Concurrent Monitoring – Round X Report

(For the period of 1st April 2023 to 30th September 2023)

Monitoring and Evaluation for Project on Climate Resilient Agriculture (PoCRA) in Maharashtra

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(Project of Government of Maharashtra in Partnership with the World Bank)

Submitted by

SAMBODHI

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Acknowledgement

Sambodhi Research and Communications, in association with TERI, is thankful to the Project Management Unit (PMU), Project on Climate Resilient Agriculture (PoCRA) for awarding the assignment of “Monitoring & Evaluation (M&E) for Project on Climate Resilient Agriculture (PoCRA)” in the eight districts of the Marathwada area of Maharashtra.

We would like to thank the Project Director and all the subject matter specialists from PMU for providing their guidance and continuous support to the M & E team for the successful execution of this assignment. Further, the project officials at the district and the sub-divisional level have been very supportive and helpful in the successful completion of the tenth round of Concurrent Monitoring.

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Key Abbreviations

AA	Agriculture Assistant
BBF	Broad Bed Furrow
CA	Cluster Assistant
CFP	Community farm pond
CNB	Cement Nala Bund
CRAT	Climate Resilient Agriculture Technology
DBT	Direct Benefit Transfer
DSAO	District Superintending Agriculture officer
FFS	Farmer Field School
FPO	Farmers Producers Organisation
FPC	Farmers Producers Company
GF	Guest Farmer
HF	Host Farmer
IDI	In-Depth Interview
M&E	Monitoring and Evaluation
MIS	Management Information System
NRM	Natural Resource Management
PDO	Project Development Objective
PoCRA	Project on Climate-Resilient Agriculture
PS	Project Specialist
SDAO	Sub-Division Agriculture Officer
SHG	Self Help Group
TAO	Taluka Agriculture Officer
VCRMC	Village Climate Resilient Management Committee

Executive Summary

The Project on Climate Resilient Agriculture (PoCRA) is being implemented by the government of Maharashtra in collaboration with the World Bank to enhance the climate resilience and profitability of smallholder farming systems in selected districts of Maharashtra. PoCRA is based on a multi-pronged and comprehensive approach that aims to build climate resilience in agriculture through the scaling up of tested technologies and practices.

Sambodhi Research and Communications (P) Ltd., in association with The Energy and Resource Institute (TERI) has been onboarded to undertake the assignment of "Monitoring & Evaluation (M & E) for Project on Climate Resilient Agriculture (PoCRA)" in the eight districts of the Marathwada area of Maharashtra, respectively. As part of its mandate of M&E, one of the key components is to conduct Concurrent Monitoring of the project, which is conducted bi-annually for six years. Concurrent Monitoring aims at finding bottlenecks in the implementation of each project component and suggesting solutions for the same. It also aims to get beneficiaries' feedback on the key processes of the different project components. Further, Concurrent Monitoring also aims to assess the progress of the project on key indicators as per the results framework which are measurable through Concurrent Monitoring rounds.

Approach and Methodology

Like previous rounds of concurrent monitoring, the combined CM focused on the concurrent process and progress monitoring for the six-month period from 1st April 2023 to 30th September 2023 which includes different components such as individual matching grants accessed using Direct Beneficiary Transfer (DBT) application, the Farmer Field School (FFS) for demonstration of climate-resilient and sustainable farming practices, construction of community assets aimed to benefit the farming community of the area including Natural Resource Management (NRM) works and community farm pond, farmer producer organizations (FPOs), and self-help groups (SHGs) for strengthening post-harvest and value-chain agri-business activities.

A mixed-method approach has been adopted for all the Concurrent Monitoring surveys of PoCRA conducted so far. The combined CM of the PoCRA project followed the common methodology suggested by PMU which is being used in the Marathwada region. A quantitative survey tool for the beneficiaries and qualitative interview schedules for other key project stakeholders were finalized in discussion with the PoCRA PMU team. The survey for combined CM was conducted in 30 project and 15 comparison clusters of the Marathwada region. A sample of 675 respondents was targeted to be covered using a quantitative survey, comprising 450 respondents in the project and 225 respondents in comparison areas of the Marathwada region. As per the methodology of combined CM, it was ensured that project to comparison respondent ratio remained at 2:1.

Also under qualitative survey, a total of 46 FGDs and 132 IDIs, covering various key stakeholders of the PoCRA project were conducted. The limitation of quantitative estimates at the aggregate level in the report is that while they provide a broad indication, they may not provide statistical precision as (a) the sampling is not entirely random, and (b) the sample size is not adequate for some categories. Therefore, a mix of quantitative estimates and qualitative insights have been used to draw conclusions related to the project. Feedback on the functioning of the Village Climate Resilience Management Committee (VCRMC), Krushi Tai, satisfaction with project and micro-planning, support from project staff, support received and expected by the FPOs/SHGs, etc., was also analyzed in the project and Comparison villages. The project MIS data for the period was also analyzed to understand the progress of the project activities during this period.

Summary of Key Findings

Agriculture is the primary source of livelihood for smallholder farmers in the state of Maharashtra which has 22.6 million hectares of land under cultivation (gross cropped area) and 5.21 million hectares under forest. About 84% of the total area under agriculture in the state is rainfed and is dependent only on monsoons[1]. 49% of the landholdings in the State fall in the marginal category, with less than 1 ha of land. Most of these poor farmers with small and unirrigated land holdings are vulnerable to climate shocks. PoCRA aims to reduce such vulnerability and improve the profitability of smallholder farmers by addressing issues related to water scarcity, degraded land resources, high production cost, low profitability due to low productivity, and lack of market access. To this end, the PoCRA project has made significant progress in addressing the above issues and its

[1] Source: PoCRA Project Implementation Plan (PIP) document

achievements are evident from the key findings of the current CM round as detailed in this report. The table below presents the summary of findings from the household survey sample data for the year 2022-23.

Summary of findings from household survey sample data

Key Indicators	Marathwada	
	Project (N = 450)	**Comparison (N = 225)**
Social Category (Gen, SC, ST, OBC and NT)	**Gen: 62%,** OBC: 19%, SC: 6%, ST: 5%, NT: 6%, Other: 2%	**Gen: 59%,** OBC: 14%, SC: 6%, ST: 6%, NT: 13%, Other: 2%
Education (No Schooling)	8%	11%
Below Poverty Line	38%	49%
Source of Income (Agriculture)	84%	89%
Average Annual Income (Rs.)	Rs. 2,12,069/-	Rs. 1,57,511/-
Small & Marginal (< 2 Ha)	58%	76%
Medium (2 to 5 Ha)	37%	23%
Large (> 5 Ha)	5%	1%
Access to an irrigation source	88%	74%
Farmers cultivating in Kharif	98% (on avg. of 4.3 acres; 4.2 acres irrigated)	93% (on avg. of 3.6 acres; 3.6 acres irrigated)
Farmers cultivating in Rabi	49% (on avg. of 3.4 acres; 3.3 acres irrigated)	36% (on avg. of 2.6 acres; 2.6 acres irrigated)
Farmers cultivating in Summer	<1% (on avg. of 2.3 acres; 2.3 acres irrigated)	<1% (on avg. of 2 acres; 1.5 acres irrigated)
Farmers cultivating in Horticulture	7% (on avg. of 3.3 acres; 3.3 acres irrigated)	<1% (on avg. of 2.3 acres; 2.3 acres irrigated)
Crop Damage	20%	20%
Crop Insurance	75%	65%

From the analysis of household survey sample data for the year 2022-23, it is observed that project clusters had better access to sources of water for irrigation as compared to the comparison clusters in Marathwada (P: 88%, C: 74%) region. Due to the increased availability of water, the farmers in project clusters can cultivate and irrigate their land throughout the year. In the Marathwada region, it is observed that more number of farmers in project clusters (49%) as compared to comparison clusters (36%) were growing the Rabi crops. The average area of land under Rabi crops in project clusters was also found to be slightly higher by around 0.8 acres than that observed in the comparison clusters. Also, though less than one percent of farmers in the sample data were cultivating the summer crops, the average area of land cultivated in the summer season in the project clusters (2.3 acres) was slightly more than that in the comparison clusters (2 acres). Further, nearly seven percent of farmers in project clusters of the Marathwada region in contrast to less than one percent in comparison clusters were found to be cultivating horticulture crops.

The penetration of micro-irrigation systems including both drips and sprinklers was found to be far better in the project clusters than in the comparison clusters. This was evident from the fact that the proportion of the farmers adopting flood irrigation practices in the project clusters (25%) was nearly half of that observed in comparison clusters (47%).

Nearly 20% of farmers in the project and comparison clusters in Marathwada region faced crop damage. However, given the effective advisory services of the PoCRA, a higher proportion of farmers in project clusters (75%) had insured their crops as compared to those in comparison clusters (65%).

The most common Kharif crops cultivated in both project and comparison clusters included Soybean, Cotton, and Pigeonpea. The most common Rabi crops cultivated in both project and comparison clusters included Chickpea, Sorghum, and Wheat. Vegetables like onions and tomatoes are mostly grown in Summer. Bananas, papaya, guava, sweet lime, lemon, and orange are common crops grown annually. Post PoCRA intervention, various crops such as chilies, capsicum, cucumber, and other cash crops including horticulture (grapes, citrus pomegranate, vegetables) and floriculture have gained popularity amongst the farmers.

The table below presents the estimates of yield of key crops for the Marathwada region. For comparative analysis, the estimates of yields during mid-term evaluation conducted in the year 2021-22 are provided in brackets. The scrutiny of estimates indicates that PoCRA interventions have led to either an increase or stabilized the productivity of key Kharif and Rabi crops cultivated in the region.

Estimates of yield for key crops

Crop	Project	Comparison
	Avg. Yield (q /acre)	Avg. Yield (q/acre)
Soybean	5.8 (5.8)	5.2 (5.4)
Cotton	6.5 (5.9)	5.0 (5.5)
Pigeon Pea	5.5 (4.5)	4.7 (3.9)
Chickpea	5.5 (4.8)	5.7 (4.3)
Sorghum	4.3 (4.9)	2.9 (4.3)

The overall percentage of land under certified seeds for key crops in both the project and comparison areas is found to be nearly about same. Considering, Marathwada, the highest average cost of cultivation was recorded for Cotton (P: Rs. 22863/acre; C: Rs. 23540/acre) followed by Soybean (P: Rs. 20889/acre, C: Rs. 21400/acre) and then Pigeon pea is (P: Rs. 18097/acre, C: Rs. 18724/acre). In *Rabi* season, the CoC for Chickpea is (P: Rs. 20918/acre; C: Rs. 21364/acre). The table below presents the difference in the cost of cultivation incurred in the project and comparison clusters of Marathwada regions. It is evident from the difference that the cost of cultivation incurred by the farmers in project clusters in both regions is less than the farmers in comparison clusters.

Cost of cultivation for key crops

Region	Village	Soybean	Cotton	Pigeon Pea	Chickpea
		Rs./ Acre	Rs./ Acre	Rs./ Acre	Rs./ Acre
Marathwada	Project (P)	21425	23142	19641	21535
	Comparison (C)	22384	23913	20230	22614
	P-C	-959	-771	-589	-1079

The survey data reveals that most of the produce (P:86% C:84% respondents in Marathwada region) is sold immediately in APMC or the nearest market to the trader. The majority of the remaining farmers (P:12% C:16% respondents in Marathwada region) store the produce at home for future sale. Farmers in both the project and comparison clusters realized better market prices for their produce as evident from the estimates presented in the table below. However, scrutiny of the market price estimates as compared to the minimum support price reveals that except for rabi crops viz. chickpea and wheat, the farmers in project clusters realized better prices for their produce than their counterparts in comparison clusters.

Market price realized for key crops

Crop	MSP per Quintal	Marathwada			
		Project (P)	P-MSP (Rs.)	Comparison (C)	C-MSP (Rs.)
	(Rs.)	Price per Quintal (Rs.)		Price per Quintal (Rs.)	
Soybean	4300	4733	**433**	4582	**282**
Cotton	6080	6916	**836**	6521	**441**
Pigeon Pea	6600	6538	**-62**	5917	**-683**
Chickpea	5335	4675	**-660**	4814	**-521**
Wheat	2125	2710	**585**	3000	**875**
Sorghum	2990	3494	**504**	3262	**272**

As discussed above, the PoCRA interventions have led to (i) an increase in the availability of water for irrigation, (ii) higher adoption of micro-irrigation practices, (iii) an increase in or stabilizing the production of key crops, (iv) a reduction in the cost of cultivation, and (v) better market price realization. The overall effect of this has resulted in a higher average annual income of farmers in the project clusters. The average annual income from all sources for the respondent households as reported by the farmers in the project and comparison clusters is Rs. 1,65,840/- and Rs. 1,32,620/-, respectively.

Nearly 74% of respondent households in Marathwada region had received the matching grant in their bank accounts. The primary motive for accessing PoCRA benefits for more than three-fourths of respondent households was to increase the availability of water for irrigation and increase their production and income. Half of the respondent households were self-motivated and the rest were motivated by family members, VCRMC members, and project staff. More than 70% of farmers completed the application process on their own or through the support of their family members. The rest of the farmers depended on support from the project staff. In the Marathwada region, 83% of respondent households used their savings, 14% took a loan (in the range of Rs. 10000/- to Rs. 30000/-) from friends/ family, and the rest 3% depended on bank/microfinance, SHG, and local money lenders. Nearly 85% of respondent households feel that allocated time for completion of activity post presanction is sufficient. Nearly one-third of the respondent households in both project and comparison clusters reported facing challenges while accessing the benefit. The average cost including loss of wage, transport, & documentation incurred in project areas is around Rs.750/- and in the comparison area is Rs.980/-. as reported in Marathwada region. It takes approximately four months (122 days) for the final disbursement of the matching grant amount to reach the beneficiary bank account. To sustain the impacts of the project, the project staff suggests reinitiating the project to enable farmers to benefit further, reduce the delay in the transfer of matching grants, increase farm mechanization, and guide farmers on recycling and environment-friendly methods of waste management through FFS.

In terms of economic benefits[2], the adoption of climate-smart agronomic practices in the project region has increased from 20% in 2019 to 60% in 2022, resulting in a diverse range of positive impacts. Implementation of water security interventions has yielded a range of positive impacts on the agro-ecosystem in the project region such as easy access to water sources for irrigation, and availability of water for irrigation during Rabi and Summer Season. This is the positive impact of the adoption of the irrigation system and hence the average land under irrigation is found to be higher (i.e., by 11 %) in project villages in comparison to control villages. The use of micro-irrigation systems is also found to be higher (i.e., by 5%) in project villages in comparison to control villages. The cropping intensity in the project village has increased by around 6% implying an increase in area under cultivation during Rabi and Summer Season. Also, project interventions have led to an increase in area under horticulture by 4% in comparison to control villages. The yield of major crops like Soybean, Cotton, Pigeon Pea, and Chickpea is found to be higher in project villages. by 1.5 q/ha, 1.7 q/ha, 0.75 q/ha, and 2.25 q/ha, respectively. The increased yields have led to an increase in average annual income in project

[2] The estimates of all parameters in project and control villages from baseline conducted in 2019-20 and midterm conducted in 2021-22 is used to see the change. These findings highlights the impacts and triangulate with observations in current CM round in both regions.

villages is higher by around 12%-15% when compared to control villages. The cost of cultivation for the major cultivated crops like Soybean, Cotton, Pigeon pea, and Chickpea has been reduced by around 8%, 3%, 5%, and 5%, respectively over the last four years. In addition to agriculture, the primary source of income in project villages (in contrast to comparison villages) comes from diverse agri-allied activities supported by projects such as inland fisheries, sericulture, and goat rearing. With the adoption of BBF, Zero tillage, and improved INM and IPM practices, a high proportion of farmers in project villages could cop with climate variabilities like less rainfall, high temperatures, dry spells, and unseasonal rainfall. Also, income resilience is observed to be enhanced through project activities like sericulture, inland fisheries, and goat rearing. With 2668 CHCs, the project focuses on pre- and post-harvest farm activities by encouraging the use of fuel-efficient (less energy) and technology-efficient (loss and time-reducing) farm machinery and equipment leading to reducing drudgery and labour costs. FPOs could cope with the climate and market variabilities due to storage (743 Godowns) and processing (835 Units) capacities created by the project. Activities like horticulture plantation and agroforestry have led to an increase in carbon sequestration by around -1700 000 tCO2eq/year (as estimated during the mid-term evaluation) which is an important co-benefit of the project. With a total of 2883 NRM works, the catchment area treatment on 42648 Ha area, and 1068 structures constructed for drainage line treatment, the project has enhanced surface water storage capacity of approx. 20577 TCM. This has also helped in recharging groundwater tables. 24% of beneficiaries are women farmers who are reached with agricultural assets or services through the project. Apart from small and marginal farmers, 5500 landless beneficiaries were supported with livelihood activities like backyard poultry, goat rearing, etc.

Key recommendations

Enhancing capacities of beneficiary farmers: To effectively implement climate-resilient technologies in agriculture, it is crucial to focus on enhancing the capacities of beneficiary farmers. Training project staff is essential, but it is equally important to empower farmers themselves with the information needed to adopt and utilize these technologies. By focusing on exposure visits, social relationship-building, training in weather advisory, and market information, farmers can be better prepared to face the changing climate. Empowering farmers with the knowledge and skills needed to implement sustainable practices will not only benefit them but also contribute to the resilience and sustainability of the agricultural sector.

Strengthening institutional capacity for sustainability: Village Community Resource Management Committees (VCRMCs) play a crucial role in the success of projects aimed at improving the livelihoods of communities. These committees need to be equipped with the necessary skills and knowledge to effectively manage resources and make informed decisions. Regular and refresher training sessions should be conducted to ensure that members of VCRMCs are up to date with the latest techniques and best practices. To enhance the administrative capacity of VCRMCs, it is essential to strengthen their linkages with block and district-level offices. By fostering strong relationships with these offices, VCRMCs can access additional resources and support to better serve their communities. This collaboration will also help streamline communication and decision-making processes, ultimately leading to more effective project implementation. Farmers Producer Companies (FPCs) and Self-Help Groups (SHGs) are other key institutions that must be encouraged to participate in training related to agribusiness activities. By staying responsive to the evolving needs of stakeholders, we can ensure that training sessions remain relevant and effective in building institutional capacity for sustainability.

Linkage with financial and marketing institutions: The major challenge faced by FPCs is the lack of adequate financial and marketing linkages. The majority of project interventions undertaken by FPCs require significant capital investment, which is often beyond the financial capacity of small-scale farmers. As a result, many farmers turn to private investors who charge exorbitant interest rates, leading to financial burdens in the long run. To address this issue, it is imperative to establish strong linkages between small farmers and formal financial institutions. By facilitating access to loans with lower interest rates, farmers can secure the necessary funds to invest in their FPCs and ensure sustainable growth. In wholesale markets, FPCs struggle to compete on pricing due to a lack of scale, while in retail markets, brand image and visibility pose significant hurdles. Moreover, there is often a lack of demand creation for the core products of FPCs, further hindering their market penetration. To overcome these obstacles, it is essential to develop robust institutional mechanisms that support efficient marketing strategies. FPCs should be encouraged to collaborate and synergize their efforts, rather than compete against each other.

Empowering female participants: During the project preparation phase, a social assessment was conducted, revealing the high participation of women in most villages. However, the participation of women was found to be minimal. To address this issue, community institutions should actively encourage the involvement of women in their meetings. By creating a more inclusive environment, these institutions can help

empower women who may have limited opportunities to participate in economic activities. Krushi Tais (KTs) play a crucial role in mobilizing women at the village level and promoting the objectives of POCRA. It is essential to motivate and educate KTs on the key components and initiatives of the project, especially those related to women's empowerment. Timely payment of remuneration and recognition of their efforts through appreciation letters can boost their morale and encourage them to continue their valuable work.

Convergence with other government schemes: Exploring the convergence with other government schemes the project can lead to a multiplier effect in achieving the desired outcomes. The various advantages of convergence are financial efficiency, integrated approach, and enhanced impact. To achieve these, the project will need concerted efforts in coordination, and data sharing and must focus on monitoring and evaluation of various convergence activities. By aligning efforts and pooling resources, diverse initiatives can work together towards a common goal of enhancing resilience and sustainability in agriculture. This collaborative approach not only amplifies the impact of individual projects but also fosters a holistic and integrated approach to agricultural development.

1. Introduction

1.1. Project Background

The Government of Maharashtra, in partnership with the World Bank, conceptualized the Project on Climate Resilient Agriculture (PoCRA) for 5220 villages in 16 districts of Maharashtra. The Project Development Objective (PDO) of PoCRA is *to enhance climate resilience and profitability of smallholder farming systems in selected districts of Maharashtra*[3]. PoCRA is a first-of-its-kind climate-resilient project undertaken in the agriculture sector. This is envisaged to be achieved by promoting climate-resilient agriculture systems, post-harvest management, value chain promotion, and institutional development[4].

The project is built around a comprehensive, multi-sectoral approach that focuses specifically on building climate resilience in agriculture through scaling up tested technologies and practices. This project attempts to bring transformational changes in the agriculture sector by scaling up climate-smart technologies and practices at the farm and (micro) watershed levels. The overall project vision is to contribute towards three critical impact areas: a) water security, b) soil health, and c) farm productivity and crop diversification. The project aims to contribute to drought-proofing and management of lands in the state's most drought and salinity/ sodicity-affected villages.

The project has been implemented in 16 districts in Maharashtra, which include eight districts of the Marathwada region (viz. Chhatrapati Sambhaji Nagar (henceforth CSN), Nanded, Latur, Parbhani, Jalna, Beed, Hingoli, Dharashiv[5]), six districts of the Vidarbha region (viz. Akola, Amravati, Buldhana, Yavatmal, Washim, Wardha), Jalgaon and Nashik[6] district of Nashik Division, and approximately 932 salinity affected villages in the basin of Purna river spread across Akola, Amaravati, Buldhana and Jalgaon districts[7].

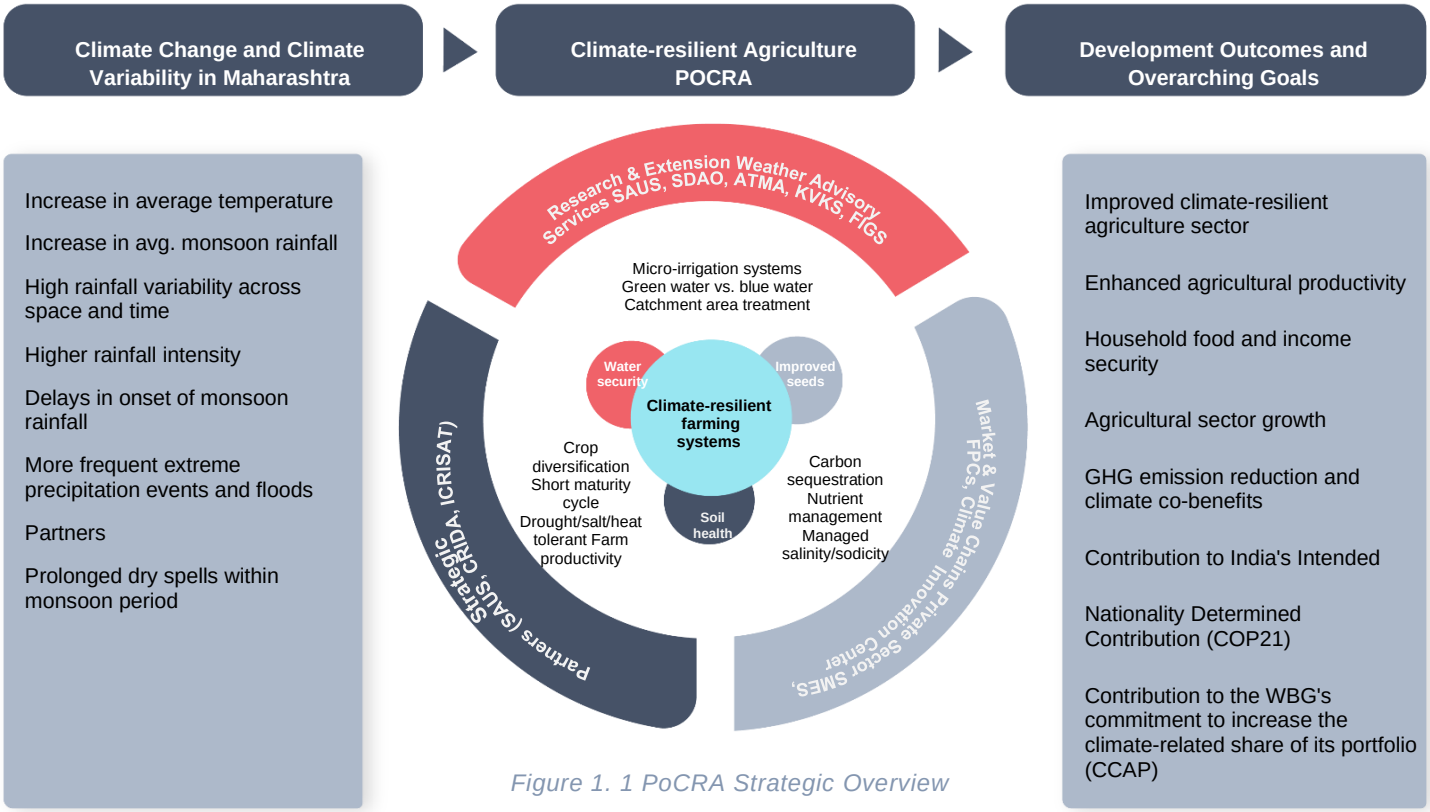


Figure 1. 1 PoCRA Strategic Overview

[3] Source: PoCRA Project Appraisal document
[4] Project implementation status report as on 31st March 2021, Maharashtra PoCRA
[5] CSN and Dharashiv renamed as Chhatrapati Sambhaji Nagar and Dharashiv, respectively.
(Extra ordinary gazette released on 15 September 2023 under Central section, Part 4B, Ext No. 364 and 365)
[6] Malegaon taluka from Nashik district was included in project in year 2022.
[7] Source: PoCRA-Terms of Reference

Figure 1.2 highlights the villages where the project is being implemented. This project is implemented over six years from 2018-2024[8]. This report is based on the Concurrent Monitoring conducted in eight districts of the Marathwada region. The project has been implemented in a phased manner reaching out to 1245 villages in year 1, 2889 villages in year 2, and 1086 villages from year 3 onwards.

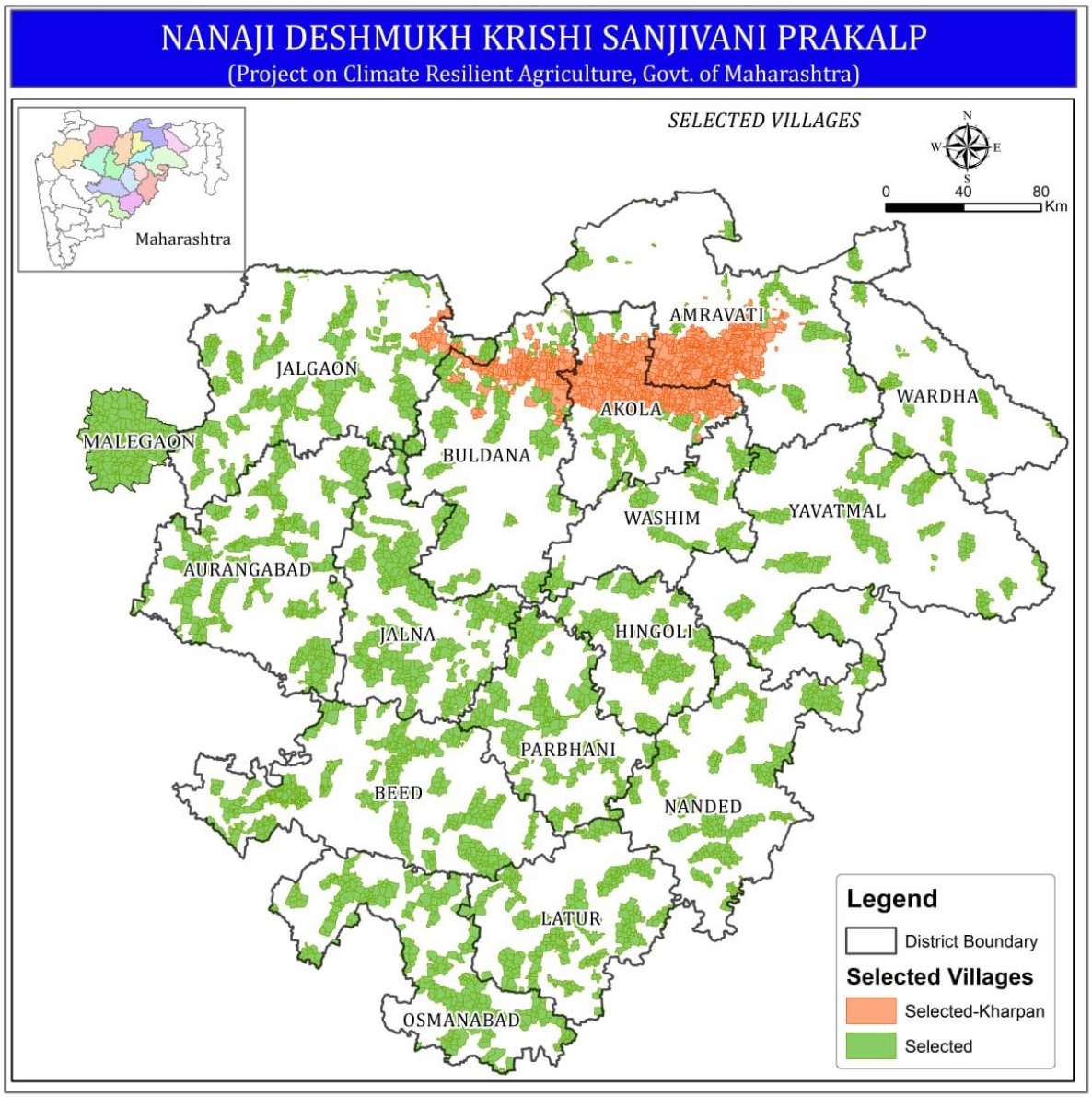


Figure 1. 2 PoCRA Project Area and Villages

[8] Source: PoCRA-Terms of Reference

1.2. Overview of the Study Area

About 40% of the State of Maharashtra falls under Drought Prone Area with less than 750 mm of the annual average rainfall[9]. In Maharashtra, the Marathwada and Vidarbha region specifically has been floundering under drought conditions since 2012, with the highest rainfall deficit in the country at 48% in 2014. Starting in 2014, the Jalyukta Shivar Abhiyaan[10], one of the state government schemes, started its intervention to make the state drought-proof by 2019. It aimed to make 5,000 villages free of water scarcity every year through the deepening and widening of streams, construction of cement and earthen stop dams, work on nullahs, and digging of farm ponds. A total of 1,58,089 water management works were to be carried out under this project, of which 51,660 had been completed by April 2018. However, the erratic rainfall pattern continues to adversely affect the drought-prone areas in the State.

The anticipated impact of climatic change as well as climate variability has presumably led to an increased pressure on already scarce water resources. Agriculture is the major source of income generation for over 64% of the State's population, and hence there is a need for concentrated efforts for mitigation and adaptation to reduce the vulnerability of agriculture and make it more resilient. The major *Kharif* crops grown in these regions are Cotton, Soybean, and Pigeon pea. The area under cereal crops has declined gradually with the induction of cash crops. Major *Rabi* crops grown in these regions are Chickpea, Wheat, and Sorghum. The rest of the project area also includes a belt of salinity-affected areas in the districts viz; Akola, Amravati, Buldhana, and Jalgaon. Some of the villages in these districts fall under the vertisols of the Purna Valley, which has a saline tract. The term salinity refers to the presence in soil and water of various electrolytic mineral solutes in concentrations that are harmful to many crops.

Within this context, there is an urgent need for farmers to enhance their resilience to the threats of climate variability. Most of the farmers in these regions are small and marginal farmers[11], and their adaptive capacity is very limited; hence economically viable and culturally acceptable adaptation techniques need to be developed and implemented. The Government of Maharashtra has realized the implications of building climate resilience in the agricultural sector and has developed a drought-proofing and climate-resilient strategy as a long-term and sustainable measure to address the likely impacts of climate change. Against this backdrop, the Project on Climate Resilient Agriculture (PoCRA) has been formulated by the Government of Maharashtra with support from the World Bank. This is the first large-scale climate-resilient agriculture project in India that aims to enhance climate resilience in agricultural production systems through a series of activities at the farm level.

1.3. Objectives of the Concurrent Monitoring of PoCRA

Along with evaluating the impact of PoCRA, the other key objective of the assignment is to conduct Concurrent Monitoring (CM) of PoCRA for its implementation in the project region. The objective of concurrent monitoring is:

- To assess the progress of the project on key performance parameters.
- To find out which key components of the intervention are effective, what are the process bottlenecks in the implementation of the project, and to get feedback from the key stakeholders on the implementation so that it can be improved.
- To validate the veracity of the MIS data by validating the information in the MIS progress reports.

[9] Hydrology and Water Resources Information System for India, National Institute of Hydrology, Roorkee http://nihroorkee.gov.in/rbis/India_Information/draught.htm

[10] Government of Maharashtra had launched a water conservation scheme named Jalyukta Shivar Abhiyan in 2016 to make Maharashtra a drought-free state by 2019. The programme aimed to make 5000 villages free of water scarcity every year. The key aim of Jalyukta Shivar Abhiyan was to establish belief in a farmer that "every drop of rainwater is owned by me and it should percolate in my land".

[11] 'Marginal Farmer' means a farmer cultivating (as owner or tenant or sharecropper) agricultural land up to 1 hectare (2.5 acres). 'Small Farmer' means a farmer cultivating (as owner or tenant or sharecropper) agricultural land of more than 1 hectare and up to 2 hectares (5 acres)

1.4. Overarching Monitoring Framework

The framework in the figure below presents the overarching approach that has been adopted for the concurrent monitoring of PoCRA:

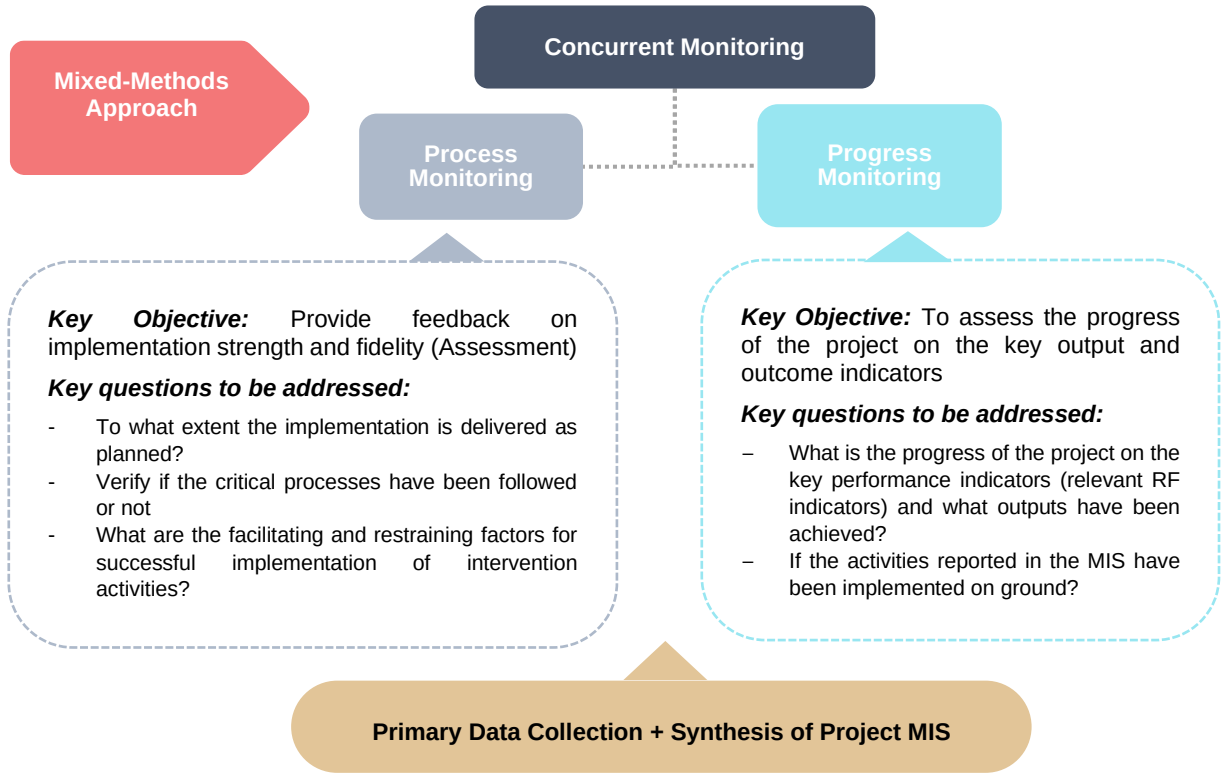


Figure 1. 3 Overarching Methodology

Building the Premise for Concurrent Monitoring

The project development objectives along with the list of activities planned to be conducted within the project areas are specified in the ToR. The project activities are carried out in three phases across project districts and clusters. The sample for each concurrent monitoring is selected in line with the sampling methodology proposed in the ToR. It is envisaged that the processes that are being implemented and need to be monitored should be listed. A detailed discussion with the PMU team, and relevant stakeholders, and a secondary literature review of relevant documents was done to understand these key processes. Also, during the listing of processes, the Sambodhi team studied the ongoing schemes or projects of similar nature in the comparison areas so that a premise for assessment could be built. The overall objective of the bi-annual concurrent monitoring reports is to provide feedback to the PMU on the status of project implementation and provide recommendations for course correction.

Limitation of Concurrent Monitoring

To provide quick feedback to PMU on progress and processes every six months, the sampling size and methodology of concurrent monitoring rounds have limited scope to statistically capture the difference between different rounds over time. While for a few variables in the report, a comparison of their values with those observed during previous rounds has been undertaken, the analysis is broadly indicative.

1.5. Methodology for Conducting Concurrent Monitoring

The methodological approach for conducting concurrent monitoring has the following steps illustrated in Figure 1.4.

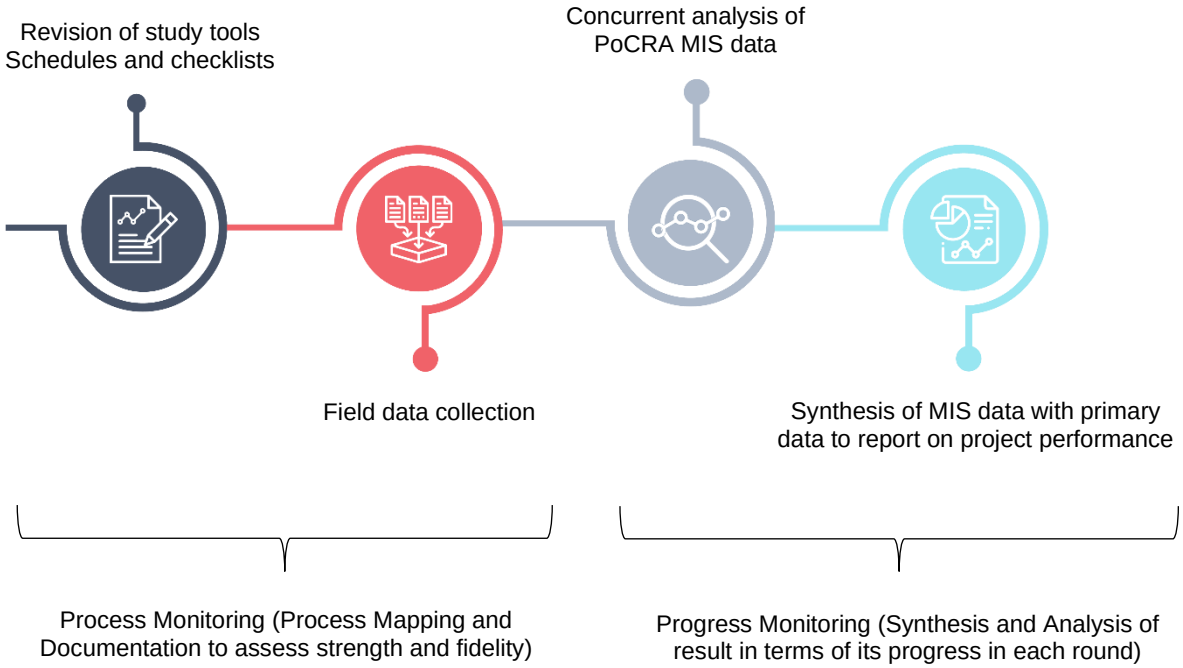


Figure 1. 4 Concurrent Monitoring Methodology Steps

Like previous rounds of concurrent monitoring, the current round also focused on the concurrent process and progress monitoring for the six-month period from 1st April 2023 to 30th September 2023 which includes different components such as individual matching grants accessed using Direct Beneficiary Transfer (DBT) application, the Farmer Field School (FFS) for demonstration of climate-resilient and sustainable farming practices, construction of community assets aimed to benefit the farming community of the area including Natural Resource Management (NRM) works and community farm pond, farmer producer organizations (FPOs), and self-help groups (SHGs) for strengthening post-harvest and value-chain agri-business activities.

A mixed-method approach has been adopted for all the concurrent monitoring surveys of PoCRA conducted so far. The concurrent monitoring of the PoCRA project followed the common methodology suggested by PMU which is being used in the Marathwada regions. A quantitative survey tool for the beneficiaries and qualitative interview schedules for other key project stakeholders were finalized in discussion with the PoCRA PMU team. The survey for the current CM round was conducted in 30 project and 15 comparison clusters of the Marathwada region. A sample of 675 respondents was targeted to be covered using a quantitative survey, comprising 450 respondents in the project and 225 respondents in comparison areas of the Marathwada region. As per the methodology of CM, it was ensured that project to comparison respondent ratio remained at 2:1.

Also under qualitative survey, a total of 46 FGDs and 132 IDIs, covering various key stakeholders of the PoCRA project were conducted. The limitation of quantitative estimates at the aggregate level in the report is that while they provide a broad indication, they may not provide statistical precision as (a) the sampling is not entirely random, and (b) the sample size is not adequate for some categories. Therefore, a mix of quantitative estimates and qualitative insights have been used to draw conclusions related to the project. Feedback on the functioning of the Village Climate Resilience Management Committee (VCRMC), Krishi Tai, satisfaction with project and micro-planning, support from project staff, support received and expected by the FPOs/SHGs, etc., was also analyzed in the project and comparison clusters. The project MIS data for the period was also analyzed to understand the progress of the project activities during this period.

Revision of Study tools – Schedules and Checklists

Based on the list of processes to be monitored, learnings/ experiences from previous concurrent monitoring rounds, and the updates in the program, the study tools, i.e., schedules and checklists were revised in the current round in September 2023. The revised tools were then shared with PMU and key experts for feedback. One-to-one key expert meetings were held to discuss the revisions in tools and expectations from expert field visits in the current concurrent monitoring round. The study tools were finalized after the incorporation of comments/suggestions received from PMU as well as key experts.

Primary Data Collection from the Field

The primary data was collected in October and November 2023, using the revised study tools which are categorized as shown in Table 1.1. In addition to the structured surveys, interviews, and focus group discussions with key stakeholders, field visits by experts were also conducted as part of concurrent monitoring. The objective of the expert field visits is to provide insights about the ground realities of the situation in agriculture as well as project implementation and accordingly highlight the key challenges as well as suggest/recommend solutions for project improvement.

Table 1. 1 Category of Study Tools

Structured Interview Schedule	An interview schedule was developed for the respondent survey and included questions relating to the access to intervention, processes, respondents' participation, perception, and feedback on activities. As part of the beneficiary survey, physical observation of the in-progress and completed activities have been done.
In-Depth Interview Schedule	Since the project activities are being carried out at different levels, including individuals, community (village and cluster) as well as the district level, In-Depth Interviews (IDIs) have been conducted with key stakeholders (viz. Agriculture Assistant, Agriculture Supervisor, Cluster Assistant, DSAO, SDAO, TAO, Technical Coordinator, Krishi Tai, and FPC representatives) involved in the implementation of the project to garner their feedback on project implementation and further improvement of the program.
Focus Group Discussion Schedule	Focus group discussions (FGDs) have been done with Farmers, Village Climate Resilience Management Committee (VCRMC) members, and Project Specialists (PSs) of districts to investigate the current status of implementation of the project and get feedback on project implementation and further improvement of the program.

Concurrent Analysis of PoCRA MIS Data

For monitoring the progress of the project, the MIS data of activities and outputs are analyzed to see if the project implementation is progressing according to the plan. The project performance is assessed on the key performance indicators, including the results framework indicators, that need to be assessed on a semi-annual or annual basis. A consultative approach has been adopted to resolve queries related to indicators on which data is required from the PMU MIS team and other relevant stakeholders. The details of district-wise implementation of the project activities are presented in subsequent chapters.

Synthesis of MIS data with Primary Data to Report on Project Performance

The MIS data on project progress, primary data on quality, and feedback from stakeholder and beneficiary interviews are synthesized to report on the status of implementation of the project for the period corresponding to the concurrent monitoring round. The current concurrent monitoring report highlights the activities/ processes for which the implementation quality needs to be improved. It also aims to identify the challenges or bottlenecks in implementation.

The quantitative estimates of this combined report at the aggregate level for some indicators provide a broad indication of the status of those indicators. However, the estimation may not provide statistical precision at the aggregate level (e.g., project and comparison; area-wise, district-wise, or category-wise) as the sample selection is not strictly random, and as the sample size is not adequate for some categories. Therefore, the estimates of any indicator should not be compared with the estimates of said indicator available from secondary sources. These limitations of the quantitative data necessitate a mix of quantitative estimates and qualitative feedback to draw insights from a monitoring point of view, not from the point of view of the evaluation of the project.

Common Methodology for both Marathwada and the Rest of the Project Areas (RoPA) region

A meeting was convened on 30th May 2022 by PMU with Sambodhi and Nabcons teams to discuss developing a common methodology and a household beneficiary tool to be used for both regions for the current concurrent monitoring round. Based on the suggestions provided by the PMU, a common methodology along with household surveys and qualitative tools was developed in June 2022. The household survey and qualitative tools were approved on the 6th of July 2022 by PMU and were first used for data collection in the CM-VII round in Marathwada and the CM-V round in the RoPA region. They were further revised during the subsequent concurrent monitoring round in consultation with PMU. The data collection software program (CAPI) for the current concurrent monitoring round was revised and tested in the first week of October 2023 before starting the field team training in the second week of October 2023.

1.6. Sampling Methodology

The sampling methodology remains the same as the one adopted during the previous rounds of concurrent monitoring. Using the proposed sampling method, in line with the ToR, concurrent monitoring was conducted in both project and comparison clusters. The ratio for the project to comparison sample is maintained at 2:1 (as given in the ToR). The steps undertaken in the sampling methodology for concurrent monitoring have been detailed in the following section.

Selection of Project Clusters

In line with the methodology proposed in the ToR, 30 clusters in Marathwada were sampled. These 45 clusters were selected proportionately from the 8 project districts. First, the clusters that were covered/surveyed during previous CM rounds were excluded from the sample frame. Then the required number of clusters from each district was selected randomly from the total number of clusters left in the respective district. These clusters are the ones in which the project has been implemented.

Selection of Comparison Clusters

A total of 15 comparison clusters were selected. These are non-PoCRA watershed clusters which were selected after matching them with project clusters based on climate vulnerability index score. As done in previous CM rounds, it was ensured that a district-wise 2:1 proportion of project and comparison is maintained while selecting comparison clusters.

The steps to identify the comparison clusters are detailed as follows:

i. The number of comparison clusters to be sampled per district was decided while maintaining a 2:1 ratio for the project to comparison clusters.
ii. The comparison clusters in each district and its taluka which have the closest climate vulnerability index score to the sampled project clusters in the respective district were selected.
iii. Using this approach, we identify a comparable non-project cluster for every project cluster. Hence, a set of 62 comparison clusters were identified which have similar characteristics to that of the sampled project clusters.
iv. Finally, 31 clusters were randomly selected from this set of 62 clusters, while ensuring that the district-wise proportion of comparison clusters is maintained.

Selection of Villages

One village was selected randomly from all the villages listed in each of the sampled project and comparison clusters.

Selection of Beneficiaries

In line with the ToR, a total of 15 beneficiaries were surveyed from each sampled cluster/village. In earlier rounds, out of these 15 beneficiaries, 10 beneficiaries were under the individual beneficiary category and five were in the community beneficiary category. As decided during the meeting on 30th May 2022, in project clusters, the number of quantitative interviews in the FFS guest farmers category be reduced from three to one and adjusted in the beneficiaries with disbursement category.

Hence, out of ten beneficiaries,

a) Two beneficiaries were applicants of Direct Benefit Transfer (DBT) who have at least received pre-sanction,

b) Six beneficiaries who have received DBT disbursement,

c) One beneficiary was chosen from the list of host farmers from the FFS, and

d) One beneficiary (either male or female) was chosen from the list of guest farmers who participated in the FFS.

These eight DBT beneficiaries and two FFS beneficiaries were randomly chosen from the list of beneficiaries in the sampled village. In the comparison villages, a list of beneficiaries (receiving benefits like that of project beneficiaries) was identified with the help of the local resource person or Krishi Mitra or with the help of gram panchayat officials. Further, the beneficiaries of the survey are chosen randomly from this list. In case a sampled beneficiary was not available on the day of the survey, a replacement for the corresponding sample was identified randomly to ensure adequate sample coverage.

Community beneficiaries are classified into four categories:

a) Beneficiaries for natural resource management (NRM) activities,

b) Beneficiaries of community farm pond,

c) Members of project-supported Farmer Producers Company (FPCs), and

d) Members of project-supported Self-Help Groups (SHGs).

The sample frame of community NRM works implemented, CFPs developed, SHGs supported and FPCs supported were accessed from the PMU team. The beneficiaries or potential beneficiaries living in the catchment area of the NRM works community intervention was identified with the support of village-level functionaries including Cluster Assistants, Agriculture Assistants, and VCRMC members. The beneficiaries of the CFPs were identified with the support of its key applicants. Also, FPC and SHG beneficiaries will be identified based on the list of their members shared by the PMU team. In the case of the Marathwada region, a total of 450 samples were covered in 30 project clusters, and 225 samples were covered in 15 comparison clusters.

Apart from the quantitative interviews, qualitative interviews were conducted with the key project stakeholders to get their feedback on the current situation of project implementation. The details of the quantitative and qualitative interviews planned to be conducted are detailed in Tables 1.2 and 1.3 below.

Table 1. 2 Planned Quantitative Samples

Activity Category	Activity	Sample per Village	Total Sample (Project)	Total Sample (Comparison)	Remarks
Individual Beneficiaries		**10**	**300**	**150**	Total of 450 are planned to be surveyed
	DBT Matching Grant beneficiaries				
	Pre-sanction received and following stages	2			
	Beneficiaries receiving disbursement	6			
	FFS beneficiaries				
	Host farmer	1			
	Guest farmer	1			
Community Beneficiaries		**5**	**150**	**75**	Total of 225 are planned to be surveyed
	Beneficiaries of NRM activities		50	25	NRM beneficiaries from sampled project and comparison villages having NRM works.
	CFP beneficiaries		36	18	Randomly selected from project and comparison villages having CFP beneficiaries.
	FPC members		48	45	3 members (2 board members + 1 general member) from 16 project-supported FPCs
	SHG/FIG members		16	8	2 members (1 president/ secretary + 1 general member) each from 8 project-supported SHGs
Target Sample		**15**	**450**	**225**	**Total of 675 beneficiaries planned to be surveyed.**

Table 1. 3 Planned Qualitative Samples

Target Respondent	Sample and Approach	Enquiry Technique	Remarks
VCRMC Representatives	– 30	– FGD with VCRMC Representatives	Investigation of all project activities implemented in their village (viz. capacity building, implementation, challenges, and suggestions for course correction)
Farmers (including farmers with more than 5 acres, and farmers with less than 5 acres)	– 8	– FGD with farmers	Feedback on challenges faced in agriculture due to climate change and the coping mechanisms adopted Feedback on the PoCRA intervention and resilience
Landless people	– 8	– FGD with landless people	Feedback on challenges faced due to climate change and the coping mechanisms adopted Feedback on the PoCRA intervention and resilience
Agriculture Assistant (AA)	– 30	– IDI with AA	Investigation of all project activities implemented at the village level (viz. implementation, challenges, and suggestions for course correction)

Cluster Assistant (CA)	– 30	– IDI with CA	Investigation of all project activities implemented at the village level (viz. implementation, challenges, and suggestions for course correction)
Farmer Producer Company (FPC) Representatives	– 16	– IDI with FPC Representatives (Board of Directors)	Investigation on support from PoCRA (viz. support received, process bottlenecks, and suggestions for course correction)
Project Specialists (PS Agriculture, PS Agribusiness, PS HRD) implementing PoCRA in districts	– 4 (1 HR, 1 Procurement, 1 Agriculture, 1 Agribusiness) *Discussions with PS in project districts*	– Discussions with Project Specialists	Investigation of all project activities implemented in their district (viz. implementation, challenges, and suggestions for course correction)
Sub-Divisional Agricultural Officer (SDAO)	– 8 One SDAO randomly selected from a list of SDAOs of sampled sub-divisions in each district	– IDI with SDAO	Investigation of all project activities implemented in their district (viz. implementation, challenges, and suggestions for course correction). Feedback on the role of Agriculture Supervisor and Takula Officer (TO) will also be taken.
Krishi Tai (KT)	– 16 *Two in each district*	– IDI with KT	Feedback on project-related activities implemented by KT
Technology Coordinator (TC)	– 8 *One TC randomly selected from a* list of TCs in each district	– IDI with FFS/ Technology Coordinator	Investigation of implementation of CRATs in their district (viz. implementation, challenges, and suggestions for course correction)
Agriculture Supervisor (AS)	– 8 *One AS randomly selected from a* list of ASs of sampled villages in each district	– IDI with AS	Investigation of project activities that are part of the scope of the AS (viz. implementation, challenges, and suggestions for course correction)
Taluka Agriculture Officer (TAO)	– 8 *One TAO randomly selected from a* list of TAOs in each district	– IDI with TAO	Investigation of project activities which are part of the scope of the TAO (viz. implementation, challenges, and suggestions for course correction)
District Superintendent Agriculture Officer (DSAO)/Project Director Agricultural Technology Management Agency (PD ATMA)	– 4 (2 DSAO & 2 PD ATMA) *IDI with DSAO and PD ATMA in eight project districts)*	– IDI with DSAO/ PD ATMA	Investigation of all project activities implemented in their district (viz. implementation, challenges, and suggestions for course correction)

1.7. Samples Covered

Quantitative Data

The sample was targeted based on the sampling approach discussed in the preceding section. However, as mentioned earlier, the actual sample covered depends on the implementation status of project interventions and the availability of beneficiaries in the sampled villages. A total of 450 respondents in the project and 225 respondents in comparison villages were covered in the Marathwada region. Of the 450 respondents covered in the project area, 242 respondents belonged to the category of individual benefits and 146 belonged to the category of community benefits. In the comparison area, of the 225 respondents, 173 beneficiaries belonged to the category of individual benefits and 52 beneficiaries belonged to the category of community benefits. In addition to the above sample, a total of 152 landless households were interviewed to obtain feedback on their situation and migration status.

Table 1. 4 District-wise Quantitative Sample Coverage in the Project and Comparison Villages

District	Project	Comparison	Total
CSN	67	45	112
Beed	41	14	55
Hingoli	42	16	58
Jalna	78	43	121
Latur	36	21	57
Nanded	54	15	69
Dharashiv	75	41	116
Parbhani	57	30	87
Total	**450**	**225**	**675**

Table 1. 5 Category-wise Quantitative Sample Coverage in the Project and Comparison Villages

District	Project	Comparison	Total
Individual			
DBT (pre-sanction and following stage)	63	10	73
DBT (disbursement received)	179	163	342
FFS- Host Farmer	32	0	32
FFS- Guest Farmer	30	0	30
Community			
NRM Community works/ Community Farm ponds	71	52	123
FPC Member	47	0	47
SHG Member	28	0	28
Total	**450**	**225**	**675**

Qualitative Data

For collecting qualitative data, key project stakeholders from the sampled project clusters were interviewed. A total of 197 interviews covering various key stakeholders of the PoCRA project were included in the qualitative survey. Table 1.6 presents the sample of various categories which were covered. In a few cases, there was a sample shortfall due to the unavailability of the stakeholders for the survey at the time of the visit, especially due to health-related reasons or personal emergencies.

Table 1. 6 Qualitative Sample Coverage

S.No.	Research Tool	Sample Covered in Marathwada
1	FGD with VCRMC Members	28
2	IDI with AA	26
3	IDI with CA	30
4	IDI with FPC Representatives	16
5	IDI with TAO	8
6	IDI with AS	15
7	IDI with SDAO	4
8	FGDs with PS	2
9	IDI with DSAO/PD ATMA	3
10	IDI with Technical Coordinator	8
11	IDI with Krishi Tai	15
12	FGD with Farmers	23
13	FGD with Landless	19
	Total	**197**

Key Expert Field Visits

Key expert field visits were also conducted to get insights into project implementation. The team leader-cum-monitoring-and-evaluation expert, environment expert, sociology expert, agronomy expert, hydrology expert, agri-engineering expert, agri-economist, agribusiness expert, and GIS expert of both M&E agencies visited the field as per the schedule mentioned in Table 1.7.

Table 1. 7 Schedule of Key Expert Field Visit

Key Expert	Domain	Date	Place of Visit
Marathwada Region			
Biswaranjan Baraj	Team Leader / M&E Expert	28th – 30th November 2023	CSN, Beed, and Jalna
R. Singandhupe	Agronomy	1st – 3rd November 2023	Latur and Dharashiv
Mini Govindan	Sociology	7th – 8th November 2023	CSN and Jalna
S. Kulkarni	Hydrology	28th – 29th November 2023	CSN, and Beed
Arindam Datta	Environment	29th – 30th November 2023	CSN, and Jalna
Vijay Agarwal	Agri Engineering	29th – 30th November 2023	CSN
T. S. Krishnan	Statistician	29th – 30th November 2023	CSN
Deodatt Singh	Agribusiness	6th – 8th December 2023	CSN, and Beed
Santosh Muriki	GIS	6th – 8th December 2023	CSN, and Beed
Dalbir Singh	Agri Economy	8th – 9th February 2024	Beed and Parbhani

2. Profile of Respondents

2.1. Demographic Details

As beneficiaries were selected as per sampling design with consideration of the representation of different categories of beneficiaries, the proportion of different socio-economic categories mentioned in this section is not fully representative of the actual population proportions of the area. Also, information about caste, educational status, and status of ration cards are based on the responses of respondents, and no physical verification has been conducted. However, the data indicates current coverage of PoCRA benefits among different socio-economic groups and would help in taking steps necessary to make the program more equitable i.e., ensuring benefits reach all strata of the population, including women farmers and farmers from scheduled castes (SCs), scheduled tribes (STs), other backward castes (OBCs), and Nomadic Tribes (NTs).

2.1.1. Gender

In the Marathwada region, nearly 84% of respondents in the project and 94% of respondents in comparison clusters were male beneficiaries.

2.1.2. Social Category

Most respondents belonged to the general category in the Marathwada region. The distribution of respondents based on social category is given in Table 2.1.

Table 2. 1 Social Category of Respondents

Social Category	Marathwada	
	Project (%) N = 450	Comparison (%) N = 225
General/ Open	62	59
Other Backward Class (OBC)	19	14
Scheduled Caste (SC)	6	6
Scheduled Tribe (ST)	5	6
Nomadic Tribes	6	13
Others	2	2

2.1.3. Education

As evident from Table 2.2, the educational attainment of respondents in project villages was slightly better than in comparison villages. Nearly 7% of respondents in the project area and slightly more than 10% of respondents in the comparison villages were found to have not attended any school.

Table 2. 2 Educational Background of Respondents

Education	Marathwada	
	Project (%) N = 450	Comparison (%) N = 225
No schooling	8	11
Primary school (up to class 5th)	17	24
Middle school (up to class 8th)	13	17

Education	Marathwada	
	Project (%) N = 450	Comparison (%) N = 225
Secondary school (up to class 10th)	24	25
Senior secondary (up to class 12th)	19	14
Diploma but not graduate	10	4
Graduate	5	3
Post-graduate	3	1
Others (Specify)	1	1

2.1.4. Poverty Status

In the Marathwada region, based on the type of ration card the household possesses, around 60% of respondents in the project and 49% in comparison clusters belonged to the Above Poverty Line (APL) category, and 38% in the project and 49% in comparison clusters belonged to the Below Poverty Line (BPL) category. The rest 2% in both project and comparison clusters were not aware of their poverty status.

2.1.5. Marital Status

In Marathwada regions, around 92% of respondents in the project and 96 % in comparison clusters were married, and about 5% of the respondents in the project and 2% in comparison clusters were unmarried. The sample in Marathwada included 20 widows in the project and 10 in the comparison clusters.

2.1.6. Household Size and Family Type

In Marathwada regions, the average number of members in a household in both project and comparison clusters is five. Nearly more than three-fourth of respondents in both the project and comparison clusters stayed in a joint family.

2.1.7. Source of Income

In Marathwada regions, farming/ agriculture is the primary source of income for nearly all respondents in both project as well as comparison clusters. While farming/ agriculture is a significant source of income in both regions, the data indicates that there is a diversity of income sources, especially in project clusters including non-agricultural labour, agricultural labour, micro-enterprises, and others. Table 2.3 lists the sources of income of respondents.

Table 2. 3 Source of Income of Respondent Households

Source of Income	Marathwada	
	Project (%) N = 450	Comparison (%) N = 225
Farming/ Agriculture	84	89
Goat-rearing	0.5	-
Dairy	1	-
Sericulture	1.5	-
Fisheries	0.5	-
Non-agriculture labour	3	4

Source of Income	Marathwada	
	Project (%) N = 450	Comparison (%) N = 225
Agricultural labourer	3.5	4
Skilled worker (tailoring, masonry, electrician, plumbing, carpentry, welding, driving, etc.)	1	-
Salaried workers (teachers, AWW, etc.)	2	1
Contractual or task-based work	-	-
Micro-enterprises (kirana shops, dhabas, mobile shops, ferry shops, etc.)	3	2
Others	-	-

2.1.8. Annual Income

The mean annual income from all sources for the respondent households as reported by farmers from Marathwada region in the project and comparison clusters is Rs. 2,12,069/- and Rs. 1,57,511/-, respectively. Table 2.4 reports the average annual income in the project and comparison clusters of both regions, separately.

Table 2. 4 Mean Annual Income of Respondent Households

Region/ Cluster	N	Mean Annual Income (Rs.)
Marathwada		
Project	450	2,12,069/-
Comparison	225	1,57,511/-

2.2. Land Ownership and Cultivation Practices

2.2.1. Land Ownership

In the Marathwada region, all respondent households in the comparison and nearly all the respondent households (except six) in the project clusters owned agricultural land. Women, in about 48% of respondent households in project clusters owned agricultural land, while in comparison clusters, the proportion for the same was 28%. The average agriculture landholding in the project cluster is 4.9 acres, and that in comparison cluster is 3.8 acres. 37 respondent households in project clusters and 21 respondent households in comparison clusters have leased an average of 2.5 acres of agricultural land. Nine respondent households in project clusters have leased out an average of 0.5 acres of agricultural land, while in comparison clusters, three respondent households have an average leased-out land size of 1.5 acres. As can be seen in Table 2.5, nearly two-thirds of the respondent households in the project (58%) and three-fourth of the respondent households in comparison (76%) belonged to small and marginal farmers (those who owned less than 2 Ha of land).

Table 2. 5 Category of Farmers Covered in the Household Survey

Category of farmers	Marathwada	
	Project (%)	Comparison (%)
	N = 450	N = 225
Small & Marginal (less than 2 Ha)	58	76
Medium (between 2 to 5 Ha)	37	23
Large (more than 5 Ha)	5	1

2.2.2. Cultivation Practices

Considering the Marathwada region, it is observed that nearly 93% of the total respondent households in project clusters cultivated their land with an average of 4.3 acres per household in the Kharif season. Similarly, 49% of the total respondents cultivated Rabi crops on an average of 3.4 acres of land, and three respondent households were found to have cultivated Summer crops on an average of 2.3 acres of land in the year 2022-23. Around 26% of farmers in project clusters cultivated horticulture crops on an average of 3.3 acres of land. In the comparison cluster, in the Kharif season, nearly 98% of the total respondents cultivated an average of 3.6 acres of land. Similarly, 36% of total respondents cultivated Rabi crops on an average of 2.6 acres of land, and two respondent households were found to have cultivated Summer crops on an average of 2 acres of land in the year 2022-23. Around 10% of farmers in comparison clusters cultivated horticulture crops on an average of 2.3 acres of land.

2.2.3. Irrigation Practices

In the Marathwada region, nearly 88% of respondents in project clusters had access to a source of water for irrigation sources. In comparison clusters, 74% had access to a source of water for irrigation. It is observed that in project clusters, the sources of water for irrigation in order of adoption by respondent households are open-dug wells, farm ponds, earthen/check dams, canal/ river, and borewells. The order of adoption for the sources of water for irrigation in comparison clusters is open dug well, borewell, earthen/check dam, canal/ river, and farm pond. While open-dug wells and farm ponds are the main sources of irrigation in project clusters, open-dug wells, and borewells are mainly used in comparison clusters of Marathwada region. This emphasizes the project's efforts in the promotion of the use of surface water storage structures by farmers and reducing their dependence on groundwater for irrigation.

Table 2. 6 Source of Water for Irrigation

Source of irrigation	Marathwada	
	Project (%)	Comparison (%)
	N = 390	N = 164
Open-dug well	67	58
Borewell	2	12
Farm pond	8	1
Canal/ River	2	2
Earthen/ Check dam	5	10
Others	16	17

2.2.4. Average Irrigated Area under Different Cropping Seasons

In project clusters of the Marathwada region, on average 4.2 acres of land with Kharif crop, 3.3 acres of land with Rabi crop, and 2.3 acres of land with Summer crop were under irrigation in the year 2022-23. Similarly, in comparison clusters of the Marathwada region, on average 3.7 acres of land with Kharif crop, 2.7 acres of land with Rabi crop, and 1.5 acres of land with Summer crop were under irrigation in the past 12 months. All the land under the horticulture plantation in both the project and comparison clusters of the Marathwada region is under irrigation.

2.2.5. Crops Grown in Different Seasons

Kharif Season: The most common Kharif crops cultivated (in both project and comparison clusters of the Marathwada region) included Soybean, Cotton, and Pigeon pea. Some of the other Kharif crops cultivated were Black gram, Green gram, Maize, Turmeric, Ginger, Onion, and Millet.

Rabi Season: The most common Rabi crops cultivated (in both project and comparison clusters of both Marathwada regions) included Chickpea, Wheat, and Sorghum.

Table 2.7 shows the percentage of respondent households in the project and comparison clusters of both Marathwada regions growing key Kharif and Rabi crops.

Table 2. 7 Season-wise Key Crops Grown by Respondent Households

Season/ Crop	Marathwada	
	Project (%)	Comparison (%)
	N = 450	N = 225
Soybean	58	54
Cotton	30	39
Pigeon pea	8	3
Chickpea	22	9
Wheat	7	3
Sorghum	4	6

Apart from growing crops in the Kharif and Rabi seasons, respondent households in Marathwada region were found growing summer and annual/ horticulture crops as follows:

Summer Season: Vegetables like Onion and Tomato are mostly grown in Summer.

Annual/ Horticulture Crops: Sweet Lime, Guava, Lemon/ Lime, Mango, Pomegranate, and Orange are commonly grown as annual/ horticulture crops. It is observed that nearly 7% of respondent households in project clusters of the Marathwada region were engaged in horticulture plantation in contrast to less than 1% of respondent households in comparison clusters.

2.2.6. Irrigation Methods Adopted

In the Marathwada region, nearly 82% of crop-related responses (657 out of 809) in project clusters and 67% of crop-related responses (209 out of 330) in comparison clusters indicate that the fields were irrigated. The irrigation methods adopted by the respondent households were flood, drip, and sprinkler. As evident in Table 2.8 below, the percentage of farmers in project clusters adopting flood irrigation is nearly half as compared to the percentage of farmers in comparison clusters. This difference highlights that PoCRA has a positive impact in the project villages which has resulted in more farmers adopting micro irrigation systems on their fields.

Table 2. 8 Irrigation Methods Adopted by Respondent Households

Irrigation Method	Marathwada	
	Project (%) N = 657	Comparison (%) N = 209
Flood irrigation	25	47
Through drip set purchased on own	7	14
Through drip set received through other schemes	17	12
Through drip set received through PoCRA	19	-
Through sprinkler set purchased on own	17	19
Through sprinkler set received through other scheme	2	7
Through sprinkler set received through PoCRA	14	-

2.2.7. Crop Damage and Insurance

It is observed that around 20% of farmers in both project and comparison clusters in the Marathwada region have reported damage to their crops. The primary reasons cited for crop damage in Marathwada regions are delayed onset of monsoon, excessive rainfall, and to some extent use of faulty seeds and pest/ disease attacks.

Table 2. 9 Reasons for Crop Damage

Reasons for crop damage	Marathwada	
	Project (%)	Comparison (%)
	Valid N = 489 (Multi response)	Valid N = 211 (Multi response)
Delayed onset of monsoon	24	24
Excessive rain	12	7
Dry spell	2	1
Pest and disease attack	7	6
Faulty seeds	9	4
Hailstorm	1	0
Other reasons	7	2

In the Marathwada region, the crop damage seems to have occurred mostly soon after the sowing stage. However, to some extent, the damage has also occurred in various other stages of crops as presented in Table 2.10.

Table 2. 10 Stages of Crop Damage

Stage of crop damage	Marathwada	
	Project (%)	Comparison (%)
	Valid N = 489	Valid N = 211
At and after the sowing stage	23	25
At flowering stage	9	11
At the pod development stage	5	6
Harvesting stage	7	9
Other stages	56	49

It is observed that nearly three-fourth of the respondent households in project clusters in Marathwada region have insured their crops. In comparison clusters of Marathwada region, 66% of respondent households insured their crops.

2.2.8. Area, Production, and Yield of Major Crops

The average area, production, and yield of major crops grown by respondent households of project and comparison areas in the Marathwada regions are presented in Table 2.11 and Table 2.12, respectively.

Table 2. 11 Area, Production, and Yield of Major Crops in Marathwada region

S. No.	Crop	Project				Comparison			
		Sample (N)	Avg. Area (Acre)	Avg. Production (q)	Avg. Yield (q /acre)	Sample (N)	Avg. Area (Acre)	Avg. Production (q)	Avg. Yield (q/acre)
					Kharif				
1	**Soybean**	263	3.6	21	**5.8**	122	3.1	16	**5.2**
2	**Cotton**	135	2.9	19	**6.5**	88	2.8	14	**5.0**

3	**Pigeon Pea**	34	2.0	11	**5.5**	6	1.9	9	**4.7**
					Rabi				
1	**Chickpea**	97	3.6	20	**5.5**	21	2.1	12	**5.7**
2	**Wheat**	30	2.2	17	**7.7**	7	2.4	14	**5.8**
3	**Sorghum**	18	2.3	10	**4.3**	13	3.4	10	**2.9**

2.2.9. Land under Certified Seeds

One of the key objectives of the project is to promote the use of certified varieties of climate-resilient seeds. To validate this objective, respondents in both project and comparison clusters were asked about the area under cultivation for each crop using certified seeds.

In the case of the Marathwada region, it is observed that the overall area under certified seeds was relatively higher in comparison villages as compared to project villages. The percentage of land under certified seeds for Soybean is slightly higher in comparison cluster (89%) as compared to project clusters (83%). However, the percentage of land under certified seeds for Pigeon Pea and Chickpea was found to be higher in project clusters by about 9% and 13% in contrast to comparison clusters. The overall percentage of land under certified seeds for these three crops in both the project and comparison areas is 81% and 86%, respectively.

Table 2. 12 Land under Certified Seed Varieties in Marathwada Region

Crop	Land under production (acres)		Land under certified seed varieties (acres)		Land under certified seed varieties (%)	
	Project	Comparison	Project	Comparison	Project	Comparison
Soybean	944 (N = 263)	361 (N = 122)	786 (N = 219)	321 (N = 110)	83	89
Pigeon pea	67 (N = 34)	12 (N = 6)	51 (N = 24)	8 (N = 4)	76	67
Chickpea	346 (N = 97)	45 (N = 21)	266 (N = 67)	29 (N = 13)	77	64
Overall	1357	418	1103	358	81	86

2.2.10. Cost of Cultivation of Key Crops

The Cost of Cultivation (CoC) has been calculated using the Directorate of Economics & Statistics methodology. Considering, Marathwada region, the highest average cost of cultivation was recorded for Cotton (P: Rs. 23142/- per acre; C: Rs. 23913/- per acre) followed by Soybean (P: Rs. 21425/- per acre, C: Rs. 22384/- per acre) and then Pigeon pea is (P: Rs. 19641/- per acre, C: Rs. 20230/- per acre). In *Rabi* season, the CoC for Chickpea is (P: Rs. 21535/- per acre; C: Rs. 22614/- per acre).

Table 2. 13 Cost of Cultivation of Key Crops in Marathwada Region

Cluster	Cost Heads	Soybean	Cotton	Pigeon Pea	Chickpea
Project	Responses	**269**	**135**	**35**	**124**
	Average of Working Capital (All Inputs - Family labour = Working capital) Rs.	14083	13925	9369	14555
	Average of Cost A1 (Land preparation to Other charges + Interest on working capital @ 6%+ Depreciation on fixed cost Rs.	15498	15421	10463	16117
	Average of Cost A2 (Cost A1+ Rent paid for leased in land) Rs.	15498	15421	10463	16117

	Average of Cost B (Cost A2 + Rental value of own land + Interest on owned fixed capital) Rs.	20853	22393	19170	21041
	Average of Cost C (Cost B + Family labour) Rs. Total CoC / acre	**21425**	**23142**	**19641**	**21535**
Comparison	Responses	**121**	**90**	**21**	**27**
	Average of Working Capital (All Inputs - Family labour = Working capital) Rs.	15122	14791	9650	14945
	Average of Cost A1 (Land preparation to Other charges + Interest on working capital @ 6%+ Depreciation on fixed cost Rs.	16599	16338	10777	16531
	Average of Cost A2 (Cost A1+ Rent paid for leased in land) Rs.	16599	16338	10777	16531
	Average of Cost B (Cost A2 + Rental value of own land + Interest on owned fixed capital) Rs.	21954	23310	19745	21455
	Average of Cost C (Cost B + Family labour) Rs. Total CoC / acre	**22384**	**23913**	**20230**	**22614**

2.2.11. Selling Price of Key Crops

The selling price of key crops including Soybean, Cotton, Wheat, and Sorghum in both project and comparison clusters of Marathwada was observed to be higher than the minimum support prices declared by the government in FY 2022-23[12]. However, for Pigeon Pea and Chickpea, the farmers in the Marathwada region seem to have received slightly lower prices than MSP. However, it is evident from the price data presented in Table 2.17 that the farmers in project clusters have fetched better prices for their produce than the farmers in comparison clusters.

Table 2. 14 Selling Price of Major Crops

S. No.	Crop	MSP per Quintal (Rs.)	Marathwada			
			Project	Price per Quintal (Rs.)	Comparison	Price per Quintal (Rs.)
			N		N	
	Kharif					
1	Soybean	4300	263	4733	122	4582
2	Cotton	6080	135	6916	88	6521
3	Pigeon Pea	6600	34	6538	6	5917
	Rabi					
1	Chickpea	5335	97	4675	21	4814
2	Wheat	2125	30	2710	7	3000
3	Sorghum	2990	18	3494	13	3262

2.2.12. Marketing of Produce

As evident from the data presented in Table 2.18, most of the produce (P:86% C:84% respondents in Marathwada region) is sold immediately in APMC or the nearest market to the trader. The majority of the remaining farmers (P:12% C:16% respondents in Marathwada region) store the produce at home for future sale. Very few farmers in the region were observed to be (i) selling their produce directly to FPC (subject to its availability), and (ii) storing their produce either at an FPC godown, private storage facility, or at a friend/ relative storage facility.

[12] Minimum Support Price for FY 2022-23 (https://farmer.gov.in/mspstatements.aspx)

Table 2. 15 Marketing of Produce

Post Harvest Activity	Marathwada			
	Project		Comparison	
	N = 585	%	N = 235	%
Sold immediately in APMC	124	21	55	23
Sold immediately in market to trader	382	65	143	61
Sold immediately to FPC	1	< 1	-	-
Stored at FPC Storage facility (Godown)	3	< 1	-	-
Stored at Friends/ Relatives storage facility	2	< 1	-	-
Stored at own house	71	12	37	16
Stored at private storage facility	2	< 1	-	-

3. Promoting Climate Resilient Technologies and Agronomic Practices

The objective of this component is to promote the transfer of on-farm technologies and agronomic practices that enhance climate resilience in the agricultural systems prevailing in the project area. Under this component, the project promoted Farmer Field Schools (FFSs) for the demonstration of climate-resilient varieties of field crops as well as productivity-enhancing agronomic practices. The project also provides matching grants to eligible individual farmers to support the adoption of climate-resilient varieties and farming practices, promote carbon sequestration through fruit tree plantation, bamboo plantation, and agroforestry, enhanced crop residue management, encourage crop diversification by supporting protected cultivation for horticulture, enhance on-farm water-use efficiency through micro-irrigation and farm ponds, and promote small-scale income-generating livestock activities for women and other selected beneficiaries identified in the PoCRA social assessment carried out during the project preparation phase.

3.1. Progress on Matching Grant

3.1.1. Status of Applications for Individual Benefits

Regarding the status of the application for individual benefits in project clusters, nearly 74% of respondent households in the Marathwada region received the matching grant in their bank account. All beneficiaries were found to be aware of their application status, which is a positive trend.

Table 3. 1 Status of Application for Individual Benefit

Status of Application	Marathwada (%) N = 244
Application for matching grant through DBT application	9
Verification of application by Cluster Assistant	2
Desk-1 - Approval by VCRMC committee	3
Desk-2 - Spot verification by Agriculture Assistant	0.5
Desk-3 - Approval and Pre-sanction by SDAO	9
Desk-4 - Post-work scrutiny by Agriculture Assistant	
Desk-5 - Account officer	-
Desk-6 - SDAO	-
Work under implementation and document supervision	2
Demand by beneficiary for matching grant	0.5
Transfer of matching grant to the beneficiary account	74

3.1.2. Reasons and Sources of Motivation for Applications

The primary motive of the majority (more than three-fourth) of respondent households to apply and adopt individual benefits like micro irrigation systems viz. drip and sprinkler, pumps, pipes, farm pond, new well and recharge of old wells, protected cultivation using shade nets, etc is to increase the availability of water for irrigation and increase their production and income.

A smaller but significant proportion of respondents mentioned the climate-resilient nature of the practices as a motivating factor. Some respondents applied for benefits based on recommendations from their social networks (friends/family), while others appreciated the simplicity of the application process and the prospect of receiving subsidies quickly. In summary, the data suggests that respondents have various motivations for applying for individual benefits, including economic considerations, environmental concerns, and ease of access. These motivations align with the goals of sustainable and resilient agricultural practices.

Table 3.2 and Table 3.3 present the distribution of responses received for reasons and sources of motivation for the application of Individual benefits.

Table 3. 2 Reasons for Applying for Individual Benefit

Reasons for applying for the benefit	Marathwada	
	Project (%) (N = 244)	Comparison (%) (N = 173)
To increase the water supply for agriculture	79	84
To increase production and income	77	75
Practices are climate-resilient	32	28
Suggested by my friends/ family	12	10
Process of application is simple	20	23
Grant is received quickly	18	13

Table 3. 3 Sources of Motivation for Applying for Individual Benefit

Motivation	Marathwada	
	Project (%) (N = 244)	Comparison (%) (N = 173)
Self	50	59
Family members	21	21
VCRMC	8	-
Friend/ Neighbour	10	17
FFS Facilitator/ Coordinator	3	-
Cluster Assistant	1	-
Agriculture Assistant	2	1
Krishi Tai/ Krishi Mitra	3	2
CSC/ e-Seva kendra	1	-
Gram Panchayat members	1	-

3.1.3. Support for Application Process

In Marathwada region, it is observed that more than 70% of farmers in the project as well as comparison have completed the application process on their own or through the support of their family members. The rest of the farmers in project clusters (11% in Marathwada) depend on Cluster Assistant and in comparison, clusters (9% in Marathwada) depend on e-Sewa Kendra.

Table 3. 4 Support for Application Process

Support for Application Process	Marathwada	
	Project (%) (N = 244)	Comparison (%) (N = 173)
Self/ Family member	77	82
With help of Cluster Assistant	11	8
With help of Friend/ Neighbour	3	1
With help of VCRMC member	1	-
With help of e-Sewa Kendra	8	9

3.1.4. Arrangement of Funds

In the case of the Marathwada region, of the total 180 respondents who have received the disbursement from PoCRA, nearly 83% used their savings, 14% took a loan from friends/ family, and the rest 3% depended on bank/microfinance, SHG, and local money lenders. The loan amount ranged from Rs. 10000/- to Rs. 30000/- with interest rates ranging between 2% to 8%. However, in comparison clusters, 97% of respondents of households used their savings, and the rest 3% took support from friends/ family. In the Marathwada, two cases with presanction did not start the activity cited challenges of coping with other household expenditures and arranging upfront costs for investment.

3.1.5. Allotted Time for Completion of Activity

In the Marathwada region, 90% (out of 244) respondent households of the project and 70% (out of 173) in comparison clusters are satisfied with the allocated time for the completion of the activity. Those farmers who found the given time insufficient for the completion of the activity cited their challenge in arranging the upfront cost for investment in the prescribed time duration.

3.1.6. Challenges in Accessing Individual Benefits

In the Marathwada region, 35% of the respondent households in both project and comparison clusters faced challenges primarily at the stage of registration, application, and pre-sanction stage while accessing the benefit.

Table 3. 5 Application Stage with Challenge

Application Stage with Challenge	Marathwada	
	Project (%) (N = 86)	Comparison (%) (N = 59)
Registration	34	39
Application	16	25
On-Site Inspection	5	5
Pre-sanction process	27	20
Completing the work	3	5
Receiving grant	14	2
Utilization of benefit	1	3

Table 3. 6 Type of Challenge

Type of Challenge	Marathwada	
	Project (%) (N = 86)	Comparison (%) (N = 59)
Lack of guidance on how to apply for availing the grant	34	35
Problem in applying for project benefits (lack of internet)	38	42
Lack of support on how to register and apply	19	18
Delay from project staff in giving sanction	6	4
Lack of funds to construct the asset	3	1

3.1.7. Cost Incurred in Accessing Individual Benefits

It is observed in the Marathwada region that nearly 50% of respondent households in both project (N=244) and comparison clusters (N=173) have incurred costs while availing the individual benefits. Table 3.7 presents the distribution of respondent households incurring different types of costs while availing the individual benefits.

Table 3. 7 Type of Costs Incurred

Type of Cost Incurred	Marathwada	
	Project (%) (N = 120)	Comparison (%) (N = 83)
Loss of wage/employment due to time spent on the process of taking benefit	26	28
Transportation cost	39	40
Documentation cost	35	33

The average cost incurred in project areas is around Rs.750/- and in the comparison area is Rs.980/- as observed in Marathwada region.

3.1.8. Feedback on DBT Application Process

Table 3.8 presents the feedback from those beneficiaries who had accessed individual benefits and whose application had received approval and pre-sanction from SDAO has been reviewed.

Table 3. 8 Feedback on DBT Application Process

Suggestions on DBT application processes	Marathwada
	Project (%)
	N = 183
Satisfied with the current process	50
Support in filling out the application through the DBT application portal	19
Process of applying and getting benefits can be simplified	13
Matching grant should be increased	15
Documentation process in the application should be simplified	3

Feedback from Agriculture Assistant (AA)

(Marathwada Region)

Adoption of CRATs:

As stated by the AAs, farmers have widely embraced various climate-resilient technologies, including BBF, Drip, Sprinkler, FFS-based training, Zero Tillage, Nimboli Extraction, climate-resilient seeds, and effective pest control methods. Most of the AAs surveyed reported that farmers identified BBF technology as highly beneficial. This technology proves invaluable by facilitating excess water drainage through furrows, thereby significantly mitigating crop damage during periods of excessive rainfall.

CRATs dissemination strategy:

To further disseminate awareness about CRATs, discussions through Mahila sabha, gram sabha, and VCRMC meetings are regularly conducted. Engaging in discussions with villagers plays a crucial role in awakening farmers to the benefits of these technologies. Farmers are not only encouraged during meetings but are also urged to adopt organic manure for sustainable agriculture practices. To enhance communication, weather forecasts, and agricultural advice are shared through WhatsApp groups. Additionally, AAs conduct field visits to farms twice a month, establishing direct contact with the agricultural community. Efforts have been made to disseminate information systematically, including the distribution of booklets in Gram Panchayats. Progressive farmers have been appointed as key influencers, actively participating in the implementation of the village development plan. The list of farmers has been uploaded, and a CRAT manual has been made accessible to the Gram Panchayat.

Positive impacts:

The positive impacts of the PoCRA project on agriculture emphasize improvements in the adoption of climate resilient technologies (CRATs), improved production, increased farm income, and enhanced water availability and irrigation use. Farmers have expressed their satisfaction with the increased adoption of CRATs, including sprinkler and drip irrigation systems, leading to notable benefits such as reduced costs and improved production. Drip irrigation, in particular, is highlighted for its role in saving water and increasing its availability. Farmers also emphasize the importance of the PoCRA project in providing valuable training and guidance, leading to a better understanding of climate-resilient agricultural practices.

The implementation of soil and water conservation structures through the NRM activity has yielded a range of positive impacts on the agroecosystem in the region. Notably, rainwater interception and storage have reduced soil erosion, leading to an expansion of irrigated areas and an increase in the groundwater level. This surge in water availability has enabled farmers to cultivate crops throughout the Kharif, Rabi, and summer seasons, resulting in heightened agricultural production. The implementation of sprinkler and drip irrigation systems has further contributed to water conservation, with observed reductions in soil erosion.

Environment-friendly measures:

AAs have proposed a range of environmentally friendly measures for effective crop residue management. One key suggestion involves the proper disposal of empty pesticide bottles, emphasizing burying them in the ground. Additionally, crop residues are recommended to be utilized as animal fodder and in the creation of compost for bio-fertilizers, promoting sustainable agricultural practices. Farmers are actively encouraged to shift towards the production of organic fertilizers, thereby reducing reliance on chemical fertilizers that may have adverse environmental impacts. A holistic approach is advocated, including the planting of trees on community land to enhance overall ecological balance.

AAs have guided farmers in adopting practices that minimize environmental damage during both community and individual activities. A notable emphasis is placed on responsible pesticide application, considering factors like wind direction and time of day to minimize environmental impact, the importance of conservation of trees, and afforestation, with farmers encouraged to plant trees during project implementation. The promotion of organic farming practices, reduction in chemical fertilizer use, and awareness campaigns on environmental issues further demonstrate a holistic approach to sustainable agriculture.

The responses from the AAs indicate varying degrees of adherence to environmental compliance at the village and community level, emphasizing the importance of minimizing harm during implementation of the community and individual activities.

Several instances highlight the successful implementation of strict rules, such as the prohibition of tree felling and encouragement of tree planting to avoid environmental damage. At times, specific guidelines are provided, like using a spray kit during insecticide application and washing hands afterward, demonstrating a detailed approach to environmental protection.

However, not all villages or groups strictly enforce such rules, and some respondents mention the absence of safety practices due to no observed harm in traditional ways of doing things. Despite the lack of stringent rules in certain cases, efforts are made to increase awareness at the village or group level, emphasizing practices like avoiding over usage of water, proper disposal of pesticide bottles, and minimizing the use of chemical fertilizers.

Agro advisory services:

The opinions expressed by the AAs regarding agro-advisory services highlight farmers' needs and expectations for effective guidance on sustainable agriculture practices. Farmers emphasize the importance of sustaining achieved reforms in agro-advisory services rather than seeking further changes. The consensus is on the necessity for training programs to enhance productivity within a shorter timeframe. Specifically, farmers seek information on optimizing production through agro-climatic advice, balancing water usage, and adopting climate-resilient technologies. There is an emphasis on advanced warnings about rainfall through advisory services, empowering farmers to plan their agricultural activities more effectively. Additionally, farmers desire information on various aspects of agriculture, including cropping systems, pest management, and the use of organic fertilizers. The importance of disseminating knowledge on changing climate patterns, modern agricultural practices, and technical advancements is highlighted as well.

Evaluation of Krishi Tais (KTs):

AAs have evaluated the performance of the KTs regularly. The evaluation was done based on the marking system. AAs shared that KTs have done good work in promoting and disseminating information on PoCRA activities. During the evaluation of KTs, performance indicators like an increase in participation of women, percentage of women aware of PoCRA, etc., were considered.

Challenges faced:

Despite these positive initiatives, challenges persist, primarily related to issues in uploading information due to network problems. Addressing these challenges is crucial to ensuring the seamless flow of information and the successful implementation of climate-resilient agriculture practices at the grassroots level. A significant hurdle highlighted by AAs during the implementation of individual activities is the delayed disbursement of grants, posing a challenge for farmers. Compounding the issue, farmers often struggle to allocate sufficient time to comprehend the benefits of these initiatives. Document and network-related challenges sometimes result in the rejection of farmers' applications, with some farmers lacking awareness about the online application process. Proposed solutions involve providing clear guidelines for the implementation of individual components, emphasizing the need for clarity on the duration allocated action to ensure that the project's benefits reach farmers effectively. In contrast, villages where community benefit and soil water conservation works have been undertaken face unique challenges. The primary issue is the lack of adequate transport facilities, hindering the execution of soil and water conservation activities. Additionally, disagreements among farmers pose difficulties in the successful implementation of community benefits and soil water conservation projects. Initial enthusiasm from farmers often diminishes when it comes time to commence the work, leading to refusals and complicating the progress of these crucial initiatives under the project. Addressing these challenges is vital for ensuring the smooth execution of community-driven activities in these surveyed villages.

Suggestions:

Suggestions given by AA to sustain the impacts of the project include restarting the project to enable farmers to benefit further, reducing the grant disbursement period, increasing mechanization, and extending the project duration by two to three years. The need for ongoing guidance to farmers, especially in soil and water conservation, is emphasized, along with the proposal to reinitiate farmer field schools.

Feedback from Agriculture Supervisors (AS)

(Marathwada Region)

Adoption of CRATs:

Farmers in the PoCRA villages have identified several climate-resilient technologies promoted in the FFS that have proven beneficial for their agricultural practices. These include the cultivation of climatically suitable crops, the use of shade nets, BBF technology, organic farming methods, integrated pest management, and efficient irrigation techniques such as drip irrigation and sprinklers. The emphasis on BBF technology is notable, reflecting its significance in preserving and utilizing local seeds. These technologies collectively contribute to building resilience against climate challenges, optimizing crop yields, and promoting sustainable agricultural practices among the participating farmers.

CRATs dissemination strategy:

Various strategies have been employed to promote and disseminate the benefits of PoCRA, including the organization of women's group discussions, farmer's group discussions, VCRMC meetings, and Gram Sabha. Progressive farmers have been encouraged to guide and support their peers, and a comprehensive list of farmers adopting climate-resilient technologies has been uploaded to the FFS app for effective tracking. Village-wise plans have been prepared to ensure a systematic approach, and the dissemination of information is facilitated through the availability of technology manuals and booklets in Gram Panchayats. Visits to the fields of farmers who have adopted climate-resilient technologies provide practical insights. Weather and agricultural advice is regularly provided to farmers through various channels, including WhatsApp groups.

Positive impacts:

The PoCRA project has demonstrated a significant positive impact on various aspects of agricultural practices. Firstly, there is a notable increase in the adoption of Climate Resilient Agricultural Technologies (CRATs) among farmers. This includes the widespread use of technologies such as sprinkler and drip irrigation, contributing to a more efficient and sustainable use of water resources. The project has played a crucial role in enhancing farm income, with farmers experiencing a substantial percentage increase in their earnings, ranging from 30% to 80%. Additionally, there has been a considerable improvement in water availability, leading to a rise in irrigation use by nearly 50% to 80%. To sustain the positive impacts and progress achieved through the PoCRA project, there are several key suggestions:

- ✓ **Extension of project:** There is a consensus that extending the duration of the project would be instrumental in maintaining the momentum of positive changes. This extension could provide ongoing support and guidance to farmers, ensuring the continued adoption of climate-resilient technologies and practices.
- ✓ **Facilitating livelihood opportunities:** There is an emphasis on facilitating livelihood opportunities for farmers through the project. The idea is to integrate economic activities that can be sustained beyond the project's closure, contributing to the long-term well-being of the community. This includes supporting farmers in agribusiness ventures and ensuring that they have the necessary resources and knowledge to continue their agricultural activities effectively.

Role and responsibility:

Efforts have been made to recognize and support farmers adopting climate-resilient practices. However, challenges exist, including delayed disbursement for certain technologies and the need for better financial accessibility for farmers to avail of benefits under the PoCRA project. Encouragingly, ongoing initiatives, such as vermicompost activity and the promotion and training in the application of organic fertilizers signify a broader commitment to sustainable and climate-resilient agricultural practices. The project encompasses a diverse range of clusters and villages, reflecting a comprehensive approach to addressing climate resilience across the project region. The assignment includes responsibility for managing various clusters, with some AS overseeing and coordinating activities across seven clusters. The distribution of villages assigned for monitoring by AS varies, with instances of managing a minimum of 8 villages to a maximum of 22 villages.

Environment-friendly measures:

AS has identified various environmental issues in their areas, and some have taken proactive measures to address and mitigate these concerns. VCRMC meetings serve as platforms where instructions are issued against tree felling. While some AS report not encountering specific environmental issues, others emphasize concerns such as excessive use of chemical fertilizers, deforestation, and the harmful effects of pesticides. In response, measures are taken to raise public awareness, promote tree planting, and advocate for the reduction of chemical inputs.

In the realm of Integrated Pest Management (IPM), AS highlighted several effective practices employed in their regions. A common and successful approach is the reduced use of chemical fertilizers in favor of biological alternatives. Cotton crops, a key crop in some project areas, benefit from a combination of chemical and biological methods to minimize pest impact. Farmers are encouraged to utilize spraying kits during pest control operations, emphasizing the importance of proper application. Notably, the disposal of empty pesticide bottles according to Environmental Safety Management Framework (ESMF) guidelines emerges as a widely successful practice in IPM. This entails burying the bottles in designated pits, ensuring environmentally responsible waste management.

To address crop residue management with an environment-friendly perspective, AS proposed various measures aimed at sustainable agricultural practices. The common suggestion is the utilization of crop residues, including vermicompost and traditional compost, for horticulture and fields. Proper disposal methods, such as composting or decomposition of crop residues in the field to produce organic manure, are advocated.

Additionally, farmers are encouraged to reuse crop residues as animal fodder, promoting a circular and eco-friendly approach to waste management. Specific recommendations include composting cotton bolls infested with pink bollworms and implementing zero tillage technology to plant maize crops on the same site after harvesting cotton.

Challenges faced:

During the activity implementation stage and post-work completion verification, several challenges and bottlenecks are reported by AS. A recurring issue is the prevalence of network problems, hindering various aspects such as geo-tagging, document uploading, and online monitoring. The co-monitoring and spot inspection of individual unit works is particularly affected by network problems in villages.

While implementing PoCRA activities, several challenges have been identified across different components:

a) Individual activities:

- ✓ Financial constraints led to some farmers refusing to avail of benefits, impacting the implementation process.
- ✓ Delays in receiving grants posed a significant challenge for beneficiaries, hindering the timely execution of individual activities.

b) Community activities:

- ✓ Mobilizing farmers for community work proved to be challenging, indicating a reluctance among villagers to collaborate on such initiatives.
- ✓ Unwillingness of people in the village to work together presented hurdles in the successful execution of community activities.

c) Farmer Field Schools (FFS):

- ✓ Farmer awareness and understanding of community works and the PoCRA project need improvement, suggesting a need for enhanced communication and education.

Suggestions:

Addressing the challenges in PoCRA implementation requires a multifaceted approach. Delegating responsibility to cluster assistants and agricultural assistants to monitor and oversee the works for which grants have been received can enhance project success. Additionally, ensuring timely disbursement of grants and extending project durations by one or two years, can contribute to increased effectiveness.

Feedback from Cluster Assistants (CA)

(Marathwada Region)

Adoption of CRATs

The feedback from the CAs consistently highlights the efficacy of various climate-resilient technologies introduced through the PoCRA FFS. BBF technology emerges as a standout choice, praised for its ability to mitigate crop damage caused by excessive rains. Micro irrigation, particularly through techniques like drip irrigation and sprinkler systems, is underscored as a beneficial climate-resilient technology, emphasizing efficient water use. Zero tillage technology receives commendation for its positive impact on cultivation, especially in addressing challenges posed by unseasonal rainfall.

CRATs dissemination strategy:

CAs shared that the current status of activities aimed at promoting and disseminating the beneficial PoCRA activities and climate-resilient technologies in the project villages is characterized by planning and multifaceted engagement. Village-wise plans have been prepared, encompassing initiatives such as women's discussions, Gram Sabha meetings, and VCRMC discussions. Progressive farmers play a vital role in the dissemination process, with their active involvement in training sessions and recruitment. Field visits to farms adopting climate-resilient technologies, and uploading lists of farmers adopting climate-resilient technologies on the FFS app, facilitate monitoring and documentation are tasks done by CA. Encouragement for organic fertilizer production is consistent, and agricultural advice is communicated through various channels, including WhatsApp groups.

Positive impacts:

As informed by the CAs, the PoCRA project has made substantial contributions to the adoption of climate-resilient technologies, increased farm income, and improved water availability and irrigation usage in the village. The adoption of climate-resilient technologies has increased by 30 to 60%, leading to an increase in production for farmers. Drip irrigation has been particularly impactful. The project has facilitated positive changes in the village, including enhanced living conditions and economic well-being.

Challenges faced:

Challenges such as network issues and limited adoption of specific technologies like zero tillage are noted. As informed by the CAs, several eligible farmers have refrained from applying for individual benefits through the Direct Benefit Transfer (DBT) system for some reasons. Financial constraints stand out as a significant barrier, with some farmers citing an inability to afford the prescribed documents required to avail themselves of project benefits. Land and monetary limitations pose additional challenges, preventing certain farmers from participating in the project. Migration further complicates the situation, as some farmers move away, leaving their farmland unattended or under the care of others. The project's stipulated minimum and maximum land limits for specific components also act as a limiting factor for certain individuals. In certain instances, farmers faced limitations related to the area where they had undertaken plantation activities and simultaneously applied for drip irrigation, leading to the rejection of their requests. Non-fulfilment of necessary documentation, particularly the clearance of 7/12 documents, has been another prevalent cause for application rejection. Some applicants failed to meet the eligibility criteria set forth by the project, resulting in the dismissal of their applications. Farmers without wells, who applied for drip irrigation, experienced rejection due to the absence of this essential infrastructure.

Late receipt of matching grants has been another contributing factor, along with a lack of awareness about the online application process. Additionally, issues like non-irrigated land, unwillingness on the part of farmers, and even cases of landlessness have further contributed to the underutilization of the DBT system by eligible beneficiaries. Addressing these multifaceted challenges is crucial for ensuring the inclusive and effective implementation of the project's activities.

The delay in the approval of individual grant applications stems from various factors, including administrative processes, financial constraints, technical issues, delays in fund disbursement, issues related to Gram Panchayat elections, and the time-consuming verification of documents by cluster assistants have contributed to approval delays. Challenges such as incomplete documentation, online processing complexities, and the absence of Aadhaar linkage have further hindered the timely approval of personal benefit applications.

CAs are responsible for multiple villages, and face challenges in visiting farms due to poor road conditions and inadequate remuneration. The high number of villages assigned to CA further compounds these challenges.

To address these challenges, potential solutions include providing better training for farmers on application processes, reducing the number of villages assigned to cluster assistants, and streamlining the documentation and grant disbursement processes for a more seamless implementation of individual activities.

Status of community activities:

The majority of the CAs informed, during VCRMC meetings, that various approaches are undertaken to discuss and plan community land development works. Initiatives include encouraging farmers and villagers to undertake water conservation works for Gram Panchayat-owned community land. Micro-planning plans are prepared to guide development efforts, and in some cases, trees are planted. Despite some Gram Panchayats lacking community land, efforts are made to enhance environmental conservation, discourage deforestation, and raise public awareness through meetings.

All CAs stated the current status of community activities including NRM works in the village has limited implementation. CAs have also mentioned that community works have not commenced in some villages, while in some cases, one or two activities have been undertaken. Micro-planning frameworks and detailed project reports (DPRs) have been prepared for certain works.

The implementation of community-level project activities, particularly in the areas of community benefit and soil water conservation, faces significant challenges in the village. CAs stated that these specific works have not been initiated, and there are difficulties in motivating and mobilizing farmers to participate in such activities. Time constraints in preparing micro-planning plans also contribute to the hindrance in water conservation efforts.

Environment-friendly measures:

All the CAs were aware of the environmental safeguards. They have consistently advised farmers against cutting down trees during project implementation, emphasizing the importance of environmental preservation. VCRMC meetings serve as a platform to impart guidance on environmentally friendly practices, including reducing the use of chemical fertilizers and encouraging tree planting.

Suggestions:

All the CAs emphasized the need to restart and sustain the project to maintain the positive impacts it has had on farmers' economic status and income. Some other suggestions include extending the duration of the project, increasing remuneration for CAs and AAs, and introducing new changes to solidify the project's lasting effects.

3.2. Status of Individual Benefits

Table 3.9 presents the status of the individual benefits covered during the survey in the Marathwada regions. In the subsequent sub-sections, the feedback from those beneficiaries who had accessed individual benefits and whose application has received approval from SDAO has been reported.

Table 3. 9 Status of Individual Benefits Covered

Individual Activity	Marathwada	
	Project (%)	Comparison (%)
	Valid N = 244	Valid N = 173
Drip irrigation	21	33
Sprinkler irrigation	30	24
Pipes (HDPE/PVC)	5	13
Water pumps	5	6
NADEP Compost Unit	1	-
Vermicompost unit	2	5
Construction of Individual Farm Pond/farm pond lining	4	1
Shade net house	3	-
Planting material in Polytunnels and Polyhouse	1	-
Production of foundation & certified seeds of climate-resilient varieties	-	-
Plantation of Horticulture Crops	18	2
Plantation of agroforestry	-	1
Recharge of open-dug wells	1	3
Construction of open dug well	4	9
Apiculture	1	-
Backyard poultry	1	-
Small ruminants	-	-
Inland fisheries	2	-
Sericulture	3	-

3.2.1. Drip Irrigation System

Out of 52 beneficiaries in project clusters who have applied for project grants for drip irrigation systems, 41 have received and established the system. We have observed 38 farmers in the comparison cluster who are using a drip irrigation system. Mostly the farmers in both project and comparison clusters are using drip irrigation only on requirement (P:54% C: 76%) and a majority of the remaining are using it seasonally (P:24% C:18%). 22% of beneficiaries in the project are using the system regularly, while 5 % in comparison are not using the system currently. The mean area irrigated using drip irrigation is nearly 4 acres in the project while in comparison it is 3 acres. Most of the respondent farmers used drip irrigation to irrigate Cotton (P:40% C:35%), Soybean (P:22% C:28%), Pigeon Pea (P:11% C:0%), and Chickpea (P:7% C:7%). Other crops include Sugarcane, Sorghum, Maize, and Turmeric. Nearly 53% of respondent farmers in the project and 34% in comparison used the fertigation technique. Two beneficiaries in the project and one in comparison clusters

faced difficulties in accessing the benefit, especially in terms of obtaining a micro-irrigation quotation/plan from the dealer and providing proof of permanent water supply. From the use of drip irrigation system, most of the respondent farmers have anticipated benefits such increase in income (P:27% C:30%), increase in production (P:24% C:30%), increased availability of water for protected irrigation (P:13% C:11%) and efficient use of water (P:12% C:6%). The percentage response for other benefits is presented in Table 3.10. Overall, the reported benefits of using drip irrigation are relatively similar between the project and Comparison areas, with slight variations in the percentages for specific benefits.

Table 3. 10 Feedback from Beneficiaries of Drip Irrigation System

Parameter	Marathwada	
	Project N = 41	Comparison N = 38
Frequency of use of drip (%)		
Only on requirement	54	76
Seasonal	24	18
Regularly	22	-
Not using currently	-	5
Average area irrigated using drip (acres)	4	3
Crops grown (%)		
Cotton	40	35
Pigeon pea	11	-
Soybean	22	28
Chickpea	7	7
Sorghum	2	7
Maize	2	13
Sugarcane	9	2
Turmeric	7	5
Other	-	3
Use of fertigation (%)	53	34
Benefits (%)	**N = 152 responses**	**N = 104 responses**
Increase in income	27	30
Increase in production (Capture factors for increase)	24	30
Increased availability of water for protected irrigation	13	11
Change in cropping pattern	7	5
Availability of water during dry spells	5	6
Efficient use of water	12	6
Increase in quality of agricultural produce	5	2
Increase in area of cultivation during Kharif Season	6	8
Increased water availability for Rabi season	3	3
Saving in fertilizer use and cost	-	-
Saving in labour cost	-	-

3.2.2. Sprinkler Irrigation System

Out of 74 beneficiaries in project clusters who have applied for project grants for sprinkler irrigation systems, 53 have received and established the system. In comparison clusters, we covered 33 respondent farmers who were using a sprinkler irrigation system. The majority of farmers (P:79% C: 82%) were observed to be using sprinkler systems only on requirement. The rest of the respondent farmers were either using it seasonally (P:9% C:15%) or regularly (P12% C:3%). The mean area irrigated using sprinkler irrigation is 4 acres in both project and Comparison areas. Crops that are irrigated using sprinkler irrigation include Soybean (P:42% C:53%), Cotton (P:20% C:13%), and Chickpea (P:18% C:6%). Other crops include pigeon pea, sorghum, sugarcane, turmeric, and maize. While accessing the project benefit, nine respondent farmers in project clusters and six in comparison reported facing difficulties in obtaining a micro-irrigation plan from the dealer, providing proof of permanent water supply, and providing agreement/consent in case of a common source of water supply. From the use of sprinkler irrigation systems, most of the respondent farmers have anticipated benefits such increase in income (P:30% C:31%), increase in production (P:28% C:29%), increased availability of water for protected irrigation (P:14% C:13%) and efficient use of water (P:7% C:2%). The percentage response for other benefits is presented in Table 3.11.

Table 3. 11 Feedback from Beneficiaries of Sprinkler Irrigation System

Parameter	Marathwada	
	Project N = 53	Comparison N = 33
Frequency of use of sprinkler (%)		
Only on requirement	79	82
Seasonal	9	15
Regularly	12	3
Not using currently	-	-
Average area irrigated using Sprinkler (acres)	4	4
Crops grown (%)		
Cotton	20	13
Pigeon pea	7	-
Soybean	42	53
Chickpea	18	6
Sorghum	2	13
Maize	1	2
Sugarcane	3	9
Turmeric	1	-
Other	6	4
Benefits (%)	**N = 152 responses**	**N = 104 responses**
Increase in income	30	31
Increase in production (Capture factors for increase)	28	29
Increased availability of water for protected irrigation	14	13
Change in cropping pattern	4	4
Availability of water during dry spells	3	2
Efficient use of water	7	2
Increase in quality of agricultural produce	3	4

Parameter	Marathwada	
	Project N = 53	Comparison N = 33
Increase in area of cultivation during Kharif Season	7	7
Increased water availability for Rabi season	4	7
Saving in fertilizer use and cost	-	-
Saving in labour cost	-	1

3.2.3. Pipes

In project clusters, nine beneficiaries out of 11 who have accessed the benefit of pipes from PoCRA were surveyed. In the case of comparison, 15 respondent farmers using pipes were interviewed. High preference was observed for the PVC pipes (P:6 C:8) in contrast to HDPE (P:3 C:7). The majority of respondent farmers in both project and comparison clusters were found using the pipes only on requirement (P:67% C:60%) and remaining using the pipes seasonally (P:22% C:40%). 11% of respondent farmers reported using pipes regularly. The average land irrigated using pipes is 4 acres in both project and comparison clusters. In both clusters, pipes were used for lifting water from the river/ canal (P:37% C:43%) and transport of water from the well to the pond (P:63% C:57%). Nearly, one-third of respondent farmers in project clusters were observed to be using the pipes along with drip (P:31%) or sprinkler (P:31%) or flood (P:31%) irrigation system. However, in comparison, it is observed that pipes were used majorly with flood (C:60%) and furrow (C:40%) irrigation systems. From the use of pipes, most of the respondent farmers have anticipated benefits such increase in income (P:26% C:34%), increase in production (P:26% C:34%), increased availability of water for protected irrigation (P:17% C:10%) and change in cropping pattern (P:14% C:7%). The percentage response for other benefits is presented in Table 3.12.

Table 3. 12 Feedback from Beneficiaries of Pipes

Parameter	Marathwada	
	Project N = 9	Comparison N = 15
HDPE	3	7
PVC	6	8
Frequency of use of pipes (%)		
Only on requirement	67	60
Seasonal	22	40
Regularly	11	-
Not using currently	-	-
Purpose of Pipes (%)		
Lifting of water from river/canal	37	43
Transport water from the well to the pond	63	57
Transport water from the pond to the field	-	-
Draw groundwater	-	-
Irrigation System (%)		
Drip/ Sprinkler	31	-
Flood irrigation	31	60
Sprinkler Irrigation	31	-
Furrow irrigation	7	40
Average area irrigated using pipes (acres)	4	3

Parameter	Marathwada	
	Project N = 9	Comparison N = 15
Benefits (%)	N = 152 responses	N = 104 responses
Increase in income	26	34
Increase in production	26	34
Increased availability of water for protected irrigation	17	10
Change in cropping pattern	14	7
Availability of water during dry spells	6	-
Efficient use of water	6	-
Increase in area of cultivation during Kharif Season	3	-
Increased water availability for Rabi season	2	-

3.2.4. Water Pumps

Seven beneficiaries from the project and eight respondent farmers from comparison clusters using water pumps were interviewed. Most of the respondent farmers used water pumps only on the requirement (P:71% C:88%) and the rest used it seasonally (P:29% C: 12%). In both clusters, pumps were used for lifting water from the river/ canal (P:29% C:20%), transport of water from the well to the pond (P:57% C:40%), transport of water from the pond to the field (P:0% C:10%) and draw groundwater (P:14% C:30%). Respondent farmers reported using pumps with drip irrigation systems (P:72% C:12%), sprinkler irrigation systems (P:14% C:50%), and furrow irrigation systems (P:14% C: 38%). The average land irrigated using the pump is 4 acres in both project and comparison clusters. The respondent farmers were using pumps of ratings there were 3HP (P:14% C:37%), 5HP (P:72% C:38%) and 7HP (P:14% C: 25%). Nearly 57% of respondent farmers in project clusters and 63% in comparison clusters used capacitors on their pumps. Pipes with a diameter of 1.5 inches were used with the pumps in project clusters. In comparison, pipes of 1-inch (C:37%) and 1.5-inch (C:63%) diameter were used. The average number of hours for which the pump was used in the Kharif and Rabi seasons was 4 to 5 hours in both project and comparison clusters. From the use of pumps, most of the respondent farmers have anticipated benefits such increase in income (P:27% C:33%), increase in production (P:28% C:33%), increased availability of water for protected irrigation (P:23% C:17%) and change in cropping pattern (P:5% C:17%). The percentage response for other benefits is presented in Table 3.13.

Table 3. 13 Feedback from Beneficiaries of Water Pumps

Parameters	Marathwada	
	Project N = 7	Comparison N = 8
Frequency of use of pump (%)		
Only on requirement	71	88
Seasonal	29	12
Purpose of pump (%)		
Lifting of water from river/canal	29	20
Transport water from the well to the pond	57	40
Transport water from the pond to the field	-	10
Draw groundwater	14	30
Irrigation System (%)		
Drip/ Sprinkler	72	12

Parameters	Marathwada	
	Project N = 7	Comparison N = 8
Flood irrigation	14	50
Furrow irrigation	14	38
Average area irrigated using pipes (acres)	4	3
Power rating (%)		
3 HP	14	37
5 HP	72	38
7 HP	14	25
Used capacitor (%)	57	63
Diameter of pipe used (%)		
1 inch	-	37
1.5 inch	100	63
No. of hours pump used in Kharif (hours)	5	4
No. of hours pump used in Rabi (hours)	5	4
Benefits (%)	**N = 152 responses**	**N = 104 responses**
Increase in income	27	33
Increase in production (Capture factors for increase)	28	33
Increased availability of water for protected irrigation	23	17
Change in cropping pattern	5	17
Availability of water during dry spells	9	-
Efficient use of water	4	-
Increased water availability for Rabi season	4	-

3.2.5. NADEP Compost Unit

In the Marathwada region, one beneficiary of NADEP composting in the project cluster was interviewed. The respondent farmer has seven beds for NADEP composting and has received training from the agriculture department. The respondent farmer can effectively utilize the crop residue after the construction of the NADEP compost unit. The respondent farmer has realized a reduction in the cost of chemical fertilizers after starting the application of organic fertilizer from NADEP compost. The respondent farmer has also experienced an improvement in soil fertility due to the use of NADEP compost.

3.2.6. Vermi Compost Unit

In the Marathwada region, five beneficiaries from the project and eight respondent farmers from comparison clusters using vermicompost were interviewed. Three of the five vermicompost units in the project and six of eight in comparison clusters were operational. One respondent farmer, each in project and comparison clusters was trained in the technology at KVK. All the units in project clusters were four-bed units. Three units in comparison clusters were four-bed units and the rest three were seven beds. While all the respondent farmers in project clusters prepared vermi wash, four of the total six respondent farmers in comparison clusters prepared it. The respondent farmer in both clusters has realized a reduction in the use of chemical fertilizers after starting the application of organic fertilizer from vermicompost. The respondent farmer has also experienced an improvement in soil fertility due to the use of vermicompost and vermi wash.

3.2.7. Individual Farm Pond

In the Marathwada region, ten beneficiaries in project clusters who accessed the benefit of an individual farm pond were interviewed. Six of them received and implemented the benefit. In comparison, two farmers with farm ponds were interviewed. Of the six farm ponds in the project, four farm ponds have an inlet and none has grass cultivation on their bund. Two farm ponds had lining. Hence, if the farm pond is filled with water, it lasts up to March/ April. However, in the absence of lining, which is the case in comparison, the water lasts until December. Because of the farm pond, most of the respondent farmers have anticipated benefits such increase in income (P:6 C:2), an increase in production (P:6 C:2), increased availability of water for protected irrigation (P:5 C:1), and an availability of water during dry spell (P:2). The key crops irrigated using farm pond are Cotton Pigeon pea, soybean, and maize.

Table 3. 14 Feedback from Beneficiaries of Individual Farm Pond

Parameters	Marathwada	
	Project N = 6	Comparison N = 2
Size	25x25x3 = 1 30x25x3 = 1 30x30x3 = 4	20x20x3 =1 30x30x3 =1
Availability of water – up to month	March = 3 April = 3	December = 2
Inlet - outlet	4	1
Grass cultivation on bunds	No	No
With lining	2	0
Benefits (%)		
Increase in income	6	2
Increase in production	6	2
Increased availability of water for protective irrigation	5	1
Change in cropping pattern	1	1
Availability of water during dry spells	2	-
Area cropped more than once increased.	1	-
Increase in area of cultivation during Rabi Season	1	-
Crops irrigated using farm pond water	Cotton, Pigeon pea, Soybean, Maize	Cotton, Soybean, Maize, Onion

3.2.8. Shade Net

In the Marathwada region, out of seven beneficiaries of shade net, six have received the benefits and implemented the activity in the project cluster. No shade net beneficiaries were found in comparison clusters. Out of six beneficiaries in the project, five have received training on cultivation using shade nets. Four beneficiaries cultivated vegetables, while others were taking horticulture crops. Five respondents said they have received guidance to cultivate in shade net mostly from agriculture assistants and one received guidance from a progressive farmer friend. Four out of six beneficiaries use shade net regularly while the other two use it seasonally. None of the shade nets were insured. The average investment was around Rs. 3.05 lakhs (ranging between Rs. 50K to Rs. 8 lakhs) last year. The average income generated from the activity was Rs. 1.4 lakhs (ranging between Rs. 90K to Rs. 2.5 lakhs). All the shade net beneficiaries sold their produce through various mediums such as directly via haat or retail mode, through local dealers in the nearest town market, and APMC. The key production and marketing-related challenges as reported by the beneficiary farmers are the high cost of production and fluctuation in market price. Regarding the disposal of the damaged shade net, one farmer proposed to burn it, the other two suggested disposing of it in the nearby area, one suggested disposing it in the dump yard and the rest two were not sure about the strategy. While accessing benefits, three shade net beneficiaries faced difficulty in attending compulsory training at the National Institute for Post-Harvest Technology, Talegaon. All of them anticipate the benefits of an increase in income, production, ability to produce a high-value crop, and an increase in employment opportunities for locals.

3.2.9. Horticulture Plantation

A total of 34 beneficiaries of horticulture plantations in the project and three beneficiaries in comparison clusters were interviewed. Of the total 34 beneficiaries in project clusters who have access to the benefit, 18 were found to have received training. The sources of training were the agriculture department (P:10), KVK (P:6), progressive farmer (P:1), and agriculture university (P:1 C:1). The main crops grown by beneficiaries were mango (P:15% C:33%), custard apple (P:26% C:67%), pomegranate (P:3%), guava (P:35%), sweet lime (P:8%), orange (8%), and lime (8%). The activity is practiced on an average of 2 acres of land. The average age of 23 plantations is around 2 years. Most of the beneficiaries sourced their saplings from government nurseries (P:47% C:67%), and the rest from agriculture universities (P:26%), government-approved nurseries (P:15% C:33%), and others (P:12%). A total of 846 saplings were planted of which 651 (around 75% and it is expected that 90% of the remaining saplings will survive in the second year) saplings survived in project clusters. Similarly, a total of 855 saplings were planted of which 766 (around 90%) saplings survived in comparison clusters. For the saplings that did not survive, farmers cited damage due to birds or animals (P:25% C:67%), damage due to fire (P:21%), water unavailability (P:29% C:33%), and poor quality of saplings (P:25%) as reasons. 32 respondents have installed drip irrigation for efficient use of water. 20 beneficiaries have started production from horticulture activity and were selling their produce in the market. Those who were selling their produce have experienced an increase in income i.e. from an average earning of Rs. 90631/- to Rs.134357/-. Nearly all respondents said they have not faced any difficulties while taking the benefit of this activity.

Table 3. 15 Feedback from Beneficiaries of Horticulture Plantation

Parameter	Marathwada	
	Project N = 34	Comparison N = 3
Training received (%)	53	33
Source of training (%)		
Dept of Agriculture	56	-
FPC	-	-
Krishi Vigyan Kendra	33	100
Agriculture University	6	-
Progressive farmer	5	-
Others	-	-
Crops Grown (%)		
Mango	15	33
Pomegranate	3	-
Guava	33	-
Orange	8	-
Sweet lime	8	-
Lime	8	-
Custard apple	25	67
Average area under horticulture (acres)	3	2
Number of saplings planted	846	855
Number of saplings survived	651	766
Reasons for poor survival (<75%)		
Damage due to fire	21	-
Damage due to animals or birds	25	67
Poor quality of saplings	25	-
Water unavailability	29	33
Purchase of seedling (%)		

Parameter	Marathwada	
	Project N = 34	Comparison N = 3
Agriculture University	26	-
Government nursery	15	33
Government-approved nursery	47	67
Others	12	-
Drip irrigated plantations (%)	94	100
Reasons for not drip irrigated (%)		
Insufficient funds	50	
Others	50	
Benefits (%)		
Will/ Increase in income	47	67
Will/ Got more production in less area	26	-
Improved soil fertility	6	-
Not benefitted till now	21	33

3.2.10. Agroforestry

In the Marathwada region, one beneficiary who accessed the benefit from the project received and implemented it in the year 2022. The beneficiary farmer received training from the agriculture department on plantation for agroforestry. The farmer has planted 450 teak wood saplings on 2 acres of land. Of the total, around 350 plants survived. The farmer had procured the saplings from the agriculture university.

3.2.11. Recharge of Open Dug Wells

In the Marathwada region, one beneficiary of the recharge of the open dug well from the project cluster and four beneficiaries from comparison clusters were surveyed. All the beneficiaries have taken guidance for recharge from the agriculture department. Under this activity, silt was collected from the well when water started following into the well. Farmers had to desilt the well every year before monsoon. After the well recharge activity, the respondent farmers experienced that water in the well lasted for an additional 2-3 months. The respondent farmers cited the benefit of the availability of water during dry spells.

3.2.12. Construction of Open Dug Well

Eight beneficiaries of the open dug well who accessed the benefits from the project have received and implemented them. 15 beneficiaries of open-dug wells were surveyed in comparison clusters. The mean diameter of the well is 29 feet, and the depth is 47 feet. The water in the well lasts till oct-nov for (P:38% C:20%), dec-jan for (P:12% C:14%), feb-mar (P:25% C:33%) and through year for (P:25% C:33%) respondent farmers. The farmer can irrigate nearly 3 acres of land about 7 to 8 times in both project and comparison clusters. From the use of open dug wells, most of the respondent farmers have anticipated benefits such increase in income (P:25% C:35%), increase in production (P:25% C:32%), increased availability of water for protected irrigation (P:25% C:22%) and change in cropping pattern (P:14% C:3%). The percentage response for other benefits is presented in Table 3.16.

Table 3. 16 Feedback from Beneficiaries of Open Dug Well

Parameters	Marathwada	
	Project N = 8	Comparison N = 15
Water availability – Up to month (%)		
Oct – Nov	38	20
Dec – Jan	12	14
Feb – March	25	33
Throughout year	25	33

Parameters	Marathwada	
	Project N = 8	Comparison N = 15
Total area irrigated	3	3
Average number of times irrigation provided	7	8
Average pumping hours per day (hours)	7	3
Benefits (%)		
Increase in income	25	35
Increase in production	25	32
Increased availability of water for protective irrigation	25	22
Change in cropping pattern	14	3
Availability of water during dry spells	7	5
Increase in area of cultivation during Kharif Season	4	3

3.2.13. Apiculture

In the Marathwada region, three beneficiaries of apiculture in the project cluster were interviewed. One beneficiary had received training from the Agriculture department. The activity was started in Jan 2022 and all project guidelines for procurement were followed. The beneficiary invested about Rs.50000/- in the activity and earned nearly Rs. 80000/- in the year 2022-23.

3.2.14. Inland Fishery

In the Marathwada region, four beneficiaries of inland fisheries were interviewed. The average farm pond size in which inland fishery was practiced was 30m*30m*4m. One beneficiary had received training. Catla, Rohu, and Tilapia fish were cultured in the fishery. The expenditure in the activity in the year 2022-23 ranged from Rs. 5000/- to Rs. 60000/-. The income generated was in the range of Rs.15000/- to Rs.90000/-. The key production and marketing-related challenges faced were the high cost of production, lack of skilled labour, fluctuation in market price, and poor survival rate. Three beneficiaries were aware of guidelines to be followed like the need to undergo training and the responsibility of selling produce etc., after taking this benefit. While accessing the benefit, two beneficiaries faced difficulty in showing proof of the source of water for the farm pond and providing evidence that water would last in the pond for 8-10 months. All the beneficiaries are anticipating an increase in income and self-employment.

3.2.15. Sericulture

In the Marathwada region, six beneficiaries who had accessed the benefits of sericulture were interviewed. Five of them have implemented the activity. Two of them have received the training from agriculture department. The remaining three were not aware of the source of training. Four are practicing the activity. They can sell the produce through various market channels like local dealers, nearest town markets, processors, FPCs, etc. One of the farmers had reported facing difficulty in providing proof of the availability of a source of water and attending training. All farmers who are practicing the activity have reported experiencing an increase in income and self-employment.

3.2.16. Adoption of BBF technology

In the Marathwada region, 23 farmers in the project have found BBF useful during Kharif and have benefitted from its use. It is reported by farmers in project clusters that BBF technology helped in the drainage of excess water (61%), root development by avoiding water stagnation (57%), saving seeds (35%), increased production (61%), row and plant distance maintenance (22%) and moisture conservation (5%). This has led to an increase in production. The average area cultivated using BBF technology in project clusters is 5 acres. Cotton, Soybean, Gram, Jowar, and Banana were primarily grown crops using this technology. Nearly 35% of 23 farmers faced some issues such as the non-availability of BBF machines, difficulty in carrying out interculture operations, and using intercropping techniques.

3.3. Progress of Farmer Field School (FFS)

The two key stakeholders in FFS are the host farmers and guest farmers. Host farmers are the ones who host the Farmer Field School on their agricultural land. Guest farmers are the one who attends the FFS sessions to learn through demonstrations of new climate-resilient agriculture technologies promoted under PoCRA.

Table 3. 17 Coverage of FFS farmers

Type Farmer	Marathwada
Host Farmer	30
Guest Farmer	30
Total	**60**

During the combined CM round beneficiary survey, a total of 60 FFS farmers were surveyed from project villages which included 30 host farmers and 30 guest farmers. Of the total FFS farmers who were surveyed, two hosts and six guest farmers were female.

3.3.1. Participation in FFS Demonstration

As a part of the project, these demonstrations were aimed at educating farmers on best practices, techniques, and technologies specific to each crop, enhancing their knowledge and skills in crop cultivation.

In the Marathwada region, a survey reveals that the majority of the host farmers are interested in undertaking a demonstration of Soybean (50%) followed by Cotton (37%) and Chickpea (20%). A similar trend was observed for guest farmer participation. However, the demonstration of climate-resilient technologies for inter-cropping systems in FFS was found to be low, with very little or no participation at all in the case of Cotton with Black Gram, Cotton with Pigeon Pea, Bajra with Pigeon Pea, and Jowar, turmeric, soybean with Pigeon Pea. Further, it is important to note that none of the surveyed host farmers were found to be interested in demonstrating inter-cropping practice in the case of Rabi with Jowar and Cotton with Black Gram. Such low or no interest in the demonstration of inter-cropping practices could be attributed to either lack of training/knowledge on inter-cropping practices or the crops were relatively less profitable for the farmers compared to the crops having higher participation such as Soybean, Cotton, and Chickpea.

Table 3. 18 Host Farmer Demonstration and Guest Farmer Participation for Key Crops

Crop	Marathwada	
	Host farmer demonstration (%) N = 30	Guest farmer participation (%) N = 30
Cotton	37	52
Maize	-	4
Soybean	50	55
Turmeric	3	-
Rabi Jowar	7	7
Chickpea	20	14
Onion	-	4
Cotton + Green Gram	3	-
Cotton + Pigeon Pea	-	7
Soybean + Pigeon Pea	3	-
Bajara + Pigeon Pea	7	4

Looking at the cropping-season-wise distribution in the Marathwada region, 97% of the guest farmers participated during Kharif, and the rest 3% during Rabi.

3.3.2. Motivation to be a Host Farmer

It was found that Agriculture Assistants were the most influential in convincing farmers to participate in FFS as host farmers, accounting for nearly 50% of the responses followed by FFS Facilitators played a significant role as well, convincing around 35% of the respondents to participate. VCRMC (Village-level Climate Resilient Management Committee) members were involved in convincing 12% of the farmers and a small percentage (3%) of respondents mentioned Agriculture Department staff had convinced them to participate in FFS activities.

3.3.3. Honorarium to Host Farmers

In the Marathwada region, regarding honorarium to host farmers, 12 of them have received it. The honorarium for three host farmers is in the process, while 15 host farmers shared that they have not received it.

3.3.4. Difference between Demo and Control Plot

Regarding the differences in the quality and cultivation of produce between demonstration (demo) plots and control plots, the survey data shows that nearly one-third of respondents reported higher yields in the produce from demo plots compared to control plots. This suggests that the adoption of practices or technologies demonstrated in demo plots led to increased productivity. Another one-third of respondents in Marathwada reported experiencing fewer pest attacks in the produce from demo plots compared to Comparison plots. This indicates that the practices or technologies demonstrated may have contributed to pest management and Comparison. Nearly one-fourth of respondents in Marathwada reported that the demo plots exhibited more resilience to weather variations compared to control plots. This suggests that the practices or technologies demonstrated may have enhanced the resilience of crops to adverse weather conditions and less than 10% of respondents reported less tillage and better quality of produce from demo plots due to reduced usage of fertilizers/chemicals compared to control plots. This indicated that the technologies demonstrated may have promoted sustainable and environmentally friendly agricultural practices in the project area.

Table 3. 19 Difference in Demo and Control Plots

Difference in Demo and Control plot	Marathwada (%) N = 30
Higher yield	33
Less pest attack	31
Climate resilient to weather	26
Less tillage	6
Better quality due to reduced usage of fertilizer/ chemical	4

3.3.5. Participation of Guest Farmers in FFS Sessions

On probing the regularity in attending all technology sessions conducted under PoCRA FFS, it is observed nearly one-fourth of the guest farmers very rarely attend the sessions. 30% of respondents in Marathwada were found attending the sessions regularly and the rest were found attending occasionally. This suggests that more efforts are needed for a substantial level of engagement of farmers in the participation of FFS sessions.

3.3.6. Reasons for not attending FFS Sessions

The most common reason for not attending FFS was either family commitment or personal work. Table 3. 20 presents the reasons for not attending all FFS sessions.

Table 3. 20 Reasons for not attending all FFS Sessions

Reason for not attending all FFS sessions	Marathwada N = 24
Had work on field	4
Had to skip the session due to personal work	25
Family commitments/personal work	21
Found new technology difficult to understand	13
Was not aware of the session's timings	4
Did not find session useful	4
Others	29

3.3.7. Motivation for Participation in FFS

When asked if the farmers have faced climate vulnerability in the last year 75% responded positively. In the Marathwada region, on asking what motivated them to participate in FFS, most of the surveyed farmers (68%) shared that they want to reduce the cost of production, 65% to increase production and income, 60% participated intending to learn new technologies related to agriculture, and thereby their income levels. The other reasons for participation cited by 60 surveyed farmers were to learn how to apply fertilizers and pesticides more effectively (37%), to utilize water more effectively (30%), and to save their crops from climate variation (20%). The rest 5% of the farmers had no specific reason and participated in FFS as suggested by their friends/ family. The female FFS farmers were also found to be equally motivated to learn and apply climate-resilient technologies in their agriculture practices and improve their production and income.

3.3.8. Means & Ways Adopted to Inform about FFS Session

In the Marathwada region, 31 respondent farmers reported that they received SMS or WhatsApp messages about the timings of FFS sessions, the other 22 respondent farmers shared that they were informed by the FFS facilitator and the remaining seven respondent farmers were informed by other project staff like the AA, CA or Krishi Tai. Nearly 3/4th of FFS participants including female FFS farmers find the timing of the FFS session convenient. 53% of all the sample guest farmers have reported that their queries were always satisfactorily answered by FFS host farmers. The rest of the respondent farmers suggested improvement in training delivery. Of the total FFS participants, including host and guest farmers, 47% found that the technologies learned through FFS demonstration sessions have been very helpful in reducing the impact of climate vulnerability (less rainfall, and high temperature). The rest found the technologies helpful to some extent. Except for one participant, all the participants reported that the information provided by the FFS facilitator was useful. Nearly 95% of the FFS participants are willing to continue using the technologies.

3.3.9. Perceived Benefits from FFS

A significant proportion of participants (71% in Marathwada) gained awareness about recommended agricultural practices, while (66% in Marathwada) reported a better understanding of input usage, such as fertilizers and seeds. Notably, many participants (52% in Marathwada experienced improvements in soil health, and 37% in Marathwada reported both soil moisture conservation around crop roots and reduced crop diseases. These benefits suggest that the demonstrations effectively covered sustainable soil management, integrated pest management, and efficient water utilization techniques. In Marathwada, nearly one-third of respondents reported better water management practices, half of the respondents experienced an increase in crop production/yield, and one-fifth of respondents savings in seed input cost. Less than 10% of respondents experienced savings on fertilizers and overall cost. Although only 2% of participants experienced an increase in crop production or yield, some participants reported cost savings in seed (0.9%) and fertilizer (1.3%) inputs, likely due to efficient input management practices demonstrated. It's worth noting that a negligible percentage (0.4%) of participants reported not benefiting from the sessions, implying the overall effectiveness of FFS sessions.

Table 3. 21 Perceived Benefits from FFS

Benefits from FFS participation	Marathwada
	Project (%) Multiple Response (N = 56)
Awareness of good agriculture practices	71
Better awareness of the use of inputs (fertilizers, seeds, etc.)	66
Improvement in soil health	52
Soil moisture was conserved around the crop roots	37
Fewer diseases in crops	55
Better water management for agriculture	30
Increase in crop production or yield	48
Saving in seed input cost	23
Saving in fertilizer input cost	5
Overall reduction in cost of production	4

3.3.10. Training and Adoption of FFS technologies

One of the key aspects of the project is to promote CRATs through training via FFS and increase willingness among the farmers to adopt the same. Regarding the same, the respondents in both project and comparison clusters were asked if they had received any training on CRATs and if they had adopted any of the CRATs in the past year. The technology-wise distribution of training received, and its adoption, is detailed below in Table 3.22.

Table 3. 22 Training and Adoption of FFS Technologies

Sr. No	FFS Technology	Marathwada		
		Trained	Adopted	Adoption (%)
1	Preparation of pesticide formulations & spraying	48	36	75
2	Foliar application of 2% DAP	50	40	80
3	Cultivation by BBF	56	42	75
4	Spraying techniques with safety measures	37	31	84
5	Seed treatment with bio-fertilizers	18	16	89
6	Bird perches (10/acre)	48	40	83
7	Irrigation by drip/ sprinkler	37	26	70
8	Integrated weed management	35	24	69
9	Crop residue management	33	24	73
10	Sowing on Broad Bed Furrow with planter	35	26	74
11	Seed treatment with fungicides	18	16	89
12	Installation of pheromone traps (4-5/ha)	22	20	91

13	Sticky traps (10/acre)	36	27	75
14	Nipping of apical bud	33	26	79
15	Application of basal dose of fertilizers	31	22	71
16	Thinning & gap filling	26	19	73
17	Preparation and application of dashaparni extract	27	22	81
18	Preparation of Broad Bed Furrow	35	24	69
19	Foliar application of Potassium Nitrate	35	24	69
20	Preparation of neem-based formulations	22	18	82
21	Sowing of border crops/Trap crops	41	24	59
22	Foliar application of 2% Urea	24	20	83
23	Application of soil amendments	34	27	79
24	Draining of excess water	26	21	81
25	Identification & removal of affected rosette flowers	27	23	85
26	Intercultural operation	19	17	89
27	Opening of alternate furrow / dead furrow	22	17	77
28	Foliar spray of micronutrients	23	17	74
29	Sowing across the slope	21	18	86
30	Use Trichocards / Crysopa (4000 eggs/acre)	15	10	67
31	Use of climate-resilient varieties	33	23	70
32	Intercropping	32	17	53
33	Zero- tillage	24	16	67
34	Use of green manure	25	18	72
35	Soil amendments	23	15	65
36	Protective cultivation	26	21	81

Feedback from Technical Coordinators (TC)

(Marathwada Region)

In the PoCRA project, the Technical Coordinator's major responsibilities include adhering to the directives of the Department of Agriculture. This involves conducting spot inspections, approving material requisitions, and ensuring that eligible farmers acquire high-quality materials for the scheme. Also, the TCs are tasked with training FFS trainers, reviewing their work, providing guidance, and actively inspecting field activities. Promoting the adoption of technologies such as BBF and pest control, along with offering technical information to farmers for their benefit, are crucial aspects of the role. The primary objective is to disseminate knowledge on cost-effective crop production and yield enhancement as part of the agricultural extension work mandated by the agriculture department.

TCs have incorporated various activities to promote climate-resilient practices which include the dissemination of BBF technology, drip irrigation, sprinkler, zero cultivation, and cropping pattern initiatives. They actively conduct meetings with CAs and AAs to offer guidance and visit agricultural schools to promote and disseminate climate-resilient technologies. They have also guided farmers on seed selection, appropriate sprays for crop diseases, and the utilization of new technologies. The dissemination of weather forecasts through WhatsApp groups helps farmers anticipate and address potential challenges based on climatic conditions.

Various activities have been undertaken by TCs to promote and adopt climate-resilient technologies involving key stakeholders in the agricultural ecosystem. This includes agricultural assistants, VCRMC committees, self-help groups, Krishi Tai, and farmers. They have made efforts to make farmers aware of the technical aspects of CR technologies, with a focus on financial benefits.

Notably, FFS plays a crucial role, with farmers being guided by agricultural assistants and experts from Krishi Vigyan Kendra (KVK). Taluka-wise monthly meetings provided a platform for discussions on BBF technology, pest diseases, and collaboration with farmer producer groups.

As informed by the TCs, farmers have enthusiastically embraced multiple climate-resilient technologies under the PoCRA project. Drip irrigation, sprinkler systems, BBF technology, and zero tillage farming methods have been widely adopted by the farming community. Among these, BBF technology has seen maximum adoption, showcasing its popularity and effectiveness in enhancing agricultural practices.

Also, the adoption of zero tillage technology is noteworthy, especially in areas where concerns about crop loss due to less rainfall are prevalent. The positive response from farmers in the subdivision indicates a successful implementation of climate-resilient technologies, contributing to sustainable and resilient agricultural practices.

Among the climate-resilient technologies demonstrated in FFS, BBF technology has emerged as particularly useful and widely adopted by farmers in the project area. This technology is valued for its ability to minimize crop losses even in the face of heavy rainfall, making it a preferred choice among the farming community. Additionally, demonstrations featuring the preparation of Neemboli extract, as well as bio-fertilizer making, have proven beneficial and are being widely utilized by farmers.

All TCs have contributed to the preparation of pamphlets and brochures aimed at disseminating climate-resilient technologies. These informational materials have been meticulously created and distributed to all Gram Panchayats, ensuring widespread access to valuable information regarding these technologies.

Several exposure visits have been undertaken as part of the project, contributing significantly to farmers' knowledge and skills. These study tours are conducted twice each season. They have been proven instrumental in providing farmers with valuable insights into new and innovative agricultural technologies, covering topics such as zero tillage.

The agricultural extension efforts have been robust, with a significant number of training courses and workshops conducted. An average of 2 to 3 training sessions and workshops have been organized by each TC, covering a diverse range of topics. The content of these workshops encompasses various aspects of agricultural practices, providing valuable knowledge to the participants.

The dissemination of weather and crop advisory information is efficiently carried out through various channels, particularly utilizing the WhatsApp platform under the guidance of AAs. Information related to climate resilient technologies, weather forecasts, and crop advisories is shared on WhatsApp groups

specifically created for farmers. These digital communication channels facilitate quick and widespread information dissemination, enabling farmers to stay informed about the latest developments, technologies, and weather conditions.

Regular and frequent interactions with AAs are integral to monitoring and reviewing the progress of extension work and the adoption of climate-resilient technologies. TCs engage with AAs at least three times a month to discuss extension activities, assess the implementation of CR technologies, and ensure effective communication. These interactions provide an opportunity to gather valuable insights into the on-ground situation, address challenges, and strategize for the successful dissemination of CR technologies.

The TCs demonstrated a proactive approach to monitoring the progress of technology adoption by farmers through regular village visits. Visiting villages once or twice a month ensures a consistent presence on the ground to assess the implementation and adoption of climate-resilient technologies. This hands-on approach involves checking whether farmers have successfully incorporated the recommended technologies, such as zero tillage and BBF.

TCs actively participated in district-level monthly meetings, providing presentations on the progress and challenges encountered during extension activities. These presentations serve as a comprehensive overview of the work done, implementation plans, and the hurdles faced in the adoption of climate-resilient technologies.

During the district-level monthly meetings, TCs received valuable feedback and suggestions from various stakeholders. TCs guided effectively addressing problems encountered during the implementation of the PoCRA project activities. The sub-departmental feedback was acknowledged and well-received, reflecting a collaborative effort to enhance project outcomes.

There were specific instructions to provide farmers with new seeds and technologies through agricultural schools, emphasizing the importance of staying updated on innovative agricultural practices. Furthermore, the meetings provided insights into crop selection and pest control strategies based on rainfall patterns, highlighting the importance of adapting agricultural practices to seasonal variations. Some TCs did not formally present progress but engaged in oral discussions instead.

TCs provided suggestions to the Krishi Vigyan Kendra and Sub-Divisional Agriculture Officer when preparing the emergency crop plan, particularly in response to challenges such as insufficient rainfall. They provide insights into the types of crops that would be suitable under the prevailing conditions and offer recommendations on potential pest infestations that might affect these crops. Collaborating with experts from Krishi Vigyan Kendra, TCs ensured that farmers received guidance on effective measures to counter pest-related challenges. The emphasis on experience-based recommendations underscores the practical knowledge and insights that TCs bring to the table, contributing significantly to the formulation of emergency crop plans tailored to address the specific conditions faced by the farmers.

3.4. Climate-Resilient Development of Catchment Areas

The objective of this component is to enhance the management of surface water and groundwater resources in the catchment areas of the project's mini watersheds; this in turn will help improve the performance of dryland farming by reducing agriculture's vulnerability to extended in-season dry spells and lower than normal annual rainfalls. Improved water management is a core ingredient of the GoM strategy to "drought-proof" agriculture and is essential to achieving increased water security, water-use efficiency (more crop per drop), enhanced farm productivity, more stable year-to-year yields, and ultimately, higher farm income.

The activities implemented under this component are derived directly from the Cluster Development and Investment Plans prepared under Component A.1. They are implemented in the watershed catchment areas and provide the foundation for the measures adopted in Component A.2 for improved on-farm availability (surface water harvesting structures), use (micro-irrigation systems) and quality of water for agriculture.

3.4.1. Status of Natural Resource Management (NRM) Works

The community activities align with the principles of climate-resilient agriculture by focusing on soil and water conservation, which can help in mitigating the impacts of climate change, such as extreme weather events, droughts, and soil degradation. Effective implementation and maintenance of these structures can contribute to the long-term sustainability and resilience of agricultural systems in the region.

This sub-section presents the findings on the NRM community interventions based on the quantitative interviews with PoCRA NRM intervention beneficiaries, beneficiaries of similar interventions in the comparison area, and qualitative interviews with key project stakeholders. In the Marathwada region, the total sample of beneficiaries of community-based NRM assets in project and comparison villages is 70 and 52 respondents. All the assets constructed in project villages were found constructed on the site.

In the Marathwada region, most of the respondent farmers in both project and comparison clusters benefitted from the construction of cement nala bunds and earthen nala bunds followed by compartment bunding and repairs of old water storage structures.

Table 3. 23 Community NRM works

Community/ NRM works	Marathwada	
	Project (%)	Comparison (%)
	N = 70	N = 52
Construction of Earthen Nala Bunds	12	39
Construction of Cement Nala Bunds	46	25
Desilting of old water storage structure	14	-
Compartment /graded bunding	12	19
Gabian Structure	3	17
Others	13	-

In the Marathwada region, nearly 95% of 70 NRM works in project clusters, and 65% of the 52 NRM works in comparison clusters were completed in subsequent years post-2019. The survey data suggests that the project witnessed a substantial amount of activity and progress in the years 2021 and 2022, with the bulk of the community NRM works being completed during this period.

3.4.2. Planning of NRM Works

In the Marathwada region, nearly 89% of the respondents in the project and 81% of the respondents in comparison clusters reported having planned for the development of community assets while keeping in mind the water balance. While a significant number of respondents (36%) were unaware or did not know whether the planning process considered the water balance or not. The responses suggest that there was a need for better awareness and understanding among the community members regarding the planning process and the consideration of water balance in the development of community assets.

3.4.3. Social Audit

In the Marathwada region, around 83% of the respondents in project clusters and 71% in the comparison clusters shared that a social audit has been done in their village. Notably, a significant number of respondents (46%) were unaware or did not know whether a social audit had taken place in their village or not. Social audits are important mechanisms for ensuring transparency, accountability, and community participation in development projects. The lack of knowledge among a significant portion of respondents raises concerns about the effectiveness of these processes.

3.4.4. Quality of NRM Works

In the Marathwada region, respondents in the project cluster (94%) were found to be more satisfied with the quality of assets than in comparison areas (87%). Detailed distribution of rating of the quality of constructed assets reported by the beneficiaries in both project and comparison areas is given in Table 3.24. As per survey data, the construction quality of the community watershed structure can be rated as "Satisfactory" by 66% of the respondents. This indicates that a majority of the respondents find the construction quality of the structure to be acceptable or meet their expectations. However, it's worth noting that 34% of the respondents rated the

construction quality as "Neither satisfactory nor unsatisfactory." This suggests that there may be some variability in perceptions among the respondents, with a significant portion not firmly categorizing the construction quality as satisfactory or unsatisfactory. In the Marathwada region, 65% of respondents in the project and 40% in comparison clusters find NRM works very useful.

Table 3.24 Feedback on the Quality of Assets

Feedback on Quality of Assets	Marathwada	
	Project (%)	Comparison (%)
	N = 70	N = 51
Very unsatisfactory	6	10
Neither satisfactory nor satisfactory	1	3
Very satisfactory	94	87

3.4.5. Benefits accrued from NRM works

In the Marathwada region, beneficiaries in project clusters reported relatively better experiences from NRM works. However, 74% of respondents in the project and 64% in comparison clusters shared that there was increased availability of water for protective irrigation because of asset creation under NRM/community works. More than 80% of the respondents in the project and 67% of respondents in comparison clusters experienced an increase in yield/production followed by a change in cropping pattern. The availability of water during dry spells, as a benefit, was found to be more in project areas than in the comparison cluster. Similarly, more participants from project areas witnessed an increase in income as well as an increase in groundwater levels after the construction of NRM assets compared to those from comparison clusters. Based on the feedback from the respondents, the distribution of benefits accrued through the constructed community NRM works in both project and comparison clusters is as follows in Table 3.25.

Table 3. 25 Benefits from NRM works

Benefits accrued from NRM works	Marathwada	
	Project (%)	Comparison (%)
	N = 70	N = 51
Increased availability of water for protective irrigation	74	64
Increase in yield/production	81	67
Change in cropping pattern	51	43
Availability of water during dry spells	24	18
Increase in area of cultivation during Kharif Season	24	14
Increase in area of cultivation during Rabi Season	26	16
Increase in income	23	16
Increase in Ground Water Level	21	2
Decreased soil erosion	7	4
Increased soil moisture duration	3	2
Have not benefitted till now but may benefit in future	-	8
Do not think will benefit from this NRM work	-	-

3.4.6. Impact on Ground Water Level

The respondents were asked if they believed that the groundwater level near their farmland had increased after the construction of the Natural Resource Management (NRM) asset. In the Marathwada region, 80% of the project and 50% of the comparison experienced an increase in groundwater levels post-construction of NRM works. Of the remaining, 20% in the project and 44% in comparison did not have the same experience. 6% in comparison clusters do not expect any change. This indicates a positive perception among a significant portion of respondents regarding the impact of the NRM intervention on groundwater levels. Of the remaining, 36% of respondents stated that they have not observed an increase in groundwater level near their farmland after the construction of the NRM asset, but they believe it could increase in the future. This suggests that although they haven't experienced immediate changes, there is optimism or expectation for positive outcomes in the long term. Only 2% of respondents expressed the belief that there would be no change in the groundwater level near their farmland because of the NRM asset construction. This suggests a minority opinion among the respondents, indicating that most respondents anticipate some level of impact on groundwater levels due to the NRM intervention. Overall, the data suggests that there was a generally positive perception among the respondents regarding the potential impact of the NRM asset construction on groundwater levels. While a majority believe that the groundwater level has already increased, a significant portion also expresses optimism for future increases. The minority of respondents who do not expect any change in groundwater levels represent a smaller proportion of the overall responses.

3.4.7. Willingness for Maintenance

When the respondents in the project clusters were asked about their willingness to be involved in the maintenance of these assets post-construction, 30 (57%) of 53 respondents responded positively. They would like to contribute to the maintenance activity of NRM works in terms of being part of the maintenance committee, paying for the maintenance of the structure, and providing labour support for maintaining the structure.

Table 3. 26 Maintenance of NRM works

Maintenance of NRM works	Marathwada Project (%) N = 30
Willing to be part of the structure maintenance committee	9
Willing to pay for maintenance of the structure	20
Willing to provide labour support from self or family for maintenance of the structure	1

3.5. Training and Adoption of CRATs

One of the key aspects of the project is to promote CRATs through training via FFS and thereby increase willingness among the farmers to adopt the same. Accordingly, the respondents in both project and comparison clusters were asked if they had adopted any of the CRATs in the past year. It is observed that there is a higher willingness for the adoption of CRATs not only in the project but also in comparison clusters, indicating a good intensity of the impact created by PoCRA interventions. The survey lists the CRATs that are majorly adopted by beneficiaries in both project and comparison areas. It includes – contour cultivation, inter-cropping, BBF method, drip/sprinkle irrigation, integrated nutrient management, integrated pest management, zero tillage, seed germination, seed treatment, and use of improved seed varieties. However, it is important to note that in some technologies, the uptake differs across project and comparison clusters. For instance, adaptation of the BBF method was found to be reported more in the project than in comparison areas, whereas adaptation of the use of improved seed varieties was found to be reported more in comparison areas compared to project areas. The technology-wise distribution of its adoption is detailed in Table 3.27.

Table 3. 27 Training and Adoption of CRATs

Technology	Marathwada

	Project			Comparison		
	Train	Adopt	%	Train	Adopt	%
Contour cultivation	143	69	48	72	54	75
Cultivation by BBF method	95	61	64	44	21	48
Intercropping	123	60	49	71	41	58
Use of improved seed	151	77	51	90	64	71
Seed treatment	124	75	60	64	40	63
INM	79	52	66	36	19	53
IPM	94	62	66	37	18	49
Furrow opening	87	42	48	37	22	59
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	151	81	54	95	66	69
Protective irrigation through farm pond	102	56	55	31	6	19
Conservation tillage	63	30	48	20	7	35
Mulching	60	24	40	20	8	40
Canopy management in fruit Crops	68	40	59	17	6	35
Shade net	45	15	33	20	2	10
Polyhouse	34	4	12	21	-	-
Polytunnel	29	4	14	17	-	-
Use of machinery	82	41	50	52	42	81
Drip & Sprinkler	186	143	77	67	31	46
Seed Germination test	95	56	59	36	20	56
IPM – Traps (Pheromone, Sticky, Light)	60	33	55	20	10	50

Benefits perceived from CRATs

In the Marathwada region, around 65% of respondents in project clusters and 56% in comparison clusters reported benefiting from the adoption of CRATs. Respondent farmers shared that they have experienced the following: (i) increased yield, (ii) reduced cost of cultivation, (iii) decrease in pest attacks, (iv) improved soil and moisture conservation, (v) improved soil fertility, (vi) optimized use of pesticides and fertilizers, (vii) increased availability of water, and (viii) improved coping mechanism. Detailed responses of the beneficiaries in the project and comparison areas regarding benefits gained after the adoption of CRAT are tabulated in Table 3.28.

Table 3. 28 Benefits Perceived from CRATS

Benefits through CRATs	Marathwada	
	Project (%)	Comparison (%)
Reduced cost of cultivation	75	83
Soil and moisture conservation	62	57
Better control of pests and diseases	69	53
Improved soil fertility	49	38
Optimum use of pesticides and fertilizers	28	24
Improved germination rate	23	14
Increased water availability	23	21
Improvement in coping mechanism	2	2

However, there were some respondents, in both project (156) and comparison (98) clusters, who were not able to realize the desired benefits of CRAT. The reasons cited by them include lack of technical knowledge (P: 58% C: 63%), difficulty in applying technology in the field (P: 22% C: 9%), unavailability of advanced agriculture machinery/ implements (P:3% C: 1%), and extreme climatic situation (P: 17% C: 27%).

Table 3. 29 Benefits Perceived from CRATS

Reason for CRAT not considered beneficial	Project	Comparison
	N = 156	N = 98
Lack of technical knowledge	58	63
Difficult to understand technologies	22	9
Unavailability of advanced agriculture equipments	3	1
Extremely climate situation	17	27

3.6. Feedback on Agro Advisory

Agro advisory services are one of the important components of the project that provides weather-based information and advice to farmers to help them make informed decisions about crop management practices.

Slightly more than half of respondents (60%) in project clusters received agro advisory as part of the project, while in comparison areas, 54% of respondents received it. Around 17% of them receive the advisory daily, and nearly 40% receive it either twice a week or once a week. Around 80% of respondents in the project area and comparison, received advisory through SMS on mobile. Other sources from where respondents in project clusters receive agro advisory are the television, newspaper, and Gram Panchayat notice board. It is observed that 82% of respondents in project clusters, as compared to 80% in comparison clusters, showed interest in following the agro advisory regularly. Beneficiaries in the project and comparison clusters reported that they received the agro advisory related to climate resilience, weather, soil nutrients, natural resource management, crop, irrigation, fertilizers, pesticides, certified seed, etc.

Usefulness of agro advisory: It is observed that nearly 74% of respondents in project clusters who received agro advisory find it useful and relevant in contrast to 72% in comparison clusters. The rest of the respondents in comparison clusters either find the information as general advice or not useful.

Perceived benefits of agro advisory: More than 50% of the farmers in the project clusters reported that the agro advisory received under PoCRA helped them make timely decisions especially related to the initial stage of crop cultivation which in turn helped them avoid future problems such as pests, crop diseases, etc. and thereby enhancing their crop yield. A similar trend was reported by 55% of the respondents in comparison clusters. Further, nearly 86% of respondents in the project and 73% in comparison clusters who received agro advisory were found to be able to market their agricultural produce based on the market price information they get. In project clusters, this has helped 95% of respondents (94% in comparison areas) to realize better selling prices. The preferred mode of receiving the agro advisory as reported by respondents in both the project and comparison clusters in order of preference is SMS on mobile (85 to 90% of respondents), through a mobile App, WhatsApp, and newspapers.

Table 3. 30 Agro Advisory Services

	Marathwada	
	Project (%)	Comparison (%)
	N = 450	N = 225
Receive Agro Advisory Services		
Yes	62	54
No	38	46
Source of Agro Advisory Services	**N = 277**	**N = 122**
PoCRA project	18	-
Agriculture Department	37	41
KVK	42	54
Gram Panchayat	2	5
Others	1	-
Mode of Agro Advisory Services	**N = 277**	**N = 122**
SMS on mobile	82	84
Through mobile app	7	4
Through Whatsapp	7	3
Newspaper	3	4
Television	1	3
Radio	-	2
Frequency of Agro Advisory Services	**N = 277**	**N = 122**
Two times a week	42	40
One times in a week	41	48
Daily	17	12
Use of Agro Advisory Services	**N = 277**	**N = 122**
Yes	82	80
Feedback on Agro Advisory Services	**N = 277**	**N = 122**
Useful and relevant	74	72
Not useful	5	3

General advice	21	25

Benefit from Agro Advisory Services	N = 264	N = 118
Helps in taking timely decisions related to initial stage of crop cultivation (land preparation, sowing, manuring, etc.)	50	55
Helps in deciding irrigation frequency	5	2
Helps in selection of certified seed variety	14	7
Helps in selection of crop for intercropping	4	5
Helps in Comparison of pests	15	18
Helps in soil health management	4	8
Helps in preparing contingency plan	8	5

Plan to use Market based on advisory	N = 236	N = 106
Yes	86	73

Better price realization	N = 203	N = 77
Yes	95	94

3.7. Feedback on Soil Treatment

Nearly 97% of respondents in comparison clusters did not have soil health cards as compared to 84% of respondents in the project. It was observed that more respondents in project clusters (14%) as compared to those in comparison (3%) treated the soil using soil health card information. Around 2% of project clusters did not find the information on soil health cards useful. About 23% of respondents from the project and 15% in comparison clusters reported that they did not have the technical knowledge to use the soil health information. A similar trend was also found by some of the experts during their field visits. Therefore, there is a need for PoCRA to focus more on training farmers on soil health cards, given its importance in making agricultural practices more climate resilient. PoCRA through its website under the section “Gram Krishi Sanjeevani Vikas Darshika” has made available soil profile (Jaminiche Gundharm Adharit Krishi salla) features like soil depth, landform, water holding capacity, percent organic carbon, etc. of 3700+ villages indicating soil type, soil depth, etc. Besides this, the soil test reports issued under various government programs are hosted on the website to know soil characteristics in a village. This feature will enable farmers to grow better crops.

4. Post-harvest Management and Value Chain Promotion

4.1. Promoting FPCs, FIGs, and SHGs

The main objective of this component is to strengthen the capacity of FPOs to (i) develop and successfully implement bankable proposals linked to climate-resilient agri-food systems and to be funded by financing institutions, (ii) operate as agribusiness entrepreneurs (Farmer Producer Companies, FPC) that generate a sustainable profit for their members; and (iii) successfully perform a range of primary processing activities for climate-resilient commodities promoted by the project, using green technologies where appropriate. Under this component, the project will finance: (i) the development of a Capacity Enhancement Needs Assessment (CENA), and (ii) the implementation of a Capacity Development and Coaching program (CDC) to meet the needs identified in the CENA.

4.2. Feedback from project supported FPCs

The FPCs that have applied to receive support or have received support through PoCRA were sampled from each district, and feedback from their directors and members was taken to understand the current activities taken by the FPCs and get feedback on the support received through PoCRA till now. Two FPCs who have received/applied for support from PoCRA were randomly selected from each district.

Coverage: In the case of Marathwada, a total of 16 projects supported by FPCs were covered, and feedback from a total of 46 FPC respondents (16 FPC directors and 30 members) was taken as part of the quantitative survey of a combined CM round. All FPCs in both regions are mixed types with both male and female members.

Membership: In the Marathwada region, the 16-project-supported FPCs have 3250 male members, 1179 female members, 437 members from the SC category, and 500 members from the ST category. This membership comprises 2834 (87%) small and marginal farmers.

Table 4. 1 Membership in FPCs

Membership	Marathwada
	N = 16
Male Members	3250
Female Members	1179
SC Members	437
ST Members	500
Small and marginal	2834

Year of establishment: Most of the FPCs were recently established. The year of establishment of FPCs is as follows: 2017(1), 2018(1), 2019(3), 2020(10) and 2021(1). All respondents shared that their FPC has both male and female members and agreed that their FPC is operational.

Employment generated: In the Marathwada region, scrutiny of 16 project supported FPOs shows that they employed 250 persons generating nearly 27620 person days of work in FY 2022-23. Of the 250 persons, nearly 86 (34%) were women. The wage rates offered are well above the MGNREGA wage rate of Rs. 256/- for the year 2022-23 in Maharashtra[13]. The table 4.2 below provides the details of the employment based on the category of work disaggregated concerning gender.

[13] MGNREGA Wage Rate for FY 2022-23 https://nregaplus.nic.in/netnrega/writereaddata/Circulars/2447Wage_Rate_2022.pdf

Table 4. 2 Employment Generated in Project-Supported FPCs

Category of employment	Number of FPOs	Total number of Persons employed	Average number of days of employment per year	Person days generated	Average wage rate per day (Rs/ day)	Average Per Capita Annual income (Rs.)
Full-Time Men	15	73	200	14600	400	80000
Full-Time Female	8	33	200	6600	280	56000
Part-Time Men	3	21	90	1890	400	36000
Part-Time Female	2	14	90	1260	280	25200
Seasonal Men	8	70	30	2100	400	12000
Seasonal Women	6	39	30	1170	280	8400

(**Source:** CM qualitative interview data)

Activities in FPCs: Table 4.3 presents the various activities carried out by FPCs in Marathwada regions.

Table 4. 3 Activities in FPCs

	Activities	Marathwada
		Valid N = 46
1	Aggregation of produce	44
2	Providing agricultural inputs like seeds, fertilizers	38
3	Providing access to market for produce	44
4	Value addition of agriculture produce like sorting, grading etc.	38
5	Provide training to farmers on best agricultural practices	38

In the project area, the most common activities reported by respondents include "Aggregation of produce" (M: 44%), "Providing access to market for produce" (M: 44%), "Providing agricultural inputs like seeds, fertilizers" (M: 38%), “Value addition of agriculture produce like sorting, grading etc.” (M:38%) and “Provide training to farmers on best agricultural practices” (M: 38%). Additionally, a notable proportion of respondents in both areas indicated involvement in "Others" activities, which could encompass a wide range of functions not specifically listed in the survey options. The survey data suggests that FPCs in the Marathwada were engaged in activities aimed at enhancing agricultural production, market access, and possibly improving value-addition processes. The variation in activities reported between the Marathwada regions seems to be influenced by factors such as resource availability, market dynamics, and project interventions.

Participation of members in meetings and decision-making: In the Marathwada region, nearly three-fourths of 30 members shared that they always participate in General Body Meetings (GBMs) of their FPCs, and the rest 20% sometimes attend them. The remaining 5% of the respondents rarely attend the GBM. Nearly three-fourths of members participate in the decision-making process of their FPCs. The rest 15% sometimes participate and the remaining 10% rarely participate. In the project clusters, 47% of respondents stated that they always participate in the decision-making process, while another 47% reported participating sometimes.

Training of Directors: In Marathwada, of the 16 Directors, 12 have received training from ATMA (9), VAMNICOM (1), and other sources (2).

Training to members through FPC: In Marathwada, of the 30 members, 22 received training on various subjects as presented in Table 4.4. The low percentage of respondents who reported receiving training through their FPC indicates potential gaps in training initiatives or resources within the FPC. Enhancing training

opportunities and resources within FPCs could contribute to the empowerment and effectiveness of their members in agricultural practices and business operations.

Table 4. 4 Training to Members through FPCs

Topics of training	Marathwada N = 66
Skill upgradation	29
Market Awareness	20
Financial planning	26
Leadership development	11
Farming Technologies	15
Not received	0

Awareness of business plans: In Marathwada, 30% (9 out of 30) were not aware of the business plan of their FPCs. The survey data indicated that a relatively smaller proportion of respondents in the project clusters (44%) reported being aware of the business plans prepared by their company for financial support from PoCRA. A larger majority of respondents (56%) indicated that they were not aware of these business plans. This lack of awareness may potentially indicate a gap in communication or information dissemination within the company regarding its plans for securing financial support from PoCRA.

Facilities/ Services provided by FPCs: It was asked what kind of facilities or services they receive from the FPCs, out of 97 valid responses from the project clusters, 17 respondents (18%) reported receiving marketing support from their FPC for selling their agricultural produce. This indicates that a portion of respondents rely on their FPC for assistance in marketing their products, 16 respondents (17%) reported purchasing seeds through their FPC. This suggests that some respondents utilize their FPC as a source for acquiring seeds for their agricultural activities. About 11 respondents (11%) reported purchasing chemicals or fertilizers through their FPC. This indicates that a portion of respondents rely on their FPC for accessing agricultural inputs, 8 respondents (8%) reported receiving support from their FPC for grading and sorting their agricultural produce. This suggests that some respondents utilize the facilities or services provided by their FPC for quality comparison purposes. While 17 respondents (18%) reported getting access to equipment or tools for agriculture through their FPC. This indicates that some respondents rely on their FPC for accessing necessary equipment or tools for their agricultural activities, 10 respondents (10%) reported having access to a godown facility through their FPC. This suggests that some respondents utilize the storage facilities provided by their FPC and 3 respondents (3%) reported receiving other facilities or services from their FPC, which are not specified in the provided categories.

Table 4. 5 Facilities and Services Provided by FPCs

Facilities/ Services	Marathwada FPC Respondent (%) N = 99
Marketing support in selling my agricultural produce	18
Purchasing seeds through FPC	17
Purchasing chemical fertilizers through FPC	12
Grading and sorting of my agricultural produce with the support of FPC	20
Converting agricultural produce to value-added products (E.g. Converting into Soybean-to-Soybean oil)	6
Getting access to equipment/tools for agriculture	18
Access to godown facility	9
None	-

Crops sold through FPC: In the case of Marathwada, 38% of the total 46 FPC respondents reported selling their crop produce through FPCs.

Table 4. 6 Crops Sold through FPCs

Crops	Marathwada (%)
	N = 18
Soybean	28
Chickpea	16
Cotton	28
Pigeon pea	-
Black gram	-
Wheat	-
Maize	8
Banana	12
Pomegranate	4
Turmeric	4
Others	-

The most commonly sold crop through the FPC was soybean, with 28% of respondents in the Marathwada reporting its sale. Cotton was the second most commonly sold crop in Marathwada with 28% of respondents reporting its sale. In the Marathwada region, Maize, Banana, Pomegranate, and Turmeric crops were sold through FPC. The survey data indicated that soybean is the predominant crop sold through the FPC in the Marathwada followed by Cotton in Marathwada. This suggests that FPCs play a significant role in marketing and facilitating the sale of these crops for farmers in the surveyed areas.

4.3. Feedback from project-supported SHGs

Another key component of PoCRA is to strengthen the existing self-help groups in their entrepreneurial ventures by providing them with financial support. This is aimed to strengthen the post-harvest activities and value chain of the major crops and to strengthen the supply chain for the climate-resilient crop varieties in the project area. The SHGs that have applied to receive support or have received support through PoCRA were sampled from each district, and feedback from their members was taken to understand the current activities undertaken by the SHGs and get feedback on the support received through PoCRA till now. One SHG who has received/applied for support from PoCRA was randomly selected from each district.

Coverage: In the Marathwada region, a total of 9 SHGs were covered, and feedback from a total of 28 SHG respondents (9 SHG presidents and 19 members) was taken as part of the combined CM round.

Type of SHG: Of 9 SHGs in Marathwada, one was the female group and the rest eight were of mixed type group including both men and women.

Year of establishment: The year of establishment of SHGs in Marathwada is as follows: 2019(2), 2020(3), and 2021(4).

Training to President: Of nine presidents who were interviewed in the Marathwada region, six received training from project staff and the agriculture department.

Training to members: In the Marathwada region, 11 members of the total 19 had received the training.

Table 4. 7 Training to Members

Topic of training	Marathwada (%)
	N = 20
Skill upgradation	33
Market Awareness	67
Financial planning	56
Leadership development	11
Farming Technologies	56

Apart from the above, members also mentioned receiving training in the use of farm machinery from CHC, turmeric processing, etc. Out of total valid responses, (M:33%) reported receiving training on skill upgradation through their SHG, (M:67%) reported receiving training on market awareness, (M:56%) reported receiving training on financial planning, (M:11%) reported receiving training on leadership development. (M:56%) reported receiving training on farming technologies. These could include a wide range of other topics relevant to personal development or agricultural practices.

Frequency and amount of saving: In Marathwada, nearly three-fourths of members saved every month. 10% of members are not saving currently and 15 % are saving every quarter. A smaller portion reported saving weekly (9%) or quarterly (13%), while 25% indicated that they are not currently saving. The average monthly saving is approximately Rs. 275.

Income-generating activities by SHGs: In Marathwada, of the nine SHGs, six are involved in income-generation activities.

Facilities or services provided/ received from the SHGs: Respondents in the Marathwada were asked about the facilities or services they provide or receive from their Self-Help Group (SHG). Out of total valid responses, it was found that in Marathwada regions, the most commonly reported facility/service received from the SHG is getting access to equipment/tools for agriculture. Other services are less commonly reported, including marketing support in selling agriculture produce (M:8%) and purchasing seeds through the SHG (M:14%). Grading and sorting of agricultural produce and value-addition activities with the support of the SHG are reported in the Marathwada region.

Table 4. 8 Facilities and Services provided by SHGs

Facilities/ Services	Marathwada SHG Respondent (%)
Marketing support in selling my agricultural produce	8
Purchasing seeds through FPC	14
Purchasing chemicals fertilizers through FPC	12
Grading and sorting of my agricultural produce with the support of FPC	21
Converting agricultural produce to value-added products (E.g Converting into Soybean-to-Soybean oil)	14
Getting access to equipment/tools for agriculture	31
Access to godown facility	-

4.4. Strengthening Emerging Value-chains for Climate-resilient Commodities

The main objective of this component is to promote the participation of FPOs in emerging value chains for climate-resilient commodities. Under this component, the project will provide co-financing (under the FPO Matching Grant scheme): (i) to implement growth-oriented sub-project proposals from eligible FPCs (and where applicable, other FPOs as well) in the selected value chains; and (ii) to establish FPO-run custom-hiring centres (CHC) for agricultural machinery. This component contributes to climate co-benefits by focusing on value chains for climate-resilient commodities, by promoting green technologies in primary processing (use of solar energy, including for storage), and by encouraging the selection of fuel-efficient (less energy) and technology efficient (loss reducing) farm machinery and equipment.

4.4.1. Support to FPCs/ SHGs for undertaking Agribusiness

Table 4.9 presents the year of grant given to FPCs and SHGs which were covered during the survey.

Table 4.9 Year of Grant for Agribusiness to Project-Supported FPCs and SHGs

Year of grant	Marathwada	
	FPC (N=16)	SHG (N=9)
2018-2019	-	-
2019-2020	4	-
2020-2021	8	6
2021-2022	4	2
2022-2023	-	1

Type of agribusiness activities: The agribusiness activity-wise number of respondents who reported the PoCRA support to their respective FPCs and SHGs is as follows:

Table 4.10 Agribusiness Activity-wise Support from PoCRA

Agribusiness activity	FPC Respondent N = 16	SHG Respondent N = 9
Custom Hiring Centre	9	5
Godown	3	2
Commodity Processing	9	1
Others	6	1

Finance for agribusiness activities: The status of funding for agribusiness activities as reported by the heads of project supported FPCs and SHGs are detailed below.

Table 4.11 Status of Funding for Undertaking Agribusiness Activities

Finance head	FPC Range of Amount (Approx.)	SHG Range of Amount (Approx.)
	N = 16	N = 9
Total value of AB project	Rs. 1.5 lakhs to Rs. 1.1 Cr	Rs. 2 lakhs to Rs.40 lakhs
Bank loan	Rs 80 K to 75 lakhs	Rs. 15 lakhs
Self-capital	Rs. 2.5 to 75 lakhs	Rs. 15K to 20 lakhs
PoCRA grant	Rs. 1.2 lakhs to 98 lakhs	Rs. 1.2 lakhs to 24 lakhs

In the case of bank loans, the directors of the project supported FPC, and presidents of SHGs shared that the loan installments were being repaid regularly.

4.4.2. Custom Hiring Centres (CHCs)

Under the agribusiness component, custom hiring centres (CHCs) are one of the major activities promoted under the PoCRA project. The objective is to contribute to climate co-benefit by focusing on pre- and post-harvest farm activities by encouraging the use of fuel-efficient (less energy) and technology-efficient (loss and time-reducing) farm machinery and equipment. Various agriculture implements that are required from tillage to harvesting are provided on a rent basis. This includes tractor, plough, rotavator, trolley, threshing machine, BBF sowing machine, etc.

A total of 14 CHCs in Marathwada considering both FPC & SHG were covered during the survey. The type of machines available in CHCs of the PoCRA-supported FPCs as reported by the respondents are as follows:

Table 4.12 Type of machines available in PoCRA-supported FPCs and SHGs

Type of Machines	Marathwada
Tractor large more than 35 HP	13
Rotavator	13
Plough	13
Seed drill (BBF)-9 tyne	7
Broad Bed Furrow Machine	2
Panaji	0
Trailor (above 1 brass)	12
Cultivator -9 tyne	10
Seed drill (BBF) – 4 tyne	3
Blower	1
Multicrop Thresher (30 hp and above)	8
Tractor small up to 35 hp	6
Power Tiller	3
Multicrop Thresher (Below 30 hp)	1
Cultivator-5 tyne	3
Trailor (below 1 brass)	1
Power weeder	0
Reaper	1
Chaff cutter	1
Combined Harvester	0
Turmeric Harvester	0
V-pass	4
Land Leveler	0
Ridger	2
Bed maker	1
Harrow	5

This suggests that the CHCs were well-equipped to support farmers in their agricultural activities, providing access to modern machinery and equipment that can enhance productivity and efficiency for climate resilience farming operations. All the respondents of FPCs and SHGs shared that the members were provided with machines from CHCs at lower rates. The various features of CHC services are as follows:

Table 4.13 Features of CHCs of PoCRA-supported FPCs and SHGs

Features of CHCs	Marathwada	
	FPC N = 9	SHG N = 5
Area under CHC service		
Within 50 hectares	1	1
50 to 100 hectares	4	-
More than 100 hectares	4	3
Service not provided	-	1
Farmers Serviced (in Project)		
1 to 50	2	2
51 to 100	1	2
101 to 150	2	-
151 and above	3	-
Don't Know	1	1
Farmers Serviced (in Comparison)		
1 to 50	3	1
51 to 100	3	4
101 to 150	2	-
151 and above	1	-
Don't Know	-	-
People trained for operating equipment		
Don't Know	1	1
1 to 5 Men	6	4
6 and above Men	2	1
1 to 5 women	-	-
6 and above women	-	-
Perceived Benefits		
Machines available at discounted rates	7	4
Reduction in cost of cultivation	9	5
Solution to labour issues	8	4
Increase in rural employment	3	3
Difficulty faced by farmers in accessing CHC		
High fuel cost	1	4
Cannot operate the machines	2	5
Skilled labour not available	3	4
Very high demand leads to a shortage of availability	5	3
Cost of maintenance is very high	3	-
Some machines are non-operational	1	-
Machines not made available to all members	4	-
Villages aware of facility	7	4
Access to facility	7	3
Display board	8	4

Training of Directors: About 41% of respondents reported that at least one member of the Director's body has taken training on the operations of the CHC. The findings also highlighted the potential gap in training among members of the Director's body regarding managing a CHC.

Discounts for shareholders: The respondents were asked about the discounted rates at which shareholders hire tools from the Custom Hiring Center (CHC). Most respondents (71%) reported that shareholders hire tools from the CHC at a discounted rate of 10% lower than the regular rates. A smaller percentage of respondents (3%) reported that shareholders hire tools at a discounted rate ranging between 10-20% lower than the regular rates. A notable proportion of respondents (24%) reported that shareholders hire tools at a discounted rate of more than 20% lower than the regular rates. Only one respondent indicated that they don't know the discounted rates at which shareholders hire tools from the CHC. As per this data, we can conclude that the majority of shareholders hire tools from the CHC at a discounted rate of 10% lower than the regular rates. However, there was also a significant portion of shareholders who benefited from more substantial discounts, with rates ranging from 10-20% lower or more than 20% lower than the regular rates. This indicated the provision of cost-effective services by the CHC, potentially contributing to the accessibility and affordability of agricultural machinery for shareholders.

Area covered by CHCs: The average area covered by the services provided by the Custom Hiring Center (CHC) in one year covered a diverse range of agricultural areas. The majority, 38% of respondents, reported that the services cover within 50 hectares, while 41% reported coverage between 50 to 100 hectares, and about 18% reported coverage of more than 100 hectares. Additionally, a small portion of respondents (3%) indicated that the service was not provided, possibly due to limitations in the CHC's capacity or other factors. This indicated the CHC's ability to cater to the needs of farmers across varying land sizes, potentially contributing to improved access to agricultural machinery and services in the project area.

Farmers benefitted by the CHC: As per survey data in project clusters, 72% of respondents reported that 1 to 50 farmers have benefitted from the CHC, while 9% reported 51 to 100 farmers, 13% reported 101 to 150 farmers and 6% reported 151 and above farmers. Similarly, in comparison clusters, 65% of respondents reported that 1 to 50 farmers have benefitted from the CHC, 13% reported 51 to 100 farmers, 16% reported 101 to 150 farmers and 7% reported 151 and above farmers. This means that most respondents in both project and comparison clusters reported that 1 to 50 farmers have benefitted from the CHC. However, there is a slightly higher percentage of respondents in the project clusters reporting higher numbers of benefitted farmers compared to comparison clusters.

Male/ Female training to operate equipment: It was also asked how many members were trained to operate the equipment. About 68% (P:34) reported that 1 to 5 men were trained, 3% reported that 6 or more men were trained and 9% of respondents reported that no men were trained to operate equipment. While 21% reported that they don't know anything about it. In the case of females, 18% reported that 1 to 5 women are trained, 38% of respondents reported that no women are trained to operate equipment and 44% reported that they don't know.

Awareness of CHC: As per the survey questionnaire, the respondents were asked whether all villagers were aware of the Custom Hiring Center (CHC) facility. It was found that most respondents (65%) reported that all villagers were aware of the CHC facility. However, a notable proportion of respondents (35%) reported that not all villagers are aware of the CHC facility. This suggests that there may be a need for increased awareness and outreach efforts to ensure that all villagers are informed about the CHC and the services it provides.

Access to CHC facilities: The respondents were also asked whether all villagers can access/ utilize the Custom Hiring Center (CHC) facility. Out of a total of 34 respondents, a majority of respondents (74%) reported that all villagers can access/ utilize the CHC facility, whereas, a significant minority of respondents (27%) reported that not all villagers can access/ utilize the CHC facility. This suggested that there may be barriers or challenges preventing some villagers from accessing or utilizing the CHC, such as geographic location, financial constraints, or lack of awareness. Addressing these barriers could help improve access to and utilization of the CHC, ensuring that it serves the needs of the entire community effectively.

According to the respondents, all villagers were aware of the CHC facility and were able to access the same. The display board for CHC was found to be available in all the villages. All equipment was found in good operational condition. This suggests that the Custom Hiring Centers were well-equipped to support farmers in their agricultural activities, providing access to modern machinery and equipment that can enhance productivity and efficiency for climate resilience farming operations.

Key Expert Observations

Based on key expert observations from respondents of 9 FPOs of Jalna and Aurangabad following are the key observations regarding custom hiring centers. Custom Hiring Centers have played a pivotal role in transforming agriculture as follows:

1. Improved time efficiency: The use of modern machinery through CHCs enables faster completion of tasks compared to manual labour, saving considerable time during planting, harvesting, and other farming operations. Nearly 30% of time is saved as reported by respondents from four FPCs.

2. Reduction in cost of cultivation: CHCs provide access to expensive agricultural machinery, allowing farmers to hire equipment at affordable rates instead of purchasing it outright. This significantly reduces the cost of cultivation as farmers don't have to invest heavily in machinery. During the interaction, farmers have reported nearly 8-10% reduction in cultivation cost.

3. Reduction in drudgery: The use of machinery reduces manual labour and physical strain, thereby minimizing the drudgery associated with traditional farming methods. Tasks like plowing, sowing, harvesting, etc., become more efficient and less physically demanding. Farmers shared to have reduced the drudgery by 70% due to the use of farm machinery.

CHC as a Business Opportunity and Viability:

CHC's business viability, coupled with the adoption of better farming practices and their positive impact on climate resilience, marks them as a significant contributor to the agricultural sector's sustainability and growth.

1. Business Potential: CHCs offer a viable business opportunity by serving as a hub for renting out agricultural machinery, providing a steady income stream for the center operators. Nearly 80% of FPO respondents agreed that CHCs offer a viable business opportunity.

2. Viability: The demand for machinery services is consistent, especially during peak seasons. Proper management and strategic location of CHCs contribute to their viability as a sustainable business model. About 40 % of FPO respondents believe that CHCs are a viable business.

Climate Resilience and Impact of CHC Services:

1. Efficient Resource Utilization: Modern machinery available at CHCs often comes with technology aimed at efficient resource use, such as BBF machines. This aids in climate resilience by optimizing inputs like water, fertilizers, and pesticides. Nealy 70 percent of FPO respondents agreed to efficient resource utilization because of CHC services.

2. Diversification of Farming Practices: Access to specialized machinery at CHCs encourages the adoption of climate-smart agricultural practices, enhancing the community's resilience to climate change. Most of the FPO respondents also highlighted the diversification of farming practices due to access to specialized machinery at CHCs.

Employment Generation:

1. Direct Employment: CHCs create employment opportunities for individuals managing and maintaining the machinery, thus generating direct employment.

2. Indirect Employment: As farming becomes more efficient and productive due to CHCs, there might be indirect employment generated in allied sectors like transportation, equipment servicing, and logistics.

4.4.3. Godown (Warehouse)

A total of five godowns in the Marathwada region were covered during the survey. The details of the various features of the godown are as follows:

Table 4.14 Features of Godown (Warehouse) of PoCRA-supported FPCs and SHGs

Features of Godown/ Warehouse	FPC Respondents N = 3	SHG Respondents N = 2
Total Capacity in Metric Ton (MT)	5000	2000
Used for storage	2	2
Capacity utilized in MT	4500	1900
Purpose of godown	Seed and Grain processing and Storage	Grain and multiple-use
Crops stored	Soybean & Gram Cotton	Soybean, Pigeon pea, gram and wheat
Farmers benefitted		
0-50	-	1
151 & Above	2	1
Rate for storage (Rs./quintal/month)	Rs. 50 to Rs. 100	Rs. 20 to Rs.30
Discount for members		
10% lower rate	1	-
10-20% lower rate	-	2
More than 20% lower rate	1	-
Perceived benefits of warehouse		
Storage available at discounted rate	2	1
Post harvest losses at reduced	1	2
Better prices to be produce		1
Perceived difficulties by farmers		
High rate of storage	-	1
Storage not available to all members	1	1
Shortage of storage	2	1
No difficulty		
Villages aware of facility	3	2
Access to facility	3	2
Maintenance like pest control	3	2
Insured	-	1
Operational condition good	3	2

Five warehouses benefitted under PoCRA were covered, out of which three were used for storage purposes and two for other purposes. These were mostly used for grain processing and storage of soybeans, gram, and other crops. As per survey data, farmers benefiting from these warehouses ranged between 1 to 50. The respondents were asked whether members of the Farmers Producer Company (FPC) or Self-Help Group (SHG) were given a discount on the rates. It was recorded that the majority of respondents (67%) reported that members of the FPO/SHG are given more than a 20% lower rate as a discount, while a minority of respondents (33%) reported that members of the FPC/ SHG are given a 10% lower rate as a discount. This indicates that there are preferential rates or discounts offered to FPC/ SHG members, potentially as a benefit of their membership. These discounts may contribute to the accessibility and affordability of services provided by the organization to its members, promoting their active participation and engagement.

The respondents were asked about the perceived difficulties faced by farmers in accessing the benefits of the warehouse. Among the perceived difficulties faced by farmers, 25% of respondents reported that hiring rates

were very high, indicating that cost could be a barrier for some farmers. Another 25% reported that storage was not made available to all members, suggesting potential access limitations within the community. While 12% reported a shortage of storage capacity, indicating a physical constraint in meeting the storage needs of all farmers. However, most respondents (38%) indicated that they did not face any difficulties in accessing the benefits of the warehouse. Addressing the reported difficulties, such as exploring options to reduce hiring rates, improving access to storage, or expanding storage capacity, could help enhance the effectiveness and inclusivity of the warehouse facility for all farmers. The respondents were asked whether all villagers were able to access/utilize the warehouse facility. Most respondents (67%) reported that not all villagers were able to access/ utilize the warehouse facility, while a few respondents (33%) reported that all villagers were able to access/ utilize the warehouse facility.

The beneficiary respondents were asked whether maintenance activities of the warehouse, such as pest control, were being done by the group/company or not. Most respondents (67%) reported that maintenance activities of the warehouse, including pest control, were being done by the group/ company and 33% of respondents reported that maintenance activities of the warehouse, including pest control, were not being done by the group/ company. This indicated that measures were in place to ensure the upkeep and functionality of the warehouse, which is important for preserving the quality and safety of stored goods. However, it's also important to address any issues or concerns raised by the minority of respondents to ensure the continued effectiveness of the maintenance activities.

4.4.4. Commodity Processing

A total of 10 commodity processing units in the Marathwada region were covered during the survey. The details of the various features of the commodity processing units are as follows:

Table 4.15 Features of Commodity Processing Units of PoCRA-supported FPCs and SHGs

Features of Commodity processing units	FPC Respondents 9	SHG Respondents 1
Soybean	5	-
Cotton	1	-
Turmeric	1	1
Chili	1	-
Milk	1	-
Number of farmers benefitted	285	15
Perceived benefits of warehouse	5	1
Increase in rural employment	1	-
Increase in shelf life of produce	1	1
Will get better access to market	5	1
Will get better price for their produce	5	1
Increase in income	2	-
Do not think will benefit	3	1
Others	4	-
Perceived difficulties in operating CPU		
Lack of supply of raw material	1	-
Electricity unavailable	3	-
Transportation	2	1
Others	3	
Villages aware of facility	9	1
Access to facility	8	1
Maintenance like pest control	8	1
Insured	5	-
Operational condition good	7	1

Ten commodity processing units supported by the project were covered. The most common commodities processed were soybean, cotton, turmeric, chilli, and milk. Nearly 300 farmers benefit from these commodity processing units. The perceived benefits are (i) increase in employment opportunities, (ii) increase in shelf life of produce, (iii) better access to market, (iv) better price realization, and (v) increase in income due to sale of value-added products. Some of the operational constraints faced in managing commodity processing units are pertaining to seasonal supply to raw material, load shedding in electricity supply, and transportation. All respondents shared that villagers were aware and had easy access to the facilities. The units were well maintained for pest control and were found in good operational conditions. However, only 50% units were insured which calls for generating awareness related to insurance.

Key Expert Observations

Godowns/ Storage facilities developed by FPCs have led to the following benefits to the farmers:

1. Reduced spoilage: Proper storage facilities provided through godowns have helped preserve the quality of agricultural produce, reducing spoilage due to pests, moisture, and environmental conditions. FPC operators reported that loss has been minimized to around 4-6 percent from 20-25 percent.

2. Inventory management: Nearly 70% of FPO respondents agreed that effective storage facilities enabled better inventory control.

Commodity processing units developed by FPCs have led to the following benefits to the farmers:

1. Better quality product: Value addition facilities have increased the activities like cleaning, grading, and sorting of produce among farmers thus enabling them to improve the quality of their produce before they market or sell.

2. Better market price realization: Effective processing strategy has given the farmers a comparative advantage and has helped them to fetch a better market price for their produce.

Effectiveness of Storage and Carrier Vans:

1. Market price watch strategy: Storage facilities allow farmers to store their produce after harvest. This strategy helped farmers avoid selling their produce at low prices during times of oversupply, waiting for better market prices.

2. Quality preservation: Storage facilities and carrier vans play a crucial role in perishable goods as they maintain the quality of produce during transportation, reducing spoilage and extending the shelf life of perishables.

3. Seasonal use and operations: Carrier vans experience seasonal peaks during harvest times and the same is the case with storage facilities when commodities are in abundance in the off-season.

Employment Generation:

1. Direct Employment: Management and maintenance of storage facilities, and carrier vans generate direct employment opportunities for individuals involved in handling, operation, and maintenance.

2. Indirect Employment: The enhancement of post-harvest infrastructure creates a ripple effect, generating indirect employment in related sectors like logistics, packaging, quality control, and transportation.

In summary, post-harvest infrastructure such as storage and carrier vans significantly contribute to minimizing wastage, allowing farmers to strategically sell their produce, and preserving the quality of perishable commodities. However, challenges remain, including the need for consistent access to such infrastructure, efficient logistics, and managing market risks for farmers growing perishable goods. Nonetheless, the development of such infrastructure not only reduces waste but also generates employment opportunities both directly and indirectly within the agricultural value chain.

Feedback from FPO Representatives (Marathwada Region)

Agribusiness activities undertaken by FPCs: Out of the 16 interviewed FPCs, 12 were not involved in any kind of agribusiness activity prior to applying for the matching grant from PoCRA. The other six were involved in the activities of procurement, trading of food grains and fruits, clearing and processing of agricultural produce, and some agri-related works. Five FPCs have received grants for multiple activities. Out of these 16 interviewed FPCs, 7 are now engaged in custom hiring centers, 10 are engaged in processing units, 4 FPCs have received support for godown, one for goat breeding, and one for nursery. The FPCs reported the project cost between Rs. 12 to 20 Lakhs. Most FPCs shared that the profit is not shared among the members but utilized for the expansion of the business. Most of the FPCs received grants in the year 2021. Since farm implements are now available through CHCs to members at cheaper rates, farmers are saving up on rent, thereby increasing their economic output. This has made them profitable and improved their standard of living. Also, their extra cost of labour and time is being saved. All the FPCs were satisfied with the support and information they received from the project staff.

Members of the FPO: The farmer's membership in the FPC ranged from 8 to 560 members. Most of the board directors reported that they had taken training for the business at some point after starting the activity. The membership fee varies for being a member of FPC amongst all the FPCs. The membership fee varied from Rs. 100/- to Rs. 1000/-. Out of the total members, it was observed that 10% of members belonged to SC and 7 % belonged to ST. It was also observed that 90% of member farmers belonged to the marginal and small farmer category and 10 % of the farmers were large farmers in the group.

Participation and decision-making: On average, it is reported that all members participate in group meetings conducted by FPCs. Many FPC representatives said that the members expressed their opinions during the decision-making process in the meetings. Efforts are made to encourage the participation of women, the tribal population, and other marginalized groups by providing membership discounts, guidance, and motivation, they have been given priority for membership, and given discounts in services FPCs offer. To increase the participation of vulnerable sections some FPCs gave an additional discount to the farmers on implements and inputs. It was observed that the attendance of members is about 50-60% for meetings.

Financial audit: Out of the 16 interviewed FPCs, only 13 FPCs said that they have made some profit in the last financial year. Despite a request to show the financial audit statements, the data on turnover and profit was shared orally by FPC representatives. Three FPCs have profits above one lakh, nine FPCs, below one lakh and one FPC shared they did not register profit.

Record-keeping: FPC maintained records of registration, attendance, financial transactions, and meeting notes. All the FPCs shared that they have conducted annual audits. The book of records is generally maintained and owned by the secretary or director in most of the FPCs. In some cases, the chairman helps in maintaining the records. 3 FPCs have hired full-time workers to make entries of equipment hiring and other documentation. In all of the FPCs, all of the members were aware of the financial transactions that were happening in the company and most of the farmers could do bank-related work independently. It shows the increase in financial literacy among farmers.

Training and capacity building: The FPCs who received training shared that on average 2-3 directors received the training. Out of the 16 FPCs, 10 FPCs reported that they had taken training after getting the grant. The topics of their training were Market linkages, Grants for hiring machines, Seed Processing, Business Proposal, and Financial Management. The main benefits perceived from the training were reported to be increased knowledge of processing as well as they understood the technical aspects required to run a business. The places of training were Pune, Aurangabad, Jalna, and Beed. Some received training from the nearby ATMA office. The agencies that gave training to members were reported to be Warehousing Corporation, VAMNICOM, and Agriculture University.

Facilities for member farmers at concessional rates: Many FPCs have shared that they give special discounts on services to women members, and members from marginal communities i.e. SC, ST which is generally an additional 10 to 20% less than the actual market rate. Some FPCs shared that they motivate women to increase their participation in the company. In most of the FPCs, the majority of the member farmers use tools for their farming. The members of the CHC delivered services that are

generally 10% less than the market rate. This was observed in the case of Godown also; member farmers pay less for storing their produce in Godown than the market rate. In the case of Custom Hiring Centers, all machinery and tools were found in good condition. Many CHCs have expressed their will to expand their business and purchase some new tools.

Challenges faced: The majority of the FPCs shared that they did not find any specific challenge in fund arrangement as the members have collected the amount for establishing the business. Some FPCs shared they faced it in the beginning. Almost all the FPCs shared that the initial fund for the establishment of the activity was raised by the members. Some FPCs shared that they used their own fund as well as in 2 FPOs took the assistance of a bank loan to raise the money. Many FPOs also expressed the challenge that they are not getting support from banks for the expansion of the business as banks are asking for properties as mortgages. They also suggested that the project should tie up with the banks to raise money for the establishment of the new FPC. The majority of the FPCs became operational within one year of its establishment.

Waste management: Waste management was not the issue in the case of CHCs. In the case of godown and processing units, the FPCs have set up mechanisms to take care of the waste at their level.

Support from project staff: The AAs are the main source of support for the majority of the FPCs. The major support that is received from the project staff as well as the agriculture department is for the preparation of the business proposals, and technical aspects. Many FPCs shared they got good information from the ATMA office and other project staff. Many FPCs suggested, that there should be a tie-up with the banks to raise the money for the establishment of the new FPC or extend the business activities of the existing FPC.

Employment: The number of laborers varies between the type of activity FPCs engaged in. Most of the FPCs hired laborers seasonally. An average of five employees are hired by each FPC. Those FPCs that are engaged in activities that run throughout the year require full-time labour. Other FPCs have 2-3 full-time employees and they hire rest seasonally. The average wage of laborers is between Rs. 300/- to R. 500/- per day.

Economic benefits: In the case of beneficiaries of processing units, the value addition of the grains gives a better price for the agricultural produce of the member farmers which increases their profits and economic well-being. In the case of CHCs, the member farmers can use agriculture tools at less rental value thus reducing their cost of cultivation. It helps them to save money. In the case of Godown, farmers store their produce until they get a good price. It reduces the distress sale of produce and farmers get better market prices for their agricultural produce. Other activities like goat breeding and nursery also contribute to the income level of FPC members.

Social benefits: Due to the CHC, many FPCs expressed that their time has been saved and the problem of laboring has been solved due to CHC tools at reasonable rates. Almost all the FPCs have contributed to generating some employment in the village. Due to this, migration has reduced a bit in the village.

Environmental safeguards and safety: Almost all the FPCs shared they have taken care of the environmental safeguards while conducting the project activity. The project is been built in a safe place. There were toilets and hand-washing facilities at the project site. Ninety percent of the FPCs equipped with fire safety standards and tools. FPC engaged in food-related activity following the food safety standards. There was awareness of water management. One FPC planted trees around the project.

Challenges faced by FPCs: As the implementation of the process was smooth as expressed by FPCs, they have not come across any major problems. Those who faced some challenges mainly were related to market linkage. They shared they need market linkage to sell their goods and need a strong supply chain. Some other challenges were financial, storage, and documents related.

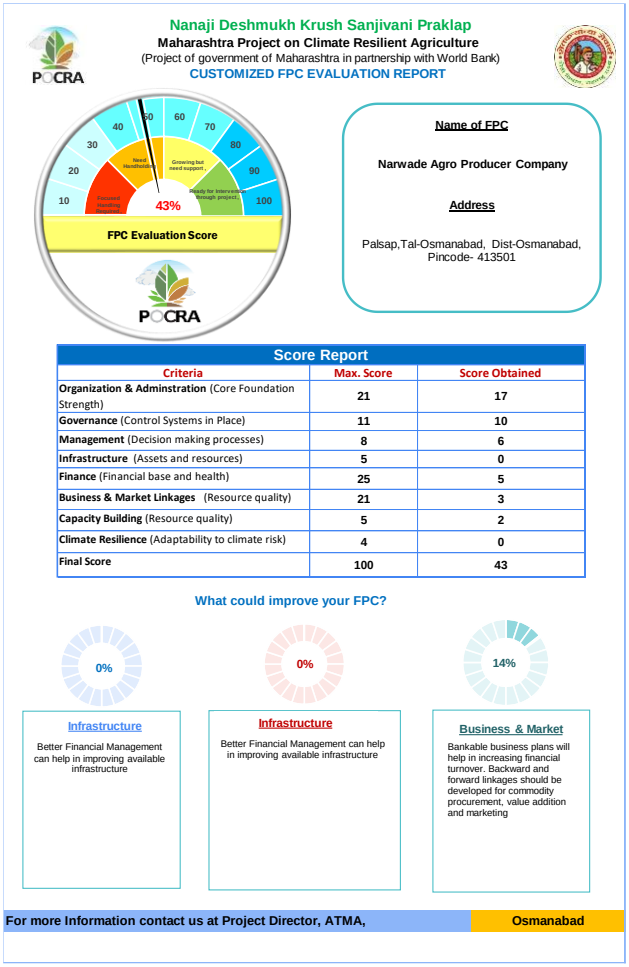
Suggestions: All the FPCs shared they have benefitted a lot due to this project. The grant amount for this project was good. This project should continue for some more time. Some members suggested project should add other agribusiness activities and other components in the next phase. One FPC director suggested the documentation should be easy.

4.5. Pre- and Post-Project Support Situation Assessment of FPCs

PMU has conducted surveys of nearly 1451 FPCs in the project region in two phases i.e., 619 in the first phase in June 2018 and 832 in the second phase in January 2021. In the survey, the data on various aspects of FPC such as its registration, composition of the board of directors, the composition of membership, share capital, working capital, the status of agribusiness activities, business plan, etc. was collected. As of 30 September 2023, a total of 1000 FPCs are supported through PoCRA in the Marathwada region. It was suggested by PMU to assess the situation of PoCRA-supported FPCs which are covered in both the current Concurrent Monitoring round as well as PMU's survey held in 2021. Accordingly, we have identified five FPCs, in Dharashiv, Hingoli, Beed, and Nanded, and have presented a pre-post situation analysis of them as follows.

Narwade Agro Farmer Producer Company, Palsap, Dharashiv

The FPC was established in 2018. It did not conduct any kind of activity before 2018. Now it is engaged in Ropvatika (Nursery). It sells saplings of various fruits and vegetables like tomatoes, brinjal, chili, flowers, etc. at reasonable rates. Before taking the benefits from the project, there used to be 100 members in the FPC, now it has increased to 260 in total which also includes 67 women and 30 members belonging to the SC category. It provides daily employment to 9 people in the village which includes 5 males and 4 females. The total project cost was Rs. 20 lakhs and the project has provided a grant of Rs. 11.96 lakhs. Before taking the benefits from the project, the FPC had no separate place, now it has its own office which is built in a safe place. The pre- and post-project support situation analysis of the FPC using the scorecard below suggests that post-PoCRA support the FPC improved on (i) general administration and operations, (ii) governance, and (iii) financial management. With an overall rating improvement of 25% and better financial management, the FPC shows a better infrastructural capacity to grow and sustain further.



Nanaji Deshmukh Krush Sanjivani Praklap
Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

Name of FPC
Narwade Agro Producer Company
Address
Palsap,Tal-Osmanabad, Dist-Osmanabad, Pincode- 413501

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	17
Governance (Control Systems in Place)	11	10
Management (Decision making processes)	8	6
Infrastructure (Assets and resources)	5	0
Finance (Financial base and health)	25	5
Business & Market Linkages (Resource quality)	21	3
Capacity Building (Resource quality)	5	2
Climate Resilience (Adaptability to climate risk)	4	0
Final Score	100	43

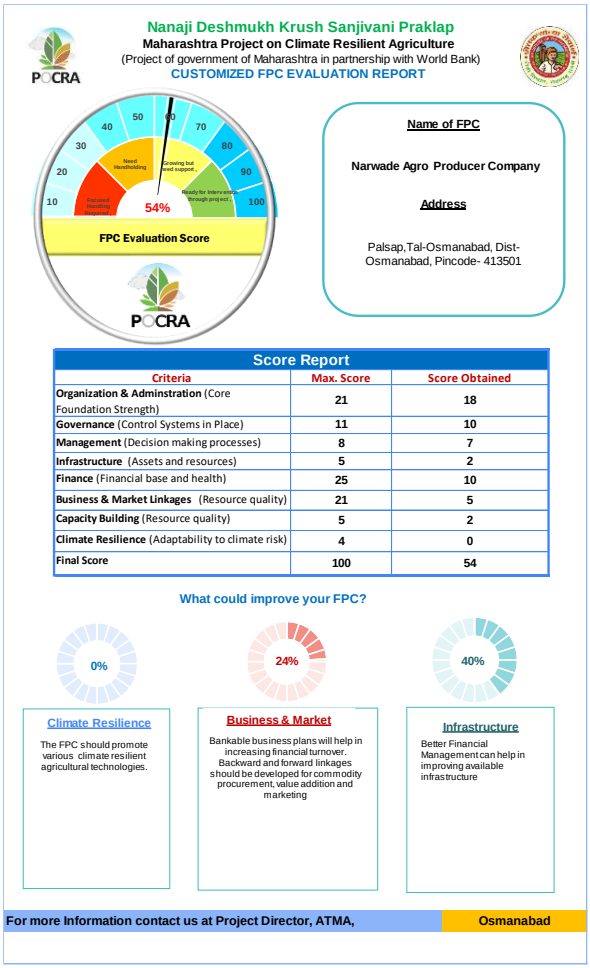
What could improve your FPC?

Infrastructure
Better Financial Management can help in improving available infrastructure

Infrastructure
Better Financial Management can help in improving available infrastructure

Business & Market
Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

For more Information contact us at Project Director, ATMA, Osmanabad



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Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

Name of FPC
Narwade Agro Producer Company
Address
Palsap,Tal-Osmanabad, Dist-Osmanabad, Pincode- 413501

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	18
Governance (Control Systems in Place)	11	10
Management (Decision making processes)	8	7
Infrastructure (Assets and resources)	5	2
Finance (Financial base and health)	25	10
Business & Market Linkages (Resource quality)	21	5
Capacity Building (Resource quality)	5	2
Climate Resilience (Adaptability to climate risk)	4	0
Final Score	100	54

What could improve your FPC?

Climate Resilience
The FPC should promote various climate resilient agricultural technologies.

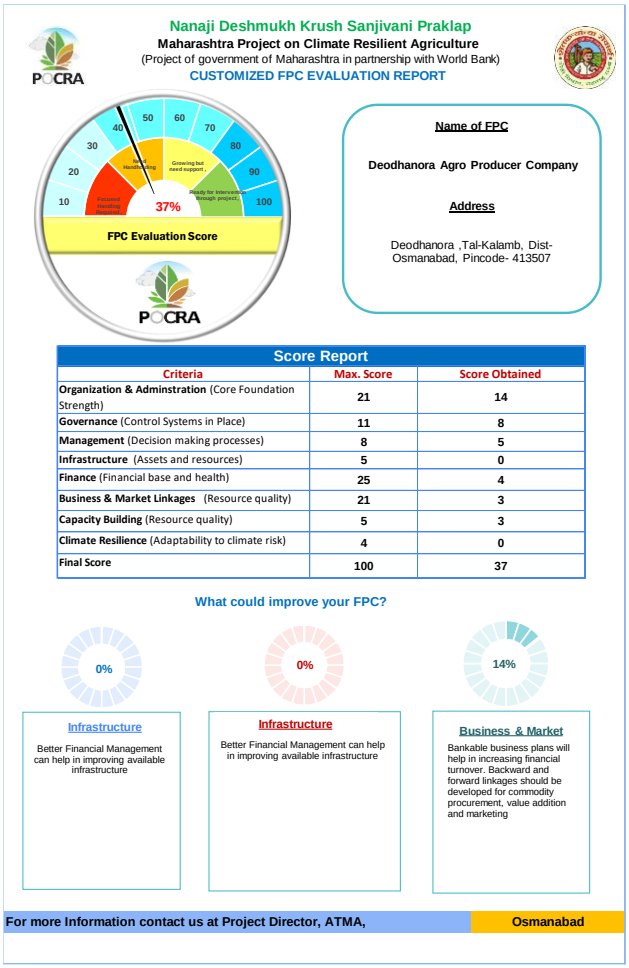
Business & Market
Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

Infrastructure
Better Financial Management can help in improving available infrastructure

For more Information contact us at Project Director, ATMA, Osmanabad

Dev Dhanora Agro Producer Company, Dev Dhanora, Dharashiv

This FPC was established in 2021. It was not engaged in any kind of activity before getting project benefits. After getting support from the project, now it runs a Custom Hiring Centre. When the FPC was formed there were only 10 members in the group. After getting benefits from the project, now it has increased to 277 members which includes men and women. 80% of the members are small and marginal farmers who own less than two hectares of land. The total cost of the project was Rs. 40 lakhs from which FPC got a grant of Rs 20 lakhs from the project. Of the total members, 70 members attended the training on the Custom Hiring Centre and another technical aspect of agriculture. The training has helped them to use more technical knowledge while performing activity business and running CHC more efficiently. This Custom Hiring Centre is now providing agriculture tools and equipment at a discounted rate for members and reasonable rates for non-members. If market rates are Rs. 1000/- per acre, for members it is Rs. 800/ - to Rs. 900/- per acre. It has helped to reduce the cost of cultivation for members, it is very useful for sowing and plowing as said by FPC members and non-members also used at market rates. It also reduces the labour cost and saves time. The FPC director expressed while interviewing to extend the business and purchase some new machine-like thresher, harvester, etc.



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(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

37%
FPC Evaluation Score

Name of FPC
Deodhanora Agro Producer Company
Address
Deodhanora ,Tal-Kalamb, Dist-Osmanabad, Pincode- 413507

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	14
Governance (Control Systems in Place)	11	8
Management (Decision making processes)	8	5
Infrastructure (Assets and resources)	5	0
Finance (Financial base and health)	25	4
Business & Market Linkages (Resource quality)	21	3
Capacity Building (Resource quality)	5	3
Climate Resilience (Adaptability to climate risk)	4	0
Final Score	100	37

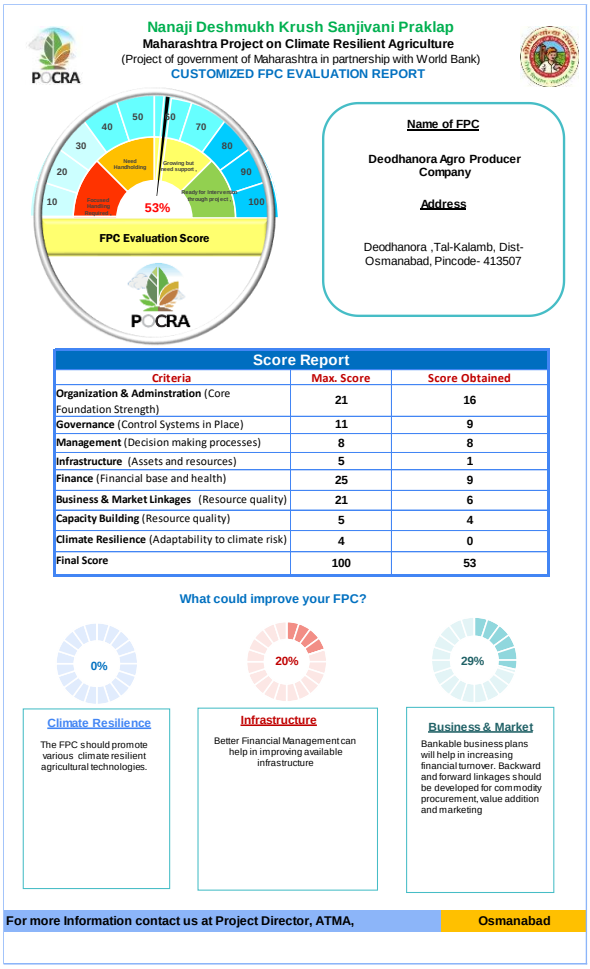
What could improve your FPC?

0% Infrastructure: Better Financial Management can help in improving available infrastructure

0% Infrastructure: Better Financial Management can help in improving available infrastructure

14% Business & Market: Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

For more Information contact us at Project Director, ATMA, Osmanabad



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Maharashtra Project on Climate Resilient Agriculture
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CUSTOMIZED FPC EVALUATION REPORT

53%
FPC Evaluation Score

Name of FPC
Deodhanora Agro Producer Company
Address
Deodhanora ,Tal-Kalamb, Dist-Osmanabad, Pincode- 413507

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	16
Governance (Control Systems in Place)	11	9
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	1
Finance (Financial base and health)	25	9
Business & Market Linkages (Resource quality)	21	6
Capacity Building (Resource quality)	5	4
Climate Resilience (Adaptability to climate risk)	4	0
Final Score	100	53

What could improve your FPC?

0% Climate Resilience: The FPC should promote various climate resilient agricultural technologies.

20% Infrastructure: Better Financial Management can help in improving available infrastructure

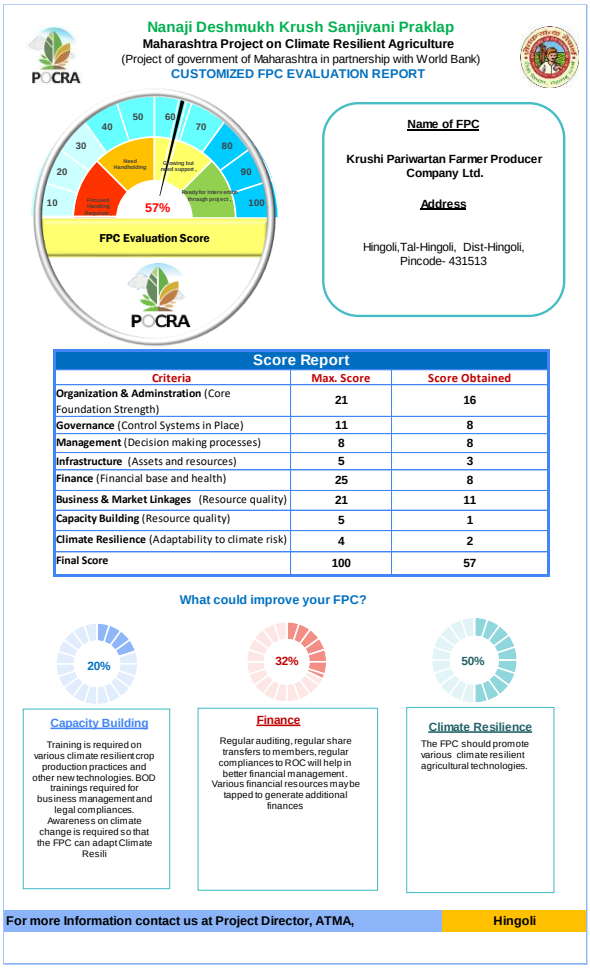
29% Business & Market: Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

For more Information contact us at Project Director, ATMA, Osmanabad

The pre- and post-project support situation analysis of the FPC using the scorecard above suggests that post-PoCRA support the FPC improved on (i) general administration and operations, (ii) governance, (iii) decision-making processes, (iv) financial management, and (v) market linkages. With an overall rating improvement of 43% and better finance and market management, the FPC is strengthened to prepare bankable business plans to expand further.

Krishi Pariwartan Farmer Producer Company Ltd, Hingoli

This FPC was established in 2020, and it was registered under ATMA in the same year. Before getting the support from the PoCRA project, it used to sell crop produce of farmers directly in the market after collecting the produce of all the farmers. It has a license to sell and purchase agriculture from the concerned authority. It is also used to provide information on the market rates of all the crops. Now this FPC is also engaged in processing unit activity after getting support from the project. It a runs Milk Processing Unit in their village. It collects milk from the farmers, processes it in the unit, and different kinds of items made to sell in the market. There is a total of 305 members in the group which consists of males and females. More than 100 members have increased at the time of getting benefits from the project. The despite being financial statements audited, verbal information was provided at the time of the interview. FPC makes Rs. 40000/- of profit every month from processing milk. As said by the FPC members, in the year 2021-22 its has generated a profit of Rs 5 lakhs and in 2022-23 it made Rs. 6 lakhs of profit. There are 8 full-time workers in the company, of which 8 are males and one is female. This employment is all through the year. The FPC has hired a clerk to keep records like Inward of Milk and Outward of prepared goods, sales and purchase of the goods, and financial transactions. The total cost of the project was Rs. 20 lakhs of which Rs.11.81 lakh FPC received support from the project. The FPC gives a 15% discount for members and a 5% discount for non-members for processing milk. Processed milk gets a good price in the market. The director of the FPC said they are planning to build a godown to support this processing unit. The unit follows the food safety standards. Due to the milk processing unit, some people get employment, and due to this they do not have to migrate to other places, farmers get good prices for their milk and as processed milk gets good prices, the members also get the economic benefits from the processing unit.



Nanaji Deshmukh Krush Sanjivani Praklap
Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

FPC Evaluation Score: 57%

Name of FPC
Krushi Pariwartan Farmer Producer Company Ltd.
Address
Hingoli,Tal-Hingoli, Dist-Hingoli, Pincode- 431513

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	16
Governance (Control Systems in Place)	11	8
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	3
Finance (Financial base and health)	25	8
Business & Market Linkages (Resource quality)	21	11
Capacity Building (Resource quality)	5	1
Climate Resilience (Adaptability to climate risk)	4	2
Final Score	100	57

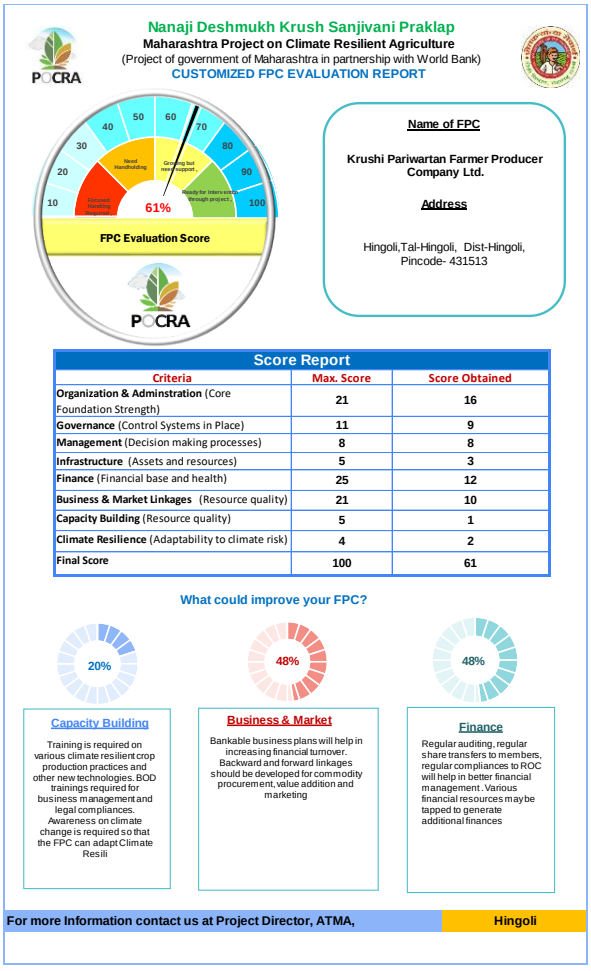
What could improve your FPC?

20% — Capacity Building: Training is required on various climate resilient crop production practices and other new technologies. BOD trainings required for business management and legal compliances. Awareness on climate change is required so that the FPC can adapt Climate Resili

32% — Finance: Regular auditing, regular share transfers to members, regular compliances to ROC will help in better financial management. Various financial resources maybe tapped to generate additional finances

50% — Climate Resilience: The FPC should promote various climate resilient agricultural technologies.

For more Information contact us at Project Director, ATMA, Hingoli



Nanaji Deshmukh Krush Sanjivani Praklap
Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

FPC Evaluation Score: 61%

Name of FPC
Krushi Pariwartan Farmer Producer Company Ltd.
Address
Hingoli,Tal-Hingoli, Dist-Hingoli, Pincode- 431513

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	16
Governance (Control Systems in Place)	11	9
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	3
Finance (Financial base and health)	25	12
Business & Market Linkages (Resource quality)	21	10
Capacity Building (Resource quality)	5	1
Climate Resilience (Adaptability to climate risk)	4	2
Final Score	100	61

What could improve your FPC?

20% — Capacity Building: Training is required on various climate resilient crop production practices and other new technologies. BOD trainings required for business management and legal compliances. Awareness on climate change is required so that the FPC can adapt Climate Resili

48% — Business & Market: Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

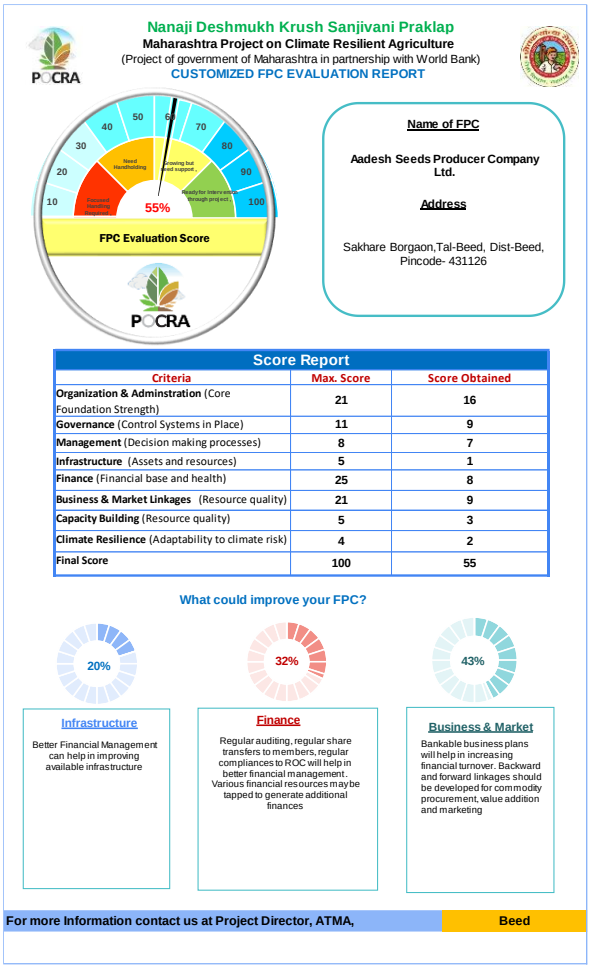
48% — Finance: Regular auditing, regular share transfers to members, regular compliances to ROC will help in better financial management. Various financial resources maybe tapped to generate additional finances

For more Information contact us at Project Director, ATMA, Hingoli

The pre- and post-project support situation analysis of the FPC using the scorecard above suggests that post-PoCRA support the FPC improved on financial management. The overall rating improved by 4 points, however, FPC needs to build capacities to improve on general administration and operations of the activity.

Aadesh Seeds Agro Producer Company Ltd., Sakhare Borgaon, Beed

This FPC has been established in 2020. Before getting the support from PoCRA it was not engaged in any activity. Now it runs a processing unit and processes soybean and gram two major crops from the village, where cleaning and grading is carried out. This value addition gives them a good price in the market. The total cost of the project is Rs. 20 lakhs, from which about Rs. 12 lakhs is received as a grant from the project. It has received a grant in May 2022. Around 50+ members have been increased after getting support from PoCRA. Now it has 110 members in total which comprises both males and females. 80% of the members in the group come from small and marginal farmer backgrounds. At the time of the interview, after asking they showed the documents, which reported the turnover for the year 2021-22 is Rs. 7.5 lakhs and made a profit of Rs. 25000/- and in the year 2022-23, its turnover is Rs. 7.5 lakhs and made a profit of Rs. 31522/-. This FPC has computer and internet facilities and has a private market license. There are 3 full-time workers in the company which are all males. The company provides them employment for 30 days and they earn Rs. 400 per day. When the FPC was established, 20 members of the company attended training on seed Processing through ATMA. It is helping them in crop value addition and reducing the loss. This FPC has contributed to generating employment, saving time, reducing costs, and increasing the economic conditions of the farmer members.



Nanaji Deshmukh Krush Sanjivani Praklap
Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

FPC Evaluation Score: 55%

Name of FPC: Aadesh Seeds Producer Company Ltd.

Address: Sakhare Borgaon,Tal-Beed, Dist-Beed, Pincode- 431126

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	16
Governance (Control Systems in Place)	11	9
Management (Decision making processes)	8	7
Infrastructure (Assets and resources)	5	1
Finance (Financial base and health)	25	8
Business & Market Linkages (Resource quality)	21	9
Capacity Building (Resource quality)	5	3
Climate Resilience (Adaptability to climate risk)	4	2
Final Score	100	55

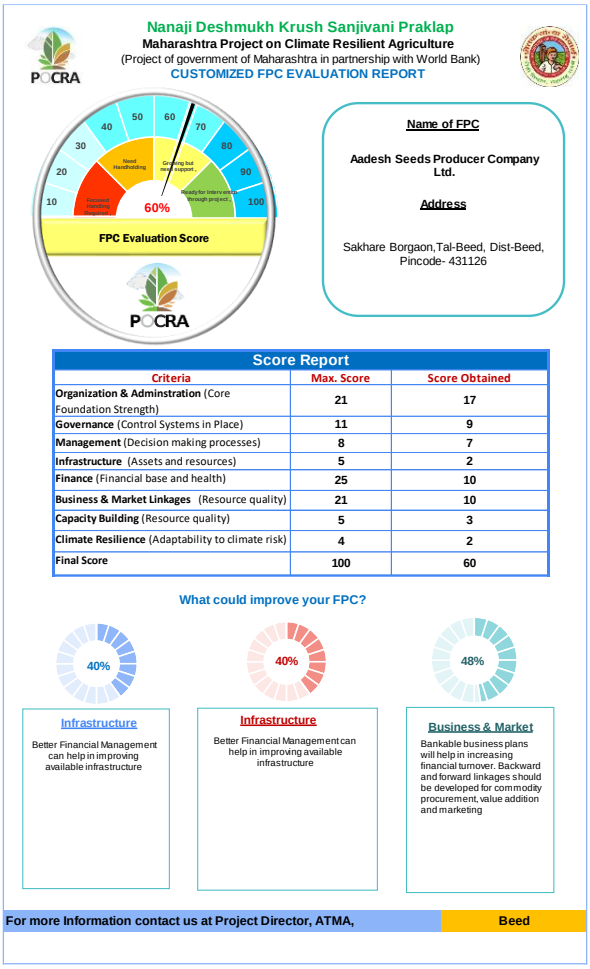
What could improve your FPC?

20% — Infrastructure: Better Financial Management can help in improving available infrastructure

32% — Finance: Regular auditing, regular share transfers to members, regular compliances to ROC will help in better financial management. Various financial resources may be tapped to generate additional finances

43% — Business & Market: Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

For more Information contact us at Project Director, ATMA, Beed



Nanaji Deshmukh Krush Sanjivani Praklap
Maharashtra Project on Climate Resilient Agriculture
(Project of government of Maharashtra in partnership with World Bank)
CUSTOMIZED FPC EVALUATION REPORT

FPC Evaluation Score: 60%

Name of FPC: Aadesh Seeds Producer Company Ltd.

Address: Sakhare Borgaon,Tal-Beed, Dist-Beed, Pincode- 431126

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	17
Governance (Control Systems in Place)	11	9
Management (Decision making processes)	8	7
Infrastructure (Assets and resources)	5	2
Finance (Financial base and health)	25	10
Business & Market Linkages (Resource quality)	21	10
Capacity Building (Resource quality)	5	3
Climate Resilience (Adaptability to climate risk)	4	2
Final Score	100	60

What could improve your FPC?

40% — Infrastructure: Better Financial Management can help in improving available infrastructure

40% — Infrastructure: Better Financial Management can help in improving available infrastructure

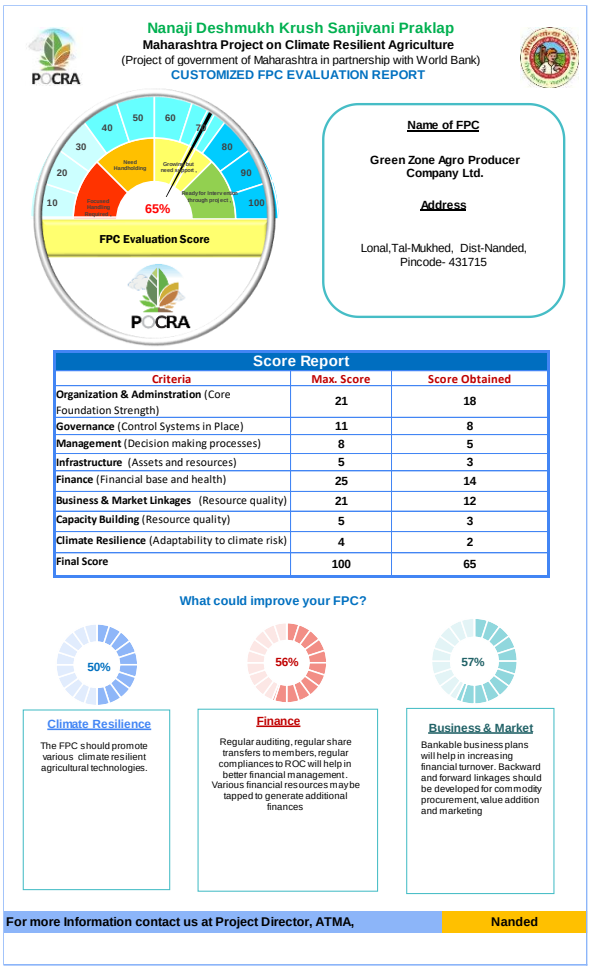
48% — Business & Market: Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing

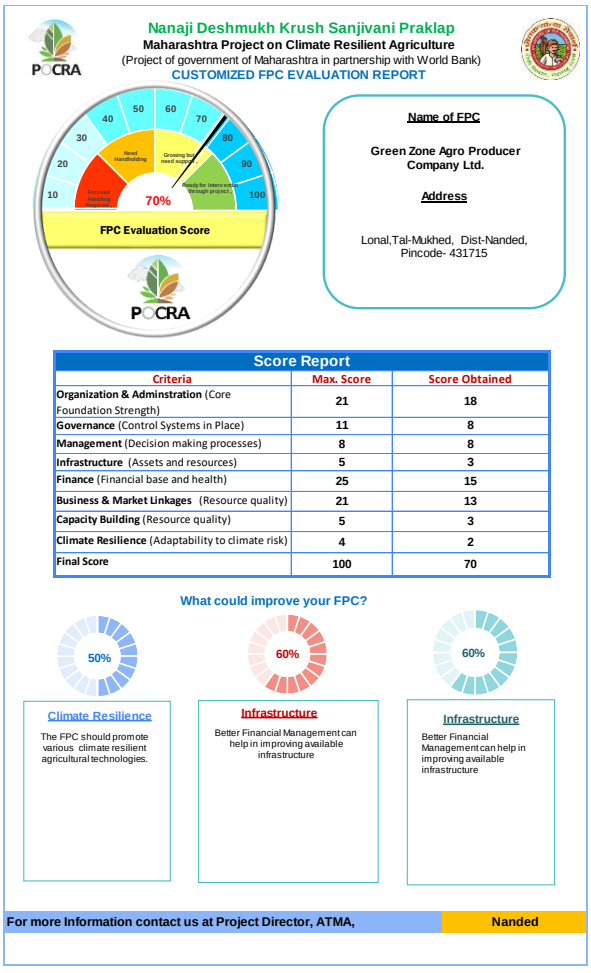
For more Information contact us at Project Director, ATMA, Beed

The pre- and post-project support situation analysis of the FPC using the scorecard above suggests that post-PoCRA support the FPC improved on (i) general administration and operations, (ii) governance, (iii) decision-making processes, (iv) financial management, and (v) market linkages. With an overall rating improvement of 5 points and better finance and market management, the FPC is strengthened to prepare bankable business plans to expand further.

Greenozone Agro Producer Company Limited, Lonal, Nanded

Since its inception in 2019, the FPC struggled to turn a profit in marketing agricultural products. However, with crucial support from the PoCRA project the FPC successfully established a Godown. This strategic move not only enabled the FPC to forge robust connections with markets but also created opportunities for negotiating competitive prices. Charging a reasonable rent of 5 Rs per quintal for both members and non-members, the FPC primarily focused on storing soybeans, boasting a capacity of 150 metric tons fully utilized for four months annually. The FPC, comprising 1000 members (350 females and 650 males), witnessed a notable increase in membership by over 100 individuals after getting support from the project. The project cost was Rs 20 lakhs from which around Rs 12 lakh support was received from the project. The FPC achieved a turnover of Rs 3 lakh and a profit of Rs 50000/- in the financial year 2021-22. The profit in the financial year 2022-23 stands at Rs 20000/-. The cooperative employs two full-time workers, with an additional four hired during peak seasons, employing for 30 days a month at a wage of Rs 500 per day. Two members attended training in CSN, focusing on market linkage and seed processing, resulting in a more technical and efficient approach to their operations. Buoyed by these successes, the FPC is now contemplating expanding its business by establishing a processing unit. This strategic move aims to not only generate employment opportunities for the youth but also provide farmers with a secure storage facility. Moreover, the value-added processing promises financial benefits for the farmers, marking a significant step towards sustainable and profitable agricultural practices.





The pre- and post-project support situation analysis of the FPC using the scorecard above suggests that post-PoCRA support the FPC improved on (i) general administration and operations, (ii) governance, (iii) decision-making processes, (iv) financial management, and (v) market linkages. With an overall rating improvement of 5 points and better finance and market management, the FPC is strengthened to prepare bankable business plans to expand further.

5. Institutional Development, Knowledge, and Policy for a Climate-resilient Agriculture

5.1. Village Climate Resilient Management Committee (VCRMC)

Marathwada Region

1. Implementation

a. Individual Benefits

i. Micro-Irrigation Systems (Drip, Sprinkler, Pumps, Pipes)

The adoption of micro-irrigation systems such as drip and sprinkler systems has been widely reported across multiple villages, highlighting a trend towards more efficient irrigation techniques. These systems are utilized as part of the committee's strategy to foster climate-resilient agricultural practices within the village. Farmers are increasingly adopting drip and mist irrigation systems, which contribute to water conservation and enhance water use efficiency.

Benefits of Micro-Irrigation:

- **Water access and efficiency:** The implementation of drip and sprinkler irrigation has led to significant water savings, facilitating more efficient use of this vital resource. The shift to micro-irrigation has been noted for its role in conserving water.
- **Crop yield:** Efficient water use has been linked with increased crop yields, allowing farmers to get more produce with less water, demonstrating the effectiveness of these systems.
- **Income stability:** The improved water availability and crop yield from micro-irrigation have contributed to increased income stability for farmers, indicating a positive impact on their livelihoods.

Challenges:

- Despite these benefits, there have been notable challenges in the adoption of micro-irrigation systems. Key issues include delays in grant disbursements due to budgetary constraints, which have hindered the timely installation of these systems.
- Financial challenges have been a significant barrier, with some farmers unable to start work even after obtaining prior consent due to financial difficulties. This points to the need for improved support mechanisms to enable farmers to capitalize on the benefits of micro-irrigation systems.

ii. Access to water for irrigation (Individual farm pond, Open dug well)

The project's initiatives have led to marked improvements in water access and availability for irrigation, as evidenced by reports from the community. The introduction of individual farm ponds and open-dug wells has been instrumental in this achievement, allowing for better water management practices. With the implementation of the project, an efficient use of water has been initiated, which underscores the success of these interventions in addressing water scarcity challenges. The efforts to enhance water access reflect a strategic approach to resource management, ensuring that farmers can reliably irrigate their crops and thus contribute to the overall goal of creating a sustainable and climate-resilient agricultural sector.

iii. Plantation (Horticulture, Agroforestry)

The VCRMC has been fostering plantation activities with a particular emphasis on tree planting as a core component of their climate-resilient village initiatives. This approach underlines the project's commitment to environmental sustainability and the acknowledgement of the critical role of forestry in climate mitigation. Encouraging farmers to plant trees as a committee-driven activity serves multiple objectives: it enhances the green cover, contributes to the ecological balance, and potentially opens up new avenues for economic benefits within the community. These efforts are indicative of a practical engagement with agroforestry principles, aiming to interlace the environmental benefits of tree cultivation with the existing agricultural practices, thereby fostering a more integrated and sustainable approach to rural development.

iv. BBF & Zero tillage

The Village Climate Resilient Management Committees (VCRMC) have actively integrated Broad Bed Furrow (BBF) alongside drip and frost irrigation into their agricultural practices as part of a concerted effort to make villages more climate resilient. This adoption is a clear result of the VCRMC's and community members' engagement in the micro-planning process, where these methods are being strategically included in village development plans. The use of BBF, in conjunction with drip and frost irrigation, is being extensively implemented to align with water budget needs. Specifically, the BBF method is promoted through awareness projects, encouraging farmers to utilize frost irrigation on a larger scale. These practices are not only aimed at enhancing water balance and addressing the adverse impacts of climate change but also at improving water access and availability for agricultural use. Additionally, there is evidence to suggest that the implementation of BBF, along with drip and frost irrigation, has led to an improvement in crop yields, indicating a positive impact on agricultural production. The widespread adoption of these methods, driven by the VCRMC, underscores a commitment to adopting sustainable agricultural techniques that contribute to the overarching goal of creating climate-resilient communities.

v. Farm mechanization

Farm mechanization has seen a wide embrace in the realm of irrigation, with significant efficiency gains, particularly in reducing the labour and time required for irrigation tasks. The transition to mechanized irrigation systems like drip irrigation has been a game-changer, drastically cutting down the time needed to irrigate fields. What previously took eight days to irrigate one and a half acres of land, now only takes six hours, showcasing the transformative impact of these systems on farming operations.

Benefits of Farm Mechanization:

- **Water access and efficiency:** The switch to mechanized systems, such as drip irrigation, has not only improved the efficiency of water use but has also contributed to better water management overall. By optimizing water usage, these systems ensure that water is available when and where it's most needed, enhancing overall agricultural productivity.
- **Income stability:** The efficiency gains from farm mechanization extend beyond water savings. By reducing the costs associated with labour and time in farming operations, mechanization has contributed to a more stable income for farmers. The reduction in resource expenditure and the ability to manage larger areas with less effort mean that farmers can expect a more predictable and stable financial return.

In summary, the adoption of farm mechanization within the scope of the VCRMC's initiatives presents a clear pathway to more efficient, sustainable, and profitable farming practices. The benefits observed from the implementation of these technologies reinforce the VCRMC's commitment to enhancing agricultural productivity while promoting climate resilience.

vi. FFS technologies

The VCRMC has facilitated the adoption of various climate-resilient technologies and practices through capacity-building initiatives. This includes training for members, which has been delivered through online platforms, to ensure the wide dissemination and adoption of these practices. Such technologies and practices encompass the deepening of drains, strategic felling of trees to manage forest resources responsibly, and the planting of a maximum number of trees to enhance green cover. Additionally, proper disposal methods for empty pesticide bottles have been introduced to minimize environmental damage, reflecting a holistic approach to incorporating sustainable agriculture practices.

Challenges in adoption: Despite the progress, a significant challenge identified is the lack of adequate training for subject members, particularly in the administrative, financial, and knowledge aspects that are crucial for the sustainability of these practices. This gap indicates the need for enhanced training programs that can build comprehensive capabilities among the VCRMC members.

Mitigation strategy: To overcome these challenges, the document underscores the necessity for detailed information about the project and specific training on the components to be implemented. It suggests

developing a structured training model that would enable a smooth transition between the outgoing and incoming committee members, thus ensuring the continuity and long-term sustainability of the climate-resilient technologies and practices initiated by the VCRMC.

b. Individual Benefits

i. NRM

Benefits of NRM Activities:

- **Water Access and Availability:** NRM activities have been undertaken across various villages to improve water access and efficiency. While these activities have not significantly increased groundwater levels, a positive impact on water availability for irrigation has been noted. This indicates that the irrigation benefits observed may be partially attributed to the NRM efforts undertaken as part of the project.
- The documentation of farmers using frost and the incorporation of drip irrigation and sprinklers supports the assertion that NRM strategies have contributed to more efficient water use and increased water availability. Such improvements are crucial for sustainable agriculture, especially in regions that face water scarcity or erratic rainfall patterns.

Reflections on NRM Impact:

- The mixed results of NRM activities, as mentioned in the VCRMC document, suggest that while there have been improvements in water efficiency and availability, there is room for further enhancing the effectiveness of these strategies. The acknowledgement of improved irrigation facilities for some community members under the PoCRA initiative reflects a selective but tangible advancement in managing water resources.
- The increased use of efficient irrigation systems like drip and sprinkler setups since the project's inception underscores a positive trend towards better water management practices, likely influenced by NRM efforts. However, the acknowledgment that groundwater levels have not increased significantly also highlights the complexity of water management in rural settings and the need for a comprehensive approach to NRM that addresses both surface and subsurface water resources.

These insights from the VCRMC FGD point to the necessity of continuing and expanding NRM activities to further enhance water conservation and management, which are essential for the resilience and sustainability of agricultural communities.

ii. CFP

Benefits of CFP initiatives:

- **Water access and availability:** There is an indication of a notable improvement in groundwater levels, with a specific mention that the groundwater level was at 83 percent for the year. This suggests that since the commencement of PoCRA, which includes CFP initiatives, there has been a positive change in water access and availability. The extensive use of drip irrigation, as part of these initiatives, has contributed significantly to water conservation. Furthermore, the creation of water storage on farms has also been cited as a factor in the increased availability of water, demonstrating the effectiveness of CFP in enhancing water resources for agricultural use.

Reflections on groundwater impact:

- Despite these positive reports, there are also observations suggesting that the overall groundwater levels in the villages have not seen a substantial increase. This highlights the challenges faced in water management and the need for a more impactful approach within the NRM and CFP strategies. The mention of ongoing NRM work in the village indicates a continued commitment to improving water management practices, yet it also reflects the complex nature of increasing groundwater levels which may require long-term, sustained efforts.

The insights from the VCRMC FGD underscore the importance of CFP initiatives in improving water management for agriculture. They also highlight the complexity of groundwater management, suggesting that while certain practices have been beneficial, there is a need for ongoing efforts to achieve significant changes in groundwater levels across the villages.

iii. FPC

Mitigation strategy for FPC:

- **Training and capacity building:** A key strategy for the FPC involves providing comprehensive training to its members. This training is tailored to equip the members with diverse skills and knowledge essential for managing and sustaining the VCRMC's functions effectively. The focus on capacity building is aimed at ensuring that the members are well-versed in various aspects of agricultural management, including climate-resilient practices and effective micro-planning.
- **Awareness and micro-planning:** Creating awareness among farmers is another pivotal component of the mitigation strategy. By enhancing farmers' understanding of the benefits and practices of sustainable agriculture, the VCRMC aims to encourage proactive participation and informed decision-making at the community level.
- **Financial support:** Financial backing is recognized as a critical factor for the success of the FPC. The provision of financial support helps to ensure that the VCRMC and its associated FPCs have the necessary resources to implement their projects and strategies successfully. This support can take various forms, from grants to micro-financing options, all intended to bolster the economic viability of the farmers' initiatives.

The strategies implemented by the VCRMC for the FPC highlight a multi-faceted approach to strengthen the agricultural community. By combining training, planning, and financial support, the VCRMC endeavors to maintain its sustainability and extend tangible benefits to the farmers it serves. This holistic approach is designed to foster a resilient agricultural sector capable of adapting to changing environmental and economic conditions.

iv. SHG

Challenges for SHGs:

- **Grant disbursement delays:** One of the primary challenges highlighted for SHGs under the Nanaji Deshmukh Project is the delay in the distribution of grants. Timely financial support is critical for the smooth operation and success of SHG initiatives, and these delays can significantly impede their activities and the delivery of benefits to their members.
- **Discontinuation of project activities:** The discontinuation of certain components within the project has also been identified as an obstacle. Restarting these components could potentially enhance the impact and reach of SHG activities.
- **Lack of training of VCRMC members:** The absence of adequate training for VCRMC members, particularly in administrative and financial management, is another concern. This lack of capacity building can affect the overall effectiveness and sustainability of SHGs, which often rely on the guidance and support of VCRMC members.

Mitigation strategy for SHGs:

- **Training and awareness:** To mitigate these challenges, the document suggests that training should be provided to both VCRMC members and SHG members on creating awareness about the components of the PoCRA project. Such training would empower them to better understand and manage their projects, leading to improved outcomes.
- **Strengthening capacities:** The focus on training for committee members is aimed at equipping them with the necessary skills to effectively lead and manage SHGs. By enhancing their administrative and financial capabilities, VCRMC members can provide more robust support to SHGs, thereby ensuring their functionality and sustainability.

The mitigation strategies recommended in the VCRMC FGD emphasize the importance of capacity building and awareness-raising as key steps towards overcoming the challenges faced by SHGs. Through targeted training and the revival of discontinued project components, SHGs can be better positioned to fulfill their objectives and contribute more effectively to the community's development.

2. Capacity building

Training received:

- **Women members training:** A notable aspect of the capacity-building efforts is the specific mention of training provided to women members of the committee. This indicates a focus on inclusive development and the empowerment of women in committee roles.
- **VCRMC member training:** There is also a mention of training conducted to strengthen the capacity of VCRMC members in administrative finance and general knowledge. This training is geared towards ensuring the sustainability of the VCRMC's initiatives, highlighting the importance of equipping members with the necessary skills to manage and lead effectively.

Type, content, duration, frequency of training:

- While the FGDs reference training in administrative finance and knowledge, as well as using climate-resilient agricultural technologies, specific details about the type, content, duration, and frequency of these training are not provided in the document.
- The mention of training in areas such as "community improvement," "climate sustainability," "adaptation," "agricultural technology knowledge," and "financial literacy" suggests a broad and holistic approach to capacity building. These areas cover a wide range of skills and knowledge essential for effective community management and sustainable agricultural practices.

The capacity-building efforts as part of the VCRMC initiatives reflect a commitment to developing a well-informed and skilled committee capable of leading sustainable and effective agricultural and community development projects. The focus on diverse training areas, including the specific mention of training for women, underscores the inclusive and comprehensive approach to capacity building within the VCRMC framework. However, the lack of detailed information about the training's specifics points to an area where more structured and documented approaches could further enhance the effectiveness of these capacity-building initiatives.

3. Social lens

Participation of vulnerable social categories:

- **Targeted inclusion efforts:** The FGDs mention efforts to include vulnerable social groups like Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBCs), and Nomadic Tribes (NT) in the project activities. This includes organizing community engagement activities like Prabhat Pheri, Chavadi Meetings, Gram Sabha, and home visits, particularly to poor families, scheduled castes, tribals, widows, and shopkeepers. These efforts suggest a conscious attempt to bring together eligible farmers, including those who have not completed their work even with prior consent, indicating a targeted approach to ensure broad-based participation.
- **Challenges in ensuring participation:** Despite these efforts, the FGDs highlight challenges in ensuring the participation of certain vulnerable groups, particularly landless tribal communities. The absence of land ownership among these tribal communities has resulted in them not benefiting from the PoCRA project. This underscores a significant challenge in making project benefits accessible to all community members, regardless of their land ownership status.

Challenges faced:

- The primary challenges mentioned relate to the difficulties in integrating landless tribal communities into the project. This highlights a critical gap in the project's outreach and impact, indicating the need for strategies that can effectively include landless and marginalized groups. Addressing these challenges is essential to ensure equitable access to the project's benefits and to achieve the overarching goal of inclusive development.

The information from the VCRMC FGDs points to both the efforts made and the challenges encountered in ensuring the participation of vulnerable social categories in the project activities. While there are targeted initiatives to include various disadvantaged groups, the challenge of integrating landless tribal communities remains a significant hurdle, calling for more inclusive and adaptive strategies to ensure that the benefits of the project reach all segments of the community.

4. Gender Lens

Participation of women farmers:

- **Active participation in decision-making:** Women members of the committee are actively involved in decision-making processes and express their opinions in meetings. This active participation signifies the project's commitment to gender inclusivity and the empowerment of women in leadership roles within the community.
- **Engagement in community activities:** Efforts to engage women farmers in various activities are evident. The document mentions initiatives like Prabhat Pheri, Chavadi Meetings, and Gram Sabha, where women farmers are brought together to participate actively. This engagement is crucial for ensuring that the perspectives and needs of women are adequately represented in project planning and implementation.

Challenges faced:

- **Need for capacity building:** A significant challenge identified is the need for more training and capacity building among women members. Specifically, there is a need to enhance their knowledge in areas like climate-resilient technologies. This gap in training indicates the potential for further improving the effectiveness and quality of women's contributions to the committee work.

Mitigation strategies:

- **Training and empowerment:** To address these challenges, the mitigation strategy includes providing capacity-building training to women committee members. This training would cover various aspects such as agricultural technology, financial literacy, and sustainable practices. By empowering women farmers with this knowledge and skills, the aim is to improve their participation and effectiveness in the project activities, thereby enhancing the overall quality of committee work.

The information from the VCRMC FGDs underscores the importance of women's participation in the decision-making processes of agricultural and community development. While women are actively involved, the need for additional training and capacity building is clear. The outlined mitigation strategies focus on empowering women members with the necessary skills and knowledge to play a more effective role in the VCRMC's initiatives, ultimately contributing to more equitable and effective community development.

5. Resilience

Awareness of climate change and environmental safeguards:

- **Raising awareness:** Efforts to raise awareness among farmers about climate change and environmental issues are significant. Activities like Prabhat Pheri, Chavadi Meetings, Gram Sabha, and home visits have been utilized as platforms to disseminate information and increase awareness about the project's environmental objectives.
- **Environmental protection actions:** The FGDs highlight proactive steps taken towards environmental protection, such as water logging management, water harvesting, and tree planting. These actions demonstrate a commitment to adopting climate-resilient practices and safeguarding the environment.
- **Climate-resilient measures:** Meetings and guidance sessions have been organized to promote climate-resilient activities. The planting of trees and deepening of drains as part of these efforts indicate a proactive approach to environmental conservation and adaptation to climate change.

Development of coping mechanisms for climate vulnerabilities:

- The implementation of activities like tree planting, water harvesting, and proper water budgeting is indicative of the development of coping mechanisms to address climate vulnerabilities. These actions represent a broader strategy aimed at enhancing environmental sustainability and building climate resilience. By adopting these practices, the VCRMC is actively working towards creating a more sustainable and climate-resilient agricultural environment.

The insights from the VCRMC FGDs underscore the importance of increasing awareness and taking proactive measures for environmental conservation and climate change adaptation. The development of coping mechanisms to address climate vulnerabilities is a key aspect of these efforts, reflecting the VCRMC's commitment to fostering a resilient agricultural community that is better equipped to handle the challenges posed by a changing climate.

6. Sustainability

a. Behavioral change observed:

- **Adoption of climate-resilient practices:** There is a clear indication of a behavioral shift among villagers towards adopting climate-resilient agricultural practices. The widespread adoption of systems like drip irrigation, frost irrigation, farm lakes, and the BBF system, as driven by the committee, showcases this change. This shift is crucial for making the villages more climate-resilient and sustainable.
- **Proactive climate change response:** Meetings and guidance sessions organized by the committee to address climate change demonstrate an active response to environmental challenges. Activities like tree planting and deepening of drains as part of the strategy to meet water budget requirements reflect a proactive approach to adapt to and mitigate the effects of climate change.

b. Extent to which capacities are enhanced and further scope for improvement:

- **Satisfaction with current measures:** There is a degree of satisfaction expressed regarding the beneficiary priority given by Direct Benefit Transfer (DBT) applications, indicating that some of the current measures are effective.
- **Need for further training and capacity building:** Despite this, there is a recognized need for further training and capacity building, particularly among women members of the committee. This suggests that while progress has been made, there is still significant room for improvement in enhancing the skills and knowledge of committee members to effectively manage and sustain climate-resilient agricultural practices.

The VCRMC FGDs highlight the progress made in shifting behaviors towards more sustainable and climate-resilient agricultural practices. However, it also points to the need for ongoing efforts in capacity building, especially for women members, to ensure the long-term sustainability and effectiveness of these initiatives. This dual focus on behavioral change and capacity enhancement is key to building a robust, climate-resilient agricultural system that can withstand and adapt to environmental challenges.

Feedback from Krishi Tai (KT)

(Marathwada Region)

Most Krishi Tai's expressed that this is their first experience working on a project. They are seriously involved in their role indicating a dedication. Some participants mention additional engagements, such as working with women's Self-Help Groups, either as members or in leadership roles like president or secretary.

The responses from Krishi Tai indicate a varied timeframe for when the participants began working on the project, ranging from 2018 to 2023. The majority of respondents joined in the year 2021, highlighting a relatively recent involvement. One participant mentioned being appointed in 2022, while another started in January 2023. There were instances where participants noted the presence of predecessors (KTs) working in the same role before their appointment.

As informed by the Krishi Tai's the levels of awareness vary among them regarding the various project activities, specifically those tailored for landless stakeholders. While some respondents express a comprehensive understanding of both individual and landless-focused components such as goat rearing, poultry, sericulture, and subsidies for personal work, others admit to not being well-informed about these aspects. Notably, some participants highlight the effectiveness and utility of components like poultry farming and goat rearing for landless individuals

As stated by KTs, a range of activities were undertaken by them as part of the PoCRA project. While some actively engage in various initiatives such as attending VCRMC meetings, motivating farmers, providing guidance during self-help group meetings, and informing farmers about the project's benefits, encouraging the participation of women farmers through various meetings, others admit to not having actively taken up specific actions.

Participants have diverse roles, from attending regular project-related meetings to providing information and guidance to farmers. Their responses also highlight the importance of advance notifications for VCRMC meetings and follow-up on pre-sanction works. Some Krishi Tai expressed a lack of training during their involvement in the project, emphasizing the role of Agricultural Assistants in informing them about their responsibilities.

When asked about the training, only a few KTs mentioned they had done online training where they were instructed to understand their responsibilities, others stated that they had not received any training on the PoCRA project or their roles and responsibilities.

The KTs expressed, that since joining the PoCRA project, they have not engaged in any exposure visits within the district or state. They consistently lack participation in study tours or visits after their involvement in the project.

KTs have taken proactive measures to engage with project beneficiaries who received pre-sanction but have not completed the activities. They have visited these farmers, personally encouraging, and guiding them to avail the benefits. The KTs acknowledge the financial difficulties faced by some farmers and attempt to address this challenge by exploring options such as providing loans through self-help groups. Home visits have been conducted by them to understand the problems faced by the beneficiaries and motivate them to complete the pending work.

Farmers employ various effective communication channels to convey their suggestions and grievances, aside from utilizing the suggestion/grievance box in the Gram Panchayat. Personal interaction plays a significant role, with farmers approaching the Krishi Tais directly to express their concerns, either in person or through phone calls. Some farmers make use of technology, such as WhatsApp groups, to share their problems and seek solutions. Meetings, including those of the Village Committee for Resource Management (VCRMC) and Gram Sabha, serve as crucial platforms where farmers articulate their grievances.

The awareness regarding the beneficiary prioritization criteria or inclusiveness system within the Direct Benefit Transfer (DBT) application varies among the responded KTs. While some affirm their knowledge of such criteria, others express a lack of awareness. The DBT application is designed to incorporate an inclusive beneficiary prioritization system, ensuring that benefits reach farmers, especially women and marginalized sections of society. However, the extent of understanding of the specific criteria or mechanisms within the application appears to differ among those interviewed.

To mobilize farmers, particularly female farmers, under the PoCRA project, various initiatives have been undertaken by the KTs. Meetings, including those of women's self-help groups, Gram Sabhas, and Farming Schools, have been organized to disseminate information about agricultural schemes and encourage participation. The focus is on reaching out to marginalized sections, including Scheduled Tribe farmers, to ensure inclusive benefits. Personal visits, guidance on climate resilient technologies, and showcasing the success of women farmers have been part of the mobilization efforts.

The KTs have actively organized and participated in various group meetings as part of the PoCRA project. These meetings include discussions with FFS, women's SHG, and the VCRMC. The meetings served as platforms to disseminate information about the project schemes, discuss challenges faced by farmers in availing benefits, and guide various aspects of the project. The active involvement in these meetings reflects a commitment to community engagement and ensuring effective communication channels for the successful implementation of the project.

Most of the KTs said that they have not encountered significant challenges or difficulties in performing their responsibilities related to project implementation. They emphasize smooth execution without notable hindrances and highlight the absence of problems in discharging their duties.

Most KTs expressed that they received strong support from their families in fulfilling their roles and responsibilities as Krishi Tai. They highlighted the crucial assistance provided by their families, enabling them to carry out their duties effectively. The support ranges from cooperation in work-related tasks to assistance in meeting the responsibilities associated with the role.

The responses of KTs varied experience regarding the receipt of their first remuneration or salary as Krishi Tai. While some mention receiving their first salary in 2021 or 2022, others expressed they have not received any remuneration yet. The reasons for the non-receipt of salary are unclear.

Some KTs mentioned specific dates, such as April 15, 2023, for receiving their last salary. However, a significant portion of the responses indicates that remuneration has not been received, stating a lack of information on the matter.

Many KTs said that they have their mobile phones, while others mention using their husband's or son's phones. The possession of mobile phones, whether personal or shared within the family, is crucial for effective communication and engagement in various project-related activities.

Some expressed awareness and proficiency in using platforms like Facebook, YouTube, WhatsApp, and digital payments, while others admitted to not knowing or using these digital tools. Some specifically mention challenges in using Android mobiles, while others stated a limited usage scope to platforms like WhatsApp. This diversity in digital literacy underscores the varying levels of exposure and comfort with technology among Krishi Tai workers.

The KTs exhibit varied levels of participation in project-related WhatsApp groups. While some affirm their active engagement and regular checking of messages in district or village-level groups, others admit to not being part of any such groups or not regularly checking notifications.

The awareness about the Digital Saksharta Program (PMGDISHA) for all women stakeholders in the project seems low among the KTs. Several respondents mentioned their lack of knowledge about the scheme, leading to their non-participation and registration. This underscores the need for improved communication strategies to disseminate information about the Digital Saksharta program, encouraging more women stakeholders to enroll and benefit from digital literacy training.

5.2. Project Management

5.2.1. Democratic Governance

As can be seen from Table 5.1, there is a higher percentage of awareness of village micro plans and participation in their preparations among farmers in the Marathwada region. The water budgeting app was found useful by farmers in both regions. Fairly good representation is observed in VCRMC committee members. Though the grievances that are received are resolved, there is a need to improve the systems for farmers to register them. Also, overall there is a lot of scope for improving every aspect of democratic governance in both regions.

Table 5. 1 Response to Democratic Governance

Features	Marathwada (%)
Awareness of village micro plan	61 (N= 394)
Participation in village micro-planning exercise	72 (N=240)
Water budgeting app is useful	99 (N= 240)
Representation in VCRMC	59 (N=394)
Awareness of grievances box in GP	44 (N=394)
Have you complained in grievance box	13 (N=172)
Resolution of grievances	83 (N=23)

5.2.2. Project Satisfaction

A high level of satisfaction was reported when asked about various activities undertaken under the PoCRA project. Apart from village micro-planning activity, in all other activities, the majority of the respondents were found to be satisfied. More than four-fifths of the total respondents were either somewhat satisfied or very much satisfied. Dissatisfaction (very unsatisfactory or somewhat unsatisfactory) was reported in one-tenth or less than one-tenth cases.

Table 5. 2 Feedback on Project Satisfaction

Concerns	Marathwada (%) (N = 394)		
	Unsatisfactory	Neither satisfactory nor unsatisfactory	Very Satisfactory
Village micro-plan rating	3	2	95
Process of accessing benefits	2	2	96
Work of VCRMC	1	2	97
Support from Project staff	-	2	98
Knowledge of FFS facilitator	1	1	98
Work of Krishi Tai	1	3	96

5.2.3. Awareness of Social Media in the Project

Three-fourths of the Marathwada region have visited the social pages. The survey also enquired regarding visits to the YouTube channel or Facebook page of the PoCRA project, about 8.6% of respondents (a total of 417 respondents), which amounts to 36 individuals, reported that they have visited the YouTube channel or

Facebook page of the PoCRA project. This indicates that a minority of respondents have engaged with the project's online presence.

Table 5. 3 Feedback on Project Features

Project Features	Marathwada (%)
	N = 394
Project information board	68
VCRMC board	66
Activity board	60
Water balance board	53

5.2.4. Access to Other Schemes

As can be seen from Table 5.4, there is a higher percentage of awareness for crop insurance through Pradhan Mantri Fasal Bima Yojna and minimum support price for crops through Kisan Samman Yojana in the Marathwada region. Farmers seem to be aware of the benefits of community works carried out by Jalyukt Shivar Abhiyaan. Other important schemes that farmers are keen on are minimum support prices declared by the government and the solar water pump given by the Department of Agriculture.

Table 5. 4 Response on Access to Other Schemes

Scheme	Project (%)	Comparison (%)
	N = 445	N = 225
Pradhan Mantri Fasal Bima Yojna	89	84
KIsan Samman Yojana	55	56
Jalayukt Shivar Abhiyaan	38	32
Minimum Support Price (MSP)	28	20
Solar Water Pump Scheme	30	29

Feedback from Taluka Agriculture Officers (TAO)

(Marathwada Region)

According to feedback received from the Taluka Agriculture Officers, BBF Technology stands out as a widely beneficial climate-resilient technology for farmers in the PoCRA project villages. Also, integrated pest management techniques, as well as sprinkler and drip irrigation methods, have proven effective in enhancing agricultural practices.

The effective promotion and wider dissemination of beneficial PoCRA activities and climate-resilient technologies in the project villages are being pursued through a well-structured approach by TAOs. Village-wise action plans have been diligently prepared, providing a clear roadmap for implementation. Regular progress reviews, conducted in collaboration with Agriculture Assistants and Technology Coordinators, ensure that activities align with the established plans. Notably, the inclusion of progressive farmers in the process serves as a valuable strategy, allowing firsthand demonstrations of successful implementation in their fields.

The PoCRA project has demonstrated a commendable absence of complaints, irregularities, or cases of duplication across its various activities. The implementation of the project has been reflected in the lack of malpractices or fraudulent incidents reported in any component. TAOs have encountered challenges across various activities. For individual activities like horticulture plantation, agroforestry, NADEP units, compost units, individual farm ponds, micro-irrigation, pipe, and motor pumps, the reluctance of farmers to adopt compost units and bio-fertilizers poses a significant hurdle. Financial constraints for beneficiaries remain a notable challenge in this context.

For community activities, there have not been reported difficulties, indicating relative success in that aspect of the project. In the case of FFS, challenges arise from farmers' initial resistance to plantation, exacerbated by delays in grant disbursement. To address the challenges, TAOs suggested some solutions which include creating awareness among farmers about the benefits of organic fertilizers and providing training to enhance their understanding. The recommendation given by TAOs emphasizes individual efforts in addressing these challenges. It is proposed that subsidies for beneficiaries should be deposited in farmers' accounts within a specified timeframe to streamline the process. The importance of personal visits to farmers' homes to convince them about the program is highlighted, along with the need for proper training. Also, concerns about incomplete tasks due to inadequate staffing are raised, suggesting an increase in the number of assistants to ensure effective coverage of villages

As stated by the TAOs, the feedback from village farmers regarding the adoption of climate-resilient technologies promoted under the PoCRA scheme is overwhelmingly positive. Farmers express a strong willingness to embrace these technologies, with a notable inclination towards using BBF technology, followed by an increasing trend in favor of SRT and Zero tillage farming. However, challenges such as water access and the impact of drought on crop production are acknowledged, raising concerns about farmers' ability to avail the scheme in such circumstances.

As informed by TAO, varied awareness, and commitment to environmental and social safeguards under the project. Several positive initiatives have been undertaken, such as promoting tree plantations, encouraging the reduction of chemical fertilizer, use of biological alternatives, and stopping deforestation while emphasizing plantation efforts. Farmers have been convinced to participate in these environmentally friendly practices through the incentive of subsidies. However, there is a notable discrepancy in the level of awareness across different TAOs, with some expressing a limited understanding of environmental and social security, viewing the project primarily in terms of enhancing income.

The feedback provided by TAOs emphasizes the need for improvement in capacity-building training for project staff under the PoCRA initiative. It is suggested that training should encompass all personnel involved in project implementation, ensuring that they are well-versed in the various components. The overall sentiment underscores the significance of extending the PoCRA scheme due to its substantial benefits for farmers.

Feedback from Project Specialists (PS)

(Marathwada Region)

The project specialists expressed a positive opinion about the PoCRA project, highlighting its significant impact on farmers in increasing production and water levels. The participatory approach, such as the village action plan and seven days of micro-planning, contributes to its effectiveness at the village level. Notably, the project offers higher subsidies compared to other regions, fostering mechanization, establishing Godown facilities, and promoting agriculture processing units.

The online application process has facilitated farmer participation, resulting in a high uptake of benefits in the selected villages, reflecting the success of the project in reaching and positively impacting genuine farmers.

The project specialists are well aware of the environmental safeguards and guidelines outlined in the Environmental and Social Management Framework (ESMF) for the project implementation. They emphasize adherence to these guidelines during the preparation of the Village Action Plan, ensuring that activities do not lead to unnecessary tree cutting and considering inclusive development without harm to the environment.

The PMU has provided them with training on environmental safeguards, and Project Ss is conscious of practices that prevent soil erosion, avoid tree cutting, and promote sustainable and inclusive development. While the respondent acknowledges limited direct observation of ground-level activities, they assure that the ESMF guidelines are followed diligently to safeguard the environment during the project implementation.

The project specialists have taken various measures to enhance the participation of women and marginalized sections such as SC/ST, small farmers, and widows in PoCRA project activities. During the formation of the VCRMC, efforts were made to ensure adequate representation of these groups. Special initiatives were undertaken, including village visits to provide advisory information on the project and encourage participation.

The project specialists organized a zero-day during microplanning, utilizing traditional methods like announcements and notice board postings at Gram Panchayats to inform villagers about the Village Action Plan. Despite challenges with lower women participation from the project's inception, the respondent motivated women through role model visits to agribusiness units, Godown, and cleaning and grading units.

The project specialists have encountered specific challenges in implementing capacity-building activities, primarily related to knowledge gaps among trainers in FFS. This deficiency hindered the trainers' ability to provide comprehensive information about the project to farmers. In the initial stages, there were challenges, but these were effectively addressed with guidance from senior officers and colleagues.

The project specialists noted issues with farmer participation, particularly for women, due to concerns about remuneration, travel costs, and the inability to secure permission to attend training sessions. Women faced additional obstacles, such as limited freedom to travel and participate in training activities. The distance of training venues from villages also contributed to lower participation rates, particularly among women.

The project specialists suggested several improvements for the training component under the PoCRA project. Firstly, there is a recommendation to provide training for trainers, focusing on different activities and the effective implementation of Farmer Field Schools to enhance training effectiveness. Additionally, the suggestion includes offering monetary assistance to farmers attending training sessions to cover travel costs, thereby encouraging greater participation, especially among women. They emphasize the importance of conducting training at the village, taluka, or district levels for better accessibility.

The challenges faced by the project specialist for agriculture include the need for effective training of trainers for FFS to ensure that farmers receive optimal benefits. Additionally, the heavy workload of AAs, who are engaged in various government schemes, hinders their capacity to dedicate sufficient time to the PoCRA

project. The suggested solution involves increasing the project staff to lessen the workload. On the other hand, Project Specialist Agribusiness notes challenges related to the location of training sessions, proposing that training should be conducted at the village or taluka level to enhance farmer participation, particularly among women. The lack of timely and comprehensive training for new joiners is identified, suggesting regular training sessions and a focus on App handling. The inconsistent IT team adds to the challenges, with the proposal to ensure consistent expertise in the team. The challenges faced by project specialists for procurement revolve around the complexity of the procurement procedure, extensive paperwork, and issues with the portal. The solution involves streamlining the procurement process, reducing paperwork, and addressing portal-related challenges to enhance efficiency.

Procurement Specialist

The procurement specialist stressed that more training on the procurement process is needed for the better implementation of the project.

Human Resource Specialist

As a human resource specialist, their responsibilities encompassed active participation in VCRMC meetings, conducting regular reviews of CA work, and organizing weekly or monthly meetings. Engaging in frequent phone conversations and both physical and online meetings with CAs ensured effective communication. Currently, the focus is on conducting a social audit. They have given proximity to the SDAO office, and they respond to numerous information requests from the public, helping and addressing queries. Knowledge sharing with colleagues is a routine practice, fostering a collaborative learning environment. Monthly visits to villages during social audits are a part of their routine. However, budget constraints have limited exposure visits in the past six months. With 27 CAs overseeing 4 to 14 villages each, monitoring their activities, especially in updating VCRMC member information, is crucial. Payment evaluations at the VCRMC level involve stakeholder feedback to ensure the quality of work before disbursing payments. Additionally, during the pandemic, online meetings were organized, and collaboration with PMGDISHA facilitated digital awareness and training sessions for women in the project.

Agribusiness Specialist

As agribusiness specialist, they have successfully garnered enough proposals for FPCs in Parbhani district, involving godowns, CHCs, food processing units, and SHGs totaling 170 activities. The objective was to motivate and engage more participants in agribusiness initiatives. Emphasizing the need for increased godown storage capacity, cleaning and grading units, grain processing units, and cold storage facilities, I actively guide and support these projects, ensuring their sustainability. Regular assessments are conducted every six months to verify project viability and financial health, with a commendable success rate of over 95% sustaining independently. Despite occasional challenges like empty godowns during certain months and dependence on agro-climatic conditions, all projects have remained operational. The positive impact is evident, as farmers involved in agribusiness experience increased income, expanded working capital, and financial growth, gaining assurance through subsidies for project success. This has led to improved earnings in every season, significant women employment generation, especially among the educated unemployed, and the development of a robust value chain. Notably, the adoption of good agricultural practices and zero tillage activities has enhanced crop conditions, even in low rainfall, resulting in increased production and subsequent benefits for the agribusiness sector.

Agriculture Specialist

In the realm of soil and water conservation, 128 high-quality works have been successfully executed, leading to increased water levels in the targeted regions. Despite a desire to complete all initiated works, the cessation of the project with its conclusion has halted progress. As a diligent project specialist, he ensured that the undertaken work adhered to guidelines, actively engaging with farmers to underscore the significance and benefits of these conservation efforts. Positive feedback from farmers validates the success of these initiatives, especially during dry spells, where conserved water is instrumental in maintaining crop

yields and income levels. Recognizing the critical need for real-time information, farmers highlight the importance of daily rainfall advisories from sowing to harvest, essential for crop protection during unforeseen natural calamities. Collaborations with AAs, KVKs, and agriculture universities contribute to advisory services on insect management and fertilizers. He said farmers expressed a need for knowledge on crop rotation and weather-related insect attacks. To enhance implementation, there is a call for delegating responsibility to block-level officials, as they possess the requisite expertise and can effectively oversee projects, while also advocating for dedicated project staff to improve decision-making and implementation efficiency.

Feedback from District Superintendent of Agriculture Officers (DSAO) (Marathwada Region)

The feedback from the District Superintendent of Agriculture Officers regarding the climate-resilient technologies taught in the PoCRA FFS program reveals a mix of positive experiences and challenges. The PoCRA project has been commended as a highly beneficial initiative for farmers in their areas, contributing to their development through seed production, micro-irrigation, and various other advantages. Despite farmers embracing modern agriculture, micro-irrigation, organic farming, and residue-free practices, there is a notable gap in export linkages. On a positive note, benefits from technologies like polyhouse, shadenet, and CHCs are acknowledged, with CHC playing a significant role in assisting many farmers.

As stated by DSAOs, the current status of activities for promoting and disseminating PoCRA activities and climate-resilient technologies in the project villages highlights both challenges and successful initiatives. Widespread awareness of the PoCRA project is noted, with every farmer in the district being familiar with the initiative. Various channels, including Gramsabhas, information pamphlets, social media, village-level boards, WhatsApp groups, print media, and YouTube, are employed to disseminate information. Training sessions covering the entire agricultural process from sowing to harvesting, field schools addressing insect attacks, and post-production training, including food processing units, contribute to farmers' practical knowledge.

The extension strategy for disseminating advisory information at the village level or to end users and farmers involves various channels and focuses on promoting climate-resilient practices. The production of climate-resilient seeds is highlighted, reflecting a shift in farmer preferences towards organic farming and the use of compost fertilizers. Notably, Dashparni Ark for spray is mentioned as an alternative to chemical pesticides, aligning with sustainable agricultural practices.

Also, advisory information is disseminated via SMS to farmers' phones, covering aspects such as weather conditions, climate-related guidance, and recommended actions at different stages of crop development. As informed DSAOs on complaints and irregularities in the project activities reveal that the most common issue is related to delays in grant disbursement, particularly concerns about not receiving grant amount on time. The suggestion is made that subsidies should be disbursed promptly to address this concern. However, internal conflicts among farmers have arisen, such as instances where only the president utilizes the instruments provided by the CHCs.

DSAOs have mixed responses on the key challenges in implementing PoCRA activities. One respondent indicates a smooth process with no problems encountered during project implementation. On the other hand, challenges are noted in the context of environmental safeguards during periods of low rainfall. However, farmers are adapting by using water from farm ponds to maintain crop production. Another challenge is identified in the context of individual activities, specifically regarding the excavation of wells with JCBs. The requirement for a GST bill to avail benefits poses difficulties as JCB owners may not provide the necessary documentation to farmers. The respondent suggests a revaluation of this requirement to address the associated challenges.

The status of the implementation of community/ NRM activities in the surveyed districts indicates a varying degree of progress. The DSAOs noted a shortfall in the implementation of community and NRM activities,

particularly in water conservation, citing difficulties in farmers coming together for group activities and challenges related to expenses. However, CHCs have provided substantial benefits. Farmers who previously lacked access to tractors or oxen can now utilize machines from CHC at reasonable prices. Despite challenges, these community/ NRM activities have made a positive impact on various aspects of agriculture.

As stated by the DSAOs, the reasons for delays in the implementation of Community/NRM activities are identified as a lack of farmer initiative and support for contractors, particularly in soil conservation work. The suggestion is made that farmers themselves should take the initiative and come forward for these activities rather than relying on contractors. The DSAOs emphasize the need for farmers to collaborate, unite, and submit proposals collectively to expedite the implementation of such activities.

The feedback from DSAOs indicated a general awareness of Environmental and Social Safeguards (ESF) under the project. One respondent affirms that the community is aware of both environmental and social safeguards, with the entire community benefiting from this awareness.

Initiatives such as climate-resilient seed production, special Gram Sabhas for women and SC and ST, and some FFS exclusively for women highlight the project's commitment to incorporating social safeguards.

The feedback from DSAOs on the capacity building or training component of the PoCRA project is generally positive. They have expressed that the training provided through the project has proven to be beneficial. The training encompasses various aspects of farming, covering the entire agricultural process from sowing to harvesting and extending to post-production activities. This positive feedback underscores the importance of capacity-building initiatives in empowering farmers and enhancing their capabilities for sustainable and resilient agricultural practices.

When asked about the suggestions for further training at the DSAO level within the PoCRA project, they highlighted specific areas that would contribute to more effective project implementation. First and foremost, there is a call for training in agriculture processing units, indicating a desire to enhance skills related to post-production activities. Another important aspect is the need for training on crop rotation to effectively manage insect attacks on crops, emphasizing the importance of sustainable farming practices.

Also, there was a demand for training on organic production, drip and sprinkler management, and agri-related businesses, including fish farming, milk processing, and sericulture. These diverse training needs reflect a holistic approach to agricultural development, encompassing various facets that would empower farmers and stakeholders for more comprehensive and effective project implementation.

The suggestions provided by DSAOs aim at enhancing the effectiveness of the project implementation. The emphasis on timely grant disbursement is highlighted, along with the recommendation to expand project components to include animal husbandry, providing resources like sillage units for animals, and facilitating individual farm mechanization. Prioritizing community benefits, particularly through initiatives like CHCs and community farm ponds is suggested, along with the need for advisory services to farmers on climate and weather, with a focus on rainfall. Also, increasing the number of CAs in the district is proposed to strengthen support at the grassroots level.

Feedback from Sub Divisional Agriculture Officers (SDAO)

(Marathwada Region)

As informed by the SDAOs, micro irrigation, and agribusiness activities stand out as the main contributors to climate resilience, providing farmers with effective tools to manage water resources and improve agricultural productivity. Also lining for farm ponds is recognized as a valuable practice for water conservation The implementation of BBF technology has particularly proven advantageous, enabling farmers to increase production while maintaining water levels efficiently.

Additionally, activities like CHCs, drip, sprinklers, as well as shade nets, have seen high demand in the surveyed districts. Training sessions covering various farm-related activities, including fertilizer

management, insect attack Comparison, pesticide use, and food processing units, have contributed to enhancing farmers' knowledge and skills.

Notably, the adoption of water-saving practices during periods of lower rainfall, such as utilizing water from farm ponds, has become crucial in mitigating dry spell situations and ensuring crop preservation. The success story of higher soybean yield in Latur district as compared to other districts in Maharashtra further underscores the positive impact of these climate-resilient technologies on agricultural outcomes in the project villages.

As stated by SDAOs, the current status of activities aimed at promoting and disseminating PoCRA activities and climate-resilient technologies in the project villages of the districts indicates a focus on individual benefits. Various channels, including VCRMC, social media, farmers' groups, and print media, are utilized to spread information about the projects. The practical knowledge gained through FFS contributes to effective training, and as a trainer, active participation and monitoring of the implementation process are emphasized

As informed by the SDAOs, the formulation of a village-wise action plan involves a structured process spanning seven days within the village. The initial day focuses on meetings with the active involvement of CAs, AAs, and supervisors. Subsequent tasks include conducting surveys on water conservation work with all stakeholders, presenting the plan to the Gramsabha, obtaining approval from the Gramsabha, verifying the plan with the agricultural department, and finally seeking sanction from the collector's office. CAs and AAs play pivotal roles in guiding the village action plan, conducting background surveys, studying village resources and problems, and collaborating with the VCRMC to prepare a comprehensive plan that addresses the water budget and village needs. This participatory approach ensures that the action plan is well-informed, inclusive, and aligned with the specific requirements of each village

Regular meetings with agricultural assistants, technology coordinators, and other stakeholders play a crucial role in the effective implementation of extension work in various villages. These monthly gatherings involve comprehensive reviews of ongoing work, addressing challenges encountered during implementation, and collectively finding solutions to ensure smooth progress. Micro-planning sessions are conducted during these meetings to tailor strategies for each village.

Efforts are being made to ensure the display of the "Climate Resilient Technology Board" in flex format at prominent public places, particularly the Gram Panchayat, in the project villages. The objective is to disseminate information about climate-resilient technologies and the project itself. To reinforce this, booklets on climate-resilient technology have been provided to AAs by the project management unit.

As stated by SDAOs, regular visits to villages are a vital component of progress monitoring and review within the project framework. These visits occur during the village action plan, providing an opportunity to assess the ongoing progress and outcomes. During these visits, specific attention is given to checking the benefits received by farmers on-site, engaging in discussions with farmers to understand how implemented technologies are positively impacting them, and reviewing the overall progress.

The implementation of PoCRA activities in their area has been conducted with a strong commitment to environmental conservation. The respondents emphasize the careful consideration and adherence to environmental safeguards throughout the project implementation process.

When asked about the advantages of the PoCRA project, as compared to regular schemes implemented under the agriculture department, they are prominently highlighted by the SDAOs. One key advantage is the simplicity and ease of understanding of the PoCRA project's processes compared to the complexity of the MahaDBT process in government schemes. The smooth and efficient execution of the PoCRA project is noted, and farmers in villages express a positive attitude towards it, often requesting its continuation.

Another significant advantage lies in the higher grant amounts offered by PoCRA, contributing to a higher adoption rate among farmers, particularly for cost-intensive activities such as shadenet and CHC.

The key challenges in implementing PoCRA activities are identified by the respondent SDAOs, with notable variations across different aspects of the project. In terms of individual activities, a significant challenge is the insufficient staffing to ensure effective implementation. Government stakeholders, burdened with

responsibilities from other schemes, face time constraints, impacting the smooth execution of PoCRA. The workload pressure on AAs is emphasized, with challenges such as e-KYC demands and discrepancies in the designated number of villages per AA, creating operational hurdles.

Concerning community activities, a respondent noted some challenges related to the scheme's complexity and documentation issues at their end. Problems with GPS accuracy and discrepancies in location data between CAs and ASs have led to delays in providing benefits to farmers. Additionally, there are some suggestions for improvement, emphasizing the need to educate farmers about the benefits of zero farming and organic farming.

For FFS and FPC/ SHG support, SDAO suggested a relatively smoother implementation in these aspects. Addressing the challenges in implementing PoCRA activities requires strategic measures, as suggested by some SDAOs. To enhance effectiveness, an increase in implementing staff is recommended, emphasizing the need for specialists dedicated solely to PoCRA work. This approach aims to alleviate the workload on government stakeholders burdened by other schemes and ensures more focused attention on PoCRA activities. To support the establishment of business activities, particularly for new FPCs lacking sufficient capital, the suggestion is to facilitate loans in collaboration with banks.

The status of implementation of Community/ NRM activities under the project reflects a mixed picture. While good quality work has been accomplished, contributing to increased water levels in villages, there are instances of incomplete projects due to the project's discontinuation. Community activities, including the establishment of CHC, and seed processing units, have been successfully executed providing tangible benefits to the community. Community benefits are notable, particularly with initiatives like CHC, enabling those without farming machinery to access equipment at reasonable rates. The potential for further focus on water conservation efforts is highlighted, contingent on the continuation of the PoCRA project in the next phase.

As informed by the SDAOs, farmers require timely and accurate information on weather conditions and rainfall from Agro advisory services to make informed decisions. The emphasis is on real-time advisory services for weather and rainfall, with a particular focus on daily updates. There are identified issues with long and mid-term weather forecasts, suggesting a preference for shorter-term advisories to align with the changing climate dynamics. The suggestion is to tailor advisory services based on the stages of crop growth and the specific crops in a given region.

The feedback from SDAOs on the capacity building or training component of the PoCRA project suggests that the training programs have been beneficial for farmers. However, a notable improvement is sought in terms of accessibility to training opportunities. While training on shadenet has been provided, logistical challenges prevent many farmers from attending training sessions in distant locations like Talegaon Dabhade. To address this, there is a suggestion to organize training in collaboration with Krishi Vigyan Kendras (KVK) at the local or taluka level, enabling more farmers to easily participate. Additionally, specific training needs are identified, including crop rotation for insect management, crop protection, organic production, and equipment management.

The awareness about environmental and social safeguards under the project is evident as stated by SDAOs, with various initiatives undertaken to ensure understanding and compliance. Door-to-door campaigns, local newspaper announcements, and the use of WhatsApp groups in each village contribute to disseminating information. Additionally, the inclusion of vulnerable groups is a priority at the VCRMC level. During the implementation of activities, environmental safeguards are adhered to, and staff members actively assist vulnerable sections, aiding their participation and prioritizing their needs.

The adequacy of staff for project implementation at the SDAO level appears to be met, with an affirmative response indicating sufficient staffing at this administrative tier. However, at the ground level, there is a common recognition that additional staff is required for effective project implementation. While there may be enough staff at the SDAO level, the simultaneous execution of other government schemes introduces challenges in allocating sufficient resources and attention to the project.

Several suggestions have been put forth to enhance the effectiveness of project implementation by all the interviewed SDAOs. Continuous water conservation efforts are encouraged, emphasizing the importance of

sustaining these initiatives. Concerns about the functionality of the app, particularly farmers' awareness and handling issues, call for technical improvements. The inclusion of Mandal Adhikari and TAO, along with an increase in staff, is recommended to address administrative challenges. Filling vacant positions in the agriculture department, particularly at the CA and AA levels, is highlighted. Technical coordinators should see an increase due to their multifaceted responsibilities across villages. The village selection process, currently satellite-based, is suggested to incorporate feedback from the cluster or taluka level for more accurate outcomes. The reintegration of activities like small ruminants and poultry for these communities is proposed to promote the inclusion of SC and ST communities as they do not have land. Recommendations also include more digitization, providing laptops to staff, and involving TAO and Mandal Adhikari to enhance oversight and support at the administrative level.

Feedback from Farmers in Project Villages

(Marathwada Region)

Feedback from the key project stakeholders, including farmers was gathered to evaluate the agricultural scenario in the Marathwada region. In addition to these qualitative interviews, experts and research team members conducted field observation visits to evaluate the on-the-ground agricultural conditions.

The village exhibits diverse cropping patterns across different seasons. In the Kharif season, crops like soybean, cotton, tur, millet, and black gram are prominently cultivated. The Rabi season witnesses the cultivation of crops such as gram, wheat, sorghum, and onions. Summer crops include groundnut, maize, and various leafy vegetables. Annual crops like sugarcane are also grown in some areas, while plantation crops like mosambi, orange, papaya, guava, chiku, bor, and mango contribute to horticulture cultivation.

The availability of irrigation facilities varies in the village, with approximately 15-20% of farmers having access to such facilities in every season. The sources of irrigation include wells, farm ponds, borewells, and farm lakes. But dug-well is the major source of irrigation.

Cultivating crops presents various challenges, with farmers highlighting the difficulty of cultivation during different seasons. The Kharif season is particularly challenging due to irregular rainfall and water scarcity. Rabi and Summer seasons also pose difficulties, with issues such as water scarcity, economic constraints, and the need for substantial irrigation. The overall consensus of the farmers was that the Rabi and Summer seasons are the riskiest for crop cultivation.

The interviewed farmers said agricultural water availability in the village relies on diverse sources but wells and farm ponds are prominently mentioned as major water sources for agriculture. The village faces challenges, such as water scarcity in canals and inadequate rainfall, impacting irrigation. Some areas have abundant water due to well depths reaching up to 100 feet, while others experience shortages. Rainfall during the monsoon season contributes significantly to the water supply for agriculture.

A variety of hybrid and improved seeds are popularly used by farmers in the village, with different crops exhibiting specific preferences. In the case of cotton, MAHYCO, Yashoda, and Rashi are among the preferred varieties. For soybeans, seeds like Phule Sangam, 9305, and 335 are commonly used. Other crops, such as gram, wheat, and green gram, also have their favored seed varieties, including Vijay, Lokvan, and Ajit 360. The diverse range of hybrid and improved seeds reflects the farmers' preferences based on factors like yield, resistance, and adaptability to local conditions, contributing to the agricultural diversity in the village.

The majority of the farmers informed that they faced various pest and disease challenges, with cotton and soybean crops being particularly susceptible. Common pests include aphids, thrips, bollworms, white flies, and fungi. Farmers employ a range of management strategies to mitigate these issues. For aphids, thrips, and bollworms in cotton, solutions involve the application of neem oil extract and chemical insecticides through spraying. White fly infestations in soybeans are also addressed with pesticide spraying. The proactive use of pesticides and other Comparison methods showcases the farmers' commitment to safeguarding their crops from pests and diseases. Farmers primarily buy pesticides based on recommendations from agri-input dealers and, in some instances, also rely on advice from agriculture officers and Krishi Mitras.

The majority of farmers said that they have not undergone soil testing. Reasons for the limited adoption of soil testing include financial constraints, lack of awareness, lack of knowledge about the importance of soil testing, and the unavailability of soil testing facilities near the village. Efforts to increase awareness about the benefits of soil testing and addressing logistical challenges can contribute to a more widespread adoption of this crucial agricultural practice in the village.

As the majority of the farmers informed various technologies have been recognized for their effectiveness in enhancing crop production, including drip irrigation, sprinkler, zero tillage, and other beneficial methods. While some farmers in the village have embraced these technologies, others continue with traditional farming practices. However, farmers perceived that BBF technology was the most useful for increasing the production of the crops.

The adoption of drip irrigation and sprinklers has also contributed to more efficient water use. Additionally, the utilization of technologies like solar pumps, polyhouses, and shadenet has demonstrated positive outcomes in increasing crop yields. These technological interventions play a crucial role in shaping modern agricultural practices and improving crop productivity.

Chemical fertilizers, particularly 10:26:26, urea, DAP, potash, 20:20:13, and others, are extensively utilized by farmers, with a focus on increasing soil fertility and enhancing crop production. The usage of these chemical fertilizers is predominant, as they are readily available and contribute to improved yields.

The most commonly used organic fertilizers include neem extract and cow dung, although their usage is comparatively limited. Farmers face challenges in accessing organic fertilizers as the prevailing practice of using chemical fertilizers has proven effective in achieving higher productivity.

Some farmers said they faced several challenges related to the use of agricultural machinery and tools. One prominent issue is the limited availability of tractors, particularly during the crucial sowing period in the Kharif season. The high demand for tractors coupled with insufficient supply poses difficulties in accessing this essential machinery. Other issues are constraints in renting machinery due to financial challenges and roads in the village are often inadequate and not well-maintained, causing further hindrances in transporting machinery to the farms. Some farmers suggested the establishment of tool banks or subsidies from the government to alleviate these challenges and enhance access to essential agricultural implements.

Farmers said they encounter significant challenges related to the storage of agricultural produce. The absence of proper storage facilities leads to various issues, such as the inability to wait for favorable market prices before selling the produce. This results in farmers selling their goods immediately, often at lower rates, and not receiving fair compensation for their efforts. Establishing accessible storage solutions, potentially through initiatives like the PoCRA project, would not only reduce wastage and financial losses for farmers but also empower them to make more strategic decisions about when and where to sell their produce for optimal returns.

The lack of accessible markets results in high transportation costs and difficulties reaching larger markets, especially given the limitations of small, inadequate roads. Consequently, farmers often sell their produce at lower prices, leading to financial constraints. To address these issues, farmers suggest linking the Gram Panchayat to the market, allowing them to leave their goods in the village. This proposed solution aims to establish a record of farmers' produce in the Gram Panchayat, potentially facilitating fair pricing and market accessibility.

The majority of the farmers said they had not engaged in value-addition processes before selling their agricultural produce. The reasons for this vary, including the insufficient quantity of produce, lack of knowledge and materials for processing, and financial constraints. While some farmers, constituting a minority, undertake value addition activities such as sorting and grading before selling their produce.

Many farmers reported difficulties in obtaining loans from banks, leading them to seek alternative sources such as dealers or potential buyers of their agricultural produce. Delays in loan disbursement create additional complications, impacting the timely application of essential farming inputs like pesticides and fertilizers. Some farmers resort to borrowing from moneylenders, pledging property documents as collateral.

The time-consuming and often frustrating process of obtaining credit from banks, coupled with limitations on the loan amounts, exacerbates the financial constraints faced by farmers. To address these challenges, farmers emphasize the importance of streamlining the loan application process, ensuring timely disbursement, and expanding the availability of credit through initiatives like the PoCRA project.

Farmers informed that they faced issues related to crop insurance. While applying for crop insurance is not perceived as a problem, the major issue arises when seeking compensation for crop damage. Farmers express dissatisfaction with the compensation received, stating that it is not sufficient, especially in cases of crop damage or drought. Delays in the assessment process and the lack of timely notifications during events like heavy rainfall contribute to the difficulties faced by farmers.

Farmers in the village encounter challenges related to the availability of agricultural labour, particularly during certain months. The main issues include both the unavailability of labour and the requirement to pay higher wages. Labor shortages are reported, especially during the months from June to January. Farmers expressed that the simultaneous cultivation activities by everyone contributed to the scarcity of labour during this period. The solution proposed by some farmers is the mechanization of agriculture, as the younger generation is reportedly less inclined to engage in fieldwork.

Farmers have informed that they implemented various coping strategies to mitigate the impact of climate change, particularly in response to unseasonal rains and water scarcity. These strategies include pesticide spraying to prevent diseases caused by untimely rains and the use of drip irrigation and sprinklers to address water shortages during periods of insufficient rainfall.

While some farmers found success in measures like drip irrigation and paddy fields to combat drought, others expressed dissatisfaction, stating that despite their efforts, crops were still damaged. Notably, not all farmers have taken measures to reduce the impact of climate change, and in some cases, no specific strategies were suggested by the farmers.

Migration patterns in the villages reveal a significant trend of people migrating for livelihood, with various factors influencing this movement. Approximately 20-50 percent of the population engages in migration, often driven by the lack of employment opportunities within the village. The months of November and December seem to witness increased migration, primarily for activities like sugarcane cutting. The youth and landless individuals are notable participants in migration, seeking better opportunities in urban areas due to limited prospects in the village. Non-availability of employment, mechanization in agriculture, and the impact of inflation are cited as key reasons prompting migration.

The awareness of the PoCRA project in the villages is quite high, with almost 100 percent of the population being informed about its implementation. The project has garnered mixed responses from the farmers, with varying degrees of satisfaction. Some farmers have benefited from activities such as horticulture, drip, and frost subsidies, while others have received support for individual units of agriculture schools and the establishment of agribusiness activities through farmer-producer groups. Drip irrigation and sprinkler technologies have been widely adopted, contributing to the overall positive impact of the project. However, challenges persist, as a portion of the population, particularly those living outside the village or facing literacy barriers, remains less informed about the project and its potential benefits.

The implementation of the PoCRA project in the village has resulted in several notable benefits for farmers. The adoption of drip irrigation and sprinkler technologies has led to increased water availability, contributing to enhanced agricultural production. Farmers have experienced a positive shift in cropping patterns, with the ability to cultivate during the Rabi and Summer seasons. The project has played a pivotal role in reducing water-related challenges, decreasing the incidence of crop diseases, and minimizing overall agricultural costs. Consequently, the income of farmers has seen a substantial increase, reflecting improved yields and more efficient water management.

As farmers informed, the PoCRA project has demonstrated a positive impact on beneficiaries belonging to vulnerable categories, including SC/ST/Tribal/Widows/female farmers in the village. A notable change has been observed in agricultural practices, with a shift from traditional methods to adopting new technologies, leading to more efficient water use, and increased income. Members of these vulnerable groups have experienced increased access to water resources, contributing to enhanced agricultural production and reduced costs. The project has played a role in social empowerment, as evidenced by the heightened participation of vulnerable category beneficiaries in Gram Panchayat meetings, enabling them to make decisions and actively engage in community affairs.

While many farmers reported no significant challenges in accessing benefits through the PoCRA project, some common difficulties emerged. Financial constraints were highlighted as a major hurdle, with farmers expressing concerns about the costs associated with purchasing inputs required for project activities. Delays in receiving personal grants and subsidies were noted as a recurring issue, impacting the timely implementation of individual matching grant activities. Farmers faced obstacles in obtaining subsidies for

personal benefit components, and there were instances of confusion regarding the eligibility criteria and documentation requirements.

Farmers have provided valuable suggestions to address the limitations faced in accessing benefits through the PoCRA project. Key recommendations include initiating the project anew, with a focus on early disbursement of personal grants to farmers' accounts. Ensuring timely credit of grants, particularly for individual matching grant activities, is crucial to overcoming financial hurdles. Farmers have emphasized the need for improved communication and guidance in agricultural schools, providing appropriate information on time. Extending the duration of the PoCRA project has been suggested to allow for comprehensive exposure to climate-resilient technologies, and restarting the project is proposed to benefit those who faced challenges during its closure.

Additionally, there was a call for subsidizing various agribusiness activities, such as goat rearing, poultry farming, and small-scale industries, to support the livelihoods of landless individuals.

Feedback from Landless in Project Villages

(Marathwada Region)

Livelihood activities and challenges:

- **Agricultural labor**: In villages like Gulkand Jalna and Sablewadi Beed, the primary livelihood for landless individuals is agricultural labour, with activities including crop farming and seasonal jobs such as sugarcane cutting. As quoted, "The landless people in our village do agricultural labour or sugarcane cutting for their livelihood".

- **Diversification and limitations**: Besides agricultural work, some landless residents engage in goat and poultry rearing. However, their ability to keep livestock is hindered by the absence of personal housing, with one respondent stating, "Landless residents face challenges in rearing livestock due to not having their own house". Other employment options include working in construction and private companies in cities, indicating a diversification of income sources beyond agriculture.

Environmental challenges impacting livelihoods:

- **Weather-related impacts**: Changing weather patterns have led to crop damage and reduced work availability. Residents have experienced excessive rain and increased heat, leading to crop failures, as highlighted by comments like, "Experienced changing climate in last three years. This had an economic and social impact on the landless family and their livelihood".

Economic struggles and migration patterns:

- **Financial difficulties and migration**: The economic constraints faced by landless individuals often lead them to migrate in search of employment, with many moving to other villages or cities for jobs, as indicated in statements like, "Landless individuals migrate outside the village for agricultural labour and construction work due to high population and limited local employment". Seasonal migration is common, particularly for sugarcane-cutting work post-Diwali.

- **Impact on education and family life**: The economic impact of migration, such as lack of regular work, indirectly affects children's education and family stability.

Interaction with the PoCRA Project:

- **Limited benefits and awareness**: Despite some awareness of the PoCRA project, many landless individuals report not benefiting from it. Comments like, "The landless people in the village did not experience any good benefits as they did not benefit from the PoCRA project" highlight this gap.

- **Unfulfilled expectations and implementation issues**: Residents express expectations of support for activities like goat rearing, poultry rearing, and small-scale industries. However, these

expectations have not been met, as evidenced by statements like, "Residents applied for Goat rearing and Poultry rearing components of PoCRA but did not receive any training".

Participation in community governance and decision-making:

- **Gram Sabha engagement**: The participation of landless residents in Gram Sabhas is varied. Some attend and present their problems, while others are hindered by organizational issues or lack of information, as seen in remarks such as, "Gram sabhas are held but residents are not always informed indicating occasional participation".

In summary, landless residents face a range of challenges from environmental impacts on agriculture to economic limitations and inconsistent benefits from development projects. Their livelihoods are largely dependent on agricultural labour, with additional constraints in diversifying income due to environmental and financial hurdles. Migration emerges as a common response to seasonal work scarcity, further complicating their socio-economic conditions. The lack of substantial benefits from PoCRA projects, coupled with limited participation in community governance, reflects the need for more inclusive and effective implementation strategies to address the specific needs and challenges of the landless population.

Suggestions for improvement:

- **Enhanced education and awareness**: The need for improved education and awareness about PoCRA is evident, as only a few people are knowledgeable about the project. Increased awareness could lead to better participation and benefit from the project's offerings.
- **Implementation of specific schemes for landless people**: The PoCRA project is suggested to implement targeted schemes for the landless, such as skill training, small cottage industry training, and initiatives in goat rearing. These schemes are seen as potential avenues for providing employment and improving the livelihoods of landless individuals.
- **Provision of small-scale industries**: There is a call for the government to provide small-scale industries like goat rearing and poultry rearing specifically for landless people. Such industries could offer sustainable income sources and lessen the reliance on seasonal agricultural work.
- **Government support for business setup**: Landless residents express a desire for government support in setting up businesses. They suggest that the government provide subsidies for business endeavors such as grocery stores, flour mills, sewing machines, and dal mills. Such support could enable them to establish stable and independent sources of income, mitigating the economic challenges they currently face.

These suggestions highlight a clear demand for more inclusive and targeted interventions by the government and project implementers to address the specific needs of landless individuals. By focusing on skill development, small-scale industries, and financial support for business establishment, there is an opportunity to significantly improve the economic status and quality of life for the landless population within the scope of the PoCRA project.

6. Progress Monitoring based on Results Framework (RF) Indicators

1. Climate Resilient Agriculture: Increased Water Productivity				
Water Productivity - kg. m^{-3} : Agriculture Production/ Water consumption (Change relative to baseline: %)				
	Baseline	**End Target**	**Achievement (Till Midterm)**	**Achievement till 30th September 2023**
	0.38	0.45	0.382	To be estimated in the end-term
2. CRA: Improved Yield Uniformity and Stability: Spatial and Temporal Yield Variability for Oilseeds and Pulses				
Soybean	CV-S: 36% CV-T: 52%	CV-S: 29% CV-T: 38%	CV-S: 31% CV-T: 33%	To be estimated in the end-term
Pigeon Pea	CV-S: 66% CV-T: 44%	CV-S: 51% CV-T: 36%	CV-S: 54% CV-T: 42%	To be estimated in the end-term
3. GHG Accounting: Carbon Sequestration and Greenhouse Gas Emissions Reduced: Net GHG Emissions in '000 tCO_2eq/yr				
	-233	-4,789	-1971	To be estimated in the end-term
4. Annual Farm Income: Farm Income Comparator (Total, Male & Female landholders) (As a ratio with/without project)				
Total	1.00	1.50	1.12	To be estimated in the end-term
Male	1.00	1.50	1.17	To be estimated in the end-term
Female	1.00	1.50	1.11	To be estimated in the end-term
5. Direct Project Beneficiaries				
Number of Farmers Reached with Agricultural Assets or Services (% Female) 1320000 (35%)			1806589 (23%)	2375543 (Female: 557445, 23.5%)

6. CRA: Farmers Adopting Improved Agricultural Technology				
Farmers Adopting Improved Agricultural Technology Promoted (% Female)				
	Baseline	**End Target**	**Achievement (Till Midterm)**	**Achievement till 30th September 2023**
	0	1272800 Female: 446000 (35%)	659205 Female: 105911 (16%)	859394 Female: 148912 (17%)
7. CRA: Improved Water Use Efficiency at the Farm Level				
Area Provided with New/ Improved Irrigation or Drainage Services (in Ha)				
	0	624000	381157	563320
8. CRA: Improved Availability of Surface Water for Agriculture				
Surface Water Storage Capacity from New Farm and Community Ponds (in 1000 m3)				
	0	83900	23864	29054
9. CRA: Enhanced Soil Health at the Farm Level				
Area with GAPs for Improved Management of Saline and Sodic Soils (in Ha)				
	0	127600	57699	66680
10: Seed Supply: Promotion of Climate Resilient Crop Varieties				
Oilseeds (Soybean), Pulses (Pigeon Pea, Chickpea) Production Area Under Cultivation with Certified Seeds of Improved Varieties (% Share)				
	64	86	86	To be estimated in the end-term
11. Farmers Producer Companies: Strengthened and Financially Sustainable FPCs				
Number of Project Supported FPCs with Growth in Annual Profits (Reported below the table)				
12. Research and Extension: Mainstreaming Climate – Resilience in Agriculture Research and Technical Advisory Services.				
Number of updated district SREPs with internalized climate resilience agenda		0	15	To be estimated in the end-term

13. Climate Innovation Center: Private Sector Participation			
Number of Clients (FPOs, SMEs, etc.) Receiving Services from the CIC	0	200	
1**4. Beneficary Participation and Civic Engagement**			
Number of Approved Participatory Mini Watershed Plans Implemented/ Under Implementation	0	670	A total of 138 cluster development plans and 5043 village development plans have been approved and were implemented.

RFID #11: Number of project-supported FPCs with growth in annual profits

As of date, the total number of unique FPCs supported under the Agribusiness component of PoCRA is 1187. All these FPCs had audit reports for at least one year before they were supported. However, to include the FPCs for the assessment of RFID which is the number of project supported FPCs with growth in annual profit, their audit reports for at least one and ideally two consecutive years are needed. Given this, those FPCs that were supported by the end of FY 2022-23 (i.e., by 31st March 2023) are eligible for inclusion in the assessment of RFID. Of the total 1187 unique FPCs, 916 were supported by PoCRA by the end of FY 2022-23 of which 595 received disbursement in FY 2022-23. The remaining 271 FPCs (out of a total of 1187 FPCs) that received disbursement in FY 2023-24 will be excluded from the analysis of RFID. Hence, the total number of FPCs that are eligible for scrutiny for assessment of RFID is 916. However, it is likely that the audit reports for FY 2023-24 of the 595 FPCs (out of 916 eligible FPCs) that received disbursement in FY 2022-23 may not be available before June 2024 for scrutiny and hence these FPCs might get excluded from the assessment of RFID. In conclusion, the audit reports of 321 FPCs (out of 916 eligible FPCs) will be scrutinized for assessment of RFID. Scrutiny of audit reports of 321 FPCs (out of 916 eligible FPCs) shows that 125 FPCs (nearly 40%) registered profit at least in one financial year post project support. Of these 125 FPCs, 23 FPCs (nearly 20%) registered profit for two consecutive financial years.

7. Insights from PoCRA MIS data

CM X, the final concurrent monitoring round, has comprehensively covered 30 sample villages across the eight districts of Maharashtra. This monitoring round serves as a culminating assessment, analyzing the Management Information System (MIS) data for the entire duration of the project—from its inception to September 30, 2023. The objective is to glean insights into the implementation status and reach of the project over this extended timeframe.

By examining the MIS data spanning the entire project duration, this analysis aims to provide a holistic understanding of the project's evolution, successes, and challenges. It serves as a valuable tool for drawing conclusions about the overall effectiveness and impact of the initiative. This meticulous review during CM-X is pivotal for encapsulating the essence of the project's journey, offering stakeholders a comprehensive perspective on its outcomes and achievements.

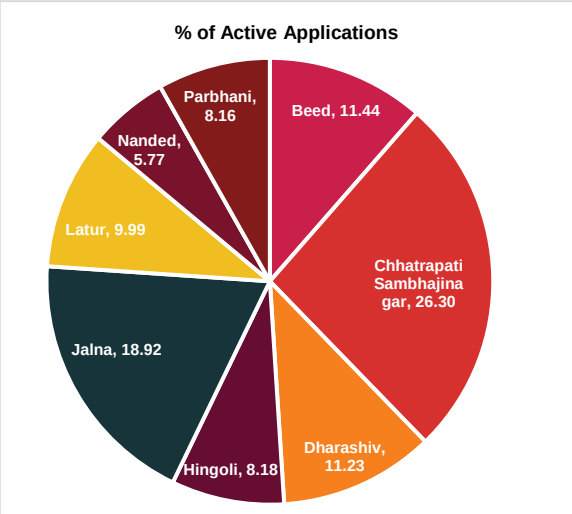
Direct Benefit Transfer (DBT)

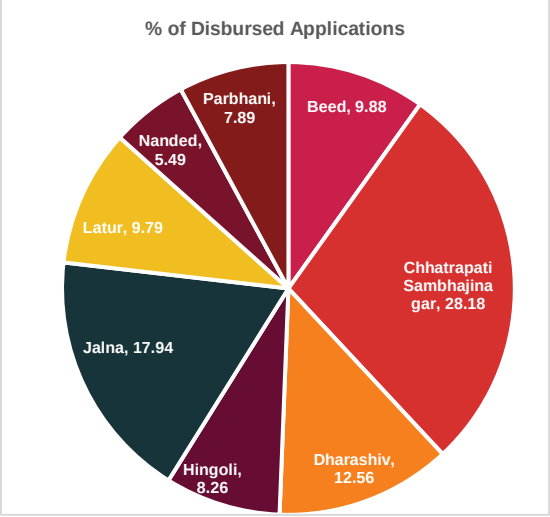
The comprehensive analysis of MIS data underscores the remarkable success achieved by the PoCRA initiative, showcasing its profound influence on the agricultural sector. From its inception, PoCRA has effectively engaged with an expansive network of over 500,000 farmers as of September 30, 2023.

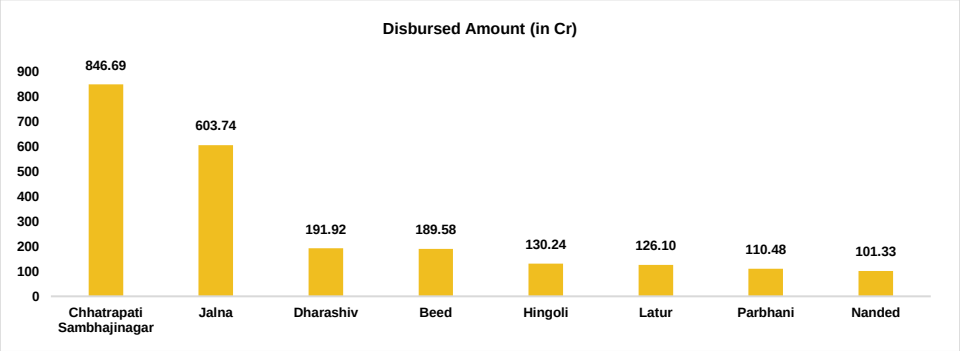
The meticulous examination of data reveals an extraordinary accumulation of 5.42 lakh presanction applications within the PoCRA project, indicative of the widespread interest and active participation it has garnered. Noteworthy is the fact that an impressive 82.45% of these applications have been judiciously disbursed under the auspices of PoCRA, culminating in a substantial financial impact totaling INR 2300 crore, as of the most recent assessment on September 30, 2023.

The dataset unveils a notable demographic composition, with male participants constituting a substantial 80.6%, while 19.25% represent female farmers. A marginal 0.15% falls into the "Others" category. Moreover, the analysis identifies 2.01% of presanction applications attributed to Scheduled Caste (SC) farmers, 0.88% to tribal farmers, and a dominant 97.11% classified under "Others". In terms of farming types, the breakdown showcases a diverse array, with approximately 47% of applications originating from small farmers, 31% from marginal farmers, and a nominal 0.3% from landless farmers. The residual 22% falls under the category of other farmers, reflecting a rich tapestry of agricultural participants.

Delving into the geographical distribution across the eight project districts, Chhatrapati Sambhajinagar emerges as the predominant leader, commanding the highest share in both presanction and disbursed applications (see Figure below). These figures attest to the localized success and strategic distribution of initiatives across diverse project districts.





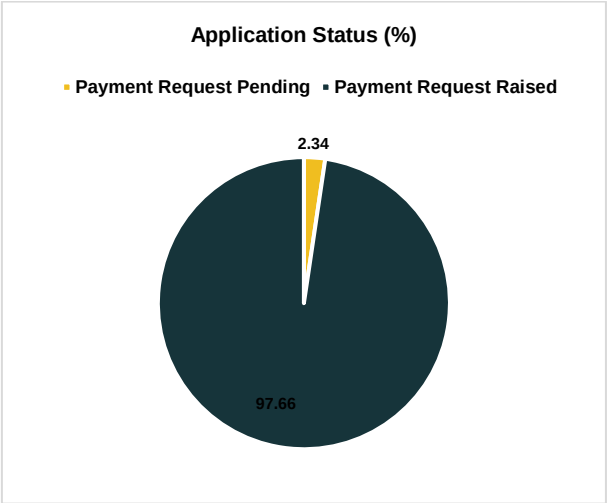


Source: MIS Data

The success in efficiently disbursing funds, coupled with the widespread adoption of the initiative, serves as a testament to its efficacy and augurs well for the prospect of further positive transformations within the agricultural landscape.

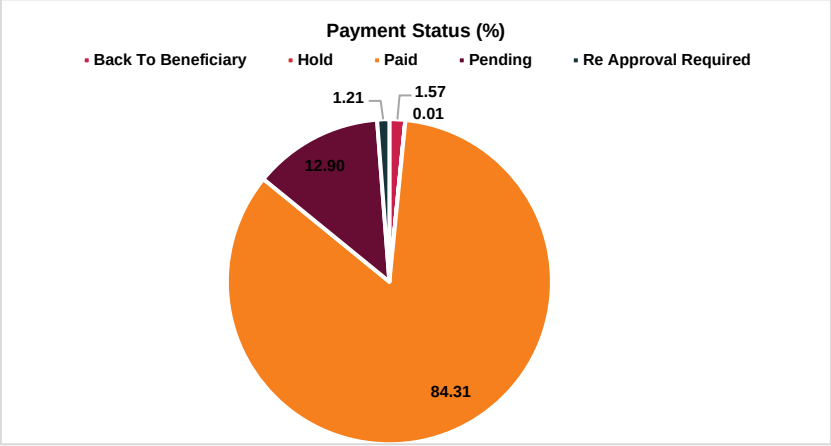
Application Payment Status Analysis

Within the ambit of the PoCRA project, out of the 5.41 lakh applications received, a remarkable 98% have triggered payment requests. In practical terms, this translates to the proactive processing of over 5.3 lakh applications, cumulatively valued at an impressive INR 3609.5 crore. These applications are currently traversing various stages of payment processing, indicative of the project's commitment to swift and efficient disbursement, further reinforcing its impact and commitment to the agricultural community.



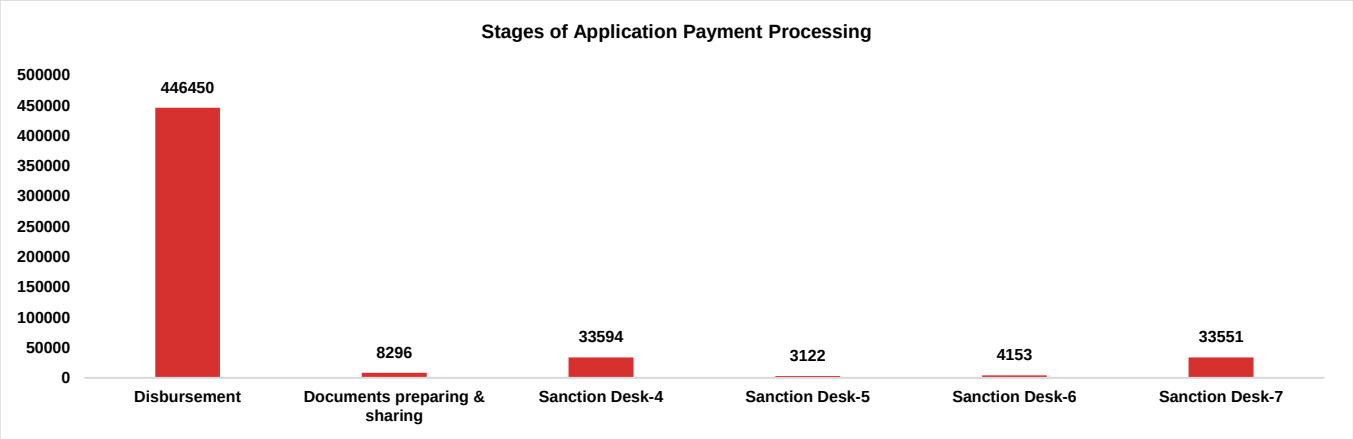
Source: MIS Data

Among the 5.3 lakh payment requests initiated, a notable 84.31% of applications have been successfully paid or disbursed, reflecting a substantial disbursement of approximately INR 2296.8 crore as benefits to the farmers under the PoCRA project. Concurrently, 12.9% of applications are currently pending payment processing, while a nominal 0.01% are presently on hold. Furthermore, 2% of the applications have been returned to the beneficiaries, and 1.2% necessitate re-approval. These delineations offer a comprehensive insight into the dynamic status of payment processing within the PoCRA initiative, showcasing both successful disbursements and the ongoing intricacies of the payment pipeline.



Source: MIS Data

Within the scope of the project, 33,551 applications, accounting for 6.3% of the total, have successfully undergone the scrutiny process and received the matching grant, resulting in the transfer of funds to the beneficiary's bank account—specifically at the Sanction Desk 7 stage. However, an additional 6.4% of applications, totaling 33,594, currently find themselves at the Sanction Desk 4 stage. This denotes that these applications await thorough examination by the Agriculture Assistant, marking a crucial step in the final processing of the application for eventual payment. This detailed breakdown provides insight into the progression and status of applications at various stages within the project's operational framework.



Source: MIS Data

Activity-wise Analysis

The MIS data (see table below) underscores a compelling trend within the PoCRA project, with a notable focus on activities related to 'Climate Smart Agriculture and Resilient Farming' and 'Promoting an Efficient and Sustainable Use of Water for Agriculture.' Remarkably, these two components have collectively garnered approximately 93% of all applications. This noteworthy statistic signifies the project's success in cultivating heightened interest and willingness among farmers to embrace more climate-resilient and sustainable agricultural practices.

Further analysis reveals that Drip Irrigation, Sprinkler Irrigation, Horticulture Plantation, Seed Production, and Water Pumps collectively constitute a substantial 85% of the total applications. This concentration underscores the pivotal role these activities play in the agricultural landscape, emphasizing their significance within the framework of the PoCRA initiative.

Activity Group	No. of Applications	%
Drip Irrigation	175765	32.44
Sprinkler Irrigation	166475	30.72
Horticulture Plantation	57356	10.58
Seed Production	37712	6.96
Water Pumps	22879	4.22
Pipes	19431	3.59
Sericulture	15145	2.79
FFS Host Farmer Assistance	7507	1.39
Shadenet House	6324	1.17
Individual Farm Pond	5636	1.04
Farm Mechanization	4252	0.78
Compost (Vermicompost / NADEP / Organic input production unit)	3863	0.71
Community Farm pond	3274	0.60
Farm pond lining	3194	0.59
Promotion for BBF Technology	2927	0.54
Well	2892	0.53
Inland Fisheries	2344	0.43
Small ruminants	1475	0.27
Agroforestry	1125	0.21
Planting material in polytunnels / Polyhouse / Shadenet house	1064	0.20
Apiculture	648	0.12
Recharge of open dug wells	222	0.04
Polyhouse/ Poly tunnels	193	0.04
Promotion of Zero tillage technology	84	0.02
Backyard Poultry	79	0.01
Total Applications	**541866**	**100.00**

Delving into the specifics of farmer categories, it is observed that small, marginal, and other farmers predominantly applied for activities such as drip irrigation, sprinkler irrigation, horticulture plantation/agroforestry, pipes, and seed production. On the other hand, landless farmers demonstrated a distinct preference for small ruminants, followed by drip irrigation and backyard poultry. This nuanced breakdown provides valuable insights into the diverse preferences and priorities of different farmer types within the PoCRA project.

FPO/FPC Analysis

The PoCRA has witnessed substantial applications for financial and infrastructural assistance from Farmer Producer Organizations (FPOs) since its inception up to September 30, 2023. A total of 7,996 applications, representing a financial outlay of INR 427.62 crore, have been tendered by FPOs. These applications encompass diverse initiatives, including the establishment of Custom Hiring Centers (CHCs), godowns, processing units, and other related ventures. Breaking down the applications, 50% are dedicated to the establishment of CHCs, reflecting a strategic emphasis on enhancing agricultural machinery access. Additionally, 24% of applications focus on godown infrastructure, 9% pertain to processing units, while the remaining 18% fall under the 'other' category, showcasing the multifaceted nature of the proposed ventures. As of September 30, 2023, disbursements have been executed for 3,213 applications, amounting to a substantial INR 342.3 crore. Analyzing the disbursed applications by activity type reveals: 63% for CHCs, 17% for godowns, 7% for processing units, and the remaining 13% designated under the 'other' category. This financial commitment not only underscores the financial robustness of the PoCRA initiative but also signifies the program's pivotal role in supporting and catalyzing the infrastructural development of FPOs.

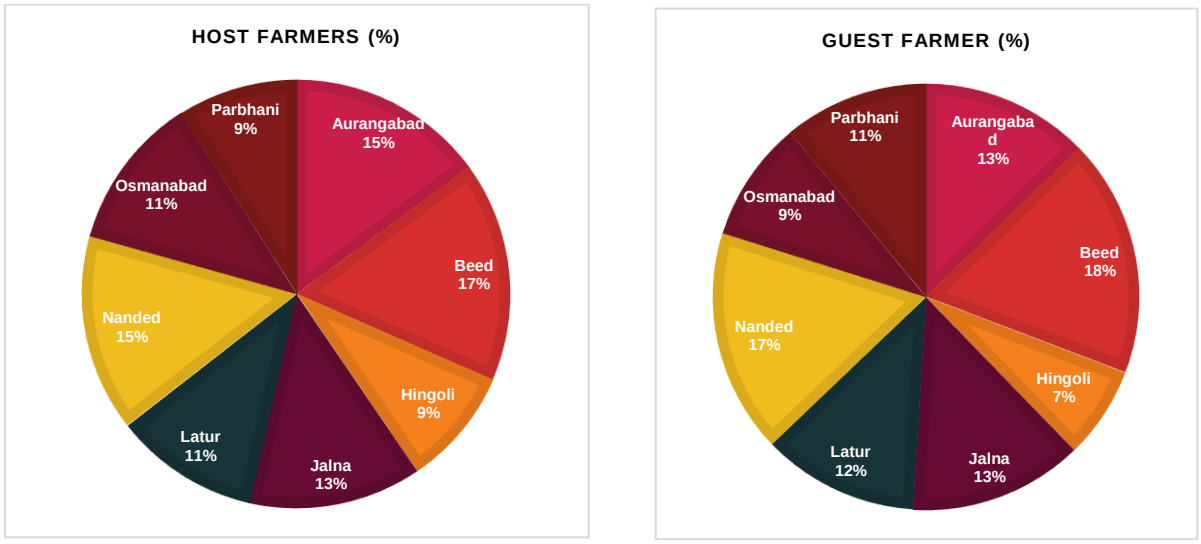
Farmer Field School (FFS)

As of September 30, 2023, the PoCRA has demonstrated remarkable engagement, involving a cumulative total of 8,355 farmers in the Marathwada region in the role of 'Host Farmers' since its inception. The primary objective has been the orchestration of 'Farmer Field Schools,' meticulously designed to deliver comprehensive training and disseminate knowledge pertaining to climate-resilient agricultural practices. Notably, the composition of host farmers reflects a deliberate commitment to inclusivity, with approximately 16.4% being female farmers and the majority, comprising 84%, representing male farmers. This distribution underscores PoCRA's commendable success in empowering female farmers—an often-overlooked demographic within the agricultural sector. The project's steadfast dedication to inclusivity serves as a testament to its commitment to fostering gender equality and recognizing the vital role played by women in agriculture.

Moreover, the data reveals that since its inception, PoCRA has successfully conducted demonstrative training through FFS sessions, reaching over 2.4 lakh farmers in the Marathwada region, with a focus on climate-resilient agricultural practices. As of September 30, 2023, a comprehensive total of guest farmers actively participated in FFS sessions. Within this demographic, 10.9% are female, 89% are male, and a modest proportion comprises transgender farmers who participated as guest farmers in the FFS. This nuanced participation reflects PoCRA's inclusive ethos, encouraging not only female farmers but also engaging farmers of diverse gender identities in several districts.

The figure below provides a visual representation of the district-wise participation rates of Farmer Field Schools across the Marathwada region, offering stakeholders a clear insight into the geographic distribution of the project's educational initiatives.

District-wise participation of Host and Guest Farmers



Source: MIS Data

Gender-wise analysis at the district level of the FFS host as well as guest farmers tabulated below. The table demonstrates a consistent trend across all districts in the Marathwada region, where the participation of female farmers as guest farmers surpasses their involvement as host farmers in Farmer Field School (FFS) sessions. This noteworthy pattern indicates an actively positive engagement of female farmers in the comprehensive training programs facilitated by the FFS. The increased numbers of female guest farmers underscore a commendable level of interest and active participation in these agricultural knowledge-sharing sessions. This inclination not only signifies the effectiveness of FFS initiatives in fostering inclusive learning environments but also emphasizes the success of PoCRA in encouraging and empowering female farmers to actively participate in and benefit from these educational opportunities. It reflects a positive stride toward gender equality and knowledge dissemination within the agricultural domain in the Marathwada region.

Gender-wise analysis at the district level of the FFS host as well as guest farmers

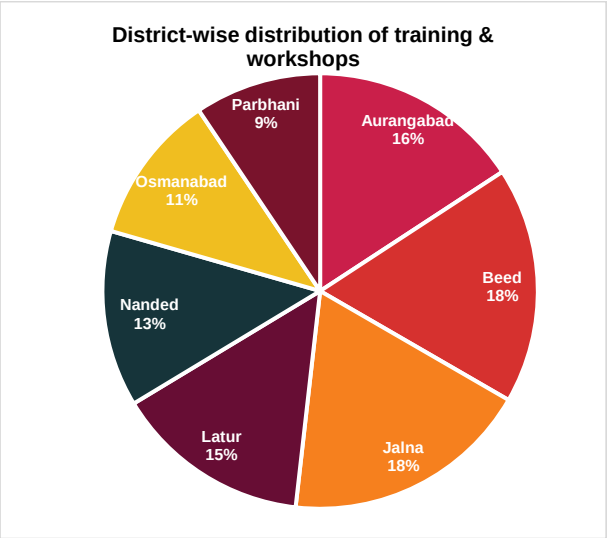
District	Gender	FFS Host Farmers	FFS Guest Farmers
CSN	**Female**	266	2909
	Male	981	28410
	Transgender	**..**	9
	Total	**1247**	**31328**
Bid	**Female**	182	4521
	Male	1208	39933
	Transgender	**..**	10
	Total	**1390**	**44464**
Hingoli	**Female**	140	908
	Male	647	16263
	Transgender	**..**	6
	Total	**747**	**17177**
Jalna	**Female**	155	1885
	Male	934	30632
	Transgender	**..**	9
	Total	**1089**	**32526**
Latur	**Female**	108	6619
	Male	805	22662
	Transgender	**..**	**3**
	Total	**913**	**29284**
Nanded	**Female**	221	4688
	Male	1022	37137
	Transgender	**..**	7
	Total	**1243**	**41832**
Dharashiv	**Female**	181	3500
	Male	788	19028
	Transgender	**..**	6
	Total	**969**	**22534**
Parbhani	**Female**	119	2007
	Male	638	25088
	Transgender	**..**	3
	Total	**757**	**27098**
Marathwada Region	**Female**	1372	27027
	Male	6983	219153
	Transgender	**..**	53
	Total	**8355**	**246233**

Source: MIS Data

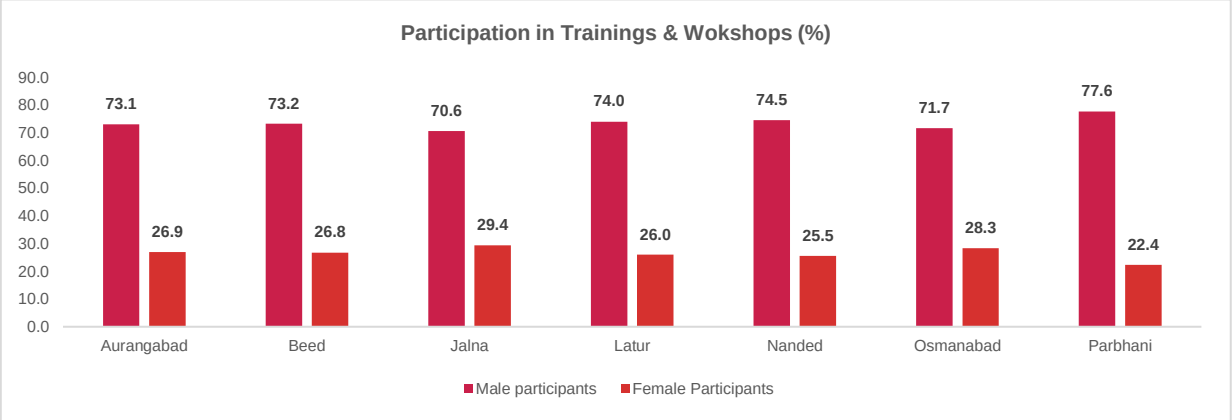
Training & Workshops

The comprehensive analysis of MIS data reveals a robust educational outreach effort within the Marathwada region under the PoCRA project. From the project's initiation until September 30, 2023, a commendable total of 26,047 training sessions and workshops have been meticulously conducted. These sessions were strategically designed to disseminate knowledge about diverse climate-resilient agricultural practices, benefiting approximately 4 lakh farmers. The district-wise distribution of these training and workshop initiatives

is visually represented in the figure below, offering stakeholders a clear and insightful overview of the geographical reach and impact of the project's educational endeavors.



In addition to the on-ground training, the project has embraced technological avenues, conducting 11,348 online webinars. These virtual sessions have further extended the reach of training efforts, positively impacting an additional 4.46 lakh farmers. Notably, the observed engagement is marked by the participation of 72% male farmers and 28% female farmers, underscoring the PoCRA project's success in establishing an inclusive and conducive environment for knowledge transfer within farming communities. This collective effort in training and education reflects the project's commitment to empowering farmers with the skills and insights necessary for climate-resilient and sustainable agricultural practices, contributing to the broader objectives of the PoCRA initiative. The analysis not only highlights the substantial number of capacity-building sessions but also emphasizes consistently robust participation rates across all districts, as depicted in the figure below. This pattern indicates a commendable commitment and keen interest among farmers, irrespective of gender, in embracing climate-resilient agricultural practices.



Noteworthy is the range of female participation, spanning from 22.36% in Parbhani to 29.41% in Jalna. While these percentages vary slightly across districts, the overall consistency observed underscores a positive trend of inclusivity within the capacity-building programs. This uniformity across diverse districts reflects the project's intentional and effective approach to involving both genders in the adoption of sustainable agricultural practices. This commitment to inclusivity not only aligns with broader gender equality goals but also contributes significantly to the creation of a more diversified and inclusive agricultural landscape. By fostering equal participation in capacity-building initiatives, the PoCRA project aims to empower farmers of all genders with the knowledge and skills necessary for resilient and sustainable agricultural practices, thereby making a meaningful contribution to the overall success of the initiative.

Natural Resource Management

Throughout the Marathwada region, a diverse array of districts and villages actively participates in a range of water conservation and management initiatives as part of Natural Resource Management (NRM). These encompass an assortment of activities, spanning from the construction of Nala Bunds to the desilting of aged water storage structures and the implementation of continuous contour trenches. According to the Management Information System (MIS) data, since the inception of the project, a total of 22 NRM works, valued at INR 1.95 crore, have been successfully executed in the Marathwada region. An analysis of the MIS data reveals a judicious allocation of works and disbursed amounts across diverse districts, extending from Beed to Parbhani. This discernment suggests the implementation of a balanced and comprehensive strategy in the pursuit of water conservation endeavors.

8. Key Recommendations

Enhancing capacities of beneficiary farmers: To effectively implement climate-resilient technologies in agriculture, it is crucial to focus on enhancing the capacities of beneficiary farmers. Training project staff is essential, but it is equally important to empower farmers themselves with the information needed to adopt and utilize these technologies. By focusing on exposure visits, social relationship-building, training in weather advisory, and market information, farmers can be better prepared to face the changing climate. Empowering farmers with the knowledge and skills needed to implement sustainable practices will not only benefit them but also contribute to the resilience and sustainability of the agricultural sector.

Strengthening institutional capacity for sustainability: Village Community Resource Management Committees (VCRMCs) play a crucial role in the success of projects aimed at improving the livelihoods of communities. These committees need to be equipped with the necessary skills and knowledge to effectively manage resources and make informed decisions. Regular and refresher training sessions should be conducted to ensure that members of VCRMCs are up to date with the latest techniques and best practices. To enhance the administrative capacity of VCRMCs, it is essential to strengthen their linkages with block and district-level offices. By fostering strong relationships with these offices, VCRMCs can access additional resources and support to better serve their communities. This collaboration will also help streamline communication and decision-making processes, ultimately leading to more effective project implementation. Farmers Producer Companies (FPCs) and Self-Help Groups (SHGs) are other key institutions that must be encouraged to participate in training related to agribusiness activities. By staying responsive to the evolving needs of stakeholders, we can ensure that training sessions remain relevant and effective in building institutional capacity for sustainability.

Linkage with financial and marketing institutions: The major challenge faced by FPCs is the lack of adequate financial and marketing linkages. The majority of project interventions undertaken by FPCs require significant capital investment, which is often beyond the financial capacity of small-scale farmers. As a result, many farmers turn to private investors who charge exorbitant interest rates, leading to financial burdens in the long run. To address this issue, it is imperative to establish strong linkages between small farmers and formal financial institutions. By facilitating access to loans with lower interest rates, farmers can secure the necessary funds to invest in their FPCs and ensure sustainable growth. In wholesale markets, FPCs struggle to compete on pricing due to a lack of scale, while in retail markets, brand image and visibility pose significant hurdles. Moreover, there is often a lack of demand creation for the core products of FPCs, further hindering their market penetration. To overcome these obstacles, it is essential to develop robust institutional mechanisms that support efficient marketing strategies. FPCs should be encouraged to collaborate and synergize their efforts, rather than compete against each other.

Empowering female participants: During the project preparation phase, a social assessment was conducted, revealing the high participation of women in most villages. However, the participation of women was found to be minimal. To address this issue, community institutions should actively encourage the involvement of women in their meetings. By creating a more inclusive environment, these institutions can help empower women who may have limited opportunities to participate in economic activities. Krushi Tais (KTs) play a crucial role in mobilizing women at the village level and promoting the objectives of POCRA. It is essential to motivate and educate KTs on the key components and initiatives of the project, especially those related to women's empowerment. Timely payment of remuneration and recognition of their efforts through appreciation letters can boost their morale and encourage them to continue their valuable work.

Convergence with other government schemes: Exploring the convergence with other government schemes the project can lead to a multiplier effect in achieving the desired outcomes. The various advantages of convergence are financial efficiency, integrated approach, and enhanced impact. To achieve these, the project will need concerted efforts in coordination, and data sharing and must focus on monitoring and evaluation of various convergence activities. By aligning efforts and pooling resources, diverse initiatives can work together towards a common goal of enhancing resilience and sustainability in agriculture. This collaborative approach not only amplifies the impact of individual projects but also fosters a holistic and integrated approach to agricultural development.

Annexure 1: List of Sample Project and Comparison Villages

S.No.	Cluster code	District	Taluka	Census Code	Village	Project/ Comparison
1	515_gp-10_05	CSN	CSN	548906	Pachod	Project
2	515_gv-33_06	CSN	Vaijapur	549150	Lakhganga	Project
3	515_te-6b_04	CSN	Soegoan	548509	Titawi	Project
4	515_gp-9_01	CSN	CSN	548788	Anjandoh	Project
5	515_gp-12_01	CSN	Sillod	548633	Rahimabad	Project
6	523_gv-59_03	Beed	Patoda	558918	Gayakwadwadi	Project
7	523_gv-59_02	Beed	Patoda	558899	Sablewadi	Project
8	523_gv-80_01	Beed	Wadwani	559451	Chinchala	Project
9	512_ppg-10_02	Hingoli	Kalamnuri	546196	Belmanda	Project
10	512_npg-3_01	Hingoli	Kalamnuri	546232	Phutana	Project
11	514_gv-54_05	Jalna	Ambad	547848	Madh Tanda	Project
12	514_gp-39_04	Jalna	Mantha	548192	Gulkhand	Project
13	514_gp-35_02	Jalna	Gahansawangi	547917	Yaval Pimpri	Project
14	514_gv-71_01	Jalna	Partur	548105	Anandgaon	Project
15	514_gp-33_01	Jalna	Jalana	547532	Ahankar Devlgaon	Project
16	524_mr-48_01	Latur	Deoni	560904	Dhanegaon	Project
17	524_mr-40_02	Latur	Shirur	560552	Yerol	Project
18	524_mr-41_02	Latur	Nilanga	560774	Nitur	Project
19	511_mr-60_05	Nanded	Mukhed	545492	Borgaon	Project
20	511_npg-7_01	Nanded	Hadgaon	544606	Pimpalgaon	Project
21	511_npg-7_03	Nanded	Hadgaon	544598	Kopra	Project
22	525_bm-11a_03	Dharashiv	Umarga	561705	Hippargarao	Project
23	525_bm-1a_05	Dharashiv	Tuljapur	561610	Murta	Project
24	525_bm-1a_04	Dharashiv	Tuljapur	561584	Kilaj	Project
25	525_mr-11_01	Dharashiv	Kalamb	561338	Deodhanora	Project
26	525_sa-26_05	Dharashiv	Bhum	561221	Hiwara	Project
27	513_gp-48_05	Parbhani	Jintur	546621	Dabha	Project
28	513_gp-59_01	Parbhani	Parbhani	546762	Parawa	Project
29	513_gp-58_01	Parbhani	Parbhani	546706	Hasnapur	Project
30	513_gv-96_06	Parbhani	Palam	547121	Peth Shivani	Project
31	515_gv-39_01	CSN	Kannad	548347	Jehur	Comparison
32	515_gp-2_06	CSN	Sillod	548621	Mhasla Kh.	Comparison
33	515_gv-43_02	CSN	Vaijapur	549177	Chenduphal	Comparison
34	523_gv-90_03	Beed	Parli	559961	Dagadwadi (N.V.)	Comparison
35	512_gv-92a_03	Hingoli	Basnath	546345	Kurunda	Comparison
36	514_gp-18_01	Jalna	Bhokardam	547291	Kotha koli	Comparison
37	514_gp-37_02	Jalna	Partur	548078	Patoda	Comparison
38	514_gp-12_02	Jalna	Bhokardam	547339	Alapur	Comparison
39	524_mr-42_01	Latur	Nilanga	560754	Kelgaon	Comparison
40	511_gv-109_01	Nanded	Umri	544898	Shelgaon	Comparison
41	525_bm-130_01	Dharashiv	Tuljapur	561591	Naldurg	Comparison
42	525_sa-34_03	Dharashiv	Tuljapur	561510	Sangvi Mardi	Comparison

43	525_sa-32_01	Dharashiv	Kalamb	561374	Malkapur	Comparison
44	513_gp-63_06	Parbhani	Purna	547232	Sategaon	Comparison
45	513_gv-97_02	Parbhani	Gangakhed	547082	Hanuman Nagar	Comparison

Annexure 2: Field Visit Notes of Team Leader and M&E Expert

Purpose of visit: CM X Field Assessment

Date of visits: 28th Nov 2023 to 30th Nov 2023

Places of visit: Beed, Jalna, and CSN

Purpose of the field visit:

- Before and after project activities: In what activities farmers were engaged before taking the benefit and what after
- Cost of inputs incurred by farmers: From cultivation to post-production
- Impact on income: How much income has increased after taking project activities from PoCRA
- Assessment of FPC, SHG
- Change in socio-economic status of PoCRA beneficiaries.
- Livelihood enhancement from project supported SHG & FPC

During the three-day field visit, visits were done in the villages of Beed, Jalna, and CSN. They interacted with beneficiary farmers, groups, VCRMC, Agriculture Assistants, and Cluster Assistants.

Key observations:

- After the support from PoCRA, the income-generating activities increased like horticulture and sericulture along with their traditional activities.
- Before the PoCRA project, there used to be huge migration in some villages, which has stopped now and now they have to import labour from other nearby villages.
- The cropping pattern has changed in many villages after PoCRA support. Farmers are giving up their traditional crops and shifting their focus to new crops like mulberry plantations for sericulture, horticulture, and vegetable production in Shadenet.

Key recommendations:

- Need for training for Krishi Tai to increase women's participation.
- Community-based organizations should shift their focus from using it for their own to generating income from it
- Sustainability of activity after PoCRA support

Mune Pradip, Cluster Assistant, Beed

After discussion with the Cluster Assistant and Agriculture Assistant, they informed us that migration in the village has stopped after PoCRA support. Nearly a maximum of households have taken the benefits of the project. Before PoCRA they were engaged in cotton and sugarcane production. Before the project people had to migrate to other villages for livelihood and 80% of the people used to migrate. Now it has changed drastically, migration has stopped 100% in the village. Labours from other villages (Non-PoCRA villages) are coming in search of livelihood in the project village.

After, the PoCRA project cropping pattern has changed from cotton and sugarcane to mulberries and nearly 90% of the people are engaged in Sericulture. There are nearly 1400 acres of mulberry plantation in the village and 600 rearing houses. The price for a cocoon is a minimum of Rs. 500/- per kg to Rs. 900/- per kg. Mulberry plantations have been affected this year due to less rainfall in the village. Due to this production and quality have decreased. Farmpond and Drips are helping farmers to maintain their production and income in such conditions. So, the climate change resilience has increased. There was not much of greenery in the village, now it has increased.

Before the project, the income for cotton production in 8 acres used to be 2 lakh per annum with expenses of 1 lakh. Now farmers are taking income of Rs. 4 lakhs for Sericulture in one acre per annum with a total expenses of Rs. 1 lakh. The net profit farmers make is Rs. 3 lakhs per annum for 1 acre of land.

The village is making transactions of Rs. 5-6 crores per month from the sericulture. Nearby villages, inspired by this village adopted this activity in their area. Labours from the nearby villages, get their livelihood in this village due to sericulture. The prosperity in the village was seen, as many of the beneficiaries built their new houses after generating income from the PoCRA activity as said by the Cluster Assistant.

Komal Nagesh Ghadge, (Women Farmer), Rui Village, Beed

Before the project, used to get production of cotton on 4 acres of land. Now after the PoCRA project cropping pattern has changed to 2 acres plantation of mulberry for sericulture and 2 acres of horticulture of Mosambi. The total cost incurred for project activity was Rs. 1 lakh from which Rs. 55,000, they received a grant from the project.

Before the project, the income used to be Rs. 1.5 lakh from which 70,000 used to be expenses. Now after the project, income has increased to 4 lakh with total expenses of Rs. 1 lakh. So the farmers are making 3 lakh of net profit in a year. She engaged in activities like cotton picking with women labourers, maintaining the crops, etc. Drip is helping to use water efficiently. After shifting towards sericulture, income has increased

There is not much impact on the decision-making of the family. Other family members take care of it. Not able to decide on her own, the family head decides all the things. She makes decisions related to labourers and their wages. She is interested in becoming a Self Help Group, as she believes it will help her and her family.

Angad Kakade, Nipani Jawalka, Beed

This farmer has taken the benefits of shadenet, drip, and farmpond community from the PoCRA. Shadenet in 1 acre, major crops tomato, Karli, Dodki, capsicum, cucumber, garlic. The production is done all over the year.

The income has generated Rs. 3,15,000/- since March 2023 with expenses of Rs. 1,25,000/-. Total expenses for shadenet Rs. 21,00,000/-, subsidy Rs. 15,97,000/-, own fund of Rs. 6,00,000/-, and loan from HDFC bank on pre-sanctions. Before PoCRA. Jowar and cotton used to be major crops. The income from these crops used to be Rs. 80,000/- per annum with expenses of Rs. 60,000/-. There has been an improvement in income levels after the PoCRA project. Now every day sell vegetables for Rs. 3000/- daily on the local market. Shadenet is helping them to cope with climate change and maintain their income level.

The community farm pond helps to sustain with water required for vegetable production in the Shadenet. Two brothers and their wives help in all the activities. No additional labor is needed. Before PoCRA family members had to be a seasonal livelihood, now they have it for all the days in a year due to project support. They used their income for household expenses and the education of their children.

Discussion with the VCRMC Members at Macchindranth Chincholi, Jalna

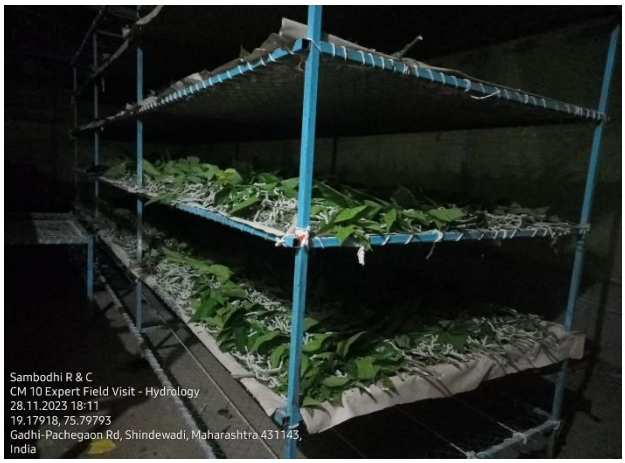
After discussion with the members of VCRMC at Macchindranath Chincholi, found that most of the people have taken the benefits of the PoCRA project. The major activities in the village are drip, sprinkler, horticulture, farm-pond, and some amount of sericulture. Farmers take four batches of sericulture in a year with an average income of Rs. 75,000/- for one batch. 20% of the income goes into expenses. Before the PoCRA project, farmers were engaged in cotton production. *Krishi Tai* has been given various responsibilities but she was not aware of things, as she has not received any kind of training. She has not received remuneration since the beginning of the project. When asked by the Cluster Assistant, he said they have not received funds for the maintenance of VCRMC. The other VCRMC members who are also part of the Grampanchayat members were very active.

The sarpanch was a female, just elected before 2 months. So she was not aware of any activity of PoCRA or VCRMC. VCRMC has not maintained any kind of written records of the meetings. Only three meetings happened since the beginning and decisions were taken by other members. 90% of people were not able to apply on their own for any kind of activity of PoCRA on mobile apps. They used to apply for benefits through the Common Service Centre (CSC) which cost them Rs.100 for one application. Agriculture Assistance and Cluster Assistant has not provided any additional information other than asked by farmers. There is an issue related to pending cases 650 out of 1500 at the CA level as the project stopped in April 2023. Crop area of cotton and sugarcane increased after project activities. The village was engaged in Sericulture in a small amount but it has doubled after the PoCRA support. With the help of drip and sprinklers, farmers used water efficiently and grow fodder crops on the farm. It increased the milk production in the village. Now daily 500 litres of milk farmers sell outside the village and 200 litres they used within their village. Some farmers thinking of processing milk in the village to get a good price.

Bhausaheb Niwade, (Reshimratna) Macchindranth Chincholi, Jalna

He owns a total of nine acres of land on which he takes an acre of Dragan Fruit, 6 Acres of Mulberry plants, and 1 acre for Farm Pond and other things. He has taken the benefits of Farm pond, sericulture, and drip from the project. He was doing sericulture before the project in small amounts but now it has increased to 6 acres which he credited to the Farm pond and lining given through the project to sustain mulberry plants. Also, there is a water recharging system he has developed in his dug well. He stores water from the well to the farm pond. Before PoCRA he was taking cotton and mulberry crops in the land from which he earned 3 lac income with expenses of Rs. 1,25,000. He also produces the silk worms and sells 600 worms in Rs. 3500. He has taken the income of Rs. 23,00,000 from Sericulture in all alone which costs him 3 lakh expenses in a year. This is the highest income generated by Sericulture in Maharashtra. He has received several awards for being progressive farmer at young age.

The daily livelihood generation from this activity is for 10 labours, which 3 members from their house and other they hired at the daily wage of Rs. 250 per day. Rearing Centre he runs all over the year. He takes 5 batches of silk production a year. He said 40-50% income has increased due to PoCRA activities. He got inspired from his uncle for from Kolhapur and planted Dragan Fruit in his farm which is giving him good income.



Ghogare Patil Farmtech Pvt. Ltd. Macchindranth Chincholi, Jalna (FPC)

This is one of the FPCs supported by the project. There are 110 members in the company, of which 10 members are main. This company has taken the benefit of Custom Hiring Centre and Godown from the Project. In CHC, they have 2 Tractors, a Trolly, a Cultivator, a Rotavator, a Plough, 5 in-one toll, V Pass, and BBF. They received Rs. 12,00,000 in support from the project and Rs. 8 lac they invested from the main members. Their own money was from crop selling or their savings.

The FPC gives their tools on rent at market prices to other farmers who are not members of the Company. For Mogda Rs. 700/- per Acre, Plough Rs. 1200/- per Acre, BBF Rs. 1000/- per Acre, etc. The member farmers used all the equipment for their agriculture activities. They just spend money on fuel and labour and use those tools. CHC is helping member farmers to reduce the cost of cultivation and save their time for agricultural activities. It has also generated an income of Rs. 1 lac in a year by giving equipment on a rental basis to other farmers. From a total income of Rs. 50,000, they have to spend on maintenance, driver labour, and fuel. The remaining amount they kept as savings. They have hired a full-time driver with a salary of Rs. 9000 per month. If there is no driver available then members go on the field to drive tractors or other tools. The company wants to extend its business. They have applied to Multi Crop Thresher through PoCRA. Members used all the tools for their agricultural activities one after another or simultaneously. They also thinking of increasing the number of members if needed.

Mauli Shetkari Swaynsahayata Gat, Dakefal, Jalna (SHG)

This Self Help Group has been established in 2022. The members of this group are both males and females. This SHG has taken the benefits of Godown, Refrigerator Van, and Pulse Mill. The total investment and support received from PoCRA are as below:

Item	Total Investment (In Lakh)	Support from PoCRA (In Lakh)
Godown	20	12
Refrigerator Van	15	9
Pulse Mill	15	9

The Godown is all used by the member farmers to store their produce like soybeans, and cotton. Before Godown farmers used to store their produce in their houses or sell it in the market at whatever prices they may get from it. But now farmers store it in Godown until there is a good price in the market. After selling their produce at good market prices, they are getting good income for their crops.

The Refrigerator Van is also used by farmer members of the SHG. It used to transport their produce from their farm to Godown and Godown to market place. Members just pay the fuel and maintenance charges of it. It is helping them to carry their produce anywhere at minimum cost. All kinds of crop produce they transported through it.

The Pulse Mill is used by members of the group. They have not used this to generate income from it. Member farmers bring their pulse crop to the mill and make pulses from it. It charges them only electricity cost. Grading of produce is done by the members themselves. Waste generated after making pulse is used as fodders for animals. They said, that if the season is good, they are willing to purchase crop produce at Rs.50 per kg and sell it after processing at Rs. 110 per Kg. Also, they can charge Rs.15-20 per kg to Tur processing of external farmers and can generate income from it.

Jai Bhavani Shetkari Gat, Bharadi, Sillod, CSN (Farmers Group)

This is a farmer's group consisting of male and female members. Grampanchayat meetings, CA, and AA motivate them to form a group and take benefits. They have taken the benefit of Godown, CHC, and Transport Van. The total investment and support received from the PoCRA project is as follows:

Item	Support from PoCRA (In lakh)	Own (In lakh)	Total Investment (In lakh)
Godown	9	2	11
CHC	10	2	12
Pick up Van	6.5	4.5	11

In Godown, farmers store their agricultural produce like cotton, tur, and corn. Before Godown, they used to store in their home. Some farmers used to do distress selling due to not having space for storage. Now they keep their produce in Godown which gives them good prices, for their crops. Now they get Rs.700-800 per quintal for selling their produce after storing it in Godown. Sometimes all the farmer groups sell to one trader which also gives them a good price.

The Custom Hiring Centre was started by the group in 2022. The average land size of members is 7 acres. It provides agricultural tools to member farmers. Farmers only have to pay for the fuel and driver charges. Before CHC, they have to rent that equipment at higher charges like Rs. 1000-1500 per acre for different tools. Now the cost of cultivation has reduced which is helping them to increase their income.

Pick Up Van is used by farmers to transport their agricultural produce to farm Godown. It is also used by member farmers to carry out their produce in the market. They incurred only fuel and driver charges for this. This also helps to reduce their cost. To transport 25-30 Qtl produce to Sillod market which is 40 Km from their place charged them 600-700 Rs for fuel charges. They informed us that planning to generate income from the activities they were using and kept aside some part of the money for the maintenance of the vehicles, tools, and machines.

Samadhan Chate, Wadoda Chate, Sillod CSN

Samadhan Chate is a progressive farmer in the village. He has done several new experiments on his farm. This farmer has built a polyhouse in the year 2022. He owes 2 acres of land. The total investment cost was Rs. 37 lakhs from which he got support from PoCRA was Rs. 19.50 Lakh. It is built on an area of 36*90 square meters. He has planted Gerbera flower plants in the polyhouse. He is the first farmer to do this activity in his village. It could earn Rs 60,000-70,000 thousand from its selling for only two months where expenses occurred him of Rs. 25,000. It also generated livelihood for 5 labours at Rs.300 per day.

Before PoCRA support he used to do farming of Cotton, Maize, and Vegetables and could earn Rs. 1,20,000 per year income with expenses of Rs. 45,000. The income was getting before for a year now is taking in two months only.

The farmer has taken the training of polyhouse in Pune and was inspired by it and built it on his land. But it could not survive in this current draught situation. Due to less rainfall in the area, farmers do not have sufficient water to give Garbera flower plants from the Polyhouse. He has Baudi but it does not have water in it. He said he would again plant the same crops.

Annexure 3: Field Visit Notes of Agronomy Expert

As per the instructions of Sambodhi Communication Ltd Pmu Mumbai, dated 19.10.2023, Dr. R. B. Singandhupe, Consultant (Agronomy) visited four villages in two districts viz. Latur and Dharashiv of CSN Division during 1-3 November 2023, in which the well-defined CR technologies of the PoCRA project are being implemented by the farmers in the selected villages and monitored the project activities in consultation with the officials of the State Department of Agriculture, local representatives (sarpanch, members) and beneficiaries. The following agronomic technologies were implemented in four selected villages considering the soil types, resources available to the beneficiaries, climatic situations, and management issues that are prevailing in those districts. It was noticed that the intensity of implementation of Climate Resilience Technologies in different villages was not the same because of several constraints existing in villages as well as with individual farmers.

As per the PAD of the World Bank (Annexure V), the following Climate Resilient Agricultural Technologies and Agronomic Practices were suggested for the development of villages and the improvement livelihood of the farmers

1. Improved seed varieties
2. Contour furrow and bund cultivation.
3. Broad Bed and Furrow cultivation
4. Intercropping
5. Integrated pest and nutrient management
6. Mulching.
7. Conservation tillage
8. Protected cultivation (Shed net and Poly house).
9. Micro irrigation (drip and sprinkler) and Farm Pond

These technologies were initiated in the selected villages in 2021- 22 and will be continued till March 2024. Since the termination of some of the CR technologies has already been done by PoCRA Mumbai, some farmers have not received substantial benefits from this project. Now the non -beneficiaries from the same villages have requested to extend further i.e., beyond March 2024 so that the remaining eligible farmers will get all benefits equally.

While retrieving certain information about the impact of the project from the farmers/ farmers groups, the following points were discussed, and the relevant information from them is briefed in the following para.

1) CR Technologies and impact of these as per PAD PoCRA

Sr no.	**Issues/ points raised with the farmers during the discussion**	**Reply received from the farmers/farmers groups**
a	Adoption of CR technologies	The farmers of the selected villages have adopted agronomic CR Technologies (BBF in Soybean, improved seed varieties i.e. seed multiplication, Farm mechanization, pipes for irrigation to reduce conveyance loss, pressurized irrigations like drip irrigation, sprinkler irrigation, shade net/ polyhouse, horticulture/floriculture, individual farm pond, lining of farm pond, sericulture, mulching, integrated nutrients, and pest management, conservation tillage i.e. kharif soybean in BBF followed by rabi chickpea in BBF). However, the implementation intensity of pipes, sprinklers, drip systems seed multiplication, and shed-net components is very high. The impact of other technologies is also visible but in lesser magnitude.

b	Agronomic benefits gained by the farmers.	The farmers have received substantial benefits, particularly from shade net unit, seed multiplication program (20-25 % more price than market rate), pipes (up to 30 % water conveyance loss is reduced) and pressurized irrigation system (in vegetable crops saving of water is up to 80-90 % as compared to surface irrigation components. Two – three times more area has been brought under irrigation due to the implementation of pressurized systems. In other components, the farmers have also received benefits that are linked with these mentioned CR Technologies.
c	Whether farmers experienced the impact	Yes. The impact of the specific CR technologies is very much visible with a very high magnitude at the field level.
d	Whether yield increased because of the adoption of CR technologies	Yes. The impact on crop yields, water, and fertilizer saving is visible in the pressurized irrigation systems and other important technologies adopted by the farmers. Shade net /polyhouse and seed multiplication of the improved varieties have shown significant improvement in the net income of the farmers. Hence provision to extend these components of CR technologies may be prioritized in subsequent phases.
e	Improved climate change adaptation and coping mechanism	The farmers are well aware of the technologies adopted under various climatic constraints. In Kharif season 2023, most of the farmers had sown soybean and other field crops very late i.e., in the first week of July 2023 due to the late onset of monsoon. In subsequent months particularly in August 2023, the long dry spell with total monthly rainfall of 14.1-24.7 mm (-62to -94% deviation from normal) and in September (up to 20, 2023) receipt of 52.4 mm to 80.5 mm (-3 to -96% deviation from normal) caused severe moisture stress to kharif crops. During this period, the soybean crop was in growth development to pod development which was highly sensitive to moisture stress. During this period the farmers who received pipes, sprinklers, and drip components as well as created water resource structures like open wells/ borewells, farm ponds, and other resource structures saved their kharif crops. However other farmers have faced severe problems managing their field crops. In the rabi season, they may not take rabi crops after kharif crops due to a lack of sufficient water with them. Hardly 10-15 % of the Kharif cultivated area will be brought under cultivation in the rabi season as informed by them.
f	Positive behavioral changes in Agricultural practices.	It was observed that the beneficiaries have taken up advanced and well-established agricultural practices to increase overall income from different cropping/ farming systems.
g	Resilience to absorb climate shock	Yes, they are very much aware of keeping up-to-date information on climatic variables through crop advisory, which is disseminated twice a week. If severe crop damage is likely to occur to their field crop, they take immediate steps and save their field crop by adopting new technologies. During this kharif season, delayed monsoons and long dry spells have reduced the area under cultivation and also reduced the crop yield of non-beneficiaries.

(2) Case study on the use of BBF/ Zero tillage and

(3) Analysis of seed multiplication/production activity in the village.

These two CR Technologies are briefly summarized village-wise in a separate section.

Soil types and rainfall distribution patterns of the visited districts

In both the districts (Latur and Dharashiv), a significant cultivated area(49.41-66.14 %) is shallow black soil (Table 1). Due to the very light textured character of soil, the water storage capacity and nutrient availability in such shallow soil is very low. Hence the crop cannot be sustained for a longer period under a dry spell but in deep black, the crop sustains under a dry spell period for a longer period. Considering the limited soil nutrient and water storage capacity, the farmers are growing shallow-rooted crops like sorghum, soybean, and, moong) in shallow black soil. In medium soil also, soybean is being grown by most of the farmers. In black soil, sugarcane is the dominant crop in the command area of minor irrigation projects. During the kharif season, soybean is a major crop (about 80 % cultivated area) however the productivity of the soybean is very low. After harvesting kharif crops, the farmers cultivate chickpeas, and pre-rabi jowar crops where an irrigation sources are available with them. In the selected village of Dharashiv district, the farmers are growing sugarcane crops in the command area of 3 minor irrigation projects in medium to heavy soil. The farmers who have received drip system are harvesting about 55-60 t/acre cane yield and those who are growing under rainfed with supplemental irrigation from January to June are harvesting only 35-40 t/acre cane yield. Such wide variation in cane yield has been seen in project-adopted and non-adopted farmers.

Table 1: Distribution of soil types in the two districts is given below.

Sr no.	Name of District (Marathwada region)	Deep black soil (% of total geographical area)	Medium deep black soil (% of total geographical area)	Shallow black soil (% of total geographical area)
1	Latur	35.70	14.89	49.41
2	Dharashiv	23.14	10.72	66.14

Visited these districts for data collection and assessment of the impact of different CR Technologies

Kharif rainfall scenarios of visited districts and other districts of Marathwada region

During Kharif 2023, the monsoon rainfall was delayed considerably by more than 15 days as against the normal monsoon arrival period of 11-16 June (Fig 1). After receiving sufficient rainfall of more than 75 mm, the farmers started sowing kharif crops from 29th June 2023 onwards. The crop stand was satisfactory up to July end but due to non-receipt of sufficient rains with deficit /deviation of -21 to -92 % over the normal rainfall from 3rd August to 20 September 2023 (48 days) in Dharashiv district and -3 to -96% deviation in Latur district, the crop growth was stunted.

During this period, the Kharif crops were in the growth period and flowering to fruiting stage. These stages are highly sensitive to moisture stress, which results in low crop yield if the rainfall is not sufficient. In the remaining six districts of the Marathwada region, a similar rainfall trend was recorded as it is reflected in Fig 1 and 2. During the dry spell period, PoCRA project beneficiaries have used pipes, and sprinkler sets to irrigate their field crops and escape their field crop from such severe moisture stress.

The district-wise total rainfall received from 1.6.2023 to 4.10.2023 was 443.3 mm (-25.2 % deviation) in Beed, 502.3 mm (-14.8 % deviation) in CSN, 455.8 mm (-18.8 % deviation) in Dharashiv, 583.3 mm (-24% deviation) in Hingoli, 407.4 mm (-33.7% deviation) in Jalna, 648.4 mm (-5.9 % deviation) in Latur, 961.8 mm (+7.3 % deviation in Nanded, 585.6 mm (-19.4% deviation) in Parbhani district. Though the rainfall amount received with a deviation of less than -19% in some of the districts, which has been recorded as normal rainfall as per IMD guidelines, the distribution was very erratic and hence it caused severe problems with crop growth and final yield.

Table 2: Rainfall pattern of Dharashiv and Latur district for the period from June 1, 2023, to October 4,,2023 (Note : Figure in brackets are % deviation from normal rainfall).

Date	Dharashiv	Latur
1-7 June 2023	0.10(-99)	3.8(-82)
8-14 June 2023	0.5(-98)	19.5(-49)
15-21 June 2023	0(-100)	2.4(-92)
22-28 June 2023	15.5(-37)	54.6(72)
29 June -5 July 2023	33.7(23)	47.4(36)
6-12 July 2023	50(50)	74.3(77)
13-19 July 2023	68.3(224)	84.3(158)
20-26 July 2023	68.9(106)	59.8(36)
27July-2 August 2023	42(29)	54.1(24)
3-9 August 2023	3.2(-90)	2.5(-94)
10-16 August 2023	2.6(-91)	2.2(-94)
17-23 August 2023	2.9(-92)	15.5(-62)
24-30 August 2023	5.4(-86)	4.5(-91)
31August-6 September 2023	29.5(-21)	41.1(-3)
7-13 September 2023	16.6(-62)	37.5(-12)
14-20 September 2023	6.3(-85)	1.9(-96)
21-27 September 2023	46.7(-5)	57(28)
28September-4 October 2023	63.9(95)	86(138)
Total rain(mm)	455.8(-18.83)	648.4(-5.9)

Status of CR technologies in visited village gram panchayat in both districts

The impact of various technologies, adopted in different villages is visible through this tabulated data of the Digital Innovation lab. PoCRA Mumbai as well as field scenarios of CR technology, adopted by the farmers in different villages. The intensity of adoption of four CR technologies has resulted in significant improvements in crop yield, water saving, increased cropping, irrigation intensity, and improvement in the livelihood of the farmers**.** Because, due to the receipt of the inadequate amount of rainfall during the monsoon season, the farmers are extensively using pressurized irrigation systems for irrigation frequently. Supply of adequate irrigation water and nutrient availability during the dry spell periods has resulted in higher crop yield as has been observed in this Kharif season of 2023.

Table 3: Impact of various CR Technologies in visited villages/areas

Sr no.	List of CR Technologies	No. of farmers to whom administrative approval was accorded	No. of the farmers benefitted and (% of the actual number of sanctioned applications/applicants for specific CR technology adopted).	No. of farmers to whom administrative approval was accorded	No. of the farmers benefitted and (% of the actual number of sanctioned applications/applicants for specific CR technology).
A	Village -Gharoda Gp , Tahsil -Chakur , Sub Division -Udgir,District -Latur			Village: Yerol Gp, Tahsil -Sirur Anantpal, Sub-Division -Latur , District -Latur	
1	Drip irrigation	29	32(90.6 %)	93	79(84.9%)
2	Farm pond, individual	4	3(75 %)		
3	Farm pond lining	1	1(100%)	1	1(100%)
4	FFS/ BBF/ Zero tillage	19	2(10.5%)	10	5(50%)
5	Horticulture Plantation/ Agro-forestry	8	4(50%	6	4(66.7%)
6	Inland Fisheries	2	2(100%)	2	2(100)
7	Pipes	13	13(100%)	2	2(100%)
8	Seed production	539	169(31.35%0	37	29(78.4%)
9	Sericulture	1	1(100%)	5	3(60%)
10	Sprinkler irrigation	121	115(95.04%)	276	261(94.6%)
11	Compost/Vermicompost	-	-	108	106(98.2%)
12	Farm Mechnisation	-	-	3	2(66.7%)
13	Planting material in poly house/shadenet house	-	-	3	2(66.7%)
14	Shed net house	-	-	4	4(100%)
	Other CR technologies are not implemented, though administrative approval has been accorded				
B	List of CR Technologies	Village- Medsinga Gp, Tahsil – Dharashiv, Sub Di Dharashiv, District -Dharashiv		Village: Ruibhar, Tahsil -Dharashiv, Sub-Division -Dharashiv, District -Dharashiv	
1	Drip irrigation	54	48(88.9%)	73	69(94.5%)
2	Farm pond, individual	8	6(755)	1	0
3	FFS/ BBF/ Zero tillage	15	0	21	7(33.3%)
4	Horticulture Plantation/ Agro-forestry	29	29(100%)	5	4(80%)
5	Small ruminant	-	-	9	9(100%)
6	Pipes	56	56(100%)	34	34(100%)
7	Seed production	12	79(58.3%)	67	43(64.2%)
8	Sericulture	33	14(42.4%)	8	3((37.5%)
9	Sprinkler irrigation	421	399(94.8 %)	303	283(93.4%)
10	Compost/Vermicompost	-	-	2	2(100%)
11	Farm Mechanisation	9	8(88.9%)	10	10(100%)
12	Planting material in poly house/shadenet house	2	1(50%	5	4(80%)
13	Shed net house	5	3(60%)	16	13(81.3%)
14	Poly house/polytunnel	1	1(100%		
15	Saline/sodic soil(Farm pond/sprinkler/water pump/FFS)	75	66(88%)	38	32(84.2%)
16	Water pump	38	38(100%)	27	27(100%)

Village -Gharoda Gram Panchayat, Tehsil - Chakur, Sub Division - Udgir, District - Latur

In the presence of the Sarpanch, Up-Sarpanch, progressive farmers, other beneficiaries, Agriculture Assistant, and technical Co-ordinator of the PoCRA project, the consultant reviewed the project activities with the farmers and collected all relevant information as per PAD guidelines of the World Bank on Climate Resilient Agricultural Technologies and Agronomic Practices, being adopted by the farmers. The details of important CR technologies are summarised in the text below.

Cropping pattern:

Kharif season: Soybean, Red gram, Kharif jowar

Rabi season: Chickpea, Rabi Jowar, wheat, tomato (10-15 % area is brought under tomato crop).

BBF Technology: In this village, Gram Panchayat about 1520 ha area is under soybean crop and most of the cultivated area has been brought in seed production with BBF system. About 350 farmers are engaged in the seed production program. During rabi season also, the farmers are growing chickpea varieties JAKI 9218, Phule Agrani, and Vijaya, and producing certified seeds for the next rabi season. Earlier they adopted chickpeas in BBF, but last two years, they have grown after leveling the field as normal sowing. They experienced more weed growth in chickpeas. For removing the weeds and interculture operation they faced problems in the BBF system. In soybeans, the farmers are growing soybean varieties like DS 228, MAUS 162, MAUS612, MAU71, MAUS158, KDS726, KDS753, KDS992, PDKV Amba 1001, and 10039. These varieties were tried by the farmers in the seed multiplication program and they received good seed yield. One of the progressive farmers Shri Prakash Govindrao Jadhav had taken soybean crop on 25 acres under BBF and all seeds were handed over to a Registered Seed Company and earned 20-25 % extra return than the APMC / MSP and local market rate. Other farmers have also handed over certified seeds to the same company and earned more income. During Kharif 2022-23, Shri Prakash Govindrao Jadhav took 25 acres in BBF and 50 acres in the flatbed system for seed production and earned substantial benefits under seed production in BBF and flatbed methods of sowing. In the last 17 years, all farmers of this village have produced about 8000 quintal certified seeds and provided them to the registered seed company. Earlier they were giving all certified seeds to Maharashtra State Seed Corporation and receiving money very late. Hence the FPC is purchasing all certified seeds and circulating the good quality seed material to the needy farmers for next season.

Table 4: Comparative performance of soybean under BBF and flat-bed system

Performance indicator	BBF planting	Non BBF planting
Crop yield	11.70q/acre	6.5 q/acre
Seed rate	18 kg /acre	25 kg/acre
Spacing (raised bed 1. 36 m followed by 60 cm furrow)	Four lines were used with row spacing of 30 cm and plant spacing of 15 cm	45 cm row-to-row and 15 cm plant-to-plant spacing. Using a manually operated drilling machine
Sprinkler irrigation during dry spell	By keeping sprinkler pipes and risers in space (furrow) the farmers irrigated soybean crops under dry spell	Rainfed
Cost of cultivation (Rs /acre)		
Seed cost	Rs 1800	Rs 2500
Land preparation (Ploughing+ BBF making charges	Rs 3000	Rs 1800 (ploughing +rotavator and levelling)
Fertiliser	Rs 1950	Rs 2000
Sowing	Rs 1000	Rs 1300
Pesticides used	Rs 3500	Rs 2800
Weedicide	Rs 1250	Rs 1300
Intercultural operation and manual weeding	Rs 3000	Rs 2400
Labour charge, (Harvesting, threshing cleaning,)	Rs 3000	Rs 2400
Transportation charges	Rs 2500	Rs 2500
Total expenditure	Rs 21000	Rs 19000

Gross return(rate Rs 4600 per quintal as per MSP)	Rs 53820	Rs 29900
Price for seed purpose (25 % extra) i.e. Rs 5750 /quintal	Rs 67275	Rs 37375
Net return as per MSP rate	Rs 32820	Rs 10900
Net return as per Seed return (seed company purchased)	Rs 46275	Rs 18375
In the case of BBF planting, about 50 % more yield is obtained and produced as seed, then an extra 25 % net income is generated.		

BBF and minimum tillage in Chickpea

After the harvest of the soybean crop, the farmers took chickpeas in BBF planting without disturbing the same design in this village during the 2021-2022 crop years. One of the progressive farmers (Shri Ashok Chirte) has given his experiences on the performance of chickpeas and the benefits accrued under the BBF system. Other farmers have narrated their experiences that the weeding and interculture operation become very difficult and it may not be feasible to continue BBF in chickpeas in the future. This rabi crop season 2023, the farmers have disturbed the BBF and plowed the field and now the sowing of chickpeas is underway. The achievement /benefits accrued by one of the farmers (Ashok Chitre) in BBF sowing of chickpeas is given below for reference.

Table 5: Chickpea under BBF (minimum tillage)

Production technology	Expenditure incurred	Flat bed method	Remark
Seed 25 kg /acre	Rs 1800	30 kg = Rs 2160	
Land preparation with BBF	Rs 3500	Rs 2500	
Sowing (dibbling by Machine)	Rs 1200	Rs 1500	
Spraying	Rs 3000	Rs 3000	
Seed treatments with Rhizobium, Trichoderma,	Rs 400	Rs 500	
Fertiliser (DAP, Vermicompost)	Rs 1800	Rs 2000	
Weedicides as pre-emergence	Rs 1250	Rs 1500	
Harvesting threshing, cleaning, bagging	Rs 3600	Rs 3000	
Transportation to market	Rs 2500	Rs 2500	
Total expenditure	Rs 19050	Rs 18660	
Yield under 3 sprinkler irrigation (as pre-sowing, flower initiation, and pod development stage)	9 q/acre	4.5 q/acre with only one irrigation.	Sprinkler irrigation is applied as pre-sowing only
Gross return (MSP 2022-23 Rs 5230/q)	Rs 47070	Rs 23535	
If seeds are certified, then a gross return of 25 % extra is accrued	Rs 58838	The produce may not qualify the quality criteria for seed certification.	
Net return (without seed certification and under seed certification	Rs 28020 Rs 39788	Rs 4875	Use of sprinkler irrigation with a sufficient amount (three times) leads to more return as compared to one pre-sowing irrigation.

Mulching in vegetable crops: Use of mulching in different vegetable crops with drip irrigation during rabi season, to improve water use efficiency, save fertilizer, retard weed growth, and maintain soil thermal regimes optimum as air temperature during the rabi season decreases. Considering the importance of mulching, the farmers have been using this technique in the village of Gharoda since the inception of the PoCRA project. In this Village Gram Panchayat, about 150 acres of the cultivated area is under Tomato crops. They are growing commercially and earning substantially. Visited one of the farmer's fields (Shri Sheikh Afsar Ismail) and discussed with him the benefits accrued from the PoCRA project. He has made drip designs with having lateral diameter of 20 mm, emitter spacing of 45 cm, and lateral spacing is 1.8 m. The lateral length is 400 ft. Generally, the discharge rate varies according to lateral length but it was constant up to 500 ft lateral length. Due to the paired row planting system, one lateral was serving two crop rows at a time. Depending upon the atmospheric water demand, the farmer was irrigating his crop at four-day intervals for 2 hours only but the water released was not measured. The crop details on the cost of cultivation and benefits achieved during the last rabi season are given below for reference.

Table 6: Paired row planting in Tomato under mulching with drip

Sr no.	Activities adapted for cultivation	Cost/acre	Remark
1	Crop geometry (paired row) Lateral distance 1.6 m	2 ft between crop (paired planting) x 2ft plant to plant	
2	Seedlings used 10000 (rate @1.50 /seedling	Rs 15000	
3	Ploughing, BBF, and Mulching cost	Rs 4000	
4	Plastic covering 6 bundles (1500 x 6 bundles)	Rs 9000	
5	Labour charge for covering 6plastic bundles	Rs 3600	
6	Wiring 2 quintal @12000 per quintal+ labour for fixing	Rs 24000+Rs 7000 = Rs 31000	The wires are again used for the next crop season
7	Sutli 2 quintal @1500 per quintal +labour	Rs 3000 + Rs 8000 = Rs 11000	
8	Labour charge 20 labour @Rs 400 for binding 3 times	Rs 8000 x 3= Rs 24000	
9	Bamboo for support of plant 1000 in numbers @Rs 40 per bamboo	Rs 40000	The bamboo will be further used in the next rabi season
10	Spraying (40 times) and harvesting of fruits each time and water soluble fertilizer through drip	Rs 1000 x 40 = Rs 40000 + Rs 15000 labour = Rs 55000	
11	Total expenditure	Rs 192600	
12	Yields 50 t/acre (2000 crates of 25 kg each)	Rs 600000	During 2021 rabi season , crop duration was six months
13	Net profit	Rs 407400	

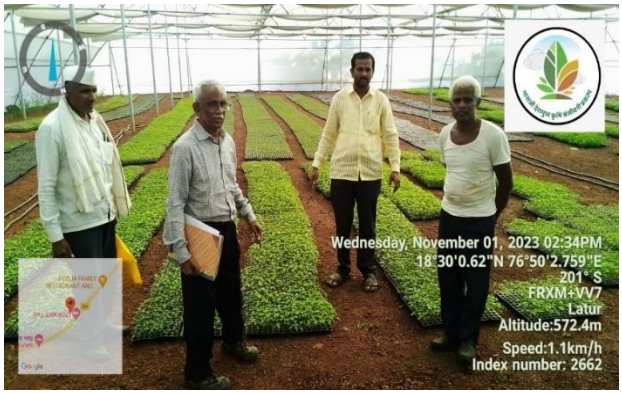
Crop photo: Tomato crop under mulching with drip at Gharoda village.

Farm implements: The farmer's group has purchased farm implements like a tractor, cultivator, drip lining machine, thresher, and rotavator, and all group members are using and providing to the other members, whenever it is required.

Self-help group: In this village, about 35 Mahilla groups (10 members each) are working effectively. They are collecting money every month and depositing in the bank. If any member is required to avail of the financial facilities, they are providing to the needy members charging 2 % interest and collecting money every month**.** They are very much interested in starting small-scale enterprises like dal mills, chili powder, dairy products, and soya-tofu preparation. These enterprises will be useful to enhance their income. To initiate these activities, they are demanding financial assistance from the PoCRA project.

Water resources structure: The cultivated area of this village is irrigated through well, and borewell water, and all these structures are recharged with a water storage reservoir, located in nearby places. The catchment area of Malegaon reservoir is 1000 acres, Hoti reservoir is 400 acres, and Seoni Budruk reservoir is 500 acres. So, all beneficiaries who have received various financial assistance from PoCRA are exploiting stored water for growing commercial vegetable crops, season cereals, pulses, and oil seed crops.

Village Gharani (Gharoda GP)



In the afternoon of 1.11.2023, visited SHED-NET unit and discussed with beneficiary Shri Balaji Baliram Changule about the impact of this unit on overall income of the farmer. He constructed this unit in 10 guntha (1000 sq. m area) by spending Rs 10.51 lakh (including his share of Rs 5.18 Lakh plus Rs 5.33 lakh of PoCRA share) in December, 2022 and using afterwords . Made borewell up to 500ft depth and irrigating his cultivated area. In this unit he growing only seedlings of vegetable crops viz. tomato, cabbage, cauliflower, marigold for 25-30 days. Once the seedling is study / healthy, he is selling the seedlings @rs 0.70-0.90(tomato, cabbage,), Rs 1.20(marigold) and Rs 2.30 per seedling (cucumber). Till on the day of visit, he had sold all seedling and earned Rs 30.00 lakh. From this total return, about 85 % was spent for growing seedling and 15 % was his net profit . So, in very light soil, if the financial assistance is given for small shadenet unit to the marginal farmers, such farmers will be benefitted. In PoCRA project, the sanction is granted for one acre area (4000 sq.m.) , the marginal famers are reluctant to invest huge amount initially and claim later on. So, the guidelines may be revised accordingly in II nd phase of PoCRA project to give maximum benefits to the marginal farmers.

BBF in soybean and chick pea

In same village, named Gharani (Gharoda GP), same farmer Shri Balaji Baliram Changule during 2021-2022 crop year had also grown soybean during kharif and chick pea during rabi season under BBF system with minimum tillage in rabi season and harvested 10.8 q/acre soybean and 12 q/acre chick pea. He provided all seeds to private seed company and earned extra rate of Rs 200 /quintal as compared to MSP. So, the BBF planting in combination with sprinkler irrigation system has given substantial benefits to small farmers. Other farmers have also adopted this type of practices and received benefits . Similarly, growing of soybean and chick pea, being leguminous crops improved soil fertility as these two crops fix atmospheric nitrogen in root nodules and adds organic carbon through stubbles /straw. The soybean and chick pea adds biological fixation of atmospheric nitrogen in soil to the extent of 26-63 kg/ha per season. Besides, about 20 t/ ha carbon is added in soil in 35 years of leguminous cropping instead of cereal cropping.

Village - Yerol Gram Panchayat, Tehsil - Sirur Anantpal, Sub division - Latur, District - Latur

On 3.11.2023, visited Yerod village and discussed with Sarpanch, Gram Panchayat members, progressive farmers, and agriculture assistant in Gram Panchayat office about the impact of CR technologies, adopted in this gram panchayat and the constraints faced while implementing the CR technologies. All farmers were informed that the provision of godown for storing farm produce, grants on pipes, water pumps, and open wells may be extended to grow the kharif and rabi crops and exploit all natural resources fully.

In these villages, the major CR technologies are drip, sprinkler, seed production, and BBF are extensively used by the farmers. Other technologies are also being implemented but with lesser magnitude. While discussing constraints, they suggested financial assistance on (i) An operated dibbling machine, (ii) STC with a generator for spraying, (iii) Subsidy on the tractor and other farm implements, crop protection from wild animals (iv) extension of PoCRA project in second phase.

BBF Technology: Considering the importance of BBF technology in soybean crops, the farmers have taken it up on a large-scale basis**.** Interviewed one farmer Shri Balaji Ramrao Sakodkar, who had taken soybeans under BBF during the kharif 2021-22 and 2022-2023 seasons. The details of the benefit received by him under the BBF system are given below.

Table 7: Soybean under BBF

Sr no.	Crop production activities followed in BBF in soybean	Cost incurred (in Rs.)
1.	Crop row spacing :4 crop row in 1.5 m on raised bed with 60 cm spaced furrow	
2	Seed rate 15 kg /acre	1500
3.	Ploughing, rotavator, levelling	5000
4	Seed treatment	500
5	weedicide	1500
6	Pesticides (3 sprays)	5000
7	Interculture operation	2000
8	Harvesting, cleaning, transporting to store	8000
9	Transporting charges to APMC market	2000
	Total expenditure	25500
10	Yield(q/acre)	11.0
11	Gross return (Rs) MSP rate Rs 4600 /quintal	50600
12	Net return	25100
13	In flat bed method , yield is 9 q/acre	
14	Gross return Rs	41400
Note	In Flat bed, if hand operated machine is used , then saving of seeds , and more yield is obtained . Hence hand dibbling machine whose cost is Rs 7000-8000 is essential.	

Seed production program: In this village, twenty-nine farmers are engaged in a seed production program and they are providing seed material (certified seeds) to one of the registered seed companies i.e. Renai Seed Company. One of the farmers Shri Anil Shivaji Gambhir had grown three soybean varieties MAUS 71, KDS 612, and KDS 726 during Kharif 2022-23 in 25 acres of land in a different farmer's field and handed over all cleaned seeds to the seed company and received 20 % more rates than MSP rate (Rs 4600 /quintal). The average seed yield was 10 q/acre. The expenditure for producing 10 q /acre seed yield was Rs 25000 /acre, the gross return was Rs 55200 /acre and the net return was Rs 30200/acre.

Drip irrigation in horticultural fruit crops: In wide row spacing horticultural fruit crops, one of the farmers Shri Balaji Ramrao Sakulkar, who had planted guava(3 m x 2 m spacing) in 2021 and installed a drip system last year. Since the fruit crop is two years old, and the fruiting has come this year, no information on benefits was collected from the farmers. He had taken soybean crop in between two rows of guava fruit crop and harvested good yield.

Shadenet and Farm Pond

Visited shadenet unit of Shri Vishnu Bhagvat Narhare, who constructed this unit in a 4000 sq meter area during 2022-23. The total cost was about Rs 25 lakh, out of this total expenditure, the PoCRA project share was Rs 18,61,648. The lined farm pond of size 30x30x3 m was also made through project assistance in 2022-23 for providing irrigation water from borewell to vegetable crops. Initially after construction, he had grown Capsicum, but was damaged due to thrips and could not satisfactorily return but from Cucumber during summer, he could harvest 12 tonnes and earned Rs 240000. Now it was ready for other vegetable crops. Outside of the shadenet unit, he has grown ridge gourd in a half-acre area with mulching and a drip system, provided through the PoCRA project and the crop is in the fruiting stages. He is expecting to get a total production of 430 crates (12 kg each) with a total return of Rs 1 lakh from Ridge Gourd.

Photo: Lined farm pond,

Photo: Shadenet unit and Ridge gourd cultivation

Sericulture:

Visited the sericulture unit of Shri Vaijunath Hanumanrao Sarole**.** The unit was constructed in 2022-23 and one cycle of silkworm has been completed by him. Within 27 days, he collected/harvested 1 quintal of silk and sold it at Rs 50000. If he takes 6-7 cycles of the silkworm in a year then the same farmer can expect a total return of about Rs 300000 to Rs 335000, however, he has very limited water resources to grow mulberry plants for feeding to worms throughout the year. If more water resources are created, then farmers can earn more income by rearing silkworms with more harvesting cycles.

Village- Medsinga, Gram Panchayat, Tehsil - Dharashiv, Sub division - Dharashiv, District - Dharashiv

On 2.11.2023 fornoon, consultant visited PoCRA adopted village Medsinga. Discussed with Deputy Sarpanch, GP members, progressive farmers , Gram Krishi Sanjivani Samittee members, other beneficiries in presence of State Govt. officials(Clustur Assistant, Agriculture Assistant and Agriculture Supervisor). About 15 farmers were present in the meeting . While discussing , they informed that all the adoted CR techonolies under PoCRA project has given substantial benefits to the farmers. While implementing the CR Technologies, they faced the follwing problems and suggested to improve in second phase of PoCRA project .

- Since the construction cost of shadenet unit is very high 50% amount may be released at the beginning and the remaining 50 % after completion of the shadenet unit. Because the marginal farmer (less than 5 acres of land holding farmer) can not afford to spend total construction cost initially and submit the bill for re-imbursement.
- Two percolation tank may be excavated and increase the storage capacity of rain water.
- Cement and Bandhara system has been damaged and requires repair as well as exacavation for increasing water storage capacity.
- More budget provision may be made in horticultural activities as more net terun is obtained from fruit crops as compared to seasonal crops. Drgaon fruit is very much popular in this area.
- Construction of Farm Store House is required.

Cropping pattern adopted: The following cropping pattern is being followed by the farmers

- Kharif season: Soybean, Arhar(Red gram), Moong,Urd, Kharif jowar
- Rabi season: Jowar, wheat, onion on a large scale, and other vegetables on a small scale are being grown. These are being used for domestic purposes

BBF Technology in Soybean: In soybean crops, more farmers have adopted BBF technology to avoid soybean crops from waterlogged conditions. Since last years the farmers have been adopting BBF technology and received substantial benefits. The detailed cost of cultivation and economic return from 10 farmers are summarized below :

Table 8: Performance of BBF technology in soybean during 2022-2023 from 10 farmers.

Sr no.	List BBF technology activities adopted	Expenditure incurred In one acre area	Remark
1.	Seed rate used in light soil 20 kg/acre)	2000	
2	Plough, rotavator	2700	
3	Tractor sowing	1200	
4	Fertiliser(DAP, urea, KNO3, rhizobium)	5000	
5	Pesticides	4000	
6	Interculture operation	1000	
7	Weedicide application	1500	
8	Harvesting by machine, threshing by labour manually	8000 (3000+5000)	
9	Cleaning (@ Rs 300 /q)	3600	
10	Seed production Yield(average yield q/acre)	12	
11	Gross expenditure	29000	
	Gross return from certified seeds @4600+20 % extra per quintal)=Rs5520 per quintal	66240	The farmers are receiving 75 % money after submitting soybean seeds to private seed company and remaining 25 % after processing the produce in June every year . In the case of Mahabeej, they are not receiving money in time.
12	Net return	37240	
13	Normal flat bed sowing , Yield was 10.5 quintal/acre	10.5	
14	Gross return @4600	48300	
15	Benefit of Seed multiplication in terms of gross return with flat bed	1.37:1	So in soybean about 1.37 times more return is accorded.

Rabi bengal gram/ chick pea: The farmers have cultivated chickpea in same piece of land without disturbing the BBF layout and harvested 6-7 q/acre chickpea seed yield, but some of them have taken up in a flatbed system and harvested 4.5-5 q/acre chickpea yield. This crop was grown under sprinkler irrigation system. The total expenditure in BBF comes to Rs 1200-1500 per acre and the gross return(@Rs 5300/q) comes to Rs 31800-37100 per acre. But in case of Flat bed system, the gross return comes to Rs 23850-26500 per acre. In this CR technology, the ratio of gross return in BBF and Flatbed system comes in the range of 1.33:1.0 to 1.40:1.0. Last year during rabi season about 90% of the cultivated area was brought for chickpeas but in this rabi season, the chickpea area will be hardly 10-15 % because of shortage of water as there was a severe rainfall deficit.

Farm mechnisation: Since custom hiring centre is not available in this village, a greater number of beneficiaries are interested to purchase farm implement individually. Hence necessary financial help may be made as narrated by them.

Sericulture: After discussion with all beneficiaries, visited sericulture unit of Shri Shitre Dyandeo, who has constructed sericulture rearing unit (26 ft x50 ft size) with total cost of Rs 3.50 lakh and grown mulberry plants in two acres of land for feeding mulberry leaves to the silkworm. He has already completed two cycles of silkworm and earned Rs 50000 with total expenditure of Rs 12000-13000 per cycle. Now the third cycle is going on in this sericulture unit. The same farmer is not interested for another 3-4 cycles due to shortage of irrigation water to grow mulberry crop. If water resources are created and rain water is harvested properly, the farmer can take up another 3-4 cycle and earn more income from same sericulture unit.

Photo: Sericulture unit and mulberry cultivation at Medsinga village.

Note: In sericulture CR technology, farmers have developed sericulture unit in May 2023 after receiving administrative approval from the competent authority on 18.1.2023. After completion, they submitted the bill in June 2023 but it was not uploaded as informed by the farmers. The concerned office informed that this particular CR technology has been discontinued. They are requesting to the competent authority to accept the bill and re-imburse the amount which was spent for this unit, but there is no repose from the office. The name of the farmers whose bills are pending is given below for reference.

1. Shitre Ravan Mahadeo village Medsinga
2. Shinde Abha Prabhu village Medsinga
3. Shitre Dyandeo Ramling village Medsinga
4. Patil Charudatta Wasudeo village Ansurda

Water resources: In this GP, about 400 open wells with depth of about 80 ft and, 700-750 borewell with depth of 400-600 ft are available. 17 Cement and Bandhara systems and 7 percolation tanks have been constructed in other govt schemes but due to siltation, water storage capacity has decreased. So, it is required to excavate the nalas and improve water storage capacity for recharging open wells and borewells.

Farm pond and solar operated pump:

Visited the farm pond of Shri Kaka Harischandra Selar who has constructed a farm pond (30x30x3m size) through the PoCRA project and used the farm pond water for irrigating field crops. During rabi and summer season it is filled with borewell water and used for vegetable crops. Whenever, electric supply is disrupted, the same farmer is using Solar operated motor pump and irrigating his vegetable particularly onion and other rabi crops. Another two solar-operated pumps of 3 HP capacity each are available with neighbors Shri Madhukar Avachar, and Mahadevi Baliram Rohile, and they are used for horticultural fruit crops as well as to intercrops (Jamun+ groundnut, Custard apple+groundnut). So the Solar pump is very much important for the farmers for irrigation as the electric supply is irregular in villages. The borewell water having a very low discharge is lifted and filled up into the farm pond thereafter the sprinkler with 8 risers is operated for irrigating different crops.

Photo: Farm pond and solar-operated pump in Medsinga village

SHG: In this GP, about 7 SHG (each of 20 female farmers) are functioning effectively in agriculture sector. They are very much interested to start small scale enterprise which are agriculture based like dal- mill, chilli powder, tomato by- product, onion dry powder machine etc. Other products like need seed extract preparation and formulation are equally important to reduce the use of pesticides in crops. For enhancing woman's Farm income, the above location specific small scale industries may be established at village level.

Field visit to Ruibhar village, Tehsil - Dharashiv, District -Dharashiv

In the afternoon of 2.11.2023, visited Ruibhar village and met all beneficiaries, Sarpanch GP Ruibhar in presence of State government officials and discussed about the PoCRA project activities.

They informed that due to scanty rainfall during kharif season 2023, severe stress may occur for growing rabi crops as ground water will not be sufficient to cover more area. Hardly 10 % of the cultivated area will be covered during rabi season 2023-24. Regarding impact of CR technologies, all adopted technologies have benefited the farmers with respect to increasing crop yield, saving of irrigation water through pressurised irrigation systems (pipes, sprinklers, drip). Other farm activities like sericulture, seed multiplication programme, shadenet, plantation of horticultural fruit crops have also showed significant impact. Now the following constraints are still prevailing in the villages to improve farm income

- Water resources structures are limited.
- Excavation of nala is required to increase water storage capacity of open wells, borewells
- More number of individual farm pond is required
- More Cement bandhara is needed to check excess water flowing from drainage nala

BBF technology and seed multiplication: In soybean crop the farmers have adopted BBF technology to escape crop from water logging and also save crops from severe moisture stress. This same farm layout was further used for rabi crops. In this way they could save the cost of cultivation and also harvested more yield under climatic aberration period. Collected the detail information about BBF technology from Shri Kiran Digamber Tirthkar and Kishore Gorakh Kolade of village Ruibhar and the benefits accrued by adopting BBF in the following table 9.

Table 9: Impact of BBF in soybean crop during Kharif 2022-23

Sr no.	Activities	Expenditure incurred (Rs per acre)	Remark
1.	BBF layout (1.2m to 1.5 m), followed by .60 m furrow (4-5 lines)	1200	
2	Ploughing + Rotavator	3500	
3	Seeds 18 kg/acre	1800	
4	Sowing by tractor	1500	Sowing by dibbler machine comes to Rs 500
5	Fertiliser + Rhizobium	2000	
6	Pesticides (3-4 times spray)	6000	
7	Interculture operation	1000	
8	Weeding manually	1000	
9	Harvesting, cleaning manually	5000+3450=8450	
10	Transportation from field to House	230	
11	Transportation from house to market /APMC/ Private seed company	1075	It depends upon distance from village to market
12	Yield (q/acre)	13.5	
13	Total expenditure	27755	
14	Gross return as per 20 % mores than MSP rate of Rs 4600=Rs 5520 /quintal certified seeds .		The farmers are giving certified seed @ 4600+20 % extra to Soroda Seed Company , ODSF Seed company , located about 8-20 km away from village instead of giving to MAHABEEJ.
15	In flat bed system , the farmers are harvesting 9-10 q/acre and selling to APMC/ MSP / private rate . Due to poor quality seeds , they are not earning good return.		

During kharif season, the farmers are using sprinkler during long dry spell and harvesting 1- 2 q/ acre more seed yield than rainfed soybean. After harvest of soybean the farmers are growing chick pea / onion without disturbing BBF layout and harvesting the rabi crops in March - April months. Some farmers are planting sugarcane crop in furrow. In this way, the farmers are using the BBF system effectively.

Photo: Soybean was grown under BBF and now it is to be used by the farmer for chickpea, onion at raised bed, and sugarcane in-furrow at Ruibhar village (Shri Hardas Dashrath Bhoite)

Shade Net: The Farmers of this village Mrs. Alka Balaji Bhoite constructed shadenet in the one-acre area in May-June 2023. She has spent a total money of Rs 28 lakh, out of total expenditure, PoCRA's share was Rs 18.61 lakhs. Now chili seedlings with mulching have been planted on 26.10.2023 in shadenet first time. Since this is a first-season crop and it is in the seedling stage, no additional information has been collected. No farm pond is available, but for irrigation, she is using borewell water directly. In the next year, all information will be available to the farmers to assess the impact of the CR Technology.

Photo: Shade net of Mrs Alka Balaji Bhoite

Mini-Sprinkler irrigation: In all field crops and close growing vegetable crops, big size water droplets sprinkler system is being used for irrigating but in small growing vegetable crops mini sprinkler having small size droplets falling over the crop canopy is showing good performance. One of the farmer Shri Kishore Gorakh Kodge has used the mini sprinkler in Coriander with total number of riser 16 (1.2 m height) for one acre of land. The main pipe was 75 mm diameter and submain was 32 mm diameter. The influence of water droplets as per company's design is 13 ft x 13 ft but it was spread up to 20 ft x20 ft with 5 Hp motor pump and irrigated one acre of cropped area within one hour period. PoCRA supported Rs 82,000 and remaining amount Rs 28000 he has spent from his own source of income. This is first year crop, he is expecting total returns of Rs1.20 lakh from one acre area of coriander. Earlier, the same farmers was covering 5 acres of land under flood irrigation but with mini-sprinkler about 8 acres of area is being covered with 5 HP motor pump.

Photo: Use of Mini-Sprinkler in coriander at Ruibhar (Shri Kishore Gorakh Godge)

SHG: In this GP, 70 (10-15 woman farmers in each group) SHG are functioning effectively. The male farmers group is 35 and 11-15 farmers are registered in each group.

Suggestion from farmers :

In the second phase of the PoCRA project, the supply of sprinklers, drips, and pipes on the grant may be continued.

- Storage structures may be created .
- Various NRM activities may be initiated
- Solar operated pump may be given for irrigation due to in-adequate/ irregular supply of power for irrigation.
- More grant for excavation of farm pond may be accorded as present rate of Rs 75000 is very low for 30mx30mx3 m pond size .

Annexure 4: Field Visit Notes of Agri-engineering Expert

<table>
<tr><td>Date of visit</td><td>28 and 29 November 2023</td></tr>
<tr><td>Visit to Villages</td><td>Pishore and Palashi (Both villages are in Kannad Taluka of CSN District</td></tr>
<tr><td>Meeting with</td><td>PoCRA Cluster Assistant & Farmers Community</td></tr>
<tr><td>Objectives Of Visit</td><td>

To assess the change in land use/cropping pattern, pre- and post- PoCRA works in project village.
To Check asset creation under different activities, its use, associated challenges faced, and take feedback from farmers and officials.

The PoCRA assisted components and its distribution to beneficiary farmers in Pishore & Palshi villgaes are given below in Table 1 & 2 respectively .

Table 1: PoCRA assisted components and their distribution to beneficiary farmers in Pishore village *

<table>
<tr><td rowspan="2">PoCRA Component</td><td colspan="2">Beneficiary farmers</td></tr>
<tr><td>Nos</td><td>% of Total</td></tr>
<tr><td>Apiculture</td><td>106</td><td>6.00</td></tr>
<tr><td>Backyard Poultry</td><td>1</td><td>0.09</td></tr>
<tr><td>Compost (Vermicompost/NADEP/Organic input production unit)</td><td>0</td><td>0.00</td></tr>
<tr><td>Drip Irrigation</td><td>944</td><td>55.24</td></tr>
<tr><td>Farm Mechanization</td><td>4</td><td>0.23</td></tr>
<tr><td>Farm Pond (Individual)</td><td>1</td><td>0.00</td></tr>
<tr><td>Farm Pond Lining</td><td>0</td><td>0.00</td></tr>
<tr><td>FFS host farmer assistance/Promotion of BBF technology/ Zero Tillage Technology etc.</td><td>1</td><td>0.09</td></tr>
<tr><td>Horticulture Plantation/ Agroforestry</td><td>14</td><td>0.82</td></tr>
<tr><td>Inland Fisheries</td><td>0</td><td>0.00</td></tr>
<tr><td>Others</td><td>0</td><td>0.00</td></tr>
<tr><td>Pipes</td><td>203</td><td>11.80</td></tr>
<tr><td>Planting material in Polyhouse/Shadenet house</td><td>57</td><td>3.33</td></tr>
<tr><td>Polyhouse/ Poly tunnels</td><td>0</td><td>0.00</td></tr>
<tr><td>Reacharge of open dug wells</td><td>0</td><td>0.00</td></tr>
<tr><td>Saline and sodic lands (Farm ponds/Sprinklers/Water pump/FFS)</td><td>118</td><td>7.00</td></tr>
<tr><td>7.0Seed Production</td><td>0</td><td>0.00</td></tr>
<tr><td>Sericulture</td><td>80</td><td>4.60</td></tr>
<tr><td>Shadenet House</td><td>102</td><td>6.00</td></tr>
<tr><td>Small ruminants</td><td>0</td><td>0.00</td></tr>
<tr><td>Soil and Water Conservation Practices</td><td>0</td><td>0.00</td></tr>
<tr><td>Sprinklers Irrigation</td><td>6</td><td>0.35</td></tr>
<tr><td>Water Pumps</td><td>72</td><td>4.20</td></tr>
<tr><td>Well</td><td>0</td><td>0.00</td></tr>
<tr><td>Total</td><td>1709</td><td>100</td></tr>
</table>
*Source :Nanaji Deshmukh Krishi Sanjeevani Prakalp, Agri. Division Dt 23/11/2023
</td></tr>
</table>

Table 2: PoCRA assisted components and its distribution to beneficiary farmers in Palshi village *

PoCRA Component	Beneficiary farmers	
	Nos	% of Total
Apiculture	33	3.03
Backyard Poultry	0	0.00
Compost (Vermicompost/NADEP/Organic input production unit)	0	0.0
Drip Irrigation	658	60.47
Farm Mechanization	2	0.18
Farm Pond (Individual)	0	0.00
Farm Pond Lining	0	0.00
FFS host farmer assistance/Promotion of BBF technology/ Zero Tillage Technology etc.	2	0.18
Horticulture Plantation/ Agroforestry	2	0.18
Inland Fisheries	1	0.09
Others	0	0.00
Pipes	177	16.26
Planting material in Polyhouse/Shadenet house	12	1.10
Polyhouse/ Poly tunnels	0	0.00
Recharge of open dug wells	0	0.00
Saline and sodic lands (Farm ponds/Sprinklers/Water pump/FFS)	140	12.86
Seed Production	0	0.00
Sericulture	1	0.09
Shadenet House	21	1.93
Small ruminants	5	0.46
Sprinklers Irrigation	4	.36
Water Pumps	30	2.75
Well	0	0.00
Total	1088	100

*Source: Nanaji Deshmukh Krishi Sanjeevani Prakalp,Agri. Division Dt 23/11/2023

Observations based on the farmer's field visit and interaction with Cluster assistant and farmer are as follows:

Change in land use/cropping pattern, pre- and post- PoCRA works in project villages

The PoCRA assisted components and their distribution to beneficiary farmers in Pishore & Palshi villages are given in Table 1 & 2 respectively show that largely beneficiary farmers took project assistance for drip and sprinkler irrigation systems which are about 67% and 73% of total nos of beneficiaries in Pishore and Palshi village respectively. With the adoption of drip (Figure 1) and sprinkler systems now the farmers are growing vegetable cash-earning crops instead of earlier field crops in open fields as given below :

Earlier Cropping Pattern	**Present Cropping Pattern with Drip/Sprinkler Irrigation**
Cotton, Maize, Wheat Cotton, Maize, Wheat, Sugarcane	Ginger, Tomato, Chilli, Brinjal, Soybean, Onion

The source of irrigation water in both villages is farmer's wells (Figure 2). It is noted that the water is available throughout the year in sufficient quantity to fully meet the crop irrigation requirements of respective farmer's fields in both villages. It is further noted that the groundwater recharge in both villages gets recharged as a result of the nearby existing Anjana Palshi Dam and its associated canal network in the area.

Interaction with the farmer who took PoCRA assistance for the drip irrigation system:

Farmer – Amul Jadhav, Village Pishore

Having a 5.0 acre field, took the following assistance from PoCRA in the year 2022. Pipes, Drip system, Pump 5.0 HP. Has his source of water – a well (Figure 2). Presently cultivating crops with drip system following crops: Tomato, Onion, Ginger, and Brinjal. Before PoCRA he was cultivating Chilli crop**s**. He pointed out that before PoCRA he was having **a** shortage of water during summer, which is not there now due **to** saving in water with drip irrigation and additiona**l**ly he is getting comparatively higher crop yields. From above it is concluded that PoCRA assistance components of drip irrigation system which is taken by in the range of 67 to 70% of total beneficiaries have resulted in change**s in** cropping pattern**s** and land use in villages namely Pishor and Palshi resulting in not only **an** increase in irrigation efficiency but appreciable increase in crop yields in comparison to without PoCRA assistance.

Interactions with the farmers who took PoCRA assistance for the Shadenet:

Farmer: Baba Saheb Jadhav in Pishore village

POCRA assistance taken by him includes 4nos x1.0 acre shade nets, Pump 5.0 HP, Pipes, and a Drip system in the year 2021. The shadenet was constructed in the year 2021 (Figure 3). Presently the shade house is planted with seedlings of Cucumber. The growing season of the Cucumber crop is Nov-Jun. For the other crops, he also takes Capsicum from Oct–June. He has his well for irrigation.

Farmer: Santosh Narian in Palshi village

PoCRA assistance taken by him includes 1no x 1.0-acre shade nets, Pump 5.0 HP, Pipes, and Drip system in the year 2020. The shadenet was constructed in the year 2020. Presently the shade is planted with Capsicum planted 7 months earlier. He has his well for irrigation. The water level in the well is 30 ft and 20 ft below ground level in summer and winter respectively. He applies the following irrigation schedule to irrigate the crops with the existing drip system: ½ Hr application @ 2-day intervals in summer and 15-minute application @ 5 and 6 days intervals in winter

Interactions with the farmers who took PoCRA assistance for the Godown:

Farmer: Sachin Valmik Jadhav

Presently storing: Maize, Bajra, with the idea to sell later at a better price. He has also taken PoCRA assistance for drip irrigation systems ie pipes, pumps, and drip. Presently he is irrigating crops like maize, cotton, and sugarcane with a drip system**.** He has his well**.** He pointed out that before project assistance with the drip system, he was having a water shortage with the flood irrigation system, The provision of the project drip system has resulted in the saving of water and no shortage of irrigation water.

Figure 1: Ginger Crop irrigated by Drip irrigation system

Figure 2: Farmer's Own Well for irrigation

Figure 3: Shadenet in Pishor Village

Figure 4: Godown facility

Annexure 5: Field Visit Notes of Hydrology Expert

Agenda of the field visit: The agenda of the field visit was to assess the drip & sprinkler systems from the point of view of saving water and energy, water use efficiency, fertigation, and how it has helped farmers planning high-value crops, achieve higher yield & ultimately income.

Summary: The major objective of the field visit was to ascertain the impact of the adoption of drip/ sprinkler irrigation in terms of water saving, energy saving, fertigation, crop diversification, increase in crop yields, and eventually in the income of beneficiary farmers. The present report provides the details of the villages visited, the increase in sprinkler and drip irrigated areas, farmers' perception of water and energy saving, the increase in crop yields, and eventually more income. The following are the key observations and recommendations;

- Groundwater is the major source of irrigation water in all the villages visited. It is seen that during the last five years the number of dug wells and bore wells have rapidly increased in these villages. Increasing number of farmers have also opted for farm ponds to achieve water security. As a result, the irrigated area increased from mere 2 % in 2018-19 to 30 % in 2022-23 in Palkhed village, while during the same period, it increased from 3% to 31% in Golwadi village (table 2a & b). Increased number of groundwater structures also enabled farmers to avail more and more sprinkler/ drip irrigation systems through PoCRA support
- Due to limited and seasonal availability of groundwater, farmers have opted for seasonal crops. Almost 90 % annual irrigated area is in Rabi season, while only 10% is under perennial crops like mosambi (sweet lime) and mulberry (table 2a & b).
- All beneficiaries are fully convinced of the benefits of drip and sprinkler irrigation. They highly appreciated the financial support received through PoCRA in adoption and installation of these efficient irrigation systems. It was seen that of the total intervention components under PoCRA, the maximum number of farmers have shown their preference to sprinkler and drip irrigation system. This was 41 % in Nipani Jawalka, 44 % in Rui, 40 % in Palkhed and 43 % in Golwadi village (table 4). As regards the share oof drip / sprinkler irrigated area in the total irrigated area of the village, it has increased from 40 % in 2018-19 to 95% in 2022-23 in Palkhad village and from 55 % in 2018-19 to 95 % at present (table 5 a & b)
- As regards the water saving benefit due to sprinkler/ drip systems, the beneficiary farmers express water savings in terms of increase in irrigated area with the same volume of water. Farmers told that due to sprinkler / drip systems, they are able to increase their irrigated area by 2 to 4 times compare to traditional flow irrigation method. Increased irrigated area means achievement of higher water use efficiency. Thus the concept of water saving needs to be revisited in context to the local situation.
- Although, drip irrigation is said to reduce electricity consumption due to less volume of water required to be pumped, this benefit is not much appreciated by the beneficiary farmers. The probable reason being rampant unmetered electricity use and increased use of solar pumps. Thus, even if the energy saving is an important attribute of drip irrigation, farmers have not realized it so far. However, for the society at large, energy saving attribute of drip irrigation is important.
- The beneficiary farmers also did not explicitly express the benefit of ‘increased crop yield’. However, they said that as irrigated areas have increased due to the adoption of sprinkler/drip systems, there was an overall increase in crop production. The beneficiary farmers can cultivate high-value/cash crops because of drip/ sprinkler irrigation. Thus, the objective of crop diversification has been achieved. It was seen that smallholder farmers prefer to go for ‘sericulture’ rather than sugarcane cultivation as it provides higher annual income and employment all year round. Increased local employment means a reduction the in migration of the village population to urban areas.
- Although, sprinkler and drip irrigation technology has been found to be a ‘game changer’ for the smallholder farmers, there are a few threats for its sustained growth. The most important being declining groundwater availability. The spread of drip/ sprinkler irrigation which has upscaled mulberry cultivation and hence the ‘Sericulture’ in these villages may face threat due to ever declining water availability exacerbated by climate change impact. Most farmers expressed their concern about inadequate groundwater in their wells forcing them to curtail their irrigated area and even in some instances abandoning the cultivation of mulberry and vegetables in their shed-nets. Another threat is of erratic availability of power supply adversely impacting the operation of drip irrigation on regular basis. There is also a need of providing guidance to farmers in proper operation and maintenance of drip and sprinkler system as also in fertigation / chemigation through drip system so as to harness full benefits of the technology.

Details of the project villages visited: The field survey was carried out in four PoCRA villages of Beed and CSN (Chhatrapati Sambhaji Nagar) districts on 28 and 29 November 2023 as shown in Table 1.

Table 1. Details of the project villages and no. of farmers interacted

Date of visit	District	Taluka	Details of the village			
			Name	Population	No. of farmers	Cultivated area (ha)
28 Nov 2023	Beed	Gevrai	Nipani Jawalka	2725	993	1323
			Rui	2665	901	1182
29 Nov 2023	CSN	Vaijapur	Palkhed	4262	1223	151
			Golwadi	1432	520	973

State of irrigation development in the villages: Water security is at the centre of building climate resilient agriculture. All income generation activities including crop production are fully dependant upon water availability at the field. Farmers, therefore are investing more and more in d developing groundwater resources in the PoCRA villages. Table 2 a & b show the growth of groundwater structures in Palkhed and Golwadi villages of Vaijapur taluka, Sambhajinagar district.

Table 2 (a) Groundwater development and irrigated area growth in Palked village

Year	Irrigation water sources			Irrigated area (ha)			% of the cultivated area
	Dug wells	Borewells	Farm ponds	Rabi	Perennial	Total	
2018-19	360	160	5	20	5	25	2 %
2019-20	390	175	11	70	10	80	5 %
2020-21	410	198	20	120	30	150	10 %
2021-22	460	220	31	190	50	240	15 %
2022-23	465	222	33	407	55	462	30 %

Table 2 (b)Groundwater development and irrigated area growth in Golwadi village

Year	Irrigation water sources			Irrigated area (ha)			% of the cultivated area
	Dug wells	Borewells	Farm ponds	Rabi	Perennial	Total	
2018-19	190	110	5	18	10	28	3 %
2019-20	240	160	13	50	15	65	7 %
2020-21	226	180	22	136	21	157	16 %
2021-22	251	201	29	184	22	206	21 %
2022-23	255	202	35	278	26	304	31 %

Adoption of drip and sprinkler irrigation by farmers: Of all the PoCRA intervention components, the majority of farmers have opted for sprinkler/drip systems as this is a game-changer technology for improved irrigation management in water-scarce areas like Marathwada.

Table 3 (a). State of adoption of drip and sprinkler irrigation by farmers in Palkhed village

Year	Portable sprinkler	Drip	Total	% of the total village farmers
2018-19	13	5	18	2 %
2019-20	98	25	123	10 %
2020-21	132	50	182	15 %
2021-22	148	54	202	17 %
2022-23	272	210	482	40 %

Table 3 (b). State of adoption of drip a and sprinkler irrigation by farmers in Golwadi

Year	Portable sprinkler	Drip	Total	% of the total village farmers
2018-19	18	10	28	5 %
2019-20	30	35	65	12 %
2020-21	68	89	157	30 %
2021-22	70	136	206	40 %
2022-23	156	164	320	60 %

Table 4. Share of the drip and sprinkler system beneficiaries in the total beneficiaries of the various PoCRA components (as of 30 November 2023)

Village	Drip system	Sprinkler system	Total beneficiaries	Share of the total PoCRA components beneficiaries
Nipani jawalka	218	71	289	41 %
Rui	345	17	362	44 %
Palkhed	210	272	482	40 %
Golwadi	156	164	320	60 %

Growth of drip and sprinkler irrigated area : Table 5 a & b show the growth of drip and sprinkler irrigated area in Palkhe and Golwadi villages. It can be seen that drip and sprinkler irrigation have become the dominant methods of irrigation. These testimonies the popularity of these systems in water scarce areas.

Table 5 (a). Drip and sprinkler irrigated area in Palkhed vllage

Year	Portable sprinkler	Drip	Total	% of the total irrigated area of the village
2018-19	13	5	18	40 %
2019-20	70	10	80	80 %
2020-21	105	45	150	85 %
2021-22	115	130	240	90 %
2022-23	217	240	462	95 %

Table 5 (b). Drip and sprinkler irrigated area in Golwadi vllage

Year	Portable sprinkler	Drip	Total	% of the total irrigated area of the village
2018-19	18	10	28	55 %
2019 - 20	30	35	65	55 %
2020 - 21	68	89	157	85 %
2021 - 22	70	136	206	90 %
2022 -23	131	180	311	95 %

Figure 1 a and b show the growth of drip and sprinkler irrigated area in Palkhad and Golwadi village of Sambhaji nagar district.

Figure 1 (a)

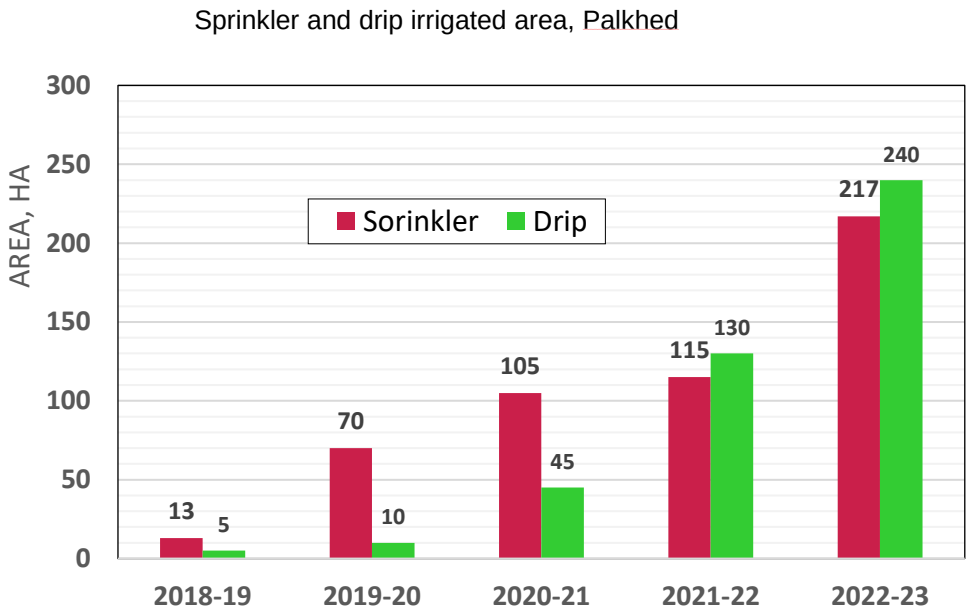
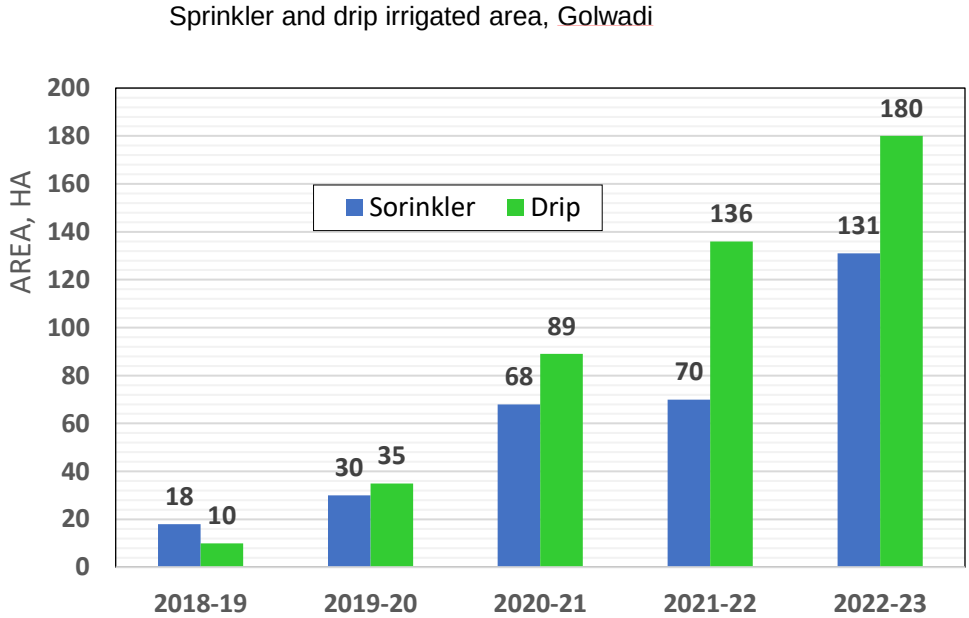


Figure 1 (b)



Interaction with beneficiary farmers

In order to know the views of the farmers as regards the water and energy saving, increase in water use efficiency, fertigation, increased in crop yields and their income. In both the villages, in all 8 farmers were interviewed, of which six beneficiaries had instilled drip system while two had sprinkler system. Table 6 gives the details of the beneficiaries and irrigation systems used by them. The salient details of the beneficiary farmers are shown in Annexure 1.1 to 1.8.

Table 6. Details of the beneficiary farmers surveyed during the field visit

Village	Name of the farmer	Irrigation system	Field area	Crop
Rui	Shivprasad Raosaheb Navale	Drip	2 ha	Mulberry
	Kashi bai Bharat ghatage	Drip	0.8 ha	Mosambi
Nipani jawalka	Angad Vishwambhar Kakade	Drip	0.4 ha	Cotton
Palkhed	Somnath Bhagwat Mulmule	Drip	0.3 ha	Onion
	Dilip Ddattu Mokate	Drip	0.4 ha	Capsicum
	Sanju Dattu Mokate	Sprinkler	0.4 ha	Onion
Golwadi	Sheelabai Dagadu Pagar	Drip	1 ha	Mosambi
	Dnyaneshwar Prahlada Pagar	Sprinkler	0.25 ha	Onion (Seed production)

Drip irrigation was used for perennial crops like Mosambi (sweet lime) and sugarcane as also for row crops like cotton, mulberry and fruity vegetables like capsicum, tomato, bottle guard. Drip system is also used to irrigate all those crops grown under shed- net. Those farmers having orchard plantation, take interculture crops like ginger, onion, gram, chickpea, etc during the first three years of the orchard plantation. All farmers have groundwater as the only source of irrigation which is available in limited quantities. All farmers said that, they are able to irrigate 2 to 4 times more area, depending upon crop type, due to drip and sprinkler system. The water saving due to drip/ sprinkler irrigation is expressed in terms of increasing their irrigated area and not as absolute saving at the source (well).

Due to drip system farmers have switched to cash crops like sugarcane, mosambi, cotton and onion. The shed-nets have been found to be a boon to small holder farmers. They grow high value and better-quality vegetables which fetches higher price in the market. Irrigating their entire area, although small (< one acre), has become possible only due to drip and sprinkler irrigation. Most farmers apply water soluble fertilizers and fungicides through drip as they can be applied precisely thereby saving not only labour but the fertilizer itself.

As the irrigation water is applied near to the plant rootzone, a favourable moisture (field capacity) is mentioned in the rootzone profile. This leads to higher yields to the tune of 30 to 40 percent than traditional surface irrigation methods. More crop yield means 'pe drop more crop' which translate in to higher water use efficiency (more crop yield per unit of water) or enhanced water productivity.

In Rui village there is a large area under mulberry plantation and many farmers are engaged in 'Sericulture' activities. The mulberry plant leaves act as the feed of silk producing larva. The mulberry plants require irrigation throughout their growth period of 4 to 5 years. Both, drip and sprinkler systems have greatly facilitated the cultivation of mulberry in the village. With sericulture a small holder farmer was earning Rs,.5 lakh per annum. Farmers said that the sericulture is 2 to 3 times more profitable than cotton cultivation.

One of the mosambi growing woman farmer said that earner, she could irrigate about 10 mosambi trees per hour using traditional basin method of flow irrigation, but with drip system she could irrigate 40 trees per hour. Shri Angad Kakade, farmer from Nippani Jawalka village said that, due to drip irrigation, he could plant cotton on one acre field and he was expecting at least Rs. 42000 per acre from the crop. Shri. Somnath, farmer from Palkhed village said that due to drip irrigation he could harvest 200 quintals of onion which was 50 quintals higher than with traditional flow irrigation from an area of 30 gunths (0.3 ha). Shri Sanju, farmer from Palkhe village said that he is irrigating his onion crop by sprinkler system and applying almost half of the water than that of surface flow method. His labour requirement has significantly reduced and also, he can apply water to crops during night hours too.

As regards the energy saving, farmers are not aware about this benefit, as there was no metering of electricity in most cases. Moreover, many farmers have installed 'solar pumps' of 3 to 5 HP. Thus, their dependency on erratic power supply has been reducing. As irrigation can be completed in much shorter time, there was a substantial reduction in electricity consumption in pumping water.

Annex 1.1

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Rui Taluka: Gevrai District: Beed Date: 28 November 2023

Name of the Farmer: Shivprasad Raosaheb Nawale Gat No: 31

Crops	Maleberry
Crop area (Acres)	2 ha
Crop sowing/ planting date	June 2018
Crop harvesting date	Leaves are harvested five time per year
Crop yield	Information not available
Source of irrigation	Dug well, 60ft deep, 25 ft dia., Solar pump of 3 HP
Irrigation method	Drip (Inline)
Dripper flow rate (LPH)	4 LPH
Spacing between two laterals and drippers	4 ft X 1.5 ft.
Number of irrigations	Kharip (1), Rabi (4), Hot Weather (16)
Depth of soil	6 ft
Type of soil	Medium
Reasons for using drip/ sprinkler irrigation	Farmer has shadenet of 30 guntha got through PoCRA and grows vegetables and local chili crop. Cultivated cotton before PoCRA but since 2018 shifted to Maleberry crop for Sericulture which is 2 to 3 times more profitable than cotton. Applies 19:19:10 water-soluble fertilizer through a drip system which is more effective than that of conventional surface application.

Annex 1.2

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Rui Taluka: Gevrai District: Beed Date: 28 November 2023

Name of the Farmer: Kashi Bai Bharat Ghatage Gat No: 177

Crops	Sweet lime (Mosambi)
Crop area (Acres)	2 acres
Crop sowing/ planting date	January 2019
Crop harvesting date	First harvest in the months of February – March 2024
Crop yield	The Farmer is expecting about 3.5 tonnes from 2acres. The farmer was also taking cotton as the intercultural crop
Source of irrigation	Dug well; 75 ft deep; 20 ft di.
Irrigation method	Drip system
Dripper flow rate (LPH)	8 LPH
Spacing between two laterals and drippers	16 ft X 4ft
Number of irrigations	Kharif (Jan - Sept.) : 10 nos. (as required), Rabi (October -January): 15 numbers, Summer (February - May): 20 nos.
Type and depth of soil	Medium, depth varies from 1 ft to 5 ft
Reasons for using drip irrigation	Earlier with basin method of irrigation only 10 plants could be irrigated in an hour. While with the drip system the farmer is able to irrigate 40 trees per hour. As irrigation can be completed in shorter time, there is a significant saving in electricity consumption The farmers apply water soluble fertilizers and fungicides/ pesticides too. The farmer was expecting a gross income of Rs. One lakh acre from the Mosambi orchard.

Annex 1.3

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Nipani jawalka Taluka: Gevrai District: Beed Date: 28 November 2023

Name of the Farmer: Angad Vishwambhar Kakade Gat No: 336

Crops	Cotton
Crop area (Acres)	1 acre
Crop sowing/ planting date	June 2023
Crop harvesting date	30 November 2023
Crop yield	8 quintals / acre (expected)
Source of irrigation	Dug well, solar pump of 3 HP
Irrigation method	Drip
Dripper flow rate (LPH)	4 LPH
Spacing between two laterals and drippers	4 ft X 1.25 ft
Number of irrigations	3 to 4
Type and depth of soil	Heavy soil and about 3 ft deep
Reasons for installing drip system	The farmers told that due to drip irrigation he was able to irrigate 4 guntha while earlier with flow irrigation he could irrigate only one guntha with the available water from his well. The farmer applies water soluble fertilizers (like DAP, Urea) as well as fungicides through drip irrigation. The gross income likely to be received by the farmer was Rs.42,000/-from one acre of his land.

Annex 1.4

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Palkhed Taluka: Vaijapur District: Sambhaji nagar Date: 29 November 2023

Name of the Farmer: Somnath Bhagwat Mulmule Gat No: 161

Crop	Onion
Crop area	28 Guntha
Crop sowing/ planting date	1 November 2023
Crop harvesting date	February 2024
Crop yield	100 quintals/ 28 guntha (estimated)
Source of irrigation	Dug well (Common between brothers 70 ft deep, 22 ft dia and installed 5 HP
Irrigation method	Drip
Dripper flow rate (LPH)	4 LPH
Spacing between two laterals and dripper	4 ft X 1.25 ft
Number of irrigations	Rabi season: at 5 days interval Hot weather: at 10 days interval (normally drip system for 8 hours /watering)
Type and depth of soil	Deep soil and about 3 ft in depth
Reasons for using drip/ sprinkler irrigation	The farmer said that he has installed the drip system to increase the onion yield. Due to drip irrigation, he could harvest 200 quintals from 30 guntha, while it was 150 guntha without drip. For the same area. The farmer had applied 19:19:19 water soluble fertilizers and Hunic Acid through drip system to enhance water and nutrient uptake and root growth.

Annex 1.5

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Palkhed Taluka: Vaijapur District: Sambhaji nagar Date: 29 November 2023

Name of the Farmer: Dilip Dattu Mokate

Crops	Capsicum
Crop area (Acres)	One acre (under shadenet, got under PoCRA scheme)
Crop sowing/ planting date	August 2023
Crop harvesting date	1st plucking was in October 23
Crop yield	4 tons /acre / year (as expected by the farmer)
Source of irrigation	Borewell, 3 HP solar pump
Irrigation method	Drip
Dripper flow rate (LPH)	4 LPH
Spacing between two laterals and drippers	5 ft. X 1.25 ft
Number of irrigations	Irrigation interval Kharif: 4 days depending upon rainfall Rabi and Hot weather: 4 days The duration of irrigation is less in kharif season and more in Rabi and summer seasons.
Type and depth of soil	Deep black cotton soil, 3 ft deep
Reasons for using drip/ sprinkler irrigation	Without drip system it was not possible to cultivate such a capital-intensive vegetable crop. He applies water soluble fertilizers (like 19:19; 12:61) to the crop through drip system. The labour requirement for irrigation has reduced by 50 percent compared to traditional furrow system. The farmer has done six plucking of the fruits so far.

Annex 1.6

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Palkhed Taluka: Vaijapur District: Sambhaji nagar Date: 29 November 2023

Name of the Farmer: Sanjay Dattu Mokate Gat No: 177

Crops	Onion
Crop area (Acres)	1 acre
Source of irrigation	Dug well, 70 ft depth and 18 ft diameter
Irrigation method	Sprinkler method (30 pipes of 75 mm and 8 nozzles)
Sprinkler flow rate (LPM)	Not known
Spacing between two laterals and drippers	40 ft X 40 ft
Number of irrigations	At 10 to 15-day intervals depending on weather conditions
Soil type and its depth	Medium, 4 ft deep
Reasons for using drip/ sprinkler irrigation	Requires 50 percent less water than the traditional surface method of irrigation and can be performed with less labour and during night hours.

Annex 1.7

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Golwadi Taluka: Vaijapur District: Sambhaji nagar Date: 29 November 2023

Name of the Farmer: Sheelabai Dagadu Pagar Gat No: 118

Crops	Sweet lime (Mosambi)
Crop area (Acres)	1 ha
Crop sowing/ planting date	June 2022
Crop harvesting date	First fruit harvest will be after 5 years of the planting
Crop yield	Not known
Source of irrigation	Dug well , 70 ft deep and 18 ft diameter
Irrigation method	Drip
Dripper flow rate (LPH)	4 LPH
Spacing between two laterals and drippers	15 ft X 13 ft (presently there are two drippers per tree
Number of irrigations	Kharif: As required depending on the rains Rabi: at 8 days interval Hot weather: at 4 days interval
Type of soil and its depth	Medium having average depth of 1.5 ft
Reasons for using drip/ sprinkler irrigation	It required 2 days to irrigate the orchard by traditional basin method, while by drip the irrigation can be completed in 3 to 4 hours. Applies water-soluble fertilizers and fungicides through the drip system. Due to drip system, weed growth around and below the tree canopy is suppressed. Grows Ginger, onion and gram as the intercrops during the early stages of the Mosambi orchard.

Annex 1.8

DRIP & SPRINKLER IRRIGATION FIELD VISIT INFORMATION SHEET

Village: Golwadi Taluka: Vaijapur District: Sambhaji nagar Date: 29 November 2023

Name of the Farmer: Dnyaneshwar Pralhad Pagar Gat No: 118

Crops	Onion Seed production
Crop area (Acres)	25 Guntha
Crop sowing/ planting date	15 October 2023
Crop harvesting date	First lot of seed harvesting was in progress
Crop yield	Not known
Source of irrigation	Dug well and farm pond
Irrigation method	Portable sprinkler; 30 pipes and 8 nozzles
Dripper flow rate (LPH)	Not known
Spacing between two laterals and drippers	40 ft X 40 ft
Number of irrigations	Twice in a week; one hour per setting
Type and depth of soil	Medium having 1.5 ft depth
Reasons for using drip/ sprinkler irrigation	Saves about half of the water required by conventional surface method, saves labour

Annexure 6: Field Visit Notes of Agri Economy Expert

Performance of PoCRA Interventions in the Selected Villages of Beed and Parbhani Districts of Marathwada Region of Maharashtra on Rural Economy

1. **Background:** During February 2023, four villages namely villages namely Ardhmsala and Ranjani in Beed district and Pathargvan and Kheda in Parbhani district were considered for in-depth investigations. These villages were considered based on the status of substantial implementations in terms of both period and number of activities during the project period. Broadly, about ten types of project activities were implemented in varying proportions. The purpose of the field investigations is to assess the resilience built within the community specifically, (a) Adoption of CR technologies, (b) Improved skillsets of farmers due to the use of CR technology, (c) Improved climate change adaptation and coping mechanism, (d) Positive behavioral change in agricultural practices, (e) Resilience to absorb sudden climate shock, (f) Resilience to market price fluctuations, (g) Development of youth entrepreneurship and (h) Achievement of sustainability in terms of livelihood enhancement, employment generation, reduction in migration, etc. During the assessment, a participatory approach such as group discussion, and interaction with the project implementation staff deployed at the field level and ultimate stakeholders such as farmers belonging to various socio-economic categories to collect information regarding the impact of project activities at farms/ households.

2. **Status of Implementation of Project Activities in the Selected Villages:** There are multiple activities implemented across the villages under PoCRA. Field experience reveals that about ten types of activities were implemented keeping in view suitability of the activities and requirement of the farmers. and multiple activities were with a view of extending benefits to the target groups. In these villages, about seventeen types of activities were implemented (Table 1).

   The number of beneficiaries also varying across the villages such as 1279 and 632 in beed and Parbhani Districts respectively. In overall, there were 1911 beneficiaries those have access to various types of activities. In Beed district villages, about 12 types of activities were implemented. The drip irrigation facilities occupy the prime position with proportion of about 56 percent of the total activities implemented followed by sericulture-based activities (about 28 percent), horticulture and plantation and agro-forestry (about 8 percent). The proportions of other activities were found limited except sprinkler irrigation and farm ponds with about 4 percent and one percent.

   In case of other activities, their proportion was less than one. In the selected villages in Parbhani districts, about 12 types of activities were implemented. Among these activities, sprinkler irrigation with about 37 proportion followed by drip irrigation (23 percent), PVC pipes (19 percent), water pumps (10 percent). In case of other activities, similar pattern can notice as in case of villages Beed district (Table 1). In overall, drip irrigation activities were implemented in larger proportion i.e. 45 percent of total activities of the total implemented activities followed by sericulture and sprinkler with the proportion of 19 and 17 percent respectively. Implementation of horticulture/ agroforestry and PVC piles was in equal proportion i.e. about 7 percent, while it was in limited proportion in other activities.

   The field experience and available PoCRA village records reveals that a beneficiary was availing more than one activity. In other words, every beneficiary was availing nearly three activities[14]. These activities were implemented as per the requirement of the farmers as well as availability and suitability of the resources.

[14] It is noted during the discussion with group of farmers in the selected villages as well as the analysis of available data relating to PoCRA village.

Table 1. Status of Implementation of Different Project Activities

Project Activities Implemented	Proportionate Distribution of Project Activities Implemented in the Selected Villages		
	Beed	Parbhani	Overall
Compost (Vermicompost / NADEP / Organic input production unit)	0.00	0.32	0.10
Drip Irrigation	56.29	23.10	45.32
Farm Mechanization	0.23	0.79	0.42
Farm Ponds (Individual)	1.02	1.27	1.10
Farm Ponds (Lining)	0.31	0.00	0.21
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	0.00	0.47	0.16
Horticulture Plantation / Agroforestry	8.37	4.27	7.01
inland Fishery	0.08	0.00	0.05
Pipes	0.39	19.30	6.65
Planting material in Polyhouse / Shadenet house	0.00	0.00	0.00
Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	0.78	2.22	1.26
Seed Production	0.00	0.16	0.05
Sericulture	28.38	0.00	19.00
Shade-net House	0.55	0.00	0.37
Small Ruminents	0.00	0.00	0.00
Sprinkler Irrigation	3.52	37.50	14.76
Water Pumps	0.08	10.28	3.45
Well	0.00	0.32	0.10
Total (Numbers)	1279	632	1911

Source: Villages Records

3. **Agricultural Practices and Adoption of Climate Resilient Technological:** The present section, dealing with the discussion on the impact of climate resilient technologies on the agricultural practices such as changes in cropping pattern and crop productivities followed by the farmers in the selected villages.

Changes in Cropping Pattern: An attempt has been made to understand changes in cropping pattern after the implementation of various project activities. It can be noted from the fact that before the project intervention, the farmers were cultivating traditional cereal crops including cotton, juar, moong maize, arhar soyabeen and so on during kharif crop season wheat, gram and rabi juari during rabi season. After the project intervention, almost, similar cropping pattern was followed by the beneficiaries but, there was a substantial change in area under different crops. A considerable decline in the area under cotton crop was noticed i.e. about two-third[15]. The area under moong, maize and tur was also reduced by one-third, one-fifth and one-fourth respectively. Similarly, area under rabi crios was also reduced considerably (Table 2). Interestingly, area under soyabeen has also been increased considerably i.e. two-fifths. The area under rabi season crops has also declined substantially in case of wheat by two-fifths. The area under gram and rabi juar has also been declined by one-fifth and one-fourth after the project implementation. After the project new crops were emerged such as horticulture crops as / fruit crops such as citrus, mangoes and pomegranate and other vegetable crops. It can be inferred from the fact that after the provision various project activities the area from traditional crops has been shifted to other new cropping pattern such as horticultor and vegetable crops.

[15] The farmers reported that there is substantial decrease in area under cotton crops. It is because of the fact that the cultivation of cotton has become more risky and costly affair. In other words, cotton cultivation has become inviable.

Table 2: Cropping pattern followed by farmers - Before and after project

Before the project	After the Project	
Crops Grown	**Crops Grown**	**New Crops Emerged**
Kharif: Cotton, Juar, moong, maize, Arhar Soyabean, Sugarcane **Rabi:** Wheat, Gram, rabi juari	**Kharif:** Cotton (-66%), moong (-33%) Soyabean (40%), Tur (-20%) maize (-25%) and Bajra (-25%). **Rabi:** Wheat (-40%), Gram (-20%), rabi juari/ (-25),	Chill, Tomatoes, Brinjal and Fruit trees including Citrus, Mangoes and pomegranate.

Source: Interaction and discussion with the group of farmers in the selected villages. `

Crop Productivity: Crop productivity is one of the major indicators of agricultural development in the country. After the project intervention, there was a substantial increase in productivity of major crops grown by the farmers in project villages. It can be because of the fact that adoption of climate resilient technologies, application recommended farm input and availability of water for irrigation after the project intervention. No double, area under cotton crop has been deceased considerable but the productivity has been increased by about one percent of half of the total cropped area. The productivity under wheat, gram and rabi juari was substantial. While this increase was noted as one-third and more than that in case of other crops (Table 2).

Table 3: Changes in Crop Productivity (Qtls/Ha.)

Crops	Before the project	After the Project	Proportionate (Percent) Change
Cotton	11.25	16.75	48.89
Moong	7.5	10	33.33
Juar	11.2	16.5	47.32
Soyabean	10.5	15.75	50.00
Tur	15	20	33.33
Wheat	11.25	20.25	80.00
Gram	10	15.5	55.00

Source: Discussion with a group of beneficiaries in the selected villages

Status of Cost Structure of Major Crops: An attempt has been made to work out the economics of major crops grown by the farmers by following the climate-resilient technologies in the cultivation of both traditional cropping systems and new crops.

The analysis shows that the total average cost incurred in the cultivation of wheat was about Rs. 22 thousand per hectare while the average revenue was worked out as about Rs. 37 thousand per hectare. Hence, per hectare, average net returns were around Rs.14 thousand. In the case of Arhar cultivation, per hectare average cost was about Rs. 21 thousand total revenue was Rs. 42 thousand and farmers were getting annual average net returns of about Rs. 21 thousand. In the case of cotton cultivation, the average net returns were about Rs. 20 thousand (Table 4). The soyabeen crop was found one of the most popular and viable crop that farmers were growing in both crop seasons. The total average cost was worked out as Rs. 24 thousand and total returns were as Rs. 45 thousand per hectare. Hence, per hectare, net returns were estimated at Rs.21. After the project implementation the beneficiaries diverted their farm practices towards vegetable cultivations. The total average cost was worked out as Rs. 2.7 lakh and total returns were Rs. 7 lakh per hectare. Hence, per hectare net returns were estimated at Rs. 4 lakh per hectare annually.

Further, analysis shows that in cultivation of vegetables during the year, human labour component constituted a major share as one-fourth in total cost followed by seed and crop nutrients as FYM and chemical fertilizer. The analysis reveals that use of chemical fertilizer and plant protection material varies across the crops.

Table 4. Cost of production of Major Crops

Particulars	Major Crops				
	Wheat	**Arhar**	**Cotton**	**Soybean**	**Vegitables**
Labor Cost					
Machine	3640	2200	1550	1250	16000
Animal	950	2400	2250	2100	4667
Human	3000	3500	6500	5100	53333
Material Cost					
Seed	2200	350	1600	4450	38000
Fertilizer	560	3600	3250	2900	33333
FYM	1100	0.00	350	1625	40000
Pesticise/ Insecticides	1950	2500	2100	1800	23333
Irrigation	1850	2000	500	800	8000
Harvesting	2150	2300	1800	2150	12667
Packing Material	1550	950	500	500	20000
Transportation Cost	1600	650	900	850	16000
Marketing Cost	1650	670	1550	350	2500
Total Cost	22200	21120	22850	23875	267833
Total Revenue	36500	41900	42500	44500	656000
Net Returns	14300	20780	19650	20625	388167
Input-Output ratio	38:62	34:66	35:65	35:65	41:59

Source: Field Observation

Adoption of Climate Resilient Technological Options: There are various technological options for crop production to make the agricultural practices climate resilient as well as minimizing the cost of production of different crops. In the present section, an attempt has been made to understand the role of various technological options on the cultivation cost of various crops. It is emerged from the discussion with different farmers' groups in the selected villages across the districts that various farm techniques were followed by the farmers have strong implications on the cultivation cost of various crops. During the field visit, it was noted that the farmers were following the inter-cropping practices on the limited size of land. The inter-cropping practices were not new but age old. The farmers were following to minimize the environmental risks. Today, these practices are following by the famers in scientific manner. As per the farmers' priorities, institutional and technical, they were following inter-cropping practices. Under these practices, the farmers were following the combinations of Soyabean+ Arhar, Cotton+Soyabean, Maize+ Cotton+Moong, and so on (Table 5). Certainly, it is because of the PoCRA's support in terms of micro irrigation include drip and sprinklers as well as water tanks that ensure irrigation facilities. Similarly, in case of other combinations of crops, the extended the benefits to the farmers were considerable. The adoption of cultivation practices such as keeping appropriate gaps in rows among different crops keeping in mind the varieties of crop as well as sowing and maturity timings. The innovative ideas and practices that followed in efficient manner was the outcome of the Farmer Field School (FFS). Hence, the performance of institutional intervention can also be noticed considerably.

Table 5: Cost of Cultivation of Selected Crop Combination in the Project Villages

Particulars	Soyabean+ Arhar	Cotton+ Soybean	Maize+ Cotton+ moong	Horticulture
				Fruit trees
Labor Cost				
Machine	1450	2950	2175	3588
Animal	1150	1820	1825	950
Human	1800	15500	20540	35750
Material Cost				
Seed	1350	1450	1650	4500
Fertilizer	2600	1900	1150	9200
FYM	1550	0	1405	5000
Pesticide/ Insecticides	2550	1750	3560	5800
Irrigation	5550	3000	4100	9500
Harvesting	2450	2500	3500	6550
Other	2100	3500	2960	8500
Total Cost	22550	34370	42865	89338
Total Revenue	84500	97500	96225	236000
Net Return	61950	63130	53360	146662
Input-Output ratio	27:73	35:65	45:55	38:62

Source: Field Observation

Keeping in view the foregoing discussion, It can be concluded that the farmers were more concerned with attaining maximum and possible profits rather than usage of resources in a sustainable manner such as irrational use of chemical inputs application. Hence, the ultimate objective of the project is missing. Farmers' priorities were to enhance the extent of profits from the limited land resources.

4. Improved Skillsets of Farmers Due to the Use of Climate Resilient Technologies

Farmers' skills include problem-solving, interpersonal, farm management, and organizational skills. The beneficiaries can use these skills in a variety of ways, from communicating with farmhands for crop cultivation and repairing machinery and so on. Similarly, in the selected project villages, the role of modern technologies like electronic devices such as computers, mobiles, and modern farm implements improved the farmers' skills in dealing with emerging issues in farm activities. Some of them were found in accessing market information and other farming-related information by using the internet facilities in the computer sets installed at the farm shed at the site. Some of them also reported that they attained knowledge about the operation of farm implements and their repair through training and individual understanding of the farm machinery. Some of the progressive farmers, and representatives of PRIs, who were involved in farm production participated in capacity-building programs at various levels.

The beneficiaries in Ardhamsala in Beed districts who availed Capacity building facilities in Beed District

Farmers in Ardhamsala village interacted during field visits regarding Capacity Building regarding farm operations in Beed District

The modern information technologies like Mobile technology is playing an important role in enhancing the skill of not only of the farmers but also of farm labour the farmers monitoring and controlling crop irrigation systems. Largely, farmers use the apps relating to agriculture operations in dealing with various challenges and related issues. They use the mobile technology in marketing of farm products and inputs. The farm labors also use mobile technology widely in have the demand for labour in farm operations[16].

[16] Milovanović, Slavoljub (2013) "The Role and Potential of Information Technology in Agricultural Improvement", Economics of Agriculture University of Nis. The arguments were emerged during the discussions with the groups of farmers and agriculture professionals involved in the implementing the project activities at the village levels.

The farming communities realized the importance of modern farm technologies including information technology and so on that may help them in resolving the problems that they often have in farm production. The farmers were of the view that there need of such technology regarding the information regarding the disaster warnings and weather forecasting at the local levels. The foregoing dicussion shows that the importance of technology in ehnacing the skill of the farmers in modern farm operation and marketing of farm products and inputs used in agriculture production. It can also be pointed out that capacity building program has also played an important role enhancing the skill of te farming community as whole. But, there a need to give due attention towads the aspect of skill developemt related intervention.

5. Positive Behavioral Change in Agricultural Practices

In the present section, an attempt has been made to understand the behavior of the beneficiaries that determines the direction of climate-resilient agriculture. Behavior change is a long-term social phenomenon that is dictated by various factors such as the risk-wearing capacity of the farmers, the performance of scientific institutions, the efficiency of capacity-building programs such as training and exposure visits, demonstration effect, and extension services provided by the project and department of agriculture. It emerged during the discussion with the group of farmers that at the initial stage they were involved with certain activities of the project such as drip and sprinkler irrigation that yielded the desirable results in terms of quantum farm income from a limited size of land. In the selected villages, extension services were also available in an efficient manner that maintained the interest of the farmers in farm operation which further resulted in a substantial increase in farm income. Certainly, it helps in generating positive behavior of the farmers towards the project activities and ultimate objectives of the intervention. Similarly, the sericulture activities launched in some of the project villages have demonstration effects in scaling up the activities to a larger extent[17].

6. Resilience to Absorb Sudden Climate Shocks

Resilience is the ability to cope with adverse shocks and stresses and to adapt and learn to live with changes and uncertainty. The review of available literature highlights that it is the 'ability to resist, recover from, or adapt to the effects of a shock or a change. Resilience is a long-term approach, not only focused on the ability to bounce back but also integrating adaptation and transformation while changing[18]. It can be measured based on characteristics rather than indicators. Characteristics are more equivalent to outcomes used in project evaluation. or output related to DRR activities. Indicators are measurable changes related to the input from a project. In all the selected villages, most of the activities have been implemented successfully and yielded the desirable results not only in terms of resource conservation but also played an important role in resource generation. Before the project intervention, the region was considered as draught prone in the state of Maharashtra causing various socio-economic challenges such as livelihood and food security as well. After the project interventions, the has become an environmental as well as livelihood shock-free area. During the recent period, there were environmental uncertainties in some of the Beed district in terms of deficient rainfall conditions. In such conditions, farmers followed certain strategies in dealing with such uncertainties by following the strategies (i) risk minimization and (ii) loss management[19]. Under such a situation, the farmer finds alternatives to deal with climate shocks such as conserving and saving important crops and attempting to manage the loss that occurs in climate shocks such as the mix-cropping in the short run (Fig 2)[20]. Under such strategies, the farmers had grown gram crops in shade net with the view that some quantum of production can have to meet for arranging the livelihood. The project intervention has strong impacts in the regions that is noticeable in many ways. The economic condition and living styles of resource poor households improved considerably. This project has not only improved the conditions of rural households but also its role can be visualized in the improving the State's economy as well.

[17] The performance of sericulture activity implemented in Ardhamsala village in Beed district was noticeable. It is reported by the CA and beneficiaries that they took the keen interest in sericulture activities.
[18] ACF International (2013) Enhancing Resilience to Shocks and Stresses, Briefing Paper https://www.preventionweb.net/
[19] Singh, Dalbir (2004) Livelihood Concerns in Water Resources Management Regimes in Scarce Conditions", Indian Journal of Agricultural Economics, Vol. 59, No.1.
[20] It is noted during the discussion with the farmers and group f farmers in Beed District village namely, Ranjani.

Figure: The farmer following strategies under climatic shocks in Beed District Village

7. Resilience to Market Price Fluctuations

In the context of price fluctuations, agricultural development is usually subject to large shocks, which also leads to clear spatial–temporal differentiation in regional agricultural economic resilience. In this context, an attempt has been made to understand the price fluctuation against the declared prices of various crops across the seasons and try to visualize the coping mechanism to deal with situation under PoCRA interventions in the project areas. To understand the market price fluctuation, only selected crops were considered for in-depth verifications. The fact shows that market institutions were inefficient that failed to yield expected benefits to the farmers. The farmers were not satisfied with the market price offered to them. But there was a compulsion to accept lower offered price in the local/ informal and nearby markets. The farmers were challenges in prevailing marketing system especially in the implementation of Minimum Support Price (MSP) and price received by them. The farmers reported that due to lack efficient marketing system, they were compelled to sale out the produce. There exists a considerable gap between MSP and received by the farmers ranging from about 10 percent to 22 percent (Table 6). Similarly, these gaps were also varying across the marketed farm produce. It can be because of the market imperfection. The farming community also revealed that inefficient marketing system cause to make the farm sector non-viable. It is found that thee were some FPOs those were involved in marketing of certain produce especially in case of soyabeen and pulses. These FPOs purchase the produce from the farmers and sold in the open market at remunerative prices. But, it was found that FPOs also facing problems at normal profit rate. But due to nexus of industrial and other stakeholders[21]. In case of

[21] The representatives of FPOs working the villages reported that they were facing certain problems in selling out the farm products. Due to certain institutional bottlenecks, they couldn't get the reasonable prices. Actually, it happens due to lack of transparency.

vegetable production, where no MSP system prevails and it make the situation noticeable. It also causes to distress among the farmers[22]. The farming community realizes that there is provision of MSP in case of limited number crops. The crops which can be useful for them such as commercial crops including fruits, vegetables and spices have no any provisions of MSP. Only market forces play their roles in price determination. Such market operations make the farmer's economy non-viable and cause to distress[23]. Hence, it is national issues relating to agricultural marketing but we should initiate locally to resolve the issues nationally. But PoCRA interventions such as provisions of assured irrigation through efficient methods like drip and sprinkler and shade-net technology helped the farmers especially marginal and small size of farmers to shift from commercial cropping system.

Table 6: Gaps between MSP and Price received for Marketed Produce

Crop	Minimum Support Price (MSP)	Price Received	Gaps	Proportionate Difference
Maize	2090	1750	340	16.27
Tur	7000	6250	750	10.71
Juar	3225	2500	725	22.48
Soyabean	4600	4600	0	0.00
Wheat	2015	1750	265	13.15
Gram	5335	4750	585	10.97

Source: CACP Reports FGDs with the farmers

8. Development of Youth Entrepreneurship

Agri-based entrepreneurship has a substantial potential to create new employment opportunities for rural youth. It can help halt the migration of rural youth from villages to urban centers and help improve the living conditions of farmers by providing alternative sources of livelihood. To make successful market-oriented farming, the farmer needs greater farm management and entrepreneurial skills. Being an entrepreneur is a way of life to look forward. The experience of selected villages shows that the implementation of PoCRA activities has resulted in substantial changes in the rural economy and still, there is a potential for further development. It is found that several youths were involved in various agriculturally based businesses including transport facilities, farm inputs business, and farm implements-based supply and repair centers. Interestingly, in these villages, there were also electronic and information technology-based shops that function properly. It emerged after a discussion with a group of farmers and individuals involved in non-farm-based businesses that there is a huge scope for agri-based businesses such as input supply and farm machinery-based businesses. There is a scope for the development of value chain business in other words installation of food processing units where a substantial proportion of youth can be involved which will help in resolving the problems of emerging unemployment[24]. There is also a scope of mobilizing information and communications technologies (ICT) and social media to promote and aware the youth aware of what agriculture is and what a career in agriculture could look like will be beneficial for the industry[25]. Hence, the Government should encourage farmers by providing attractive schemes and minimum support prices for all crops. Loans should be given to the persons who are interested in Agri-business. This will be a result-oriented initiative to encourage youth to get involved in the agriculture sector.

[22] During the group discussion, it emerged that some time prevailing market prices doesn't cover the harvesting and stransportation cost of the products. The farmers reported that in case bumper cropping season, they have to dispose the production of potatoes at the price of Rs. 2-3 per kg.
[23] It was emerged during FGDs with farming communities in the project villages.
[24] Based on the discussion with group of farmers and representatives of various stakeholders across the selected villages and out-side the villages.
[25] https://ap.fftc.org.tw

9. Achievement of Sustainability in Terms of Livelihood Enhancement, Employment Generation, Reduction in Migration, etc.

Sustainability is a crucial issue in PoCRA intervention. Certain activities such as the provision of assured irrigation with water-saving technologies, and the installation of shade nets and water tanks both community and individuals have played an important role in resource conservation and regeneration in the project villages. Interestingly, the farmers were following climate-resilient technologies in crop cultivation. It is also noted from the fact that the farming communities were more concerned with the economic viability of crop cultivation rather than the optimality of resource use. Certainly, it needs certain technological options and institutional reforms like strengthening capacity-building programs that may be useful from a sustainability point of view.

Generation of Employment Opportunities: PoCRA has generated employment opportunities for both males and females substantially. It can be noted from the fact that components of human labour constituted the major proportion of the total cost of production across the various crops. The case of certain crops especially horticulture including vegetables and floriculture absorbed the labour force considerably. Hence, there is a growing demand for human labour in crop production. The growing demand for labour is met from outside the village. Therefore, agriculture development provides employment opportunities to the outside workforce[26].

Migration: PoCRA has strong implications for migrations of labor within and outside the villages. The migration from the project villages has been stopped. There was a substantial demand for labor for accomplishing farm activities across the different crop seasons. Hence, there was considerable migration from non-project areas to project villages. It can be stated that sout migration due to livelihood compulsions of the households from the project villages has been stopped.

Discrimination in Wage-employment: Past experiences in various villages show that there was a considerable difference i.e. one-fourth to one-third in wage rates between males and females. But in two villages like Tapovan and Tubewari in Jalna district where there was a substantial demand for farm labour in seed production and floriculture and it is difficult to fulfill in peak seasons. It resulted in the disappearance of gender discrimination in wage employment.

10. Concluding Observations

The present section deals with observations that emerged from the field investigation. Certainly, these observations give some insights that may help make the program more efficient.

- The analysis of village-level information reveals that there exist wide variations in the implementations of various project activities across the villages that are attributed to the socio-economic conditions of the target groups, village-level natural resource base, and prevailing institutional arrangements such as village-level formal and informal institutions as well as public institutional such as governance system as well as efficiency of financial institutions both formal and informal.

- Climate Resilient technologies at their transfer to households/farms have yielded the desirable results in shifting the farm economy from subsistence to commercial levels. It is also noted from the fact that at the village level and beyond, there is substantial change in the household economy and institutional arrangement from a wider perspective.

- The project has resulted in a substantial creation of infrastructure at the village level especially farm implementation and the emergence of effective institutional arrangements. It sustained the accessibility of resource-poor farmers to modern implements and other related inputs that resulted in farm mechanization. It has not only brought the structure change in the farm sector but also improved the living conditions of the farmers[27].

[26] No doubt, there were substantial scope for employment generation and halting labour migration. But due to climatic shocks has adverse impact on employment generation and minimizing the migration of local human resource.
[27] Based on the past experience as well as monitoring and evaluation of the project activities during the implementation of project activities.

- After the implementation of various activities of the project, the problems relating to the farm production have been resolved but the exists a weak institutional arrangement in terms of an effective agricultural marketing system. No doubt, certain community-based efforts have been made to establish an effective marketing system. But there exist certain bottlenecks that due attention at various levels.

- After the withdrawal of the project implementing agency, there is the issue of sustainability of the intervention. It is observed during the discussion with various stakeholders that not only public agencies like government and financial institutions such as the World Bank but also the farming communities have made a quantum investment. Hence, the sustainability aspect can be visualized in the time ahead. But it needs the due attention of the functional institutions.

Annexure 7: Field Visit Notes of Environment & GIS Expert

Vilages in Ghansawangi and Silod talukas of Jalna and Chattrapati Shambaji Nagar districts, respectively were visited during November 2023 to understand the environmental and social impacts of PoCRA activities in these regions.

Machindranath Chincholi village of Ghaneswari taluka

A discussion was organized with the VCRMC members in the morning at Machindranath Chincholi village of Ghaneswari taluka. Along with progressive farmer, Krishi Tai, a women member of the VCRMC the Sarpanch and Deputy Sarpanch were present in the meeting. Drip, sprinkler, and sericulture are major benefits that the villagers have received under the PoCRA scheme. The 'Krishi Tai' seems no knowledge about her activity and farmers are not aware of 'Krishi Tai' in the village. She never attended any training program. Some members of the VCRMC mentioned that the 'Krishi Tai' attended some of the initial meetings of PoCRA at the village and subsequently, she was chosen as 'Krishi Tai'. The 'Krishi Tai' did not even receive any remuneration for her post. The VCRMC has not yet received any funds from PoCRA related to its regular functioning. The Sarpanch was newly elected and she did not know about the PoCRA activities in the village. She informed me that, first she needs to understand the PoCRA activities and role of VCRMC in the village and then the village committee will decide how to take forward the VCRMC in post-PoCRA time. During the meeting with the VCRMC, no representatives of backward castes were present. Later, it was reported by the villagers that most of the benefits were received by the upper caste or influential farmers of the village, and following that there was an agitation of backward-class farmers during the meeting. However, both groups of farmers were happy with the fast processing of applications and direct distribution of subsidies under the PoCRA scheme. It was also noted that economically weaker farmers could not apply to the PoCRA scheme, due to the non-availability of initial funds vis-à-vis bank loans. Instead of this, the VCRMC reported that about 60% of farmers of the village benefited under the PoCRA schemes. 650 applications are still pending at DESK III and a total of around 1500 applications are still pending to process. Cotton was an important crop in the village and mostly they used flood irrigation to cultivate cotton. Following PoCRA most of the farmers have shifted to drip irrigation if they are growing cotton. However, most of the cotton-growing farmers have shifted to other agriculture, especially sericulture with the subsidies from PoCRA. After the meeting, there was a visit to the farm of one of the progressive farmers in the village. The farmer has 9 acres of land. Earlier, he was a cotton farmer, but with support from PoCRA, he had completely converted to a silk farmer. He has received a PoCRA grant related to drip irrigation, sprinklers, sericulture, and lining of farm ponds. On 6 acres, the farmer has a mulberry plantation and sericulture. The farmer was in sericulture activity before starting the PoCRA scheme, he extended his sericulture activities and upgraded the entire mulberry plantation area to a sprinkler irrigation facility. He mentioned that the growths of the plants are much higher under the sprinkler irrigation system compared to flood irrigation. The farmer is growing dragon fruits in 1 acre with drip irrigation support from PoCRA. In addition to individual farm ponds, the farmer has two dug wells of 60 ft depth. Both dug wells used to get dried around April-May; however, following PoCRA support, he is storing the water from the dug well in a farm pond and using the water for farming through drip and sprinkler irrigation. In addition, the farmer has 1 acre of land under fodder cultivation with drip irrigation. The farmer informed us that there is a market for damaged old polythene pipes used for drip irrigation. If the pipes are ISI marked, then the farmer gets a 50% discount on the new purchase of pipe in exchange for the old damaged ones. However, there is no market for the nets used in the shed of sericulture. The farmers started to develop silk worms in parallel and sold them to local farmers. About 100DFL of silkworms (1DFL = 600 worms) can be sustained with leaves from the mulberry plant of 4 acres. The farmer last year sold cocoon worth 23 Lakhs. Last year the selling price of cocoon was Rs. 900/Kg; however, at present it is Rs. 500/Kg. We visited a 100-member CHC in the village – Bhogne Patil Farmtek Pvt. Ltd. There were two tractors, one rotavator, one cultivator, one Palti Nagar, and one BBF at the CHC. Both member and non-member farmers rent the machines as per requirement paying the same rental amount; however, member farmers get priority booking. I lakh is a net annual income of the CHC of which about 50% is spent on diesel, maintenance of machinery, and salary of the driver. Member farmers are allowed to operate the machinery. A 60m 22m shed area was developed to park the machinery. All machineries were procured with the grant from PoCRA and the shed was also built with the grant from PoCRA. Looking at the demand of the machinery and profit from the renting of machinery, the Farm Producer Company which runs the CHC has already applied for a grant under PoCRA to extend the CHC. The land area where the CHC was built was under cotton cultivation earlier. The area was under cotton cultivation before the PoCRA; however, with support from PoCRA, the farming community of the area has started to grow multiple crops. The CHC has already applied for the grant to a multi-crop thrasher to meet the demand from local farmers. The CHC needs to store diesel in the shed to operate the machinery. However, they do not follow any safety precautions in storing the diesel in the shed.

Dhakefal village of Ghaneswari taluka

FPC godown and Dal mil are developed in the Dhakefal village with subsidies under the PoCRA scheme. Twenty members Mauli Shetkari Syam Sahayata Gat is operating both. Dal mill is operated completely with electricity and residue generated during the process is used as fodder. The godown at present is being used to store the cotton crop of the member farmers. However, it was noted that the structure of the godown is not suitable for long storage of the cotton crop, particularly if there is off-season rain, then there is a chance of damage to the crop. In addition, the FPC also procured a cold transport vehicle with subsidies from PoCRA. These vehicles are also being used by the members to transport perishable crops over long distances for better market prices. One of the progressive farmers of the village has developed three Shadenets with PoCRA support. He is growing musk melon, cabbage, cauliflower, watermelon, cucumber, and corn under the shadenet. The corn growth under the shadenet is huge and the cob size has also enhanced. Earlier the farmer used to grow Cotton and tur in his 22 acre land area. The area is deficient in water and the soil is full of stones. Due to these, the farmer was not able to take summer season crops earlier; however, at present, he is growing multiple crops under the shadenet. The production of sweet corn outside the shadenet is about 5-6Q/acre while it is 20-25Q/acre when grown under the shadenet. The farmer produced around 20-25 tons/acre of capsicum under the shadenet. The farmer is concerned about the disposal problem of the plastic lining of the shadenet.

Waradi village in Silod block

Jai bhawani Setkari Gat was visited in the village. It is a 15-member gat. The gat has received the grant from PoCRA on Godown, CHC, and 30Q pickup trucks. The CHC machinery is 50HP tractor, Rotavetor, BBF, Plough, and cultivator. Cotton, corn, and wheat are planned to be stored in the godown. It was noted that there were black spots on the wall of the godown, the FPC member mentioned that last year there was a problem in the storage of cotton, and a lot of damage was noticed to the cotton crop and the black spot on the wall due to the moisture in the cotton crop. Each of the FPC members has a share in developing the Godown, CHC and purchasing the pickup. They are paying a rental amount and operating the machinery individually. Rotavator Rs. 1000/acre; Plough Rs. 1000/acre; BBF 1500/acre. There is no designated driver for the machines. However, still, they have not planned to provide the machinery on rental to non-FPC members. They did not yet have any business planning to undertake the operations in the future or undertake necessary maintenance of the machinery. It was also noted that the FPC has no shed for the machineries and they are mostly kept in the open. Earlier, the villagers used to rent a tractor and other farm machinery from resource-rich farmers at comparatively higher costs. The support from PoCRA on one side damaged the business of rich farmers and on the other, it reduced the cost of cultivation for the farmers.

Earlier cotton storage system

Present cotton storage system

Mark of cotton crop damage inside the godown due to moisture

A beneficiary of shadenet was interviewed during the visit to Wadodchatha village. There is no water evacuation plan in the shadenet and the shadenet was found completely flooded and the farmer was busy saving the aubergine crop. It was a very good quality of aubergine, but it was found there was a lot of waste as some particular quality of aubergine has no value in the market. Farmer reported that they burn the residues after the harvest of the crop to avoid pest infection to the next crop. In addition to the shadenet, the farmer grows ginger (2 acres), Chilli (1 acre), and corn on 1 acre. He also practices cotton tur intercropping in 1 acre of land. About 10 people work in the shadenet @INR400/day. Different types of pesticides and

fungicides are applied to the crop inside the shadenet. Some farmers of the area remove part of the nets of the shade net to grow different crops, they said that this is to avoid pesticide attack on the crop due to nonavailability of water. One farmer has established a polyhouse in the village to undertake floriculture. This was a 36m/90m polyhouse and growing Gerbera flower. The plant has 6 years of life cycle; however, the farmer needs to remove the crop during the summer season, due to the nonavailability of water. The farmer is getting 60K/month as the selling price of the flower monthly. In addition to floriculture the farmer also has plots of cotton, corn, aubergine, etc. he is earning about 120000/- per month after the PoCRA scheme, however, most of the earnings are coming from floriculture. The farmer has received training in floriculture from the National Horticulture Mission. However, the area may not be suitable for the Gerbera type of floriculture crop due to the severe crisis of water and non-seasonal heavy rainfall. PoCRA needs to check before any sanction, whether the planning of the applied cropping activity is suitable to the climatic condition of the area or not. Crop residue burning, disposal of pesticide bottles, and safety during the application of pesticides remain a challenge in most of the PoCRA villages, particularly with shadenet beneficiaries.

Annexure 8: Field Visit Notes of Sociology Expert

Villages visited:

- Jalna district – Bazar Vahagao, Tapovan,
- CSN district – Tonga, Pimprikurd

Method of data collection:

- Key person interview - Krishi Tai, FPC farmer, SHG farmer
- Focus group discussion – VCRMC
- Date of field visit – 6th – 8th November
- Team – Mini (TERI) and Chetan (Sambodhi)

Broad objectives of the visit:

- Is the VCRMC empowered for the decision-making process?
- Decreased level of vulnerability to climate change effects - The case of Shade Net
- Impact of agribusiness project on members of FPC/SHG
- Analyzing the beneficiaries of PoCRA

Findings

VCRMC – are they successful and empowered in participatory decision-making?

VCRMC is envisaged as the building block of PoCRA, where the members of this committee have been selected by the Gram Sabha, representing different interest groups with a focus on vulnerable sections of the village. In all the visited villages in the districts of CSN and Jalna, it was noted that the composition of VCRMC was representative of the mandated representations from SC/ST/marginal farmers, women farmers (4-5), and women SHG members. Meetings were conducted mostly once a month and the main activities undertaken were - a review of project progress in their village, guidance to farmers regarding application for matching grants, approval of the application, payment information, and liaison with the department for payments. Since the belt is involved in the production of horticulture crops and off-season vegetables, the majority of applications were support for micro-irrigation systems (drip/sprinkler) and horticulture plantations. The key documents maintained were records of meetings, visitor registers, and documents related to individual applications and sanctions. However, an in-depth interaction with all the members of VCRMC revealed that VCRMC is not truly empowered to become the principal authority for planning, decision-making, and implementation through effective devolution of functions. Most of them were not even aware of or participated in the preparation of participatory village micro-plans, planning and executing community works as per the approved annual action plan, and facilitating social audit of the project activities. The members also did not present the accounts of the project to the Gram Sabha at least once a quarter. Some of the women were only proxy and namesake members and were not able to make their presence felt at meetings - ill-informed about procedures and functions. They were often accompanied by a male member of the family who participated in the meetings on their behalf. All the major decisions and activities were undertaken by cluster assistants and agriculture assistants who were more aware of the project activities and could relate that to the locally available resource endowments, and relative absorptive capacity of farmers. They were quite active in all VCRMC meetings to facilitate the application process and also undertook spot visits. In principle, the cluster and agriculture assistant ran the show and there was a heavy dependency on them by the VCRMC for all issues related to administration and governance. The sarpanch/members often acted only as a signatories for the approval and sanctions where all the background work would have been undertaken by the cluster/agricultural assistant including identification of beneficiaries. So the VCRMC did not play a major role in providing an institutional framework for popular administration of project activities. Hence they did not have an empowering effect in decision-making processes.

Shade Net – an effective approach towards combating climate vulnerability and employment generation

One of the main objectives of the project is to demonstrate the benefit of high-value crops under a controlled environment and address the microclimate variability through the promotion of shade net. The key benefits of protected cultivation will be through better soil moisture management, higher yield and quality enhancement, fewer pest and disease incidents, and off-season cultivation. Krishna Parkade is a young farmer from Tapovan

village, located in the Jalna district. Till a few years back he was undertaking small-scale vegetable cultivation (chili and tomato) along with his family members on his farmland. In 2019, he heard about the introduction of the PoCRA project in his village and decided to avail the shade net benefit to optimally utilize the land. He stated, *"I wanted to produce exotic vegetables that land up on the dining tables in the five-star hotels. So I applied for the shade net and got a pre-sanction within two months of my application". After satisfactory post-work verification by agricultural assistants and other officers, a grant of 7.42 lakhs was sanctioned by PoCRA for the shade-net system along with piping materials. I had to spend only 3 lakh from my pocket to complete the work in 0.5 acres".* Krishna Prakade, however, changed his mind about growing exotic vegetables when he got a lucrative offer from Anantha Vegetable Seeds Private Limited where he agreed to a buy-back arrangement to produce only chili seeds of a high-yielding variety. In the buy arrangement, the nursery expenses are borne by the company, while the charges of labour, fertilizer, pesticides, and maintenance are taken up by Krishna. Due to polyhouse, he can harvest 1 quantal of chilies every six months and the seeds are sold to the company for 4000/kg. Last year alone he made a profit of 4 lakhs. An important highlight of this success story of shade net is not just the profit earned by Krishna but the employment opportunity it has created for women from his and the neighboring villages. Around 20 women are employed to do artificial pollination which is a skilled labour and hence fetch them a daily wage of more than 300 Rs. This wage is much higher than the normal agricultural wages the women in the region earn as labourers. Training to do artificial pollination was conducted by the seeds company. Due to the nature of their high wages, the women get maximum support from their families to manage their household chores. Savitri Bai, a young mother happily stated "My *mother–in–law is fully supportive of my job. She takes care of my 2-year-old daughter while am away. Moreover, she helps me in the kitchen and makes sure I am not overburdened with household chores".* Her friend couldn't agree more, "*we get good support from our families, and you know I always try and get some small gifts for all family members including myself from the money I earn"* remarked Laxmi Bai. It could be stated that this shade net activity supported by PoCRA has caused a spin-off effect in the region where unskilled women labour force would like to embrace the new knowledge of artificial pollination which would, in turn, fetch them better wages in the labour market.

Advantages of PoCRA-supported FPC/SHG - benefiting from the existing social capital

Component B - climate smart post-harvest management and value chain promotion of the project actively promoted FPCs in the project locations and established Custom Hiring Centers at the cluster level to promote appropriate farm mechanization for coping with climate variability. This component also supported viable mechanisms to further consolidate and set up new business linkages for FPCs with the private sector and financial institutions. In the districts of CSN and Jalna, few FPC/SHG have availed this benefit from PoCRA. The visited FPC/SHG – Hrushikrupa Producer Company, Farmer King Agro Processing Company, and the Sreeswayam Samati Setkari Ghat have been actively functioning in the area for a couple of years and have rendered benefits of cooperation to their members. These FPC/SHG are currently involved in produce aggregation, buying seed and fertilizers in bulk to supply to their members, cleaning, grading, sorting, and seed processing. These institutions have been successful in making rural producers follow organized marketing of their products themselves instead of continuing to rely on exploitative transactions managed by brokers and other intermediaries. The benefits availed by these institutions from PoCRA are support for establishing godown (warehouse) and custom hiring enters. For instance, the Sethkari Ghat built a godown incurring an expense of 23 lakhs of which nearly 12 lakhs were contributed by PoCRA. The remaining expenses were equally contributed by its 20 members, who used their savings and borrowed interest-free money from their family and friends. They did not prefer to avail of any bank loan. The godown is rented to farmers especially small and marginal farmers on nominal charges, yet the SHG can make a profit of around 25000 a month. This storage facility has served as a replacement for home storage techniques resulting in reduced post-harvest losses for farmers due to spoilage or pest infestation. Moreover, it has helped in the stabilization of prices by adjusting demand and supply. Omkar Rao, a small farmer hailing from Bazar Vahangoan stated "*I used to grow soya, harvest and sell it quickly without waiting for the favorable market conditions since storage of the produce was a problem for me. But now with the facility of godown right at my footsteps, I wait for the right market signals to sell my hard-earned produce."* The FPCs - Hrushikrupa Producer Company and Farmer King Agro Processing Company have availed the custom hiring center benefit from PoCRA. They have procured agri-equipments like rotavators, threshers, tractors, and plough and chaff cutters. By renting this equipment they make a profit of around Rs 20000/month. For members, user charges are not applicable, but for using a tractor they have to bear the expense of diesel. Further, they have included machinery for grading, sorting, and value addition of all kinds of cereals, pulses, and legumes in their center. They charge 100 Rs/quantal for processing of which they consider around Rs 40 as profit after bearing maintenance and labour expenses. An expense of 20 lakh was incurred for setting up the custom hiring centre out of which 11 lakh was contributed by the members. Even in this case the farmers did not take any loan from

the bank and mobilized interest-free loans from known sources. Manoj Sukdev, who owns around 5 acres of land and is a regular customer of this FPC thankfully, stated that "*the best part of this FPC is that we don't have to pay money immediately for taking their services. They understand the problem of farmers and are happy to help us in hours of need."* As these FPC/SHG emerge as new institutional forms for members-led agribusiness, their ability to expand their horizon has been made possible with the active support from PoCRA. Their success in including small and marginal farmers and the capacity to tap social networks is deeply connected to the pre-existing social ties in the village.

Annexure 9: Field Visit Notes of Agribusiness Expert

Date of field visit	Place visited	Name of FPC/ Farmer Group	Activities of the FPC/ Farmer Group
07.12.2023	Garaj and Shioor, Vaijapur	1. Krushnanand farmer producer company limited 2. Krushnanand swami shetkari gat 3. Kushal shetkari gat 4. Chandravade agro farmer producer company ltd. 5. Swami samarth shetkari gat 6. Jeevan shetkari gat	1. Cleaning and Grading unit 2. Dehydration Unit 3. Dal Mill 4. Storage 5. Custom Hiring Centre 6. Onion Storage 7. Milk Processing 8. Weighing scale (Dharam Kanta)
08.12.2023	Neknoor and Wadwadi, Beed	1. Samrudhi sericulture agro producer company ltd 2. Deepankur agro producer company ltd 3. Shri bankatswami agrotech producer company ltd 4. Abhiman creative farmer producer company ltd	1. Sericulture 2. Geranium Oil extraction plant 3. Custom Hiring Centre 4. Cleaning Grading unit 5. Seed Processing Unit 6. Oil Mill

The visited FPCs and Farmer Groups (Gat) fall under the following categories:

1. Custom Hiring Centers
2. Storage and Cleaning Grading Facilities
3. Specialized activities like Sericulture, Milk processing, Geranium oil extraction, etc.

The detailed observations under each category are as under:

1. Custom Hiring Centers (CHCs):

The following points were considered while evaluating CHC's business. The establishment of Custom Hiring Centers (CHCs) in agriculture has positively impacted farmers in various ways, particularly in reducing the cost of cultivation, minimizing drudgery, and improving efficiency. Here's an assessment of these aspects:

Reduction in Cost of Cultivation and Drudgery:

- **Cost Reduction:** CHCs provide access to expensive agricultural machinery, allowing farmers to hire equipment at affordable rates instead of purchasing them outright. This significantly reduces the cost of cultivation as farmers don't have to invest heavily in machinery.
- **Reduced Drudgery:** The use of machinery reduces manual labour and physical strain, thereby minimizing the drudgery associated with traditional farming methods. Tasks like plowing, sowing, harvesting, etc., become more efficient and less physically demanding.

Time, Labor, and Cost Reduction due to CHCs:

- **Time Efficiency:** The use of modern machinery through CHCs enables faster completion of tasks compared to manual labour, saving considerable time during planting, harvesting, and other farming operations.
- **Labor Reduction:** Farmers can accomplish tasks more efficiently, requiring fewer laborers due to the mechanization provided by CHCs.
- **Cost Efficiency:** Instead of investing in costly machinery individually, farmers are accessing these tools at a fraction of the cost through CHCs, thus reducing their financial burden.

CHC as a Business Opportunity and Viability:

- **Business Potential:** CHCs offer a viable business opportunity by serving as a hub for renting out agricultural machinery, providing a steady income stream for the center operators.
- **Viability:** The demand for machinery services is consistent, especially during peak seasons. Proper management and strategic location of CHCs contribute to their viability as a sustainable business model.

Climate Resilience and Impact of CHC Services:

- **Efficient Resource Utilization:** Modern machinery available at CHCs often comes with technology aimed at efficient resource use, such as BBF machines. This aids in climate resilience by optimizing inputs like water, fertilizers, and pesticides.
- **Diversification of Farming Practices**: Access to specialized machinery at CHCs encourages the adoption of climate-smart agricultural practices, enhancing the community's resilience to climate change.

Employment Generation:

- **Direct Employment:** CHCs create employment opportunities for individuals managing and maintaining the machinery, thus generating direct employment.
- **Indirect Employment:** As farming becomes more efficient and productive due to CHCs, there might be indirect employment generated in allied sectors like transportation, equipment servicing, and logistics. Custom Hiring Centers play a pivotal role in transforming agriculture by reducing costs, labour, and drudgery for farmers. Their business viability, coupled with the adoption of better farming practices and their positive impact on climate resilience, marks them as a significant contributor to the agricultural sector's sustainability and growth.

2. Storage and carrier van activity of Farmer Producer Company:

Storage facilities developed by FPCs have led to the following benefits for the farmers:

- **Reduced Spoilage:** Proper storage facilities provided through godowns have helped preserve the quality of agricultural produce, reducing spoilage due to pests, moisture, and environmental conditions. FPC operators reported that loss has been minimized to around 4-6 percent from 20-25 percent.
- **Inventory Management:** Effective storage facilities enabled better inventory control.

Effectiveness of Post-Harvest Infrastructure (Storage, Carrier Vans):

- **Market Waiting Strategy:** Storage facilities, allowed farmers to store their produce after harvest. This strategy helped farmers avoid selling their produce at low prices during times of oversupply, waiting for better market prices.
- **Quality Preservation:** Storage facilities and carrier vans play a crucial role in perishable goods as they maintain the quality of produce during transportation, reducing spoilage and extending the shelf life of perishables.
- **Seasonal Use and Operations:** Carrier vans experience seasonal peaks during harvest times and the same is the case with storage facilities when commodities are in abundance. In the off-season.

Employment Generation:

- **Direct Employment:** Management and maintenance of storage facilities, and carrier vans generate direct employment opportunities for individuals involved in handling, operation, and maintenance.
- **Indirect Employment:** The enhancement of post-harvest infrastructure creates a ripple effect, generating indirect employment in related sectors like logistics, packaging, quality control, and transportation.

In summary, post-harvest infrastructure such as storage, and carrier vans significantly contribute to minimizing wastage, allowing farmers to strategically sell their produce, and preserving the quality of perishable commodities. However, challenges remain, including the need for consistent access to such infrastructure, efficient logistics, and managing market risks for farmers growing perishable goods. Nonetheless, the development of such infrastructure not only reduces waste but also generates employment opportunities both directly and indirectly within the agricultural value chain.

3. Other activities (Sericulture, Geranium oil extraction, milk collection plant, and weighing scale):

The sericulture and geranium oil extraction unit has engaged most of its members. Members sell cocoon and geranium plants to the spinning and oil extraction unit. The FPCs have a very established market linkage where they sell their final produce. Cocoons produced during erratic rainy seasons yield low-quality fiber. Both the processing units are generating employment for 10-15 persons per day. From wastage, a sheet is prepared which is used in the quilt. Killed insects are used for feeding poultry and fishery. Daily production of the unit is 25 kg thread. The unit operates 250 days a year. The unit pays Rs. 600/- to skilled labour that comes from Karnataka. Local unskilled labour gets Rs. 300/- per day. The geranium oil extraction unit receives Geranium from farmers and extracts oils to sell to a contracted buyer. FPC members also have access to a nursery from where they buy plants for establishing new plantations. The processing unit engages 5-8 labour daily. Milk collection and the chilling unit are being run very successfully engaging most of the members, Procurement and payment systems are very transparent. This unit is also able to generate employment for 5-8 persons per day. Running a weighing machine business is a one-time investment business. The entire operation is managed by 2 persons. Weighing charges for members are Rs. 100/- and non-members 150/-. Vegetable drying unit: This unit also engages most of the members. Solar dying is done by pre-contracted clients and fixed prices. This business is quite safe and generates employment for 5-6 people daily.

Annexure 10: Verification of Agri-Business Assets (Marathwada Region)

Sr. No.	FPC Name	District	Village	Activity	Remarks	Asset Verification Photographs
1	Mane FPC	Latur	Ashiv	Seed Processing Unit	Activity was observed and is yet to be operational.	
2	Adikant Seeds Agro FPC	Beed	Udandwad gaon	Seed processing	Activity was observed in operational condition.	
3	Munjal Brothers FPC	Jalna	Mardi	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
4	Raytecha Raja FPC	Hingoli	Sengaon	Establishment of Custom Hiring Centers.	Activity was observed in operational condition.	

Sr. No.	FPC Name	District	Village	Activity	Remarks	Asset Verification Photographs
5	Aamhi Baliraja FPC	Jalna	Math Jalgaon	Construction of Godown/ Small Warehouse	Activity was observed in operational condition.	
6	Sakar FIG	Ch. Sambhaji Nagar	Pokhari	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
7	Alok Sanjivani farmers FPC	Latur	Murud	Grain Processing Unit (Cleaning/ Sorting/ Grading Unit)	Activity was observed in operational condition.	
8	Shambhu nath FPC	Nanded	Ardh	Establishment of Integrated Packhouse/ Aggregation Centers	Activity was observed and is yet to be operational.	
9	Aadesh Seeds FPC	Beed	Sakar	Seed Processing Unit	Activity was observed in operational condition.	
10	Shingro FPC	Nanded	Telur	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	

Sr. No.	FPC Name	District	Village	Activity	Remarks	Asset Verification Photographs
11	SRB FPC	Nanded	Bhoshi	Spices Unit	Activity was observed in operational condition.	
12	Narvade agro Nursery FPC	Dharashiv	Palsap	Other Agribusiness Activity/ Nursery Farming	Activity was observed in operational condition.	
13	Deidhanora Agro industries company	Dharashiv	Deodanora	Establishment of Custom Hiring Centers .	Activity was observed in operational condition.	
14	Sapan agro gat	Ch. Sambhaji Nagar	Pokhari	Establishment of Custom Hiring Centers .	Activity was observed in operational condition.	

Sr. No.	FPC Name	District	Village	Activity	Remarks	Asset Verification Photographs
15	Samrat Krushi Udyog FIG	Dharashiv	Murta	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
16	Baliraja Shetkari SHG	Jalna	Sevali	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
17	Mauli shetkari SHG	Nanded	Sugaon Bk.	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
18	Samarth Setkari SHG	Chhatrapati Sambhajin agar	Dahegaon	Grain Processing Unit (Cleaning/ Sorting/ Grading Unit)	Activity was observed in operational condition.	

Sr. No.	FPC Name	District	Village	Activity	Remarks	Asset Verification Photographs
19	Nagesh Shetkari SHG	Ch. Sambhaji Nagar	Rahimabad	Construction of Godown/ Small Warehouse	Activity was observed in operational condition.	
20	Sai Shetkari SHG	Hingoli	Siddhesh	Turmeric Processing Unit	Activity was observed in operational condition.	
21	Sai Mathura FPC	Ch. Sambhaji Nagar	Lakhganga	Establishment of Custom Hiring Centers	Activity was observed in operational condition.	
22	Indira Mahila Shetakari SHG	Parbhani	Zari	Construction of Godown/ Small Warehouse	Activity was observed in operational condition.	

Annexure 12: Fact sheet of FPCs Surveyed during CM-X in Marathwada Region

FPC Details		Information about Agribusiness							
Name of the FPC	Village Name	Godown		CHC		Food Processing Unit		Other Agribusiness Activities	
		Members	Non Members	Members	Non Members	Members	Non Members	Members	Non Members
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli					305	0		
Maane Farmer Producer Company Limited	Ashiv, Latur	0	22						
Shambhunath Agro Producer Company	Barad, Nanded					271			
SRB Purofine Producer Company	Bhoshi, Nanded					308	400		
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv					300	120		
Greenzone Farmer Producer Gat	Lonal, Nanded	1000							
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	1	25	250	60	1	18		
Amhi Baliraja Farmer Producer Company	Math Jalgaon, Jalna	300							
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	10				200	200		
Narwade Agro Farmer Producer Company	Palsap, Dharashiv							200	300
Sampanna Farmer Producer Company	Pokhari, CSN			30	20				
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed			100	40	100	50		
Shingroba Shetkari Uptadak Gat	Telur Nanded			210	50				
Adikant Seeds Agro Producer	Undad Wadgaon, Beed			700					

FPC Details		Rates for Members and Non-Members							
Name of the FPC	Village Name	Godown		CHC		Food Processing Unit		Other AB Activities	
		Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli					If in bulk, 15% discount	If not in bulk 5% discount		
Sakar	Pokari, CSN				Ploughing = 1500 Rs Acre, BBF =800 Rs Acre, Rotavator = 1400 Rs acre, Shaft Cuttor = 800 Rs Acre				
Maane Farmer Producer Company Limited	Ashiv, Latur	25 Rs per quintal	40 Rs per quintal			25 Rs per quintal	40 Rs per quintal		
SRB Purofine Producer Company	Bhoshi, Nanded					10rs for 30 gram pouch	15rs for 30 gram pouch		
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv			900 Rs per acre	1000 per acre				
Raytecha Raja Producer Company	Kawtha, Hingoli			Ploughing =1000, Panji = 500, Rotavator= 1000	Ploughing =1200, Panji = 600, Rotavator= 1200				
Greenzone Farmer Producer Gat	Lonal, Nanded	5 Rs per quintal	5 Rs per quintal						

FPC Details		Rates for Members and Non-Members							
Name of the FPC	Village Name	Godown		CHC		Food Processing Unit		Other AB Activities	
		Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs	Rate for Members Rs	Rate for Non Members Rs
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	300	350	800 per acre	1000 per acre	25 Rs per Kg	30 Rs per Kg		
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	We store our own processed goods				50 Rs per quintal	50 Rs per quintal		
Narwade Agro Farmer Producer Company	Palsap, Dharashiv							Tomato Plant = 1.80Rs, Brinjal = 1 Rs, Mirchi = 1.20 Rs, Flower = 0.80 Rs	Tomato Plant = 1.80Rs, Brinjal = 1 Rs, Mirchi = 1.20 Rs, Flower = 0.80 Rs
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed			600 Rs per day trolly					
Shingroba Shetkari Uptadak Gat	Telur Nanded			Rotavator = 1500, cultivator = 1000, Plough = 1000, Threshor = 800	Rotavator = 1700, cultivator = 1200, Plough = 1200, Threshor = 800				
Adikant Seeds Agro Producer	Undad Wadgaon, Beed			Plough = 1400, Other = 1600	Plough = 1600, Other = 20% discount			250 per quintal (Cleaning, Grading)	300 per quintal

Name of the FPC	Village Name	Type or Name of the machinery or instrument provided	Usefulness of machines	Utilization and rent paid by non-member	Issues faced in implementing activity	Plans for purchasing new machines/ Implements
Sakar	Pokari, CSN	Ploughing, BBF, Rotavator, Shaft Cutter		Yes	Financial Problems	Shaft Cutter, New Tractor
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv	Tractor, BBF, Plough, Rotavator, Koyda	Yes, reduce cost by 10%	Yes, as per market standards	No issues	Yes, horaster related
Raytecha Raja Producer Company	Kawtha, Hingoli	Tractor, Rotavator, Panji, Trolly, Pough, Malni Yantra	It saves our time	Couldn't provide service to all	No issues	Yes, to purchase some new machines
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	Plough, Rotavator, Sowing machine, Mogda, It is available on time	Saves labour cost and time	Yes, 1000 per acre	problems with labour and maintenance	Yes, trying to purchase cutter machine
Sampanna Farmer Producer Company	Pokhari, CSN	Rotavator, Cultivator, Plough, power tiller, tractor trolly	Yes, useful for farming, members get a 20% discount,	Yes, give them as per the market rates	No	Cutting machine
Shingroba Shetkari Uptadak Gat	Telur Nanded	Tractor, Trolly, Thresher, Plough, Panji, Wakhar, Tiri Sari, Cultivator, Rotavator, Sowing machine, mogda	Yes it us useful, Saved time and labour	Yes, 200rs more than members	No	Yes
Adikant Seeds Agro Producer	Undad Wadgaon, Beed	Plough, sowing machine, mogda, trolly, thresher,	Yes its useful, save time and labour, cost reduce	Yes, non members as per market standards	No	Yes

Name of the FPC	Village Name	Type of produce stored	Total capacity of the godown (metric tonnes)	Average capacity utilized per year (metric tonnes)	Average number of days of storing the produce	Percentage of loss during storage	No. of persons employed	Average number of days of employment	Average daily wage per person employed in godown
Green zone FPC	Lonal, Nanded	Soybean	150 mt	150 mt	4 months	0	2	30	500
Munjal BrotherFPC	Mardi, Sambhaji Nagar	Soybean, Tur	200 mt	200 mt	200	5	5	310	300
Amhi Baliraja FPC	Math Jalgaon, Jalna	Soybean, Tur	350 mt	100 mt	2 months	0	4	60	300
Alok Sanjiv FPC	Murud Akola, Latur	Soybean	1000 mt	1000 mt	30	10	4	30	300

Name of the FPC	Village Name	Type of produce stored	Processed before selling	Selling strategy	Location of sale and unit selling price (Rs. per Kg/ Quintal/ Ton)	Operational Cost	Income generated monthly	Issues faced in implementing the activity	Plans for expansion
Green zone FPC	Lonal, Nanded	Soybean	Yes, before selling, we process it	Direct sell	Sold to company, 4800 Rs per quintal	2 Rs per quintal	20000	Market linkage problem	Yes, trying to start processing unit
Munjal BrotherFPC	Mardi, Sambhaji Nagar	Soybean, Tur	Yes, before selling, we process it	Sell in the market directly	Solapur Market, 400000	25000	12000	Labour not available on time	No
Amhi Baliraja FPC	Math Jalgaon, Jalna	Soybean, Tur	Yes, before selling, we process it	Direct sell	As per market rate in the APMC	2 Rs per quintal	Project in loss	Project in loss	No
Alok Sanjiv FPC	Murud Akola, Latur	Soybean	Yes, before selling, we process it	intermediary sell	In the market	50 Rs per quintal	40000	No issues	No

Name of the FPC	Village Name	Type of produce prosessed	Total capacity of the processing unit	Average capacity utilized per day	Percentge of loss during processing	No of persons employed	Average number of days of employment	Average daily wage per person (in Rs.)
Krishi Parivartan FIG	Hingoli, Hingoli	Milk	200 Litres	200 litres	5%	7	30	250
Shambhu Nath FPC	Barad, Nanded	Bananas	40	40	10%	40		300
SRB Purofine FPC	Bhoshi, Nanded	Haldi, Mirchi and Masale	5 quintal per day	2 quintal per day	2%	5	300	400
Munjal Brothers FPC	Mardi, Sambhaji Nagar	Soybean and Tur	2 tonnes	10 tonnes	2%	3	320	300
Alok Sanjivani FPC	Murud Akola, Latur	Soybean	8 quintal	10 quintal	5%	3	30	300
Adesh Seeds FPC	Sakher Borgaon, Beed	Soybean, Gram	8 tonne			3	30	400
Adikant Seeds FPC	Undad Wadgaon, Beed	Wheat, Soybean	16 Quintal	10 Quintal	5%	3	22	500

Name of the FPC	Village Name	Type of produce prosessed	Source of raw material	Selling strategy	Location of sale and unit selling price	Operational cost (Rs)	Income generated monthly (in Rs.)	Issues faced in implementing the activity
Krishi Parivartan FIG	Hingoli, Hingoli	Milk	Farmers	Directly or through intermediaries	Local Market, 400 Rs. per Kg	0	40000	Sometimes when there is no power, milk get wasted
Shambhu Nath FPC	Barad, Nanded	Bananas		Agreement MNC to sell	1500 Rs per Quintal		25000	As bananas are perishable, so there are problems with it
SRB Purofine FPC	Bhoshi, Nanded	Haldi, Mirchi and Masale	Farmers	Mediators	Local Market, 10Rs for 30 gm		50000	No problems faced
Munjal Brothers FPC	Mardi, Sambhaji Nagar	Soybean and Tur	Members	Direct in the market	In city	15100	25000	Electricity and labour
Alok Sanjivani FPC	Murud Akola, Latur	Soybean		mediators	In market, 4500Rs per qtl	50 Rs per quintal	40000	No
Adesh Seeds FPC	Sakher, Beed	Soybean, Gram				100 Rs Ton		
Adikant Seeds FPC	Undad Wadgaon, Beed	Wheat, Soybean	Farmers	Packing sell 25kg per bag, trader	Beed Market 3250 for 25kg of soybean	2500	32000	Proposal making

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli	While doing food processing, there is wash room and toilets for waste water management	FPC has been build while considering the environmental aspects and on safe place.	FPC is in comliance with Food Safety Standers, There is awareness about the water management	Youth got the employement, due to this they don't have to migrate to other places, farmers getting good prices for their milk	Faced problems related to market linkages and collecting capital	It is good and helpful	Got good support from the project officers	The project should start again
Sakar	Pokari, CSN	The Custum hiring centre is been built while considering the environmental safeguards and at safe place	The Custum hiring centre is been built while considering the environmental safeguards and at safe place	FPC is in compliance to Fire Safety standerds and aware about the water management	Its helped to save time and cost. Also created employement	No problems as of now	It is good	Got good support from project officers	Pocra Project should continue

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
Maane Farmer Producer Company Limited	Ashiv, Latur	When built godown, there was toilet and hand washing facility, seperated dry waste and wet waste and its management, taken care of the environment	It has been build safe from the environment point of view	FPC is in compliance to Fire Safety standerds and aware about the water management	Before this project benefits, as due to less space for storage, we used sell early, but now we wait till good price for produce and it benefited us, less damage post harvest, due to this increase income	There were lots of problems regarding the documents.	No use for FPC	Got good support from project officers	Documents hurdles needs to be easy, the benefits process should be easy
Shambhunath Agro Producer Company	Barad, Nanded	There was toilet and hand washer while built the plant, its built on open place	It has been build safe from the environment point of view	Aware about the wataer management	As we are exporting good quality of Bananas, we are getting good price for it. due to this our income has increase and there is less loss.	As bananas are perishable, so there is problems with the supply chain, there is no vehicles available for export	The monopoly of traders has been finished as framers become the owner of the company	Got good support from project officers time to time	The project should start again

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
SRB Purofine Producer Company	Bhoshi, Nanded	Built processing unit in way it cuase less harm to the environment. Toilets and hand washing facility is there.	it is in compliance with the fire safety anf industrial zone standerds	There is fire safety and aware of the water management	People got employement through this FPC, Increase income level, got good price for productions	No problems as of now	It is good	Got good support from project officers	Project should continue.
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv	CHC built on the safe place	It is built on the safe place	FPC is in compliance to Fire Safety standerds and aware about the water management	Saved time, Employment generation	No problems as of now	It is good	Got good support from project officers	Project should continue.
Raytecha Raja Producer Company	Kawtha, Hingoli	Taken care of the environment while building the plant.	It is built on the safe place	FPC is in compliance to Fire Safety standerds and aware about the water management	Employement generation for youth, farmers getting machines for farming easily, increase income, time saved	No problems as of now	It is good	Got good support from project offcers	Project should continue and more activities should included.

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
Greenzone Farmer Producer Gat	Lonal, Nanded	Taken care of the environment while building the plant. There is toilet and handwash facility	FPC has been build while considering the environmental aspects and on safe place.	FPC is in compliance to Fire Safety standerds and aware about the water management	Employement generation for youth, farmers got safe place to store produce, due to value adding, farmer got financial benefits	No problems as of now	It is good	Got good support from project officers	project should continue and more new compenent should be added.
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	Taken care of the environment while building the plant. Pollution management is done.	FPC has been build while considering the environmental aspects and on safe place.	Yes, there is awareness about the water management and water being saved		Problem related to bank	It is good	Got good support from project officers	No
Amhi Baliraja Farmer Producer Company	Math Jalgaon, Jalna	Taken care of the environment while building the plant. There is toilet and handwash facility. Planted trees around the plant	FPC has been build while considering the environmental aspects and on safe place.	FPC is in compliance to Fire Safety standerds and aware about the water management	AS there is dry spell in the area, farmers are not coming to store their produce, due to this, compnay is in loss	Market linkage problem is there	Show status very late in the portal	Got good support from project officers	Benefits should get earlier, project should provide market linkage

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	Taken care of the environment while building the plant.	FPC has been build while considering the environmental aspects and on safe place.	FPC is in compliance to Fire Safety standerds and aware about the water management	Employment generation, profit due to value addition	No problems as of now	It is good	Got good support from project officers	It is good project as compaired to the other schemes
Narwade Agro Farmer Producer Company	Palsap, Dharashiv	Company office is been built on safe place	FPC has been build while considering the environmental aspects and on safe place.	FPC is in compliance to Fire Safety standerds and aware about the water management	Employment generation, profit due to value addition	No problems as of now	It is good	Got good support from project officers	It is a very good project, grant is bigger than any other schemes
Sampanna Farmer Producer Company	Pokhari, CSN	Taken care of the environment while building the plant.	FPC has been build while considering the environmental aspects and on safe place.	Yes,there was fire extinguisher earlier not now	Time saved, cost reduce of farming, employment generation	Need technical training	It is good	Got good support from project officers	Project should continue
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed	Taken care of the environment while building the plant.	FPC has been build while considering the environmental aspects and on safe place.	FPC is in compliance to Fire Safety standerds and aware about the water management	employment generation, save time, reduce cost	No problems as of now	it is good	Got good support from project officers	Project should continue

Name of the FPC	Village Name	Compliance to environmental safeguard	Envitonmental considerations	Fire safety standards & water management strategies	Benefits from the project	issues and challenges faced	Feedback on FPO portal.	Feedback on support from project staff	Suggestions for project
Shingroba Shetkari Uptadak Gat	Telur Nanded	Yes, done tree plantation after building the shade	FPC has been build while considering the environmental aspects and on safe place.	FPC is in comliance with Food Safety Standers, There is awareness about the water management	employment generation, save time, save labour	No problems as of now	It is good	Got good support from project officers	Project should extended
Adikant Seeds Agro Producer	Undad Wadgaon, Beed	Taken care of the environment while building the plant.	FPC has been build while considering the environmental aspects and on safe place.	FPC is in comliance with Food Safety Standers, There is awareness about the water management	Saved time, reduce cost, employment generation, profit due to value	Need training from pocra	it is good	Got good support from project officers	no suggesstion

Name of the FPC	Village Name	Year of Establishment	PoCRA grant year	Registration	Registration institution	Member contribution	Audit	Participation in group meeting	Average attendance	Active during group meeting	Efforts to increase participation
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli	2020	Mar-22	Yes	2020, ATMA	100	Yes	All members participate	100 to 120 members	Yes	They are been given livelihood and been included in the group
Sakar	Pokari, CSN	2020	May-22	Yes	2020	100	Yes	50% members participate	50-60 Members	Yes, If someone is unware of any thing or transacation they asked about it	No
Maane Farmer Producer Company Limited	Ashiv, Latur	2019	Dec-20	Yes	2019	100		All members participate	5-6 Members	Yes	No

Name of the FPC	Village Name	Year of Establishment	PoCRA grant year	Registration	Registration institution	Member contribution	Audit	Participation in group meeting	Average attendance	Active during group meeting	Efforts to increase participation
Shambhunath Agro Producer Company	Barad, Nanded	2018	Jan-21	Yes	2017, ATMA		Yes	75% members participate	180-200 members	30-40 members speak in meetings	Guided marginal communities and womento participate and motivate them to increase their participation
SRB Purofine Producer Company	Bhoshi, Nanded	2020	Jan-22	Yes	2020, ATMA	100	Yes	All members participate	150-200 members	All members speak	Taken efforts to increase their participation
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv	2021	Jun-22	Yes	2021	100	Yes	80% members participate	120-125 members	All members speak	Tell about the project by going to door to door
Raytecha Raja Producer Company	Kawtha, Hingoli							All members participate	100-120 members	All members speak	Motivate womens to participate
Greenzone Farmer Producer Gat	Lonal, Nanded	2019	Jul-22	Yes	2019, ROC	1000	Yes	All members participate	650-700 members	All members speak	no
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	2019	Feb-20	Yes	2019, MCA	100	Yes	All members participate	10	All members speak	They are given information about the government schemes and give them

Name of the FPC	Village Name	Year of Establishment	PoCRA grant year	Registration	Registration institution	Member contribution	Audit	Participation in group meeting	Average attendance	Active during group meeting	Efforts to increase participation
											service on lower prices
Amhi Baliraja Farmer Producer Company	Math Jalgaon, Jalna	2018	Mar-21	Yes	2019, ATMA	500	Yes	All members participate	210-215 members	All members speak	Make them aware to increase their participation
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	2020	Oct-21	Yes	2020	100	Yes	All members participate	7-8 members	All members speak	No
Narwade Agro Farmer Producer Company	Palsap, Dharashiv	2018	Oct-20	Yes	2018	100	Yes	All members participate	10-12 members	All members speak	no
Sampanna Farmer Producer Company	Pokhari, CSN	2020	Dec-21	Yes	2020	100	Yes	All members participate	25-50 members	All members speak	Give discount of 10 to 20% to increase women participation
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed	2020	May-22	Yes	2021	100	Yes	All members participate	40-45 Members	All members speak	Not taken any efforts but give them priority to become members
Shingroba Shetkari Uptadak Gat	Telur Nanded	2020	Oct-21	Yes	2020, ATMA	500	Yes	All members participate	150-200 members	All members speak	They have been called for meeting, taken their opinions
Adikant Seeds Agro Producer	Undad Wadgaon, Beed	2020	Dec-21	Yes		100	Yes	50% members participate	70% members	All members speak	they have been given discount

Name of the FPC	Village Name	Types of records maintained	Resposibility of book keeping	Number of members trained	Place of training	Topics of training	Impact due to training
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli	Inward of Milk and Outward of prepared goods, sales and purchase of the goods	Cleark	0	NA	NA	NA
Sakar	Pokari, CSN	Notes and financial transactions	Director	2	Vaikunt Mehta Sahkar Prashikhan Prabodini, Pune	Market Linkage	Helped us to search for market
Maane Farmer Producer Company Limited	Ashiv, Latur	Financial transactions	Secretory	1	Pune	Grant for hiring machines	Got information about all the machines
Shambhunath Agro Producer Company	Barad, Nanded	Member registration book	CEO	All members attended trainings	KVK, MCDC Pune	Business proposal, financial management, market linkage	Helped to increase production and income
SRB Purofine Producer Company	Bhoshi, Nanded	Financial transactions	Director	0		Not attended any kind of training	
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv		Staff	70	ATMA	Got information about technical things in agriculture	
Raytecha Raja Producer Company	Kawtha, Hingoli		Sscretory	5	ATMA	Grant for hiring machines	Got to know about how to spent money, how to plan it, financial transactions
Greenzone Farmer Producer Gat	Lonal, Nanded	Inward and outward of produce farmers keep	Director	2	CSN	Market Linkage, seed processing	Due to training, work is been done in technical manner

Name of the FPC	Village Name	Types of records maintained	Resposibility of book keeping	Number of members trained	Place of training	Topics of training	Impact due to training
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	Records of good and labour	Director	35	ATMA, Jalna		Awareness increases, production increases, for market linkages
Amhi Baliraja Farmer Producer Company	Math Jalgaon, Jalna	Inwards and outwards of farm produce	Cleark	1	CSN	Seed Processing	Understood the technical aspect and applying it to store goods
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	Financial transactions	Director	0			
Narwade Agro Farmer Producer Company	Palsap, Dharashiv	Meeting notes, Financial transactions	Director	0			
Sampanna Farmer Producer Company	Pokhari, CSN	Meeting notes, Financial transactions	Director	0			
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed	Meeting notes, Financial transactions	Director	20	ATMA, Beed	Seed Processing	Crop Value addition done safe and loss has reduced
Shingroba Shetkari Uptadak Gat	Telur Nanded	Financial transactions	Director	0			
Adikant Seeds Agro Producer	Undad Wadgaon, Beed	inward outward and financial transactions	Secretory	5	CSN		

Name of the FPC	Village Name	Key Activities before PoCRA project	Source of information about PoCRA	Activity under PoCRA Project	Cost of project	Arrangement of funds	Time taken to operationalize
Krishi Parivartan Shetkari Utpadak Gat	Hingoli, Hingoli	Not related to this	From PoCRA office	Processing Unit	1200000	Collected funds from management body	Yes, it took six months
Sakar	Pokari, CSN	No activity we were doing before taking benefits from the pocra	From ATMA office, Agri Assistant, Cluster Assistant	Custum Hiring Centre, Small Ruminants	For CHC = 991000, Small Ruminants = 760000, Total = 1751000		
Maane Farmer Producer Company Limited	Ashiv, Latur	Before taking benefit from Pocra, we were taking produce from farmers, then its sorting, cleaning	From pocra representatives who gave us training	Godown and Processing Unit	6000000	75% percent of funds arranged by Banks, and 25% of fund collcted by farmers	Yes, it took a year
Shambhunath Agro Producer Company	Barad, Nanded	Used to sell Bananas in the local market	From Training camp at pune by Pocra	Processing Unit	6390000	Taken loan from bank, so such problems occurrred	Currenlty It is not operational, as there is not bananas produce
SRB Purofine Producer Company	Bhoshi, Nanded	Agriculture related works	From Pocra officers	Processing Unit	3915819	Collected funds from all members	Yes, it took six months
Dev Dhanora Agro Producer Company	Dev Dhanora, Dharashiv	Giving information to farmers	Agri Assistant, ATMA	Custom Hiring Centre	2000000	collected from members	Yes, it took six months
Raytecha Raja Producer Company	Kawtha, Hingoli	About group farming	Agri Assistant, ATMA	Custom Hiring Centre	947000	collected from members	Yes, it took 1.5 years
Greenzone Farmer Producer Gat	Lonal, Nanded	Related to agriculture work	Pocra office, Agriculture department	Godown	1183000	collected by management body	Yes, it took one year
Munjal Brothers Farmer Producer Company	Mardi, Sambhaji Nagar	No activity we were doing before taking benefits from the pocra	From Agriculture Office	Processing Unit, Custom Hiring Centre, Godown	6000000		Yes, it took six months

Name of the FPC	Village Name	Key Activities before PoCRA project	Source of information about PoCRA	Activity under PoCRA Project	Cost of project	Arrangement of funds	Time taken to operationalize
Amhi Baliraja Farmer Producer Company	Math Jalgaon, Jalna	Related to agriculture work	Agriculture officer	Godown	1200000	Collected by members	Yes, it took a year
Alok Sanjivani Farmer Producer Company	Murud Akola, Latur	No activity we were doing before taking benefits from the pocra	Agriculture department, ATMA office, local farmers	Processing Unit	756000	Collected by members	Yes
Narwade Agro Farmer Producer Company	Palsap, Dharashiv	No activity we were doing before taking benefits from the pocra	Agriculture department	Plantation (Ropvatika)	1196000	Collcted by members	Yes, it took 3 months
Sampanna Farmer Producer Company	Pokhari, CSN	No activity we were doing before taking benefits from the pocra	Agriculture Assistant, ATMA office	Custom Hiring Centre, Milk Processing Unit	1965000	Collected by members (50% self, 50% bank loan)	Yes, it took 3 months
Adesh Seeds Agro Producer Company Limited	Sakher Borgaon, Beed	No activity we were doing before taking benefits from the pocra	Agriculture Assistant, ATMA office	Processing Unit	2087400		
Shingroba Shetkari Uptadak Gat	Telur Nanded	Related to agriculture work	Other FPC, Pocra Employees	Custom Hiring Centre	1066000	Collected by members	Yes, it took a year
Adikant Seeds Agro Producer	Undad Wadgaon, Beed	Sell purchase work, production	Agriculture Assistant, ATMA office	Custom Hiring Centre, Processing unit	2066000	collected by members	Yes, it took one and half year

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