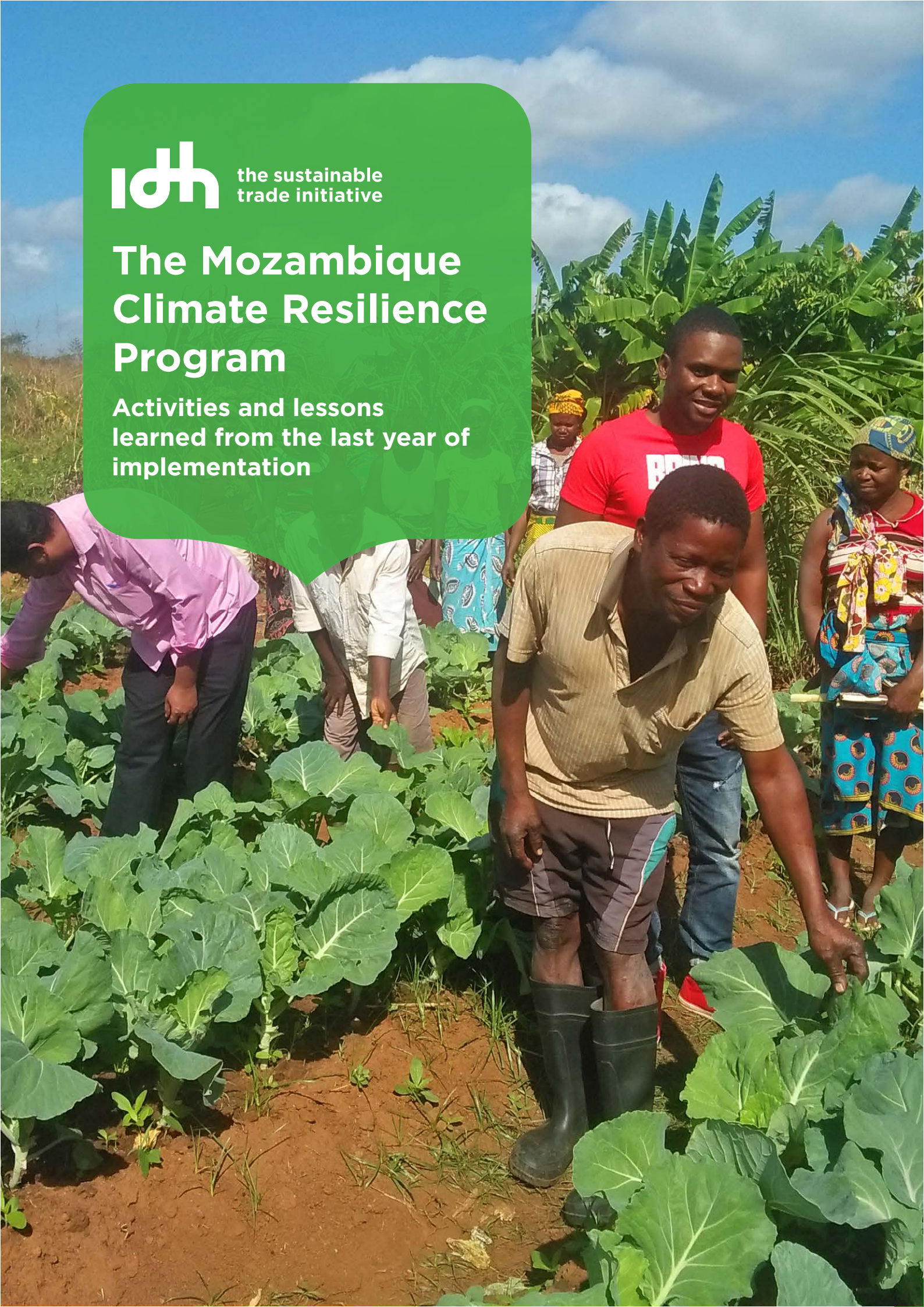

the sustainable trade initiative

The Mozambique Climate Resilience Program

Activities and lessons learned from the last year of implementation

Contents

Introduction

The importance of climate resilience in Mozambique

Mozambique's agricultural sector accounts for 22% of the national Gross Domestic Product (GDP). This sector provides employment to 73% of the country's workforce and approximately 95% of the total agricultural workforce consists of smallholder farmers.[1]

Due to Mozambique's geographical position and predominant dependence upon rain-fed agriculture, smallholders are increasingly becoming more vulnerable to the effects of anthropogenic climate changes, especially as most of the country's agricultural production is subjected to excessive floods and droughts[2], which impacts their livelihood and food security, becoming increasingly more susceptible to external shocks. This is the reality for a large majority of Mozambique's rural population that is dependent upon agricultural production as their income source, with 25% of the population currently vulnerable to natural hazards and 35% suffering from chronic food insecurity.

Ensuring resiliency of smallholder farmers against volatile weather patterns is essential to secure the agricultural productivity and, in turn, health and well-being of Mozambique and its people. It requires mitigating the impact of climate change by de-risking farmer livelihoods via maximizing all possible and existing assets, starting with developing the household and community as a reliable safety net and requiring a holistic livelihood approach for robust 'asset' development and risk mitigation.

1 Agricultural employment statistic: https://idea.usaid.gov/cd/mozambique?comparisonGroup=region
2 http://www.fao.org/mozambique/fao-in-mozambique/mozambique-at-aglance/en/

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The Mozambique Climate Resilience Program

De-risking the farmers' livelihood from the threats associated with rainfall and climate change means maximizing all possible and existing assets to mitigate impact. The program seeks to increase farmers' resilience and knowledge starting at the household and community level.

Beginning in 2016, IDH partnered with four private-sector organizations: Olam, San-JFS, Plexus, and SANAM and, with additional technical support from Action for Food Production (AFPRO), convened a program designed to increase farmers' resilience against extreme conditions and poverty by employing a coordinated approach to provide farmers with diversified income, improved food intake, and training on sustainable agriculture production.

The Mozambique Climate Resilience Project (MCRP or "the Program") provides a holistic approach to livelihood for robust 'asset' development towards risk mitigation by embedding water management to all aspects of household activities, such as crop-management techniques, via increased knowledge of good agricultural practices (GAPs), gender empowerment, alternative livelihood opportunities (e.g., backyard poultry, second food crop, etc.), and empowerment of village-level institutions.

Initially, a feasibility study was conducted to understand the context and potential areas for development of interventions. In October 2016, the Program launched with a selection of pilot sites and conducted a needs' assessment exercise along with three partner agencies (Olam, San-JFS, and Plexus). Another partner agency, SANAM Namialo, joined in the last quarter of 2017. AFPRO, as a knowledge partner, facilitated project planning, guided partner agencies during execution, and provided handholding support at community level to increase local-level capacities.

Pillars of intervention

Based on the feasibility study and consultation of all the Program stakeholders, the following pillars of intervention were identified:

1. Improved water and land management
2. Better agricultural practices and access to agricultural tools
3. Increased alternative livelihood opportunities
4. Access to both energy and information

Program achievements

Over the period of four years, the Program saw tremendous success in improving water access for the communities, resulting in additional income benefits by way of second-crop opportunities and animal husbandry activities. This also contributed to safe drinking water for the local communities, leading to improved community health. Water-harvesting structures created under the Program further supported the controlling of soil erosion. These structures are simple, low cost, and produced with locally available materials. Construction and maintenance of these structures do not require highly skilled manpower and are now being managed at the community level in several project areas.

Incorporating year-on-year learnings from the Program, innovations at the field level were implemented for deepening impact. Training on GAPs and accessing information proved an important pillar of the Program. In the third year of intervention, MCRP partnered with Kuza, a social-development enterprise, to develop tailored learning content for supplementing farmer capacity-building trainings to foster learning and adopt more GAPs, by launching a digital microlearning toolkit consisting of microlearning videos that can be accessed in the most remote areas of Mozambique – without requiring electricity or internet access.

Instead of a single-angled focus (e.g., the farmer or cash-crop production) only, the holistic approach brought by the Program provided households a variety of tools for empowerment and a greater chance to institutionalize a system change for improved livelihoods.

In this report, we summarize our achievements and learnings from the Program intervention over the four years of implementation.

Program Partners

Public-Sector Partners

- **The Embassy of the Kingdom of the Netherlands (EKN)**: EKN in Maputo, Mozambique is the key public donor and convenes the annual Mozambique Climate Resilience Program meeting to stimulate dialogue and exchange best practices with other relevant stakeholders active in the region.
- **Local District Government (GoM):** Local governments from Lalaua and Monapo districts, Nampula province, Cuamba district, Niassa province, and Balama district, Cabo Delgado province supported the initiative by providing technical assistance and extension services via offering essential support for mobilizing rural communities to support and maintain the development of the natural resources (land, water, vegetation, and animal husbandry) for long-term sustainability.

Private-Sector Partners

In this partnership, we work together with four private-sector partners representing Mozambique's largest cotton-producing, processing (ginning), and lint-trading companies. The four companies, under Mozambique's concession system, support smallholder farmers with extension services including input provision and training on sustainable agricultural practices (SAPs). Alongside public funders of MCRP, they co-invested in the development of water resources and alternative livelihood activities to improve cotton productivity and output while simultaneously diversifying farmer crops, income, and strengthening livelihoods. The details of private-sector partners under MCRP:

- **Sociedade Algodoeira do Niassa JFS (San JFS)**: San JFS is based at Caumba, Niassa province in the northern region of Mozambique. San JFS supported 42,000 smallholder farmers for cotton cultivation, covering an area of approximately 35,000 ha.

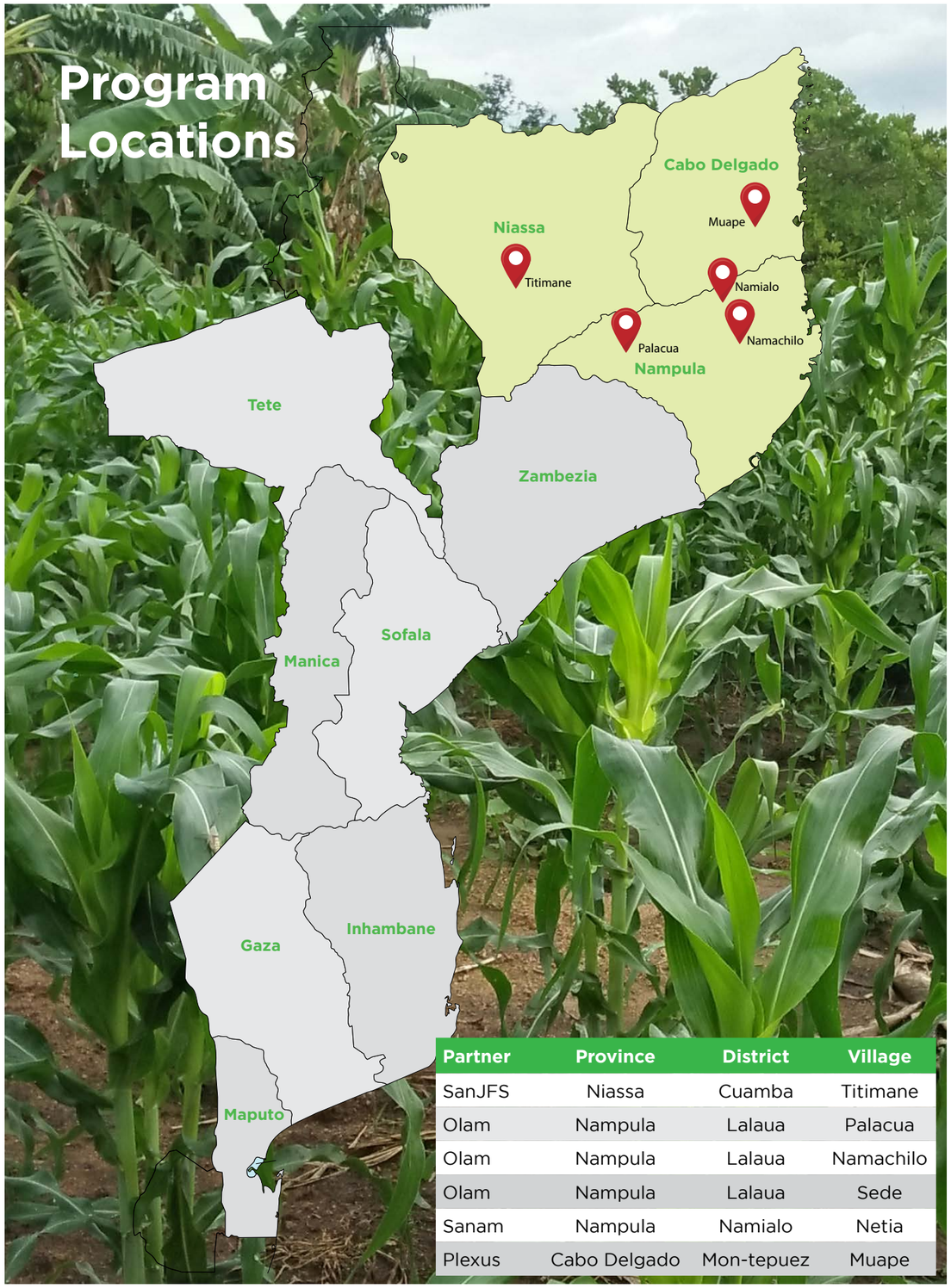
- **Sociedade Algodoeira de Namialo (SANAM)**: SANAM is based at Namialo, Nampula province in the northern region of Mozambique. SANAM supported 48,000 smallholder farmers for cotton cultivation, covering an area of approximately 40,000 ha.
- **Plexus, Mozambique (Plexus) :** Plexus is based at Montepuez, Cabo Delgado province in the northern region of Mozambique and they supported 72,000 smallholder farmers for cotton cultivation covering a 60,000 ha area.
- **Olam, Mozambique (Olam):** Olam is based at Reibaue, Nampula province in the northern region of Mozambique. Olam supported 30,000 smallholder farmers for cotton cultivation covering an area of 25,000 ha.

Civil Society Partner

Action for Food Production (AFPRO) is a voluntary organization based in India, specializing in developing cost-effective rainwater-harvesting and soil-management solutions and providing training to local communities on construction, operation, and maintenance of different Natural Resource / Watershed Management initiatives with water budgeting and crop planning. AFPRO co-designed the framework of these pilot interventions and provided technical backstopping support to MCRP's Implementing Partners (IPs) in the development of land and water resources. To ensure long-term sustainability, AFPRO was actively involved in facilitating knowledge transfer and capacity building in land and water-resource development of local communities and IPs in Mozambique.

Social Enterprise Partner

Kuza Biashara (Kuza) is a social-development enterprise specializing in developing digital micro-learning content tailored to farmers' needs. In partnership with Kuza, we developed high-quality, digital-learning materials for farmers to provide access to knowledge and supplement field training in remote areas without requiring electricity or the internet. Learning materials developed in the pilot phase include lessons on water management, integrated crop management, pest management, crop planning, farm management, and animal husbandry.



Partner	Province	District	Village
SanJFS	Niassa	Cuamba	Titimane
Olam	Nampula	Lalaua	Palacua
Olam	Nampula	Lalaua	Namachilo
Olam	Nampula	Lalaua	Sede
Sanam	Nampula	Namialo	Netia
Plexus	Cabo Delgado	Mon-tepuez	Muape

Program Deliverables

Mozambique Climate Resilience Program was established as a response to changes in weather patterns and explored ways to address its impacts on cotton farmers.

In the first of year implementation, the Program focused on laying the groundwork and convening key stakeholders. Ground activities included: building of the essential water-harvesting and soil-conservation structures; developing demonstration plots for second crops; providing the initial beneficiaries with goats and chickens; training farmers on water management, good agricultural practices in cotton and second crops, and animal and disease management; and equipping community-based entrepreneurs with solar panels as well as developing repayment models based on mobile-charging units for the communities.

In the second year, following the completion of the water-harvesting and water-management structures, farmers were able to leverage available water for cotton production, crop diversification, and animal husbandry activities. Improvements in living conditions in the communities as a result of the additional water available to both farmers and community members for farming, drinking, washing, and other activities started to become visible.

During the year, IDH and its partners focused its community engagement on local capacity-building activities to ensure farmers and community beneficiaries could maintain the water catchment areas, second cropping activities, and animal husbandry for long-term sustainability post-pilot. Under the partnership with Kuza Biashara, a digital micro-learning content was developed to provide farmers with more dynamic and engaging training material (online and offline) to adopt good agricultural practices.

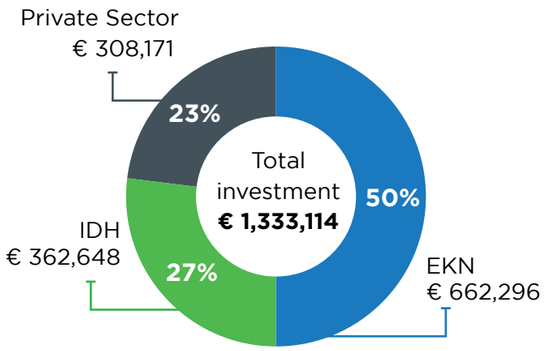
Even though smallholder farmers were already exposed to climate risks, 2020 brought additional challenges due to the COVID-19 outbreak (e.g., as health risks,

price fluctuation, labor and input shortages, unpredictable market conditions, and loss of diversified incomes). The pandemic has aggravated these risks and pushed the vulnerability of cotton farmers even further. Hence, in this last year of implementation, the Program focused on overcoming operational challenges due to travel restrictions and field-work activities imposed by the COVID-19 crisis while preventing health risks. Overall, emphasis was on preparing for the Program's conclusion, addressing the long-term sustainability of the program.

Program Investment

The funding structure for the Program and the implementation of the field-level projects is based upon matched funded support between public funders (the Dutch Embassy of Mozambique and IDH), and the private partners of the Program. Due to such public-private partnerships, innovative approaches like these can be de-risked and tested.

Additionally, to achieve impact at field level, IDH supports the Program in its three roles of convening, piloting, and co-funding.



Convening program stakeholders

As a part of MCRP, IDH convened the Program stakeholders for designing interventions and sharing the Program learnings. Supported by EKN, the meetings were critical to identify strategic priorities and areas of collaboration.

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Improving access to water and minimizing the effects of weather-related shocks and stresses by establishing community-based watershed structures

Mozambique Climate Resilience Program endorsed the development of water structures including water-management techniques (e.g., community water harvesting, dug wells, and dams) and water-storage techniques (e.g., soil conservation and land development through bunds and furrows). MCRP supported the creation of water catchment areas (e.g., open wells, ponds, and reservoirs) to enable water to be retained for longer periods throughout the season.

Over last year, the Program concentrated on advancing infrastructure development, repairing existing facilities, and transferring knowledge to run maintenance routines on key water harvesting structures (e.g., running de-siltation of over 4,000 m^3 of sediments and maintenance in existing check dam, repairing the main wall, increasing side wall height, and constructing earthen-guide bund on both sides).

Communities benefitted from an enlarged stream (deepening and widening the water channel), which contributed to increasing water storage capacity by 13,065 m^3 (12,090 m^3 from desilting and 975 m^3 from increased stream). New structures were implemented (as field work restrictions allowed) including 65 gully plugs, 90 spillways across 5.6 km of contour bund / farm bund, and 1,368 m of trenching, and two irrigation schemes contributing to controlling soil erosion, increasing water infiltration, and soil moisture. These structures enabled farmers to use

an additional 60 ha of land for diversified agricultural production.

As a result of soil conservation and land development, water resource development, and irrigation infrastructure development initiatives, MCRP created an additional water-storage capacity of over 170 TCM and irrigation was brought to a 100+ ha area.

The combination of maintenance training, community management with soil-conservation structures, cost-efficient water harvesting, and irrigation facilities demonstrated to be effective against the effects of heavy rainfall, loss of fertile soil through erosion, and extended periods of drought. Hence, the Program experienced a positive contribution to increase the climate resilience of smallholder farmers and rural communities.

Total number of water-harvesting structures

Structure	Proposal target	Achieved results
Earthen embankments	2	5
Check dams	6	9
Farm ponds	10	9
Open wells	6	6
Artificial recharge borewells	3	3
Irrigation pumps	9	15

Total number of soil and land-conservation structures

Structure	Proposal target	Achieved results
Trenching	500 m	3,968 m
Farm bund and contour bund	13,550 m	23,427 m
Gully plugs	36	103

Masonry Check Dams

CASE STUDY 01

Different types of water-harvesting structures supported harvesting rainwater and enhancing water storage at village level to further provide protective irrigation for cotton and second-crop cultivation.

Check dams, weirs, and retention walls are stone-masonry structures for water harvesting constructed on streams with a width of 10-30 m and a depth of 2.00-5.00 m. They recharge water tables of wells, provide drinking water, and sustain agriculture.

During the Program period, there were nine check dams, three check weirs (at Muape village), two check dams and one check dam each at Palacua and Netia villages, along with a retention wall at Namachilo and one restoration/repair of an existing check dam at Lalaua Sede.

Masonry check dams were built in the project regions of Olam, San-JFS and Plexus. Members of the local community were engaged for construction of these dams. They also contributed by giving their land for construction and providing water for water curing for the structures. They are now using water from these structures on a shared basis.

There is an increase in irrigation and water availability in the downstream of the structures. As a result, more farmers are now cultivating secondary crops in the project areas.

In one such project area at village Netia, the check dam is supporting recharge of groundwater table, helping to increase water in newly constructed open wells to meet the water requirement of an oil mill owned by SANAM. Further, the local community is harvesting vegetables such as onion, tomato, sweet pepper, and cabbage during dry season. Farmers also sell their surplus produce for additional income.

Gully Plugs

CASE STUDY 02

Gully plugs are a simple, low-cost soil-conservation structure made of locally available materials such as boulder or stone. For gully plug construction, the proposed section is 1.50 m2 (i.e., base width 2.50 m, top width 0.50 m, and average height 1.00 m). Gully plug length varies per gully width. Normally, gully plugs are constructed in gullies with a 5-10 m width. Throughout the Program, we constructed 103 gully plugs in five project villages.

Gully plugs were built in the project regions of Olam, SANAM, Plexus and San-JFS for Lalaua Sede project. Community engagement and contributions were substantial for the structures as local community members gave land and labor for the construction.

The communities who have benefitted are now cultivating crops like paddy on the deposited silt in gully plugs. In Lalaua Sede, villagers use the stored water in gully plugs for cultivating second crops as well as for washing and bathing. Villagers are willing to maintain the structures at the community level. Given no external cost in development of these structures, volunteers from Namachilo, Palacua and Lalaua Sede villages decided to replicate such structures in their fields during the coming year.

Farm Ponds

CASE STUDY 03

Farm ponds are water-harvesting structures normally constructed in areas having a natural depression and potential for surplus runoff water storage. They are effective in increasing soil moisture in nearby fields to enhance crop cultivation and crop productivity. Throughout the Program, nine farm ponds with average dimensions of 20m x 20m x 3m were constructed with an average water storage capacity 1,000 m^3 (cubic meters) and the potential to benefit a 4-5 ha area.

Farm ponds were built in the project regions of Olam, SANAM, and Plexus. Members of the local community were engaged for the ponds' construction; they also contributed by giving their land for construction.

Farm ponds helped to enhance soil moisture in surrounding areas, which has improved irrigation, enhanced cotton productivity, and supported second-crop cultivation.

At village Namachilo, the farmers use the water from the farm pond for irrigation and cultivation of second crops. In village Titimane, the villagers are also using water from the pond for daily activities including washing and bathing.

Artificial Recharge Structures

CASE STUDY 04

Artificial Recharge Structures – Bore Wells: Village Netia in the project area had one dysfunctional bore well as well as two bore wells with a low yield and a high total dissolved solids (TDS). Under MCRP, artificial recharge structures were constructed to enhance yield and water quality.

The work included digging a pit around the existing bore well, perforating 3m x 3m x 3m casing pipe, and covering the pit and casing pipe with filter media such as boulders, gravel, and sand). One earthen/stone bund was constructed to divert runoff water to the excavated pit and control velocity.

Artificial recharge structures were built in the project regions of SANAM. Members of the local community were engaged for construction of these dams and they, too, contributed by giving their land for construction and providing water for water curing of the structures. Artificial recharge structures support in recharging water table and improving water access and water quality.

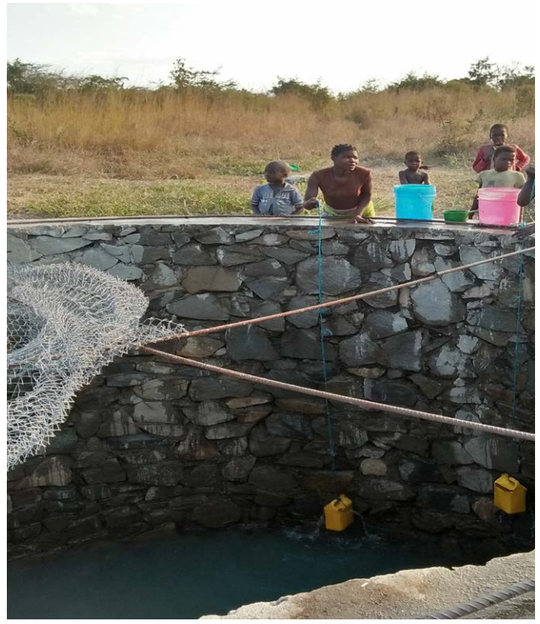
Open Wells

CASE STUDY 05

To tap the sub-surface water, six open wells were constructed under MCRP at five project sites. The primary purpose of these wells is to provide protective irrigation to the main crop in case of a delayed monsoon season whereby farmers can use available water for second crop cultivation and villagers can use this water for drinking purposes.

Open wells were built in the project regions of Olam, San-JFS, SANAM, and Plexus. Members of the local community engaged in construction of these wells as well as contributing by giving their land for construction and providing water for water curing for the structures.

Open wells are a good source of groundwater and the structures constructed under the project are providing increased water access to the local communities for drinking and irrigation. Local communities maintain these structures and also remove the silt as required.



Summary of area brought under irrigation:

Sr. No.	Name of Project Site	Implementing Partner	Year Wise Achievement, ha				
			2017-18	2018-19	2019-20	2020-21	TOTAL
1	Namachilo	Olam	10	0	4	5	19
2	Palacua	Olam	5	7	5	10	27
3	Lalaua Sede	Olam & San-JFS	0	0	0	10	10
4	Netia	SANAM	2	10	5	5	22
5	Titimane	San-JFS	5	0.6	1	2	8.6
6	Muape	Plexus	10	1.25	2	3	16.25
Total			**32**	**18.85**	**17**	**35**	**102.85**

Sr. No.	Name of Project Site	Implementing Partner	Year Wise Additional Water Storage Capacity Created, m3 (cum)				
			2017-18	2018-19	2019-20	2020-21	TOTAL
1	Namachilo	Olam	11,500	0	0	0	11,500
2	Palacua	Olam	8,500	12,000	0	0	20,500
3	Lalaua Sede	Olam & San-JFS	0	0	0	33,177	33,177
4	Netia	SANAM	3,200	24,000	7,816	0	35,016
5	Titimane	San-JFS	23,000	7,500	0	0	30,500
6	Muape	Plexus	9,500	500	32,800	0	42,800
Total			**55,700**	**44,000**	**40,616**	**33,177**	**173,493**

“A revolutionary change has been noticed in the life of farmers residing around bore well. Easy, quick availability of water for SANAM factory and farmers for crops throughout the year, increase of moisture content in soil, water conservation, and protection of crops from excess water flow are key benefits. Farmers taking initiatives to grow different crops have been noticed as well.
Thus, benefits derived were magical, unique and unparallel[ed].”

- SANAM

Providing alternative livelihood opportunities for increasing income and food security – Diversification of crop production

Crop diversification provides farmers with both income diversity and food security to ensure resilience against external shocks. This is essential as one-third of Mozambique's population is already food insecure due to low returns in agriculture that do not provide enough income to maintain entire households.

By enabling farmers to grow secondary crops through the provision of agricultural inputs, fertilizers, pesticides, and farmer training in modern agricultural practices, farmers can grow additional crops for self-sustenance and added income.

Additional income generated helps farmers to save and develop buffers in poor harvest seasons and enables their purchase of additional goods and services to support their needs and long-term vision (e.g., sending their children to school). The benefits continue: increased food security to the communities' health and improved decision-making on their cash-crop production during the rainy season (decisions less driven by hunger and starvation are based more on financial understanding).

IDH hired a local agronomist to help, plan, and execute second-crop patterns in all project villages as well as to provide on-site training and demonstrations at each of the project sites. Additionally, MCRP partners provided farmers with seeds, fertilizers, and pesticides.

For a greater local ownership of the projects, IDH encouraged the farmers to form groups ranging in size from 10 to 25. These groups were provided input and training on nursery raising, transplantation, irrigation, and application of fertilizers and pesticides.

Monthly visits were made by the agronomist to the field sites.

A beekeeper consultant trained 113 participants on honey-production techniques and connected them with a processing facility committed to buy their produce. Among the participants, ten community liaison officers were taught how to replicate their newly acquired knowledge in other villages. Training took place in Lalaua, where 124 beehives were installed. With this installed capacity, the forecast for total honey production is approximately 6,650 kg per year, which can potentially complement farmers' income.

As a result of promoting a second-crop initiative, 267 farmers from all six project villages were trained, yielding an additional area of 14.50 ha under cultivation of second crops including tomato, cabbage, onion, lettuce, and sweet pepper.

Providing solar energy capacity and access to technology - Training village-level entrepreneurs in solar-energy business models

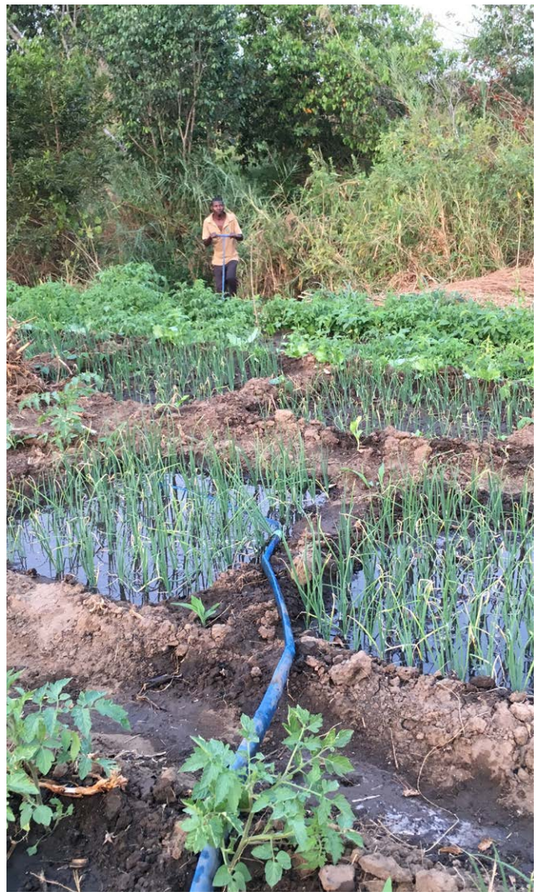
Access to energy and information technologies is fundamental to building resilience. Technology is growing rapidly, and the cost of procurement is lower and becoming more affordable. By harnessing low-cost technologies, the Program provided solar panels at the community level along with appropriate implementation schemes to ensure participants can be credited and reimbursed through viable financial models.

Providing Solar Kits for lighting and charging

Due to a lack of power supply in the villages, people did not have any exposure to electronic media, resulting in a lack of information opportunities. To fill this gap, a community-based approach towards adopting solar energy was selected. MCRP chose an entrepreneur to initiate an information dissemination center and act as village field facilitator to support the intervention.

The interested person is provided a solar energy-based kit with provisions for LED lights, mobile recharge units, and desktop or LED-television connections. The entrepreneur bears the initial cost, although a major part of support is provided by the partner agency from project funds. Entrepreneurs are responsible for repaying the balance amount. This activity did not generate considerable response due to the cost involved and the product quality in the market. Five entrepreneurs were supported by the partners in Titimane (San-JFS), Palacua, and Lalaua (Olam and Muape (Plexus)).

San-JFS adopted an approach to provide partial equipment cost to the entrepreneurs for purchasing a solar-energy-based household lighting system and mobile charging unit. Two entrepreneurs were supported by San-JFS to start mobile recharge services by using solar-energy operated devices with the capacity to recharge five mobile units simultaneously.



Providing alternative livelihood opportunities for income diversity and food security – Animal husbandry

Diversification of income and dietary options is further enabled by providing animal husbandry services as an additional activity to second crop cultivation.

In the farming system, animal husbandry plays a key role in Mozambique especially for the smallholders as it serves as another alternative livelihood opportunity. It requires low investment and takes advantage of locally available resources. Goats and chicken are considered a major asset alongside farming activities as they can be sold for cash income, traded for other goods or services, and can meet household consumption needs while supplying essential dietary nutrients. Although a huge demand exists in Mozambique, the animal husbandry sector is underdeveloped, primarily due to a lack of infrastructure, entrepreneurial skills, and support mechanisms.

In the project villages, increased water availability with water-harvesting structures provided an opportunity to undertake animal husbandry as an additional source of income for the beneficiary community. Interventions under this activity mainly focused on providing three services for effective and sustainable impact on the animal-husbandry component:

1. Providing locally suited animal breeds to a selected group of voluntary beneficiaries who demonstrated interest and motivation to engage in animal husbandry.
2. Creating Self-Help Groups (SHGs) to promote a group-based management model to stimulate learning, knowledge sharing, and enabling upscaling of activities. SHGs were trained on good management practices and a few members were appointed as community veterinarians, receiving basic veterinary capacity-building training.
3. Assisting SHGs in the procurement and provision of vaccines, feed, and housing materials for the animals.

Under the Program, 93 women were supported with poultry and 130 men were supported with goats for rearing. This exceeded the initial target of supporting a total of 59 community members for goat rearing and 38 for poultry.

SHGs, established in five project villages, received training on working collectively with roles and responsibilities as well as the required routines for proper animal practices (e.g., health management, housing, and feeding). During 2017, AFPRO deployed an expert to provide supplemental training on health care, vaccinations and deworming, as well as other facets of management and market linkages.

In total, 17 community veterinarians received training, ensuring at least one individual at each site was available to advise the other beneficiaries on animal health management. In the second year of implementation, communities received refresher trainings on animal and health management and supplementary support from local district offices for vaccines and other veterinary services. Based on the linkages with local resource persons and district officials, further support was mobilized for vaccinations.

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Increasing productivity in cotton - Providing GAP training, access to inputs, and markets

Cotton is a major agricultural crop in Mozambique, ranking sixth in total export value. It is the main source of income for over 300,000 smallholder households in central and northern Mozambique. Ultimately, the cotton sector has the potential to drive a household poverty reduction in the target villages. However, this potential is currently clouded by low productivity, low utilization of inputs and technology (less than 3% of farmers use fertilizers), and limited connectivity and commercialization (8 in 10 farmers are disconnected from reliable all-weather road networks and do not sell their production).

GAPs are on of the important determinants of cotton yields. As a result, MCRP builds on the existing work for the promotion of the Better Cotton Initiative (BCI) and Cotton made in Africa (CmiA).

In 2013, BCI signed an agreement with the Mozambique Cotton Institute (IAM), which saw BCI's Minimum Production Criteria embedded in the country's cotton legislation and national guidelines of the farmer extension services. The latter is carried out by cotton concessionaires, who in turn provide training to the farmers as per the BCI principles.

The Better Cotton Standard System and CmiA are holistic approaches to sustainable cotton production covering all three pillars of sustainability – environmental, social, and economic. Each of the elements – from the Principles and Criteria to the monitoring mechanisms that show results and impact – work together to support the Better Cotton Standard System, the credibility of Better Cotton, and BCI. The system is designed to ensure the exchange of good practices and continuous learning for improving farmers' knowledge.

Different trainings were designed and delivered to ensure the adoption of good practices and continuous learning. Additionally, cotton concession partners provided packages of inputs and credit to all smallholders at key stages of the production cycle. Capacity building on GAPs followed the production principles of BCI:

- Minimize harmful impact of crop-protection practices
- Promote water stewardship
- Care for health and soil
- Enhance biodiversity
- Preserve fiber quality
- Promote decent work
- Operate an effective management system

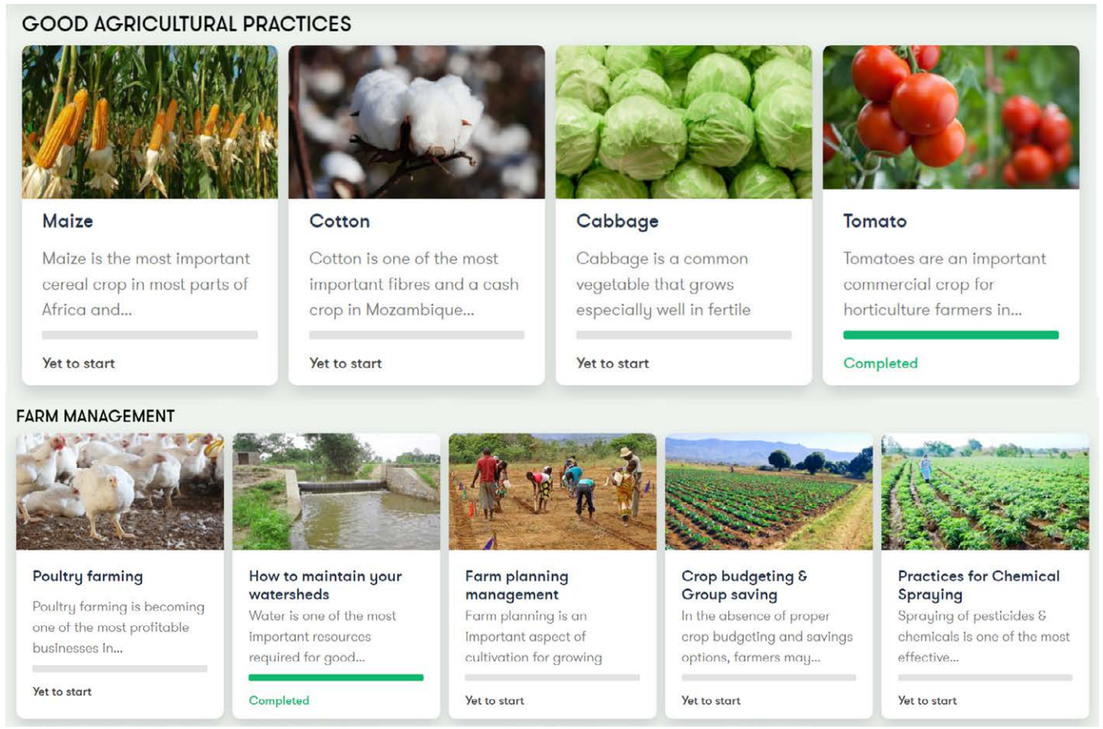
Developing digital micro-learning content for more effective farmer capacity building

IDH partnered with Kuza Biashara, a leading social-technology enterprise specializing in developing digital microlearning content, to develop tailored learning content for supplementing farmer capacity-building trainings to foster learning and adopt more GAPs.

In February 2020, IDH and Kuza launched the Mozambique Climate Resilience digital microlearning toolkit, consisting of 46 microlearning videos for farmer capacity building in watershed management, animal husbandry, and GAPs in cotton, maize, tomatoes, and cabbage. The toolkit supported the delivery and scale of farmer capacity building under MCRP and was used to train farmers on quality and key agronomic practices.

The toolkit consists of a wireless hard drive, projector, white screen, and tablet and will be used by extension workers to supplement their farmer trainings.

Figure reference: Example of learning materials on farm management



Initially, the Program proposed development of Mobile Application for capacity building of farmers. Through the toolkit, extension workers accessed and screened tailor-made digital microlearning videos on GAPs in the field – even the most remote areas of Mozambique – without requiring electricity or internet access.

Overall Program Outcomes and Impact

The Program achieved its objectives in promoting scalable and budget-wise rainwater harvesting and soil-management solutions, progressively increasing water availability by 79% in year two (from 55,700 m^3 in 2017-18 to 99,700 m^3 in 2018-19), 41% in year three (140,316 m^3 in 2019-20), and 24% in year four (173,493 m^3 in 2020-21), when compared to the baseline. This additional water was utilized for irrigation purposes, allowing 103 ha of farmland to be cultivated under a more stable and controlled production system, with an average increase in irrigated surface of 48% per year.

The importance of increasing water availability can be emphasized when comparing future projections provided by climate change. Data from the Climate Change Profile of Mozambique[3] shows trends for a worst-case scenario in the region where the pilot is located. The report predicts that due to weather-pattern changes, cotton yields tend to drop 24% by 2050.

Overall, the project design was logical and coherent with the objectives; interventions were considered consistent with local needs and priorities. The design took advantage of the field-level assessment, resulting in good quality, innovative interventions relevant to the context and desired goals in a representative and scalable fashion for the northern Mozambique cotton-growing region.

In terms of its organization and roll out, the Program adopted a simple and decentralized structure, with interdependent team members and interactive participation (technical staff from private companies, local leaderships and champion farmers, IDH local team, and external experts). This allowed easy communication among the

[3]Available at: https://reliefweb.int/report/mozambique/climate-change-profile-mozambique

key actors in the implementation process. The organization is suitable considering the pre-established roles of each stakeholder. Conversely, the wider geographical dispersion of the four sites brought operational challenges at field-level supervision and monitoring. The community involvement in the project was key for its success.

Participating communities were organized in associations or other collective-action groups, the majority at the initial stages of organization. Community involvement was observed in all of the Program components. Local government engagement and leadership varied from district to district with higher levels in Lalaua and to some extent Monapo, but weaker in Cuamba and Balama. For example, in Lalaua district, Nampula province, a stronger leadership of local authorities resulted in a stronger ownership of the initiative by the community. This was associated with a combination of early local government participation at the planning stages and key to support the transition when Olam left the concession in 2020. In Monapo district, Nampula province, the local District Office of Agriculture (SDAE) is strongly involved via extension services for the beneficiaries and included in their annual plan activities to support existing groups in extension training and animal vaccination activities. In Cuamba district, Niassa province, local government officials were well-informed of the project beneficiaries and valued the initiative, recommending stronger commitment to surpass agricultural use towards increasing drinking water for community members.

In summary:

- The infrastructure work such as water-harvesting structures and soil-moisture conservation contributed significantly and increased the additional water-storage capacity by approximately 173 TCM, which increased water availability in the Program villages.
- As a result of soil conservation and water-resource development interventions and irrigation schemes, approximately 103 ha of additional area was brought under irrigation.
- 430 metric tons (mt) of second crops was produced for food intake and additional income generation.
- 24 solar-energy entrepreneurs servicing the local community for mobile charging and other services were established.
- Approximately 1,700 smallholder farmers received training on GAPs in cotton and second-crop cultivation based on village-level cropping patterns.
- 50 Self-Help Groups were instituted for sustained water-resource management and expansion of the animal husbandry activities.

Program Learnings

The Program objective was to build resilience by de-risking smallholder farmers from the impacts of climate change and climate variability. The project-design strategies included the promotion of scalable and cost-efficient rainwater harvesting and soil management solutions to increase productivity and yield, to strengthen water availability, and to enable food security and alternative income sources though crop diversification and animal husbandry.

Over time, the MCRP became a learning model for all stakeholders involved, providing support for future scale up to address climate-change issues in the country. Key learnings and recommendations from the Program's four-year intervention include:

- For long-term sustainability, it is essential to engage the local community in the planning and execution process. Active community involvement increases knowledge and understanding of the issues.
- Involve a pool of local leaders with local knowledge to support identification of suitable location and measures.
- Capacity building of local community members with a basic technical knowledge of soil, moisture conservation, and water-harvesting structures is essential for maintenance and repair of watershed structures.
- Special training on behavioral aspects is essential to develop shared responsibility and ownership of resources (e.g., water pumps or animals like goats and poultry); this training would also include focused handholding support from planning to managing the resources.
- Timely provision of inputs (seeds, fertilizer, and pesticides) and extension services (pest/disease management and distribution of vaccines) are fundamental to the success of the interventions for enabling smallholder inclusion, including sustainable cotton production, horticultural production as second crops, or animal husbandry.
- Commitment from IP, including private investments, was key to creating the sense of ownership and confidence among other stakeholders.
- There is room for improvement in the choice of alternative crop production to broaden it beyond vegetables – to best capture the conjugation of added value, shelf life, and market access.

Stories from the field

Vincent Mario Sauje
Village leader of Muape, from Balama District of Cabo Delgado province of Mozambique

In the beginning, I had doubts about the impact of this project for Muape village, but today, after almost five years, I am very happy because the activities done by the project is bringing very good impact. The existing drinking water source, which was constructed and rehabilitated by construction of water storage tank and hand pump under the Program is providing safe water for more than 150 families.

Earlier, the families were collecting drinking water from traditional wells, in which the water was not clean, and they were suffering a lot from diseases such as cholera. But till now, even by the end of last rainy season, we didn't have any case of cholera at our community. In addition, the trenching work has helped to protect the houses near to the mountain. All water coming from there is being captured and collected in the dams, avoiding destruction of houses. During year 2016, seven families had lost their house, but now all houses are safe.

Antonio Waloha
Lalaua District of Nampula province of Mozambique

My family was primarily dependent on rain-fed agriculture. After the rainy season, we did not engage in any other agricultural activities and this resulted in reduced opportunities to cover all house expenses, even planning for investments.

With the implementation of this project, my life changed. We are now farming all year long, by producing normal food crops during the rainy season and horticulture during the dry season through the irrigation and water-harvesting system created by the project.

We are benefitting from the technical assistance given under the Program. Provision of horticulture seeds and other supportive inputs allowed me to produce enough for my own consumption and get surplus to sell to the market and consequently increases my family income. I have now opened a bank account, invested in acquiring and preparing two more pieces of land of half a hectare each, to increase the horticulture and other crops' production area.

I also managed to buy myself some additional seeds, fertilizers, pesticides and managed as well to produce onion seedling to sell to other farmers. I plan to make savings, build a concrete house, and a motor water pump in near future with incomes from horticulture production.

Annex 1: Program KPIs

Output Indicator	Units of Measure	Year wise Achievements & KPIs					
		2016-17	2017-18	2018-19	2019-20	2020-21	Total
1. Access to Water through NRM and Watershed Management							
Water Resource Development [WRD] Initiatives							
Earthen Embank-ments [ENB]	Numbers	-	2	2	1	0	5
Check Dams/Weirs/Retention Walls/RCNB [CD]	Numbers	-	4	4	0	1	9
Farm Ponds [FP]	Numbers	-	9	0	0	0	9
Artificial Recharge Structures [ARS] -Bore Wells	Numbers	-	3	0	0	0	3
Soil Conservation & Land Development [SWC] Initiatives							
Water Absorption Trenching [WAT]	Meters	-	2,600	0	0	1,368	3,968
Farm Bund & Contour Bund [FB-CB]	Meters	-	7,985	8,122	1,700	5620	23,427
Gully Plugs [GP]	Numbers	-	16	22	0	65	103
Irrigation Infrastructure Development Initiatives							
Open Wells for Drink-ing & Irrigation Water	Numbers	-	5	1	0	0	6
Irrigation scheme (Lift & Drip) with Pumping Device (treadle/fuel) & Pipes	Numbers	-	3	9	1	2	15
Additional Water Storage Capacity cre-ated	Cubic meters	-	55,700	44,000	40,616	33,177	173,493
Additional area brought under Irriga-tion	Hectares	-	32	19	17	35	103
2. Sustainable Cotton Production through GAP							
Farmers trained on Better Cotton Initia-tive (BCI) and Cotton made in Africa (CmiA) standards	Numbers	207 (167M+40F)	168 (142M+26F)	517 (427M+90F)	178 (126M+52F)	193 (136M+57F)	1,263 (998M+265F)
Area under sustaina-ble production	Hectares	122	137	240	35	56	590
Volume of sustainable production	Metric Tonnes	65	27	87	11	NA	190
3. Alternative Livelihood through Crop Diversification							
Farmers trained on crop diversification / second crops	Numbers	-	16 (10M+06F)	92 (69M+23F)	159 (122M+37F)	179 (132M+47F)	446 (333M+113F)
Area cultivated under second crops	Hectares	-	1.50	7.60	5.40	7.40	21.90
Volume of second crops harvested	Metric Tonnes	-	20.50	57.70	148.50	204	430.70
4. Alternative Livelihood through Animal Husbandry							
Total beneficiaries trained on animal husbandry services	Numbers	-	129	94	190	250	663
Male beneficiaries trained on goats/sheep	Numbers	-	85	45	86	110	326
Females beneficiaries trained on poultry	Numbers	-	44	49	104	140	337
Self Help Groups for animal husbandry	Numbers	-	8 (04M+04F)	10 (05M+05F)	14 (07M+07F)	18 (8M+10F)	50 (24M+26F)
5. Generating access to Energy & Information							
Households equipped with solar energy kits	Numbers	-	3	4	2	15	24

Annex 2: Infrastructure distribution

Partner	Province	District	Village	Check Dam (units)	Earthen Embankment (units)	Farm Pond (units)	Art. Recharge / Bore Wells (units)	Trenching/ WAT (linear meters)	Farm Bunds (linear meters)	Gully plugs (units)	Open Wells (units)	Irrigation scheme (units)
SanJFS	Niassa	Cuamba	Titimane	0	0	5	0	1,600	6,862	0	2	4
Olam	Nampula	Lalaua	Palacua	1	1	1	0	0	4,668	13	1	4
Olam	Nampula	Lalaua	Namachilo	3	0	1	0	350	1,455	10	1	3
Olam	Nampula	Lalaua	Sede	1	0	0	0	1,368	5,620	65	0	2
Sanam	Nampula	Namialo	Netia	1	1	2	3	100	2,662	12	1	1
Plexus	Cabo Delgado	Montepuez	Muape	3	3	0	0	550	2,200	3	1	1
Total				**9**	**5**	**9**	**3**	**3,968**	**23,467**	**103**	**6**	**15**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