also relevant to mention that the climate-smart practices presented consider key value chain stages from input supply to marketing, that target the economic perspective by thriving to ensure fair selling prices which in turn benefit farmers´ income, and explore strategies to add value by providing certification to the final produce. Likewise, the use of organic inputs not only represent economic advantages for farmers but also involve the protection of agricultural and biological diversity, that is important to withstand climatic shocks and their negative impacts on the farm systems such as pest and diseases outbreaks. Transportation facilities for marketing and even the use of local organic inputs for plant nutrition entail co-benefits in reducing the GHG emissions across the value chain by making efficient use of fossil energy and minimizing the carbon emissions per unit of food produced. All these actions ultimately highlight the multiple opportunities that emerge from a committed and organized cooperative approach.

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