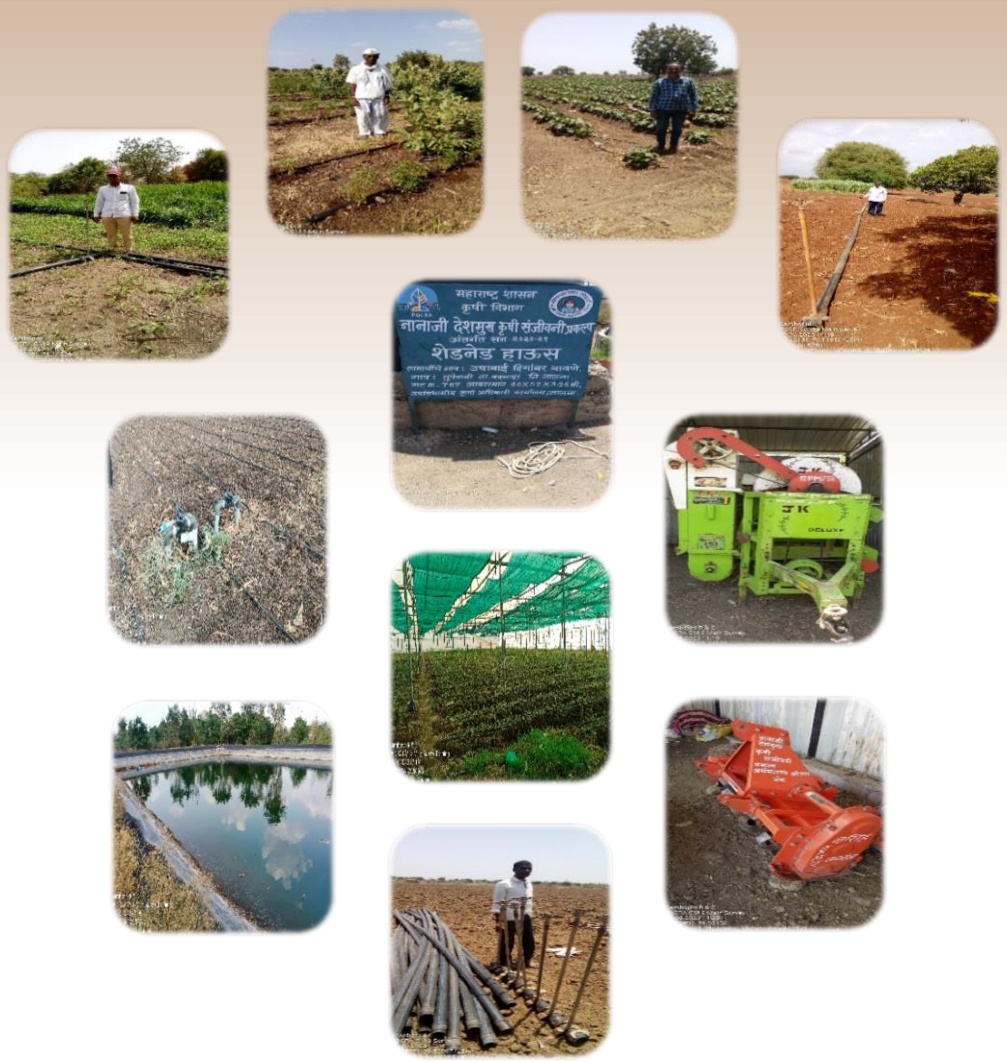
Concurrent Monitoring – Round IX Report

(For the period of 1st October 2022 to 31st March 2023)

Monitoring and Evaluation for Project on Climate Resilient Agriculture (PoCRA) In Marathwada Region, Maharashtra

Nanaji Deshmukh Krishi Sanjivani Prakalp

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



Submitted by

SAMBODHI

In Association with

teri The Energy and Resources Institute

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Abbreviations

AA	Agriculture Assistant
BBF	Broad Bed Furrow
CA	Cluster Assistant
COVID-19	Corona Virus Disease 2019
CBP	Capacity Building Program
CFP	Community farm pond
CNB	Cement Nala Bund
CRAT	Climate Resilient Agriculture Technology
CSN	Chatrapati Sambhaji Nagar
DBT	Direct Benefit Transfer
DSAO	District Superintending Agriculture officer
FFS	Farmer Field School
FPO	Farmers Producers Organization
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 Agriculture 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 with an objective of enhancing 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, in partnership with TERI, has been recruited to conduct Monitoring and Evaluation (M&E) of PoCRA in all eight districts of the Marathwada region. As part of its mandate of M&E, one of the key components is to conduct Concurrent Monitoring of the project 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 aims to assess the progress of the key indicators of the project, as per the results framework, which are measurable through Concurrent Monitoring rounds. The first Concurrent Monitoring was conducted for the period starting from the beginning of the project in the year 2018 till 31st March 2019. With a plan to conduct a total of 12 rounds of concurrent monitoring, once every six months, the current round, i.e., the ninth concurrent monitoring round, covers the period from 1st October 2022 to 31st March 2023.

Methodology

Like previous rounds of concurrent monitoring, the current **Concurrent Monitoring-IX (CM-IX)** focused on the concurrent process and progress monitoring for different components such as individual matching grants accessed using the Direct Beneficiary Transfer (DBT) application, the Farmer Field School (FFS) for demonstration of climate-resilient and sustainable farming practices, construction of community assets which are aimed at benefiting the farming community of the project area including Natural Resource Management (NRM) works and community farm ponds, farmer producer companies (FPCs) and self-help groups (SHGs) for strengthening post-harvest and value-chain strengthening agri-business activities. Feedback on the functioning of the Village Climate Resilience Management Committee (VCRMC), Krushi Tai (KT), satisfaction in project planning, micro-planning, support from project staff, support received and expected by the FPOs/FPCs, etc., was also analyzed in the project and control villages. The project MIS data for the period (under consideration) was also analyzed to understand the progress of the project activities during this period. The study area is comprised of eight districts of the Marathwada region of Maharashtra viz. Chatrapati Sambhaji Nagar (CSN), Beed, Nanded, Pignoli, Latur, Dharashiv, Parbhani and Jalna.

A **mixed-method approach** has been adopted for all the Concurrent Monitoring surveys of PoCRA conducted to date including the CM-IX round. The CM-IX round of the PoCRA project follows the common methodology suggested by PMU which is being used in both the Marathwada and Rest of Project Areas (RoPA) region for the current round. A quantitative survey tool for the beneficiaries and qualitative interview schedules for the other key project stakeholders were finalized in discussion with the PoCRA PMU team.

The survey for the CM-IX was conducted in 30 projects and 15 comparison villages. A sample of 675 beneficiary respondents was targeted to be covered under the quantitative survey, which includes 450 respondents in the project and 225 respondents in comparison areas. As per the methodology, it was ensured that project to comparison respondent ratio remains 2:1.

A total **quantitative sample of 450** was covered in the project area with a sample of 282 covered for individual interventions and 168 for community interventions. In the comparison area, a total of 225 samples were covered with 150 beneficiaries from individual benefits and 75 from community benefits. This sample was proportionately spread in all eight districts. Also, as part of the qualitative component, a total of 150 samples (**40 FGDs and 110 in-depth interviews**) comprising 26 Focus Group Discussions with VCRMC members, four with Project Specialists and 10 with farmers in project villages; and key-informant in-depth interviews of three SDAOs, 25 Cluster assistants (CAs), 25 Agriculture Assistants (AAs), two DSAOs, 17 FPC representatives, two FFS Facilitators, four Technical

Coordinator, 14 Krushi Tais (KT), 10 Agriculture Supervisors (AS), and 8 Taluka Agricultural officers (TAO) were conducted.

The quantitative estimates and the comparison of the status of indicators between the rounds in the report provide a broad indication and the estimates may not provide statistical precision as the sampling is not entirely random. Furthermore, for some categories, the sample size is not adequate to capture the difference between different rounds or the changes over time. However, following **a mix of quantitative estimates and qualitative insights** to conclude the point of view of monitoring the project, the sampling bias has been overcome to a large extent. Also, as the purpose of CM-IX is monitoring, not evaluation, the focus is more on providing feedback to better implement the program based on evidence.

Summary of Key Findings in Concurrent Monitoring Round IX

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]. According to the Agriculture Census 2015-16, the total area of small and marginal operational holdings (up to 2.0 ha) constituted 45% of the total area of operational holdings whereas the number of small and marginal operational holdings constituted 79.5% of the total number of operational holdings[2].

Most of these poor farmers with small and unirrigated land holdings are vulnerable to climate shocks. PoCRA aims to reduce such vulnerabilities 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 aforementioned issues and its achievements are evident in the key findings of CM round IX, detailed in this report.

Key Findings

The data collected as part of the CM-IX round reveals that in project clusters, on average 3.8 acres of land with Kharif crops, 3.6 acres of land with Rabi crops, and 2.5 acres of land with summer crops was under irrigation. In the comparison clusters, the land under irrigation was found to be low with an average of 2.8 acres of land with Kharif crops, 3.0 acres of land with Rabi crops, and 1.8 acres of land with summer crops being under irrigation in the past 12 months. This indicates **a positive impact of PoCRA by way of improved availability of water for irrigation in project clusters**.

The most common Kharif crops cultivated in both project and comparison clusters included soybean, cotton, and sorghum. The most common Rabi crops cultivated in both project and comparison clusters included chickpea 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, and vegetables) and floriculture have gained popularity amongst the farmers**. Nearly 11% farmers of the total 450 farmers interviewed in the project area are engaged in horticulture plantation as compared to 6% farmers of the total 225 farmers interviewed in the comparison area.

Regarding the status of the application for individual benefits in project clusters, 75% of respondents received the matching grant in their bank account. All beneficiaries were found to be aware of their application status, which is a positive trend.

Out of 65 beneficiaries who have applied for project grants for drip irrigation systems, 52 (80%) have received and established irrigation systems. Out of 52 beneficiaries, 43 of them (83%) used their

[1] Source: PoCRA Project Implementation Plan (PIP) document
[2] Economic Survey of Maharashtra 2022-23 (https://mahades.maharashtra.gov.in/files/noticeboard/press_note_eng_22_23.pdf)

irrigation set only when required. Two beneficiaries use the set regularly, while the remaining use the set seasonally. The mean area irrigated using drip irrigation is 3.7 acres. Most of the farmers used drip irrigation to irrigate cotton (52%), and soybean (26%). Other crops include sugarcane, sorghum, wheat, maize, and onion. Besides this, all horticulture plantations including fruit crops have invariably used drip irrigation.

A total of 65 beneficiaries who had accessed the sprinkler irrigation system under the project were surveyed. 48 of them (74%) have implemented it in their fields. Out of these, barring nine, all others used sprinkler sets only on the requirement. The mean area irrigated using sprinkler irrigation is 3.5 acres. Common crops that are irrigated using sprinkler irrigation include soybean (65%), sorghum (8%), wheat (4%), cotton (27%), and maize (2%). Other crops include turmeric and onion. **The major benefit reported by more than 80% of the total beneficiaries of micro-irrigation systems was an increase in income. Other benefits they experienced were increased availability of water, increase in the area of cultivation in both Kharif and Rabi seasons, change in cropping pattern, and availability of water in dry spells**.

Two shade net beneficiaries who were surveyed have received training on how to practice cultivation with shade net. They are growing vegetables in their shade net. One of them got technical guidance on how to cultivate to achieve better productivity with the help of an agriculture assistant and another from Krishi Vigyan Kendra (KVK). Both use the shade net seasonally. The average investment was around Rs 1.5 lakhs while they earned an income of nearly Rs. 2 lakhs from their produce last year. None of the shade net beneficiaries faced any difficulty in accessing the benefits from PoCRA.

It is observed that the respondent farmers were unaware of Broad Bed Furrow (BBF) technology earlier. They learned about BBF technology through FFS. Because of the adoption and use of BBF technology, they have experienced an increase in production, a reduction in the cost of cultivation, and debt. In the year 2022, there has been a lot of change in the weather, the amount of rain was higher, so planting with BBF has benefited the farmers as the excess water that has fallen has gone off the beds, thus increasing the yield. This illustrates the contribution of PoCRA towards climate resilience. Furthermore, when compared with the observation from the previous concurrent monitoring round, it is observed that on average more area is under BBF i.e., five acres in the current round as compared to one acre in the previous round. Other important climate-resilient techniques that were covered in FFS were zero tillage, care to be taken in pesticide spraying, spraying of biological pesticides, and seed treatment.

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. Data suggests that there exists a higher willingness for the adoption of CRATs not only in the project but also in comparison clusters, indicating the strength of the impact heralded 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, micro-irrigation, integrated nutrient management, integrated pest management, zero tillage, seed germination, seed treatment, and use of improved seed varieties.

Around 65% of the respondents experienced a reduction in the cost of cultivation; 51% experienced better control over pests and diseases; 32% reported improved soil and moisture conservation; and 28% reported improved soil fertility as a result of the adoption of CRATs in project areas. Similar changes are also observed in comparison areas, but the levels are 1-4% higher than those observed in project areas, except for the case of better control over pests and diseases (35% in comparison areas against 51% in project areas).

Most of the surveyed FFS guest farmers (78%) shared that they wanted to learn about the new technologies related to agriculture; and increase production and income (70%), and 50% of guest farmers wanted to understand ways to reduce their cost of production. The other reasons for participation cited by surveyed guest farmers were to learn how to apply fertilizers and pesticides more effectively (33%), to utilize water more effectively (16%), and to save their crops from climate variation (6%). **The female FFS farmers were also found to be equally motivated to learn and apply climate-resilient technologies in their agriculture practices and increase their production and income**.

The CM-IX survey found that on average nearly 80% of farmers were receiving agro-met advisory services through WhatsApp. Agricultural weather advice gives information about the changes in the weather and the problems that may arise due to the changing weather. It's worth noting that a significant percentage of respondents in both project clusters (87.5%) and comparison clusters (77.6%) expressed interest in following agromet advisory regularly, indicating a strong willingness to engage with and benefit from these services.

Regarding community-based NRM, most of the surveyed beneficiaries in both project and comparison areas were found to be involved in compartment /graded bunding under community-based NRM works followed by the construction of earthen and Cement Nala Bunds (CNBs). Around 61% of respondents in the project area reported an increase in the availability of water for protective irrigation because of asset creation under community-based NRM works. More than 60% of the respondents experienced an increase in production followed by a change in cropping pattern.

The following **key recommendations** are articulated based on the analysis of the CM-IX survey:

1. **Emphasize water resources management in micro-planning:** With farm ponds being the most desired activity among farmers, it is recommended that in the next phase, the project should continue to focus on such activities, together with water harvesting and utilization.
2. **Empower Community-Based Organizations (CBOs):** Concerted efforts are needed to involve and empower the CBOs, namely VCRMCs, SHGs, FIGs, and FPCs to enhance the coverage of those small and marginal farmers who are yet to benefit from the project.
3. **Promote linkage with Financial Institutions:** It is recommended that efforts should be made to link small landholders with formal financial institutions so that they can avail loans at lower interest rates and uptake and invest in project activities.
4. **Capacitate Farmers' Field Schools:** Attention needs to be paid to mobilizing farmers to attend FFS sessions, timely payment of honorarium of host farmers, and capacity building of FFS facilitators.
5. **Offering guided assistance to Farmer Producer Companies (FPCs):** Along with a capacity-building program on business development, handholding of FPCs through the initial phase is much needed to make them financially viable. Developing a digital platform for FPC members and other stakeholder management would be useful.
6. **Enhance compliance with environmental safeguards:** Orientation and training on environmental safeguards and their compliance should be conducted for key stakeholders including beneficiary farmers, project staff, VCRMCs, project-supported FPCs, SHGs, and FIGs.
7. **Promote renewable/ solar energy initiatives:** Given the highly erratic and inadequate supply of electricity, which limits the pumping hours, exploring alternative sources of electricity like solar energy is recommended.
8. **Promote initiatives for the sustainability of project interventions:** The project staff should emphasize and sensitize the local communities about the importance of the project's sustainability, and intervention strategies should be reviewed for sustainability based on the experience gained over five years.

1. Introduction

1.1. Project Background

In a joint effort between the Government of Maharashtra and the World Bank, the Project on Climate Resilient Agriculture (PoCRA) was devised. This project aims to encompass 5220 villages spread across 16 districts of Maharashtra. Its primary objective is to enhance the agriculture sector's resilience to climate change and related challenges[3]. The Project Development Objective (PDO) of PoCRA is *to enhance climate resilience and profitability of smallholder farming systems in selected districts of Maharashtra*[4]. 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[5].

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.

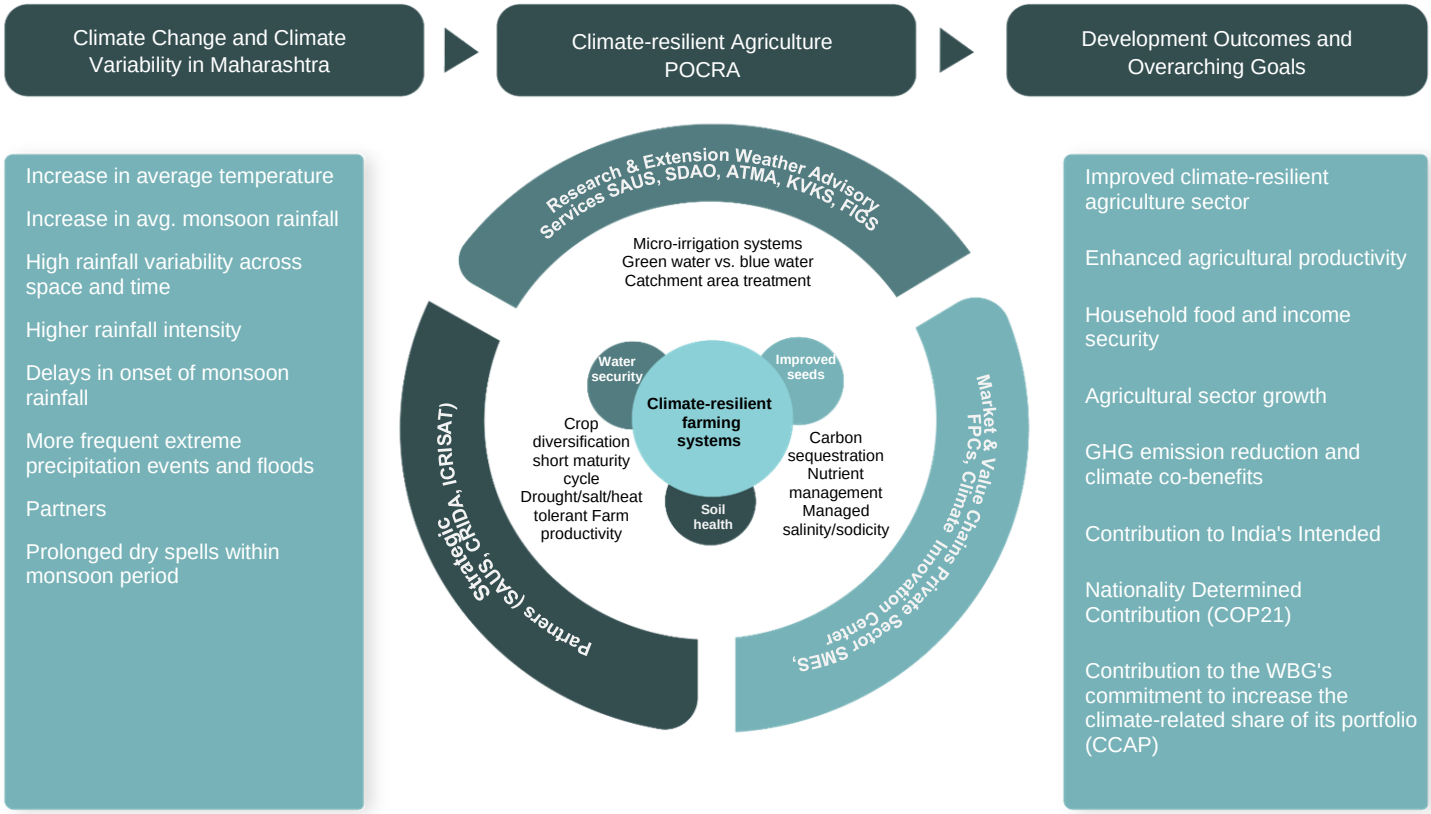
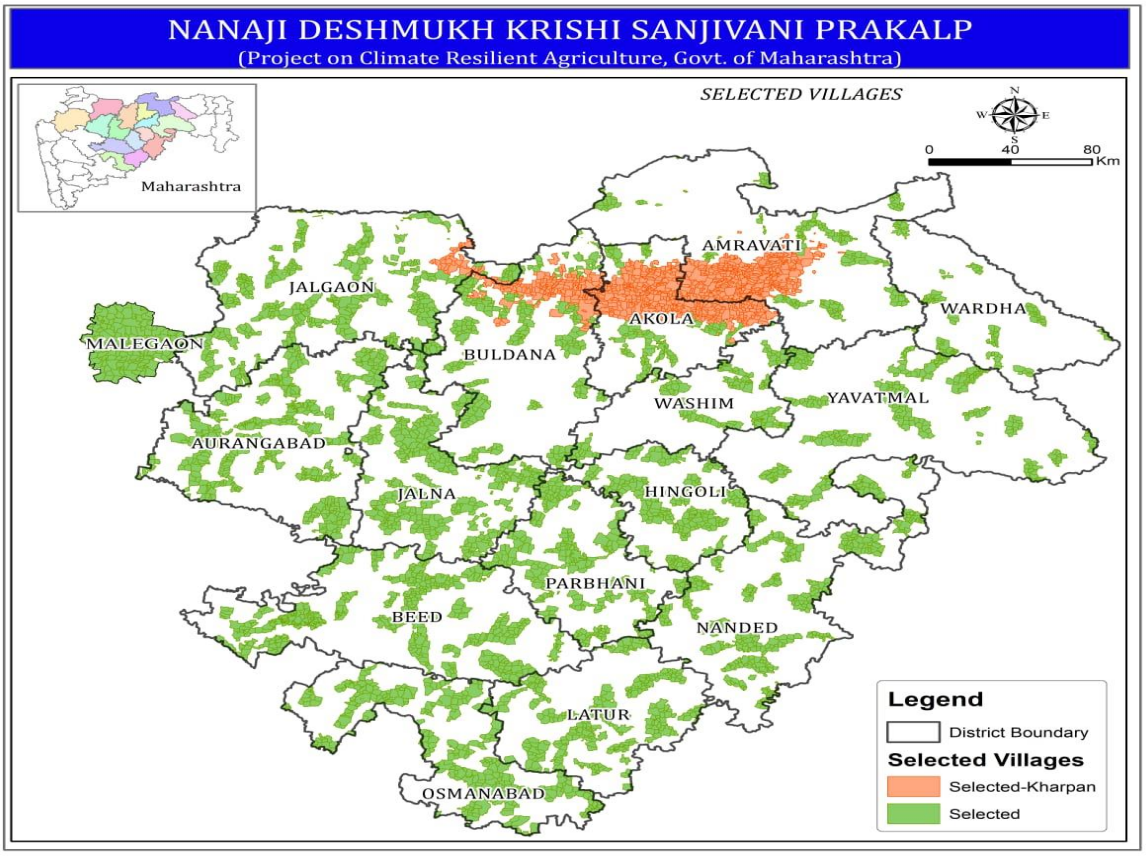


Figure 1. 1 PoCRA Strategic Overview, Thematic Linkages and Expected Outcomes

[3] Source: PoCRA Project Appraisal document.
[4] Source: ibid
[5] Project implementation status report as on 31st March 2021, Maharashtra PoCRA

The project has been implemented in 16 districts in Maharashtra, which include 8 districts of the Marathwada region (Aurangabad (henceforth Chhatrapati Sambhaji Nagar (CSN)), Nanded, Latur, Parbhani, Jalna, Beed, Hingoli, Osmanabad (henceforth (Dharashiv)))[6], six districts of the Vidarbha region (Akola, Amravati, Buldhana, Yavatmal, Washim, Wardha), Jalgaon and Nashik[7] district of Nashik Division, and approximately 932 salinity affected villages in the basin of Purna river spread across Akola, Amaravati, Buldana and Jalgaon districts[8]. Figure 1.1 highlights the villages where the project is being implemented. This project will be implemented in six years from 2018-2024[9]. Out of the 16 districts where PoCRA is implemented, this report is based on the Concurrent Monitoring conducted in eight districts of the Marathwada region, covering 347 mini-watershed clusters. The project is being implemented in a phased manner reaching out to 70 clusters in year I, 175 clusters in year II, and 102 clusters in year III.

Figure 1. 2 Nanaji Deshmukh Krushi Sanjivani Prakalp (PoCRA) project area and villages



1.2. Overview of the Study Area

About 40% of the State of Maharashtra falls under drought-prone areas with less than 750 mm of the annual average rainfall[10]. In Maharashtra, the Marathwada region specifically has been floundering under drought conditions since 2012, with the highest rainfall deficit in the country at 48% in 2014. The Marathwada region consists of eight districts viz., CSN, Beed, Latur, Dharashiv, Parbhani, Jalna, Nanded, and Hingoli.

[6] Aurangabad and Osmanabad finally renamed as Chhatrapati Sambhaji Nagar and Dharashiv (https://indianexpress.com/article/cities/mumbai/aurangabad-osmanabad-renamed-chhatrapati-sambhaji-nagar-dharashiv-8465248/)
[7] Malegaon taluka from Nashik district was included in project in year 2022
[8] Source: PoCRA-Terms of Reference
[9] Source: ibid
[10] Hydrology and Water Resources Information System for India, National Institute of Hydrology, Roorkee http://nihroorkee.gov.in/rbis/India_Information/draught.htm

The region has a population of about 1.87 crores and a geographical area of 64.5 thousand sq. km[11]. Agriculture is the major source of income generation for over 64% of the state's population. However, given harsh weather conditions, the region's agricultural system has been depleted significantly. Jowar, Bajra, along with other Kharif crops, were completely wiped out in 2012 when the monsoon failed (Kumar, Mail Online India, 2013). Jalna, famous for being the biggest producer of sweet lime, had been the worst hit by drought. The anticipated impact of climatic change as well as climate variability has presumably led to an increased pressure on already scarce water resources.

Starting in 2014, the Jalyukta Shivar Abhiyaan[12], 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. This demonstrates that there is a need for concentrated efforts for mitigation and adaptation to reduce the vulnerability of agriculture and make it more resilient.

Within this context, there is an urgent need for farmers to enhance their resilience to the threats of climate variability. The fact is that most of the farmers in the project region are small and marginal farmers[13], 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 of PoCRA for its implementation in the Marathwada 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.

[11] Census 2011, http://shodhganga.inflibnet.ac.in/bitstream/10603/152935/11/11_chapter%204.pdf

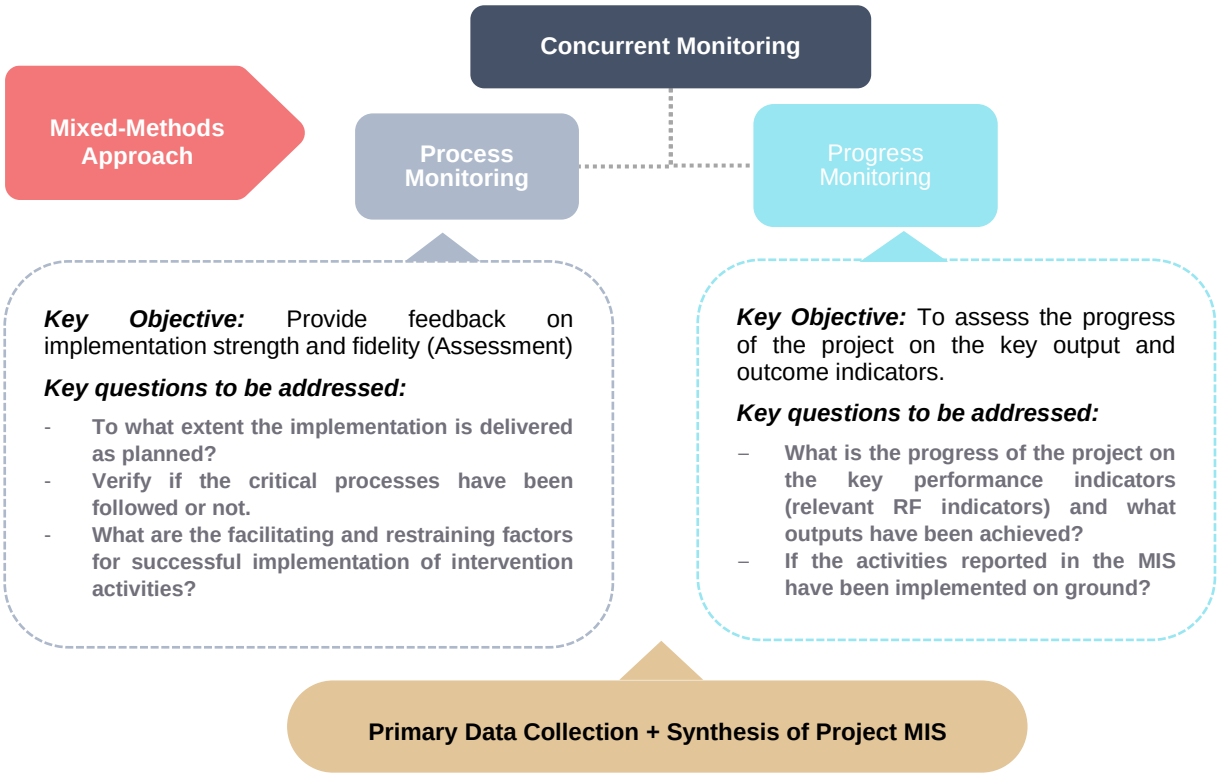
[12] Government of Maharashtra had launched a water conservation scheme named Jalyukta Shivar Abhiyan in 2016 to make Maharashtra a drought-free state by 2019. The programme aimed to make 5000 villages free of water scarcity every year. The key aim of Jalyukta Shivar Abhiyan was to establish belief in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

[13] '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

The major focus of concurrent monitoring is to provide quick feedback to PMU every six months on progress and processes being adopted while implementing the program. Therefore, with a limited sample size and purposive sampling methodology to cover all clusters, the sample size and methodology of Concurrent Monitoring rounds have limited scope to statistically capture the change that happened in 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.

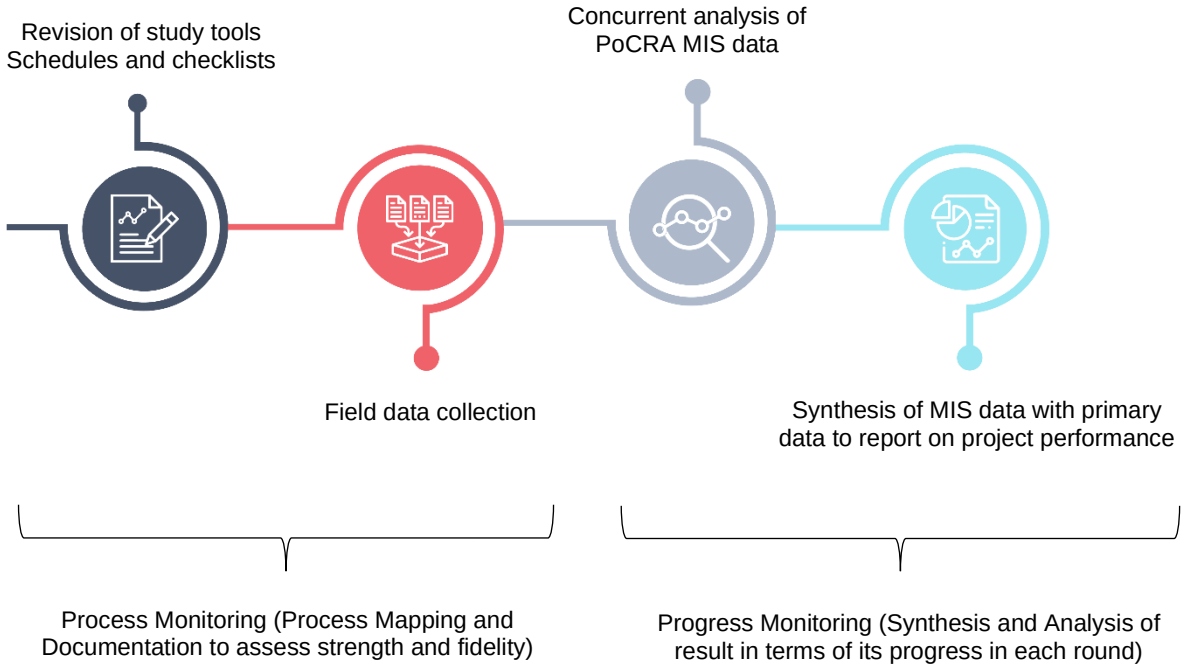


Figure 1. 4 Concurrent Monitoring Methodology Steps

Like previous rounds of concurrent monitoring, the CM-IX focused on the concurrent process and progress monitoring for the six-month period from 1st October 2022 to 31st March 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 CM-IX of the PoCRA project followed the common methodology suggested by PMU which is being used in both the Marathwada and Rest of Project Areas (RoPA) region, for the current round. 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 CM-IX was conducted in 30 projects and 15 comparison villages. A sample of 675 beneficiary respondents was targeted to be covered using a quantitative survey, comprising 450 respondents in the project and 225 respondents in comparison areas. As per the methodology of CM-IX, it was ensured that project to comparison respondent ratio remained at 2:1.

Also, under qualitative survey, a total of 150 samples, comprising 40 Focus Group Discussions (FGDs) and 110 In-depth Interviews (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 conclude the project. Feedback on the functioning of the Village Climate Resilience Management Committee (VCRMC), Krushi Tai, satisfaction in Project Planning, Micro-planning, support from project staff, support received and expected by the FPOs/FPCs, etc., was also analyzed in the project and control villages. The project MIS data for the period was also analyzed to understand the progress of the project activities during this period. The study area is comprised of eight districts of the Marathwada region of Maharashtra viz. CSN, Beed, Nanded, Hingoli, Latur, Dharashiv, Parbhani, and Jalna.

Revision of Study tools – Schedules and Checklists

Based on the list of processes to be monitored, learnings/ experiences from previous CM rounds, and the updates in the program, the study tools, i.e., schedules and checklists were revised in Round IX in April - May 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 CM-IX round. The study tools were finalized after the incorporation of comments/suggestions from PMU as well as key experts.

Primary Data Collection from the Field

The primary data was collected in June-July 2023, based on 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.
Key-informant 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, key informant interviews (KIIs) have been conducted with key stakeholders (viz. Agriculture Assistant, Agriculture Supervisor, Cluster Assistant, DSAO, SDAO, TAO, FFS Coordinator & Facilitator, Krushi 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 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 the district-wise implementation of the project activities are presented.

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

The MIS data on project progress, primary data on quality, and feedback on implementation (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 the CM-IX 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 insights 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. They were further revised during the CM-VIII and CM-IX rounds in consultation with PMU. Accordingly, in the CM-IX round, the data collection software program (CAPI) was revised and tested in the last week of May 2023 before starting the field team training on the 5th of June 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 areas. The ratio for the project to comparison remains at 2:1 (as given in the ToR). The Concurrent Monitoring exercise intends to cover all 347 clusters across eight districts over six years.

A total of twelve Concurrent Monitoring rounds are to be conducted over six years, i.e., two rounds each year. Given the phased approach to implementation, the project has been implemented in 70 clusters in the first year, 175 clusters in the second year, and 102 clusters in the third year. The sampling strategy for Concurrent Monitoring is proposed accordingly. The number of clusters to be sampled in each district for each round has been selected proportionately. The distribution of the beneficiary samples across districts and monitoring rounds is presented in Table 1.2.

Accordingly, a total of 30 project clusters and 15 comparison clusters have been covered in Concurrent Monitoring Round IX. The list of the sample project and comparison clusters and villages has been provided in a separate Annexure I.

Table 1. 2 Sample Distribution

Sl. No	Districts	Round wise clusters to be covered												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
1	**CSN**	3	5	5	5	5	5	5	5	5	5	5	5	58
2	**Beed**	3	4	3	3	3	3	3	3	3	3	3	3	37
3	**Jalna**	2	2	5	5	5	5	5	5	5	5	5	5	54
4	**Latur**	3	3	4	4	4	4	4	4	3	3	3	3	42
5	**Dharashiv**	3	5	5	5	5	5	5	5	5	5	5	5	58
6	**Nanded**	2	2	3	3	3	3	3	3	3	3	3	3	34
7	**Parbhani**	2	3	3	3	3	3	3	3	4	4	4	4	39
8	**Hingoli**	2	3	2	2	2	2	2	2	2	2	2	2	25
Total project clusters		20	27	30	30	30	30	30	30	30	30	30	30	347
Total comparison clusters		10	14	15	15	15	15	15	15	15	15	15	15	174
Total project sample		300	405	450	450	450	450	450	450	450	450	450	450	5205
Total comparison sample		150	210	225	225	225	225	225	225	225	225	225	225	2610
Total beneficiary sample		450	615	675	675	675	675	675	675	675	675	675	675	7815

The steps undertaken in the sampling methodology for CM-IX have been detailed in the following section.

Selection of Project Clusters

Thirty clusters were sampled for Concurrent Monitoring Round IX in project areas. These 30 clusters were sampled proportionately from the eight project districts, as presented above in the beneficiary sample distribution Table 1.2. The clusters required to be sampled from each district were sampled randomly from the total clusters in the district, in which the project has been implemented in Phase I, II, and III (excluding the clusters which have already been covered in the previous CM Rounds). It is to be noted that based on the suggestions from PMU, five project clusters were purposively selected in the current Concurrent Monitoring round such that they belong to Phase I and have NRM works implemented in them.

Selection of Comparison Clusters

Fifteen comparison clusters are selected for Concurrent Monitoring Round IX. The non-PoCRA watershed clusters are selected after matching them with PoCRA clusters based on the Climate Vulnerability Index score. It has been ensured that a district-wise 2:1 proportion of project and comparison is maintained while selecting comparison clusters. The steps followed to identify the comparison clusters have been detailed below:

Step 1: The number of comparison clusters to be sampled per district is decided while maintaining a 2:1 ratio in project and comparison clusters per district.

Step 2: The comparison clusters in each district which has the closest Climate Vulnerability Index score to the sampled project clusters in the corresponding district are selected.

Step 3: A comparable non-PoCRA cluster is identified for every sampled PoCRA cluster. It means against every sampled PoCRA cluster a non-PoCRA cluster is identified for the selection of comparison group for the concurrent monitoring.

Finally, out of the 30 identified non-PoCRA clusters, 15 clusters are randomly selected for concurrent monitoring.

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, ten 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 was 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 Farmer Field School (FFS), and

d. one beneficiary (either male or female) was chosen from the list of guest farmers who had participated in the Farmer Field Schools (FFSs).

These eight DBT beneficiaries and two Farmer Field Schools (FFS) beneficiaries were randomly chosen from the list of beneficiaries in the sampled villages. In the comparison villages, a list of beneficiaries (receiving benefits like that of PoCRA beneficiaries) was identified with the help of the local Agriculture Assistant (AA) or with the help of Gram Panchayat (GP) officials. Further, the beneficiaries of the survey are chosen randomly from this list. Table 1.3 summarizes the selected beneficiary categories. 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.

Table 1. 3 Planned Quantitative Samples

Activity Category	Activity	Sample per Village	Total Sample (Project)	Total Sample (Comparison)	Remarks
Individual Beneficiaries		**10**	**300**	**150**	Total of 450 individual beneficiaries were 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 community beneficiaries were planned to be surveyed
	Beneficiaries of NRM activities		50	25	NRM beneficiaries from the sampled project and comparison villages having NRM works
	CFP beneficiaries		36	18	Randomly selected from project and comparison villages having CFP beneficiaries

Activity Category	Activity	Sample per Village	Total Sample (Project)	Total Sample (Comparison)	Remarks
	FPC members		48	24	3 members (2 board members general member) from 16 project-supported FPCs and 8 FPCs in comparison or other villages
	SHG members		16	8	2 members each from 8 SHGs in the project and 4 SHGs in comparison villages (one in each district)
Target Sample		**15**	**450**	**225**	Total of 675 beneficiaries were planned to be surveyed

Community beneficiaries are classified into four categories:
a) beneficiaries for Natural Resource Management (NRM) activities
b) beneficiaries of community farm pond
c) members of the project-supported Farmer Producers Company (FPCs)
d) members of project-supported Farmer Interest Groups (FIGs) and Self-Help Groups (SHGs)

The sample frames of NRM work implemented, community farm ponds developed, and project-supported FPCs, FIGs, and SHGs were taken from the PMU team. 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 Assistant, Agriculture Assistant, and VCRMC members. The final coverage of the sample was based on the status of the execution of individual and community activities in the sampled villages. In case of unavailability of the required number of beneficiaries of the specific category, the beneficiaries available from other categories were surveyed to maintain the sample size.

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 qualitative interviews planned to be conducted are detailed in Table 1.4.

Table 1. 4 Planned Qualitative Samples

Target Respondent	Sample and Approach	Inquiry Technique	Remarks
VCRMC Representatives	– 30	– Discussion with VCRMC Representatives	Investigation of all project activities implemented in the village (viz. capacity building, implementation, challenges, and suggestions for course correction)
Agriculture Assistant (AA)(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/ Organization (FPC/FPO) Representatives	– 16 2 FPO/FPC representative interviews per district	– IDI with FPC/FPO Representatives (Board of Directors)	Investigation on support from PoCRA (viz. support received, process bottlenecks, and suggestions for course correction)

Target Respondent	Sample and Approach	Inquiry Technique	Remarks
Project Specialists (PS Agriculture, PS Agribusiness, PS HRD) implementing PoCRA in districts	– 8 Discussion with PS in all 8 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 1 SDAO randomly selected from the 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 Taluka Officer
Krushi Tai (KT)	– 15 Randomly selected from the 30 sampled PoCRA villages	– IDI with KT	Feedback on project-related activities implemented by KT
Farmer Field School (FFS) Facilitator	– 15 Randomly selected from the 30 sampled PoCRA villages	– IDI with FFS Facilitator	Investigation on implementation of FFS at the village level (viz. implementation, challenges, and suggestions for course correction)
FFS Coordinator	– 8 1 FFS coordinator was randomly selected from the list of FFS Coordinators of sampled villages in each district	– IDI with FFS Coordinator	Investigation on implementation of FFS in their district (viz. implementation, challenges, and suggestions for course correction)
Agriculture Supervisor (AS)	– 8 1 AS was randomly selected from the 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 1 TAO was randomly selected from the list of TAOs of sampled villages 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)	– 8 IDI with DSAO and PD ATMA in all 8 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 during CM-IX Round

Quantitative Data

The sample was targeted based on the above-mentioned sampling approach. 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. Of the 450 respondents covered in the project area, 282 respondents belonged to the category of individual interventions and 168 belonged to the category of community interventions. In the comparison area, of

the 225 respondents, 150 beneficiaries belonged to the category of individual benefits and 75 beneficiaries belonged to the category of community benefits.

Note that in case of non-response, the sample was covered under another activity category to maintain the total strength/number of the sample according to the plan for the Concurrent Monitoring round. This strategy has been adopted to address the cases of non-response in both project and comparison areas.

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

District	Project	Comparison	Total
CSN	52	25	77
Beed	42	22	64
Hingoli	53	26	79
Jalna	64	35	99
Latur	45	19	64
Nanded	53	28	81
Dharashiv	87	44	131
Parbhani	54	26	80
Total	**450**	**225**	**675**

Table 1. 6 Category-wise Quantitative Sample Coverage in the Project and Comparison Villages

District	Project	Comparison	Total
Individual	**282**	**150**	**432**
DBT (pre-sanction and following stage)	22	13	35
DBT (disbursement received)	194	137	331
FFS- Host Farmer	31	0	31
FFS- Guest Farmer	35	0	35
Community	**168**	**75**	**243**
NRM Community Works	43	71	114
Community Farm ponds	33	4	37
FPC Member	63	0	63
SHG Member	29	0	29
Total	**450**	**225**	**675**

Qualitative Data

For collecting qualitative data, key project stakeholders from the sampled project clusters were interviewed. A total of 150 samples (40 FGDs and 110 IDIs) covering various key stakeholders of the PoCRA project were included in the qualitative survey. Table 1.7 presents the samples of various categories which were covered under CM-IX. In a few cases, there was a sample shortfall due to the unavailability of the stakeholders for the survey during the time of the visit, especially due to health-related reasons or personal emergencies.

Table 1. 7 Stakeholder wise Qualitative Sample Coverage

S.No.	Research Tool	Samples Covered
1	FGD with VCRMC Members	26
2	IDI with AA	25
3	IDI with CA	25
4	IDI with FPC representatives	17
5	IDI with TAO	8
6	IDI with AS	10
7	IDI with SDAO	3
8	FGDs with PS	4
9	IDI with DSAO/PD ATMA	2
10	IDI with FFS Facilitator	2
11	IDI with Technical Coordinator	4
12	IDI with Krushi Tai	14
13	FGD with farmers	10
Total		**150**

Expert Field Visits

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-economist, agribusiness expert, agri-engineering expert, and GIS expert visited the field as per the schedule mentioned in Table 1.8.

Table 1. 8 Schedule of Key Expert Field Visit

Key Expert	Domain	Date	Place of Visit
Jitendra Sinha	Team Leader	7-9 June 2023	Project Villages in CSN, and Jalna
S. Kulkarni	Hydrology	4-6 July 2023	Project Villages in CSN and Jalna
Arindam Datta	Environment	12-15 July 2023	Project Villages and FPCs in Nanded and Hingoli
R. Singandhupe	Agronomy	16-18 July 2023	Project Villages in Latur and Beed
Dalbir Singh	Agri Economy	12-15 July 2023	Project Villages and FPCs in Nanded and Hingoli
Deodatt Singh	Agribusiness	9-12 July 2023	Project FPCs in CSN and Jalna
Mini Govindan	Sociology	12-15 July 2023	Project Villages and FPCs in Nanded and Hingoli
Santosh Muriki	GIS	12-15 July 2023	Project Villages and FPCs in Nanded and Hingoli
Vijay Agarwal	Agri Engineering	27-28 August 2023	Project Villages in CSN



2. Profile of Respondents during CM-IX Round

2.1. Demographic Details

As beneficiaries were selected as per sampling design on considering 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, it indicates current coverage of PoCRA benefits for 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 other backward castes (OBCs), scheduled castes (SCs), scheduled tribes (STs), nomadic tribes, and farmers that are not literate or do not have formal education.

Gender: Nearly 89% of the total 450 beneficiaries interviewed in the project and 88% of the total 225 beneficiaries interviewed in comparison clusters were male.

Social Category: Most respondents belonged to the general category. The composition of respondents based on social category is given in Table 2.1.

Table 2. 1 Social Category of Respondents

Social Category	Project (%)	Comparison (%)
	N=450	N=225
General/ Open	74	64
Other backward class (OBC)	13	19
Scheduled Caste (SC)	6	6
Scheduled Tribe (ST)	3	6
Nomadic Tribe (NT)	2	4
Others	2	1
Total (%)	**100**	**100**

Education: As can be seen from Table 2.2, the educational attainment of respondents in project villages was slightly better than in comparison villages. Nearly 9% of respondents in the project area and nearly 20% of respondents in comparison villages were found to have not attended any school.

Table 2. 2 Educational Background of Respondents

Education	Project (%)	Comparison (%)
	N=450	N=225
No schooling	9	20
Primary school (up to class 5th)	14	23
Middle school (up to class 8th)	15	15

Education	Project (%)	Comparison (%)
Secondary school (up to class 10th)	24	19
Senior secondary school (up to class 12th)	21	13
Diploma but not graduate	9	5
Graduate	6	4
Post-graduate	2	1
Total	**100**	**100**

Poverty Status: Around 59% of respondents in the project and 46% in comparison belonged to the Above Poverty Line (APL) category as per their ration card status, 40% in the project and 51% in comparison belonged to the Below Poverty Line (BPL) category, and the rest 1% in project clusters and 3% in comparison clusters were not aware of their poverty level category.

Marital Status: Around 94% of respondents in project areas and 96% of respondents in comparison areas were married and about 5% of the respondents in the project and 2% in comparison areas were unmarried. The sample also included 7 widows in the project and 5 in the comparison cluster.

Household Size and Family Type: On average, the total number of members in a household in both project and comparison clusters was five. 85% of respondents in the project clusters and 88% of respondents in comparison clusters stayed in a joint family.

Source of Income: Farming/agriculture was the primary source of income for nearly all respondents in both project as well as comparison clusters. Apart from agriculture, other sources of income for sample households were livestock, unskilled wage labor, micro-enterprises, and contractual work. This implies the dependence of sample households on agriculture as the primary source of income. Table 2.3 lists the sources of income of respondents.

Table 2. 3 Source of Income of Respondents

Source of Income	Project (%) Valid N=450 (Multi response)	Comparison (%) Valid N=225 (Multi response)
Farming/ Agriculture	90	89
Goat-rearing	1.2	0
Dairy	1.4	2.4
Fisheries	0.4	0
Unskilled wage labor (construction, brick kiln labor, etc.)	0.2	1.2
Non-agriculture labor	0.2	0.4
Agricultural Laborer	2.4	4.4
Skilled worker (tailoring, masonry, electrician, driving, etc.)	1	0.4
Salaried workers (teachers, AWW, etc.)	0.4	0
Contractual or task-based work	1	0.8
Micro-enterprises (kirana shops, mobile shops, etc.)	2	1.2

Annual Income: The average annual income (from all sources) for the respondent households in project and comparison clusters is Rs. 1,96,929/- and Rs. 1,22,578/-, respectively.

Table 2. 4 Average Annual Income of Respondents

Cluster	N	Mean Income (Rs.)	Std. Dev	95% CI	
Project	450	196929	383974	161356	232502
Comparison	225	122578	124144	106269	138887

2.2. Land Ownership and Cultivation Practices

Land Ownership: All respondent households, except five in the project and one in the comparison area owned agricultural land. Women, in about 28% of respondent households in project and comparison clusters owned agricultural land. The average agriculture landholding in the project cluster is 4.2 acres, and that in comparison cluster is 3.1 acres. Of the average agricultural land holding in both types of clusters, nearly all lands are cultivable. 37 respondent households in project clusters have leased-in an average of 1.1 acres of agricultural land, while in comparison clusters 15 respondent households have on an average leased-in land size of 0.8 acres. 21 respondent households in project clusters have leased out an average of 0.33 acres of agricultural land, while in comparison clusters, 10 respondent households have an average leased-out land size of 0.5 acres. As can be seen in Table 2.5, nearly two-third of the respondent households in the project areas (68%) belonged to small and marginal farmers (those who owned less than 2 Ha of land), while 84% belonged to small and marginal farmers in comparison areas.

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

Category of farmers	Project (%) N = 450	Comparison (%) N = 225
Small & Marginal (less than 2 Ha)	68	84
Medium (between 2 to 5 Ha)	28	15
Large (more than 5 Ha)	4	1

Cultivation: In the project cluster, nearly 89% of the total respondents cultivated an average of 3.8 acres of their land in the Kharif season. Similarly, 57% of the total respondents cultivated Rabi crops on an average of 3.6 acres, and 2% of respondents cultivated summer crops on an average of 3.4 acres in the last 12 months. Around 11% of farmers in project clusters cultivated horticulture crops on an average of 2.5 acres of land. In the comparison cluster, nearly 91% of the total respondents cultivated an average of 2.8 acres of their land in the Kharif season. Similarly, 47% of total respondents cultivated Rabi crops on an average of 2.9 acres, and 0.1% of respondents cultivated summer crops on an average of 1.8 acres in the last 12 months. Around 6% of farmers in comparison clusters cultivated horticulture crops on an average of 3.2 acres of land. In contrast to the situation in comparison clusters, project clusters have a slightly higher proportion of farmers cultivating on slightly larger area of land in each cropping season.

Irrigation: Nearly 92% of respondents in project clusters had access to irrigation sources, while in comparison 83% had an irrigation facility. The percentage access to irrigation is observed to be near about the same since CM round VII. In project clusters, the sources of irrigation in order of availability to the respondent households are open-dug wells, earthen/check dams, farm ponds, canals, and rivers. In comparison clusters, the source of irrigation in order of availability is open dug well, canal/ river, earthen/ check dam, and farm pond. Both in the project and comparison clusters, open-dug wells were found to be a major source of irrigation, as Table 2.6 reflects. Also, a little more than one-tenth of the

respondents in project areas (12%) reported farm ponds as a major source of irrigation which was found to be less in comparison clusters (5%).

Table 2. 6 Source of Irrigation

Source of irrigation	Project (%)	Comparison (%)
	Valid N = 410 (Multi response)	Valid N = 185 (Multi response)
Open dug well	57	63
Farm pond	12	5
Canal/ river	3	16
Earthen/ check dam	27	12
Total (%)	100	100

Average Irrigated area under different Cropping Seasons:

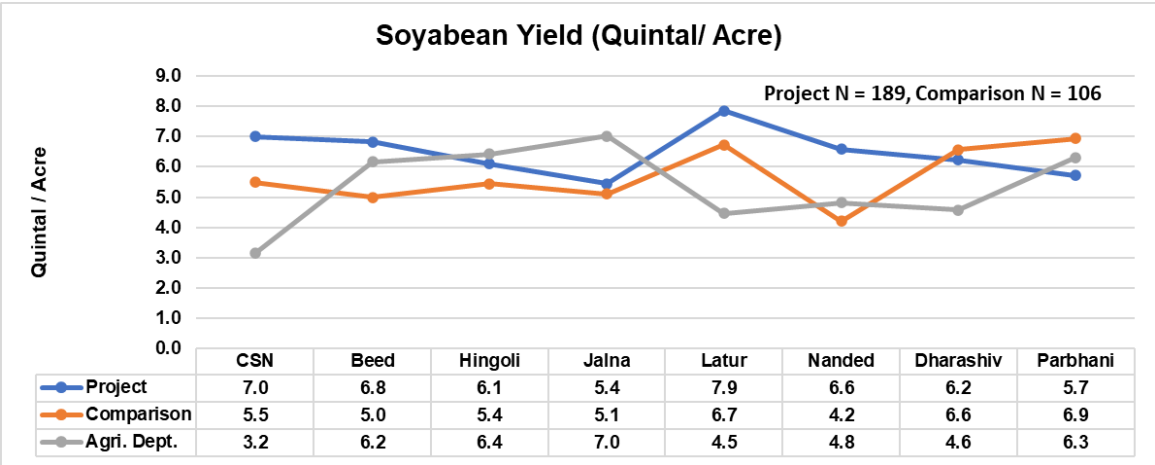
In project clusters, on average 3.8 acres of land with Kharif crop, 3.6 acres of land with Rabi crop, 2.9 acres of land with summer crop, and 2.5 acres of land with horticulture crop were under irrigation in the past 12 months. Similarly, in comparison clusters, on average 2.8 acres of land with Kharif crop, 3 acres of land with Rabi crop, 1.8 acres of land with summer crop, and 2.7 acres of land with horticulture crop were under irrigation in the past 12 months. Hence, more land was under irrigation in the project areas than in comparison during various cropping seasons.

Crops Grown in Different Seasons:

Kharif Season: The most common Kharif crops cultivated (in both project and comparison clusters) included soybean, cotton, maize, sugarcane, and sorghum. Some of the other Kharif crops cultivated were black gram, turmeric, onion, and millet.
Rabi Season: The most common Rabi crops cultivated (in both project and comparison clusters) included sorghum and wheat.
Summer Season: Vegetables like onion and tomato are mostly grown in Summer.
Annual Crop: Banana, papaya, guava, sweet lime, lemon, and orange are common crops sown annually.

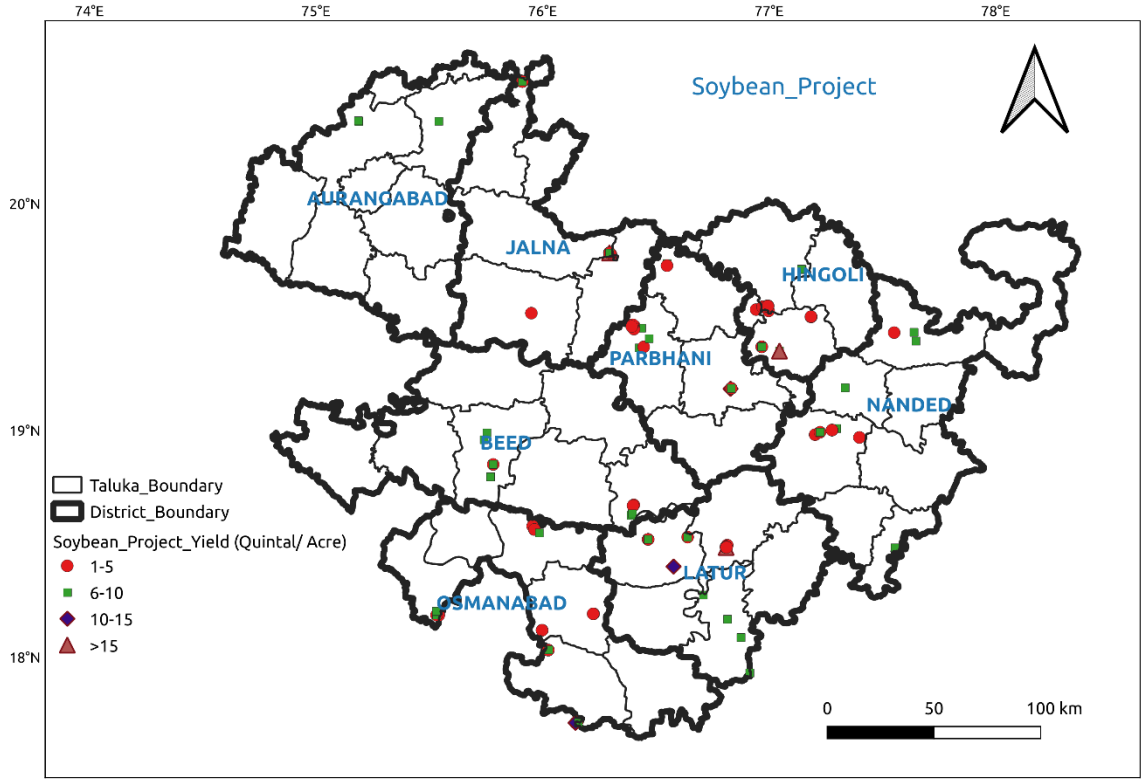
Analysis of soybean yield (Quintal per Acre)

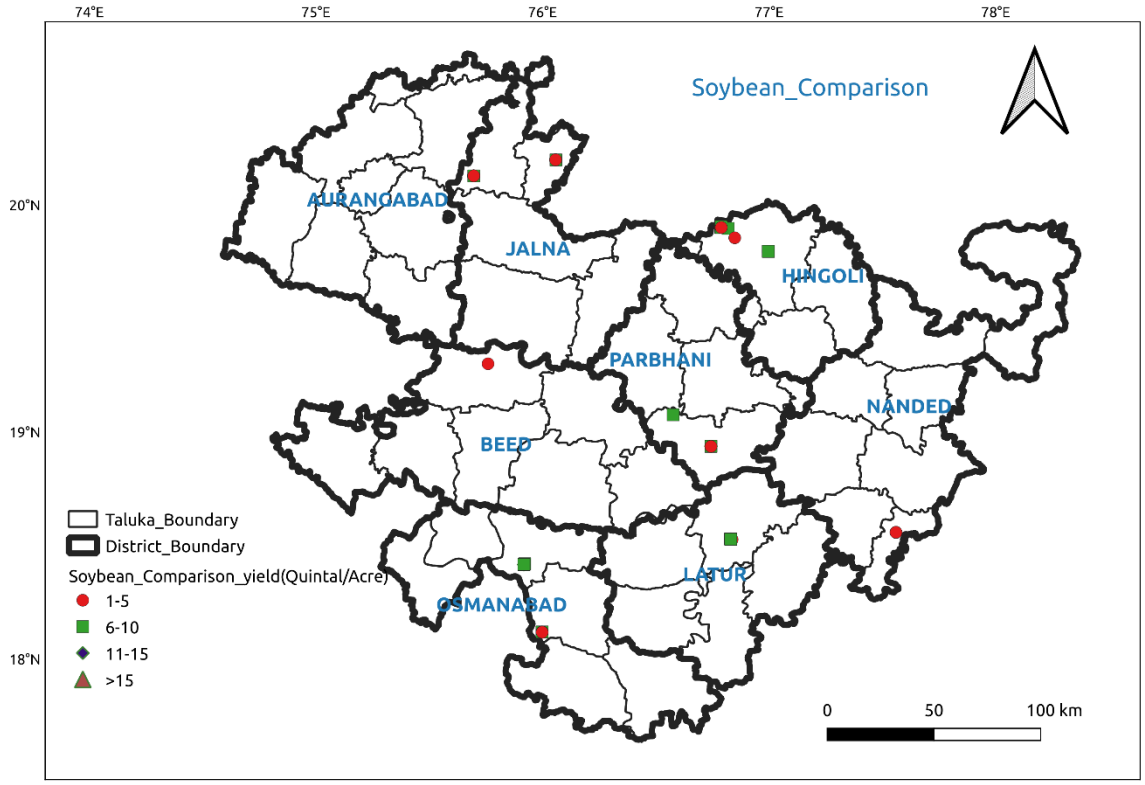
As can be seen in the graph below, except in the Parbhani district, the average of the yield Soyabean crop reported by farmers in project areas in CSN, Beed, Hingoli, Latur, and Nanded for Kharif 2022 was found to be slightly higher than the comparison areas and it is nearly equal in Jalna and Dharashiv districts to the average yield in comparison areas.



	CSN	Beed	Hingoli	Jalna	Latur	Nanded	Dharashiv	Parbhani
Project	7.0	6.8	6.1	5.4	7.9	6.6	6.2	5.7
Comparison	5.5	5.0	5.4	5.1	6.7	4.2	6.6	6.9
Agri. Dept.	3.2	6.2	6.4	7.0	4.5	4.8	4.6	6.3

The spatial distribution of GPS locations of the sample beneficiaries who reported their production data for the Soybean crop during Kharif 2022 during the CM-IX survey is presented in Figure 1.5.





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

Regarding the status of the application for individual benefits in project clusters, 85% of respondents received the matching grant in their bank account. All beneficiaries were found to be aware of their application status, which is a positive trend. Of the total 219 applicants interviewed in project areas, 65% applied for the benefits to increase water supply in agriculture (81% in comparison areas) followed by those who applied for matching grants (66%) to increase their production (56% in comparison areas) as well as income, and 17% applied to make their farming practices climate-friendly (9% in comparison areas). Details of the survey are given in Tables 3.1 and 3.2.

Table 3. 1 Status of Application

Status of application	N = 219	%
Application for a matching grant through DBT application	7	3
Verification of application by Cluster Assistant	1	0.5
Desk-1 - Approval by the VCRMC committee	3	1.4
Desk-2 - Spot Verification by Agriculture Assistant	5	2.3
Desk-3 - Approval and Pre-sanction by SDAO	13	6
Desk-6 – SDAO Post work Approval	1	0.5
Transfer of Matching Grant to the Beneficiary Account	185	85

Table 3. 2 Reasons for Applying for a Benefit

Reasons for applying for the benefit	Project (%) Multiple response (N = 219)	Comparison (%) Multiple response (N = 148)
It will help increase the water supply for agriculture	65	81
It will help increase production and income	66	56
These practices are climate-friendly	17	9
Was suggested by my friends/family	6	4
The process of application is simple	7	6
The grant is received quickly	19	6

Feedback from Agriculture Assistants (AA)

It was found that AAs were able to regularly monitor and provide proper guidance to Krushi Tai (KT) in regularizing her work. They further informed that the format provided for evaluating KTs' performance has proved to be beneficial.

It was observed that all the Agriculture Assistants (AAs) have been able to undertake and complete their assigned activities according to the village action plans, mobilizing farmers to create more awareness about climate resilient (CR) technologies through VCRMC meetings and Mahila sabha, etc. They shared that they faced difficulty in convincing farmers to adopt zero tillage technology. However, the surveyed AAs reported that farmers have been found to benefit the most from organic farming, BBF, drip irrigation, and sprinkler irrigation as these technologies have helped farmers save crop damage, improve crop productivity, and thereby experience an increase in their income.

Surveyed AAs were found to be aware of the environmental safeguards/checklist to be complied with as part of the project implementation through the village development plan /cluster development plan. Training on water balance, shade nets, drip irrigation, and other training conducted through PoCRA was found to be the most beneficial by the farmers.

The following challenges were reported by AAs:

- Lower female participation in meetings, training, etc.
- KTs have not received their remuneration, thereby affecting their work.
- Difficulty in improving women's participation, especially in the committee.
- The unavailability of farmers to attend the agriculture training due to their work or fieldwork came out as a challenge.

Some AAs have witnessed positive changes in farmers' attitudes towards the adoption of climate-resilient technologies through POCRA especially the micro-irrigation systems i.e., drip and sprinkler irrigation, and protected cultivation using shadenet which has improved their productivity and income.

It was highlighted by AAs that farmers have been suggesting adding weather advisory, market prices information, etc. as part of agromet advisory which can help them in better planning their cultivation activities.

Surveyed AAs have suggested that providing training to farmers through universities on CRATs, extending the duration of the POCRA project, encouraging farmers who have benefitted from PoCRA to help other farmers in adopting CRATs, etc. may help in sustaining the impact created through PoCRA.

Feedback from Agriculture Supervisors (AS)

The interviewed Agriculture Supervisors (ASs) shared that they have observed notable changes in their respective villages in terms of the availability of water. This has encouraged farmers to grow crops in almost all agriculture seasons, increasing the cropping intensity in the project areas. Among the various technologies introduced, ASs reported that drip irrigation, sprinkler irrigation, and BBF technology have been widely adopted by farmers.

According to the ASs, village plans have been successfully implemented resulting in effective dissemination of CR technologies in their respective project villages. The ASs were also found to be well-informed about integrated pest management practices, and they reported successful implementation in their villages, including proper disposal of empty fertilizer and pesticide bottles and the utilization of neem extract. Additionally, the interviewed ASs were found to be knowledgeable about environmentally friendly measures to be adopted for crop residue management, such as composting residue and collecting sugarcane bases and other crop remnants for composting to produce fertilizer, etc. These observations underline the positive impacts and proactive engagement fostered by the PoCRA project in the villages.

Some of the challenges faced during the PoCRA activity implementation and verification stage highlighted by the ASs are as follows:

- **Network Issues**: Geo-tagging faces network problems, which affect the ability to control and monitor individual components efficiently. This includes difficulties in document uploading and geo-tagging due to network constraints.
- **Financial Constraints**: Farmers' reluctance to start work even with prior agreements due to financial constraints is a challenge. Delays in receiving grants further exacerbate this issue.

- **Spot Inspections and Monitoring**: Co-monitoring and performing spot inspections of individual units are challenging, particularly due to the large number of villages. This impacts the timely completion of tasks to deliver benefits to farmers.
- **Weather-Related Challenges**: The muddy condition of roads during the rainy season hampers accessibility to farms and work sites, making it difficult to reach every farm for monitoring and implementation.
- **Technical Issues**: Technical problems, such as files not uploading correctly due to app issues, hinder the efficient use of the geo-tagging system.
- **Delays in Disbursement**: Farmers' dissatisfaction due to delays in receiving grants is a challenge, as it affects their financial situation and possibly their motivation.

Furthermore, when asked about the visible impact observed after the implementation of PoCRA, ASs shared that the adoption of climate-friendly technologies, particularly micro-irrigation systems, under the PoCRA project has led to improved water availability and management, enhanced production, and the adoption of environmentally sustainable practices. The project has positively impacted both income and production levels while promoting efficient water use and technology adoption.

Expansion of the project to include new villages is suggested to sustain the positive changes seen in the current village, which was a key suggestion provided by interviewed ASs for sustaining the impact generated by PoCRA.

Feedback from Cluster Assistants (CA)

According to Cluster Assistants (CAs), the most favored climate-resilient technologies adopted by the farmers in their respective villages include BBF technology, drip, and sprinkler irrigation, as well as shadenet and polyhouse. Awareness regarding the PoCRA project has been facilitated through initiatives such as gram sabha, mahila sabha, and VCRMC meetings, which has further helped in gradually establishing trust within the community. Field inspections/ visits were also conducted. Information materials, including booklets on climate-friendly technologies, were prepared, and distributed to farmers.

CAs reported that soil water conservation works and community benefits have yet to be realized in their villages. All CAs demonstrated awareness of the project's environmental safeguards and compliance checklist within the framework of village and cluster development plans.

Challenges in Farmer Participation
CAs identified several factors leading to farmers' hesitation in applying for individual benefits through Direct Benefit Transfer (DBT), including land suitability issues, discrepancies in land size, financial constraints, Aadhaar linkage problems, delayed grants, and eligibility concerns.

Similarly, CAs reported that the rejection of individual grant applications stems from diverse reasons, including duplicate submissions, mismatched size criteria, document non-compliance, economic constraints, eligibility discrepancies (particularly related to land excess), documentation errors, location, or land criteria mismatches, Satbara errors, shared farming or small land areas, and unverified farm group numbers under POCRA. These factors collectively contribute to potential rejections, underscoring the importance of addressing aspects such as duplicate applications, document compliance, economic conditions, eligibility criteria, and location.

Furthermore, as shared by CAs, the delay in approving individual grant applications has been attributed to factors such as technical glitches, document-related delays, network disruptions during checks, farmers' absence during spot inspections, technical application errors, insufficient funds, and financial limitations.
Notably, financial constraints emerge as a primary deterrent preventing farmers from procuring or constructing individual assets, despite obtaining pre-sanctions for such activities.

Positive Impacts and Constraints
All CAs reported that the implementation of the PoCRA project has induced positive changes in the village in terms of promoting the uptake of climate-friendly technologies by farmers increasing agricultural production, thereby increasing income and contributing to improved economic conditions.

3.2. Status of Individual Benefits

In the following section, the feedback from those beneficiaries who had accessed individual benefits and whose application had received approval and pre-sanction from SDAO has been reviewed.

Of the total 219 beneficiaries of individual activities interviewed, around 98% of beneficiaries have constructed assets at the site. Rest have either not started the activity due to financial issues or the assets are under construction. As indicated by them (see Table 3.3), almost all the beneficiaries had a good experience with the application process.

Table 3. 3 Feedback on DBT application processes

Suggestions on DBT application processes	Project (%)
	Valid N = 188
Satisfied with the current process	67
Support in filling out the application through the DBT application portal	19
Process of applying and getting benefits can be simplified	28
Matching grant should be increased	35
Documentation process in the application should be simplified	13

In the following section, the feedback from those beneficiaries who had accessed individual benefits and whose application has received approval and pre-sanction from SDAO has been reviewed.

Drip Irrigation System

Out of 65 beneficiaries who have applied for project grants for drip irrigation systems, 52 (80%) have received and established irrigation systems. Out of 52 beneficiaries, 43 of them (83%) used their irrigation set only when required. Two beneficiaries use the set regularly, while the remaining use the set seasonally. The mean area irrigated using drip irrigation is 3.7 acres. Most of the farmers used drip irrigation to irrigate cotton (52%), and soybean (26%). Other crops include chickpea, sugarcane, sorghum, wheat, maize, and onion. Besides this, all horticulture plantations including fruit crops have invariably used drip irrigation.

Out of the 52 beneficiaries, nine belonging to the general category acknowledged getting benefits from using drip irrigation, however, they reported that they faced various difficulties in accessing the benefits, especially in terms of obtaining a micro-irrigation quotation/plan from the dealer (44%), getting geotagged photos with the asset examiner (44%), providing proof of permanent water supply (33%), and providing agreement/consent in case of the common source of water supply (33%).

Sprinkler Irrigation System

A total of 65 beneficiaries, who had accessed the sprinkler irrigation system under the project were surveyed. 48 of them (74%) have implemented it in their fields. Remarkably, except for nine beneficiaries, all others are utilizing the sprinkler sets strictly as needed. The mean area irrigated using sprinkler irrigation is 3.5 acres. Common crops that are irrigated using sprinkler irrigation include soybean (65%), cotton (27%), sorghum (8%), wheat (4%), and maize (2%). Other crops include chickpeas, turmeric, and onion. Three farmers (one each from the general category, schedule caste, and NT) reported difficulties in obtaining a micro-irrigation plan from the dealer and providing proof of permanent water supply while accessing the project benefits.

As per the TAO, farmers have shown a strong inclination to adopt water-saving technologies. The Farmer Field School (FFS) program plays a crucial role in educating farmers about effective water management. This includes informing them about their local rainfall patterns and determining the precise amount of water required for irrigation, thereby promoting water conservation by using only the necessary amount. Additionally, micro-irrigation systems have garnered significant attention due to their extensive advantages, resulting in a high demand for motors and pipes within the agricultural community.

Pipes

13 beneficiaries who have accessed the benefit of pipes from PoCRA were surveyed. All of them have received the benefit. Eleven of them were found using it as per the requirement. One of the beneficiaries is found to be using it regularly and the other is using it seasonally. Generally, the pipes are used for transporting water from the well to the pond and then from the pond to the field. The mean land irrigated by pipes is 4 acres. Except for three beneficiaries (two from the general category and one from the scheduled tribe), none reported any difficulty in taking benefit of the pipes.

Water Pumps

Of the 11 beneficiaries who have accessed water pumps as a project benefit and were surveyed, seven of them used water pumps only on the requirement, and the rest used them regularly. The mean land size irrigated using water pumps is 3 acres. Generally, the pump is used for lifting water from either a river/ canal or ground and transporting it from a well to a pond. Of the eleven beneficiaries interviewed, one beneficiary used the water pump with a power rating of 3HP, while the remaining ten farmers used pumps with 5 HP power. To protect the motor from tripping/ damage due to erratic power supply, nearly half of the surveyed pump beneficiary farmers used capacitors. All farmers were aware of the diameter of the pipes they were using. The diameter of pipes ranged from 1 inch to 1.5 inches.

It is observed that on average, the pump is operated for 3.2 hours per day during the Kharif season and 4 hours during the Rabi season. Except for one farmer from the general category, none of the respondents reported difficulties in accessing the benefit. The difficulty was to provide proof of a permanent water supply.

Table 3. 4 Purpose of Pipes and Pumps

Purpose	Pipes Respondent (%)	Pumps Respondent (%)
Lifting of water from river/canal	20	30
Transport water from the well to the pond	80	40
Transport water from the pond to the field	20	0
Draw groundwater	0	50
Total %	100	100
Valid N	10	10

Table 3. 5 Irrigation System used with Pipes and Pumps

Irrigation system	Pipes Respondent (%)	Pumps Respondent (%)
	Valid N=13	Valid N=11
Drip/ Sprinkler	15	73
Flood irrigation	23	18
Sprinkler Irrigation	54	-
Furrow irrigation	15	9

As Table 3.6 (below) reflects, beneficiaries have reported that the use of micro-irrigation systems has led to an increase in production and hence their income. Furthermore, they have highlighted several other significant advantages, including increased availability of water, especially during dry spells, increase in the area of cultivation in both Kharif and Rabi seasons, and change in the cropping season.

During our conversation with KT, it was shared that PoCRA benefits such as wells, sprinklers, and drip irrigation have led to lower costs for the farmers. Among the technologies taught through FFS, BBF technology, and drip irrigation technology have found widespread adoption among farmers due to their substantial benefits. Drip irrigation, in particular, has contributed to increased crop yields even in regions with limited rainfall, making it a valuable asset for farmers.

Table 3. 6 Benefits Perceived from Drip, Sprinkler, Pipes, and Pumps

Benefits Perceived	Drip (%)	Sprinkler (%)	Pipes (%)	Pumps (%)
Increase in income	83	83	92	91
Increase in production	75	90	100	82
Increased availability of water	46	42	77	27
Change in cropping pattern	21	6	8	9
Availability of water during dry spells	8	13	8	36
Efficient use of water	15	21	15	27
Increase in quality of agricultural produce	12	17	0	0
Increase in area of cultivation during Kharif	6	8	0	18
Increase in area of cultivation during Rabi	6	17	8	18
Timely availability of water for irrigation	0	0	15	27
Valid N	52	48	13	11

Individual Farm Pond

Eight beneficiaries who accessed the benefit of an individual farm pond were interviewed. Six of them received and implemented the benefit. Except for one farmer, the rest five are using their farm ponds as per requirement. Three farm ponds have an inlet and outlet as well as a lining on them. None of the farm ponds have grass cultivation on their bund. The farmers reported that once the farm pond is filled with water, it lasts for around 60 days. Currently, none of the beneficiaries are using the farm pond for inland fishery activity. Except for one farmer from the general category, the beneficiaries did not encounter difficulties in accessing the benefits from PoCRA.

The beneficiaries have experienced benefits like an increase in production, income, increased availability of water for irrigation, and the ability to switch to horticulture plantations. Their cultivation primarily consists of cotton, soybean, and sugarcane crops.

"Enhancing Agricultural Productivity and Income through Farm Ponds and Drip Irrigation: A Success Stories from CSN District"

Success Story 1 - Shri Suresh Balu Raut, residing at Gat no. 166/1 in Nandur village, Tal: Paithan, CSN district, has constructed a farm pond with a capacity of 720 cubic meters (25m X 25 m X 3 m). In the year 2019-20, Shri Raut availed subsidies for (a) planting sweet lime plants, (b) constructing the farm pond, and (c) installing a drip system for sweet lime trees. The farmer uses the pond for one or two irrigations during the kharif season, once a week during the rabi season, and every 3 to 5 days during the summer season. He plans to shift the drip system from cotton crops to the sweet lime orchard for more efficient water and fertilizer use. **The system has led to an estimated 40 percent energy reduction in irrigation**, and Shri Raut expects a fruit yield of 15 to 20 tonnes per acre, with a gross income of Rs. 2 lakhs from the first-year harvest. **This showcases the positive impact of farm ponds and drip irrigation in improving agricultural productivity and income**.

Success Story 2 - Shri Bhagwan Vishnu Lohagade, residing at Gat no. 126/3, Village Dera, Tal: Paithan, CSN district, constructed a farm pond with a capacity of 720 cubic meters (25m X 25 m X 3 m) in 2019 under the POCRA scheme. He received a subsidy of Rs. 1,38,050 for this project. The farm pond is filled by lifting water from Jayakwadi Projects' Left Bank Canal (PLBC) from October to May whenever the canal flows. Additionally, the pond is also filled with water from a dug well during the rainy season as required. He owns 6 acres of land, where he cultivates sweet lime on 2.5 acres, sugarcane on 1.5 acres, and other seasonal crops like cotton, wheat, and gram on the remaining area. He has installed a drip system for the sweet lime orchard. The farmer highlighted the significant benefits of the farm pond, stating that the water stored in it acts as a buffer stock, particularly during the summer months (March to May) when water is in high demand for the crops. **The combination of the farm pond and drip irrigation has proven to be a great boon for farmers like him.** With this facility, Shri Lohagade has been able to irrigate 2 hectares of land effectively, leading to **improved agricultural productivity and water conservation**.

Success Story 3 - Shri Pradeep Jaibhyae, who was present during the field visit, shared that the farm pond is typically filled with groundwater during the rainy season and sometimes in the summer season as well. He mentioned that all five farmers have greatly benefited from the farm pond as they can now irrigate a total of 10 hectares of land, compared to the previous 5 to 7 hectares. **This increased irrigation capacity has resulted in higher crop production and ensured a reliable water supply.** When asked why they don't irrigate directly from the groundwater, Shri Pradeep explained that the discharge from the open and dug wells is too low to efficiently irrigate his fields. Therefore, he irrigates his crops using a sprinkler set obtained under the POCRA scheme. Additionally, groundwater availability declines significantly during the summer season. The crops irrigated with the farm pond water include soybean and cotton during the Kharif season, gram during Rabi, and okra and watermelon during the summer season. **These improvements in irrigation practices have led to increased income for farmers like him.** However, Shri Pradeep expressed concerns about the non-availability and erratic power supply, which limits the extent of the irrigated area.

Success Story 4 **- Shri. Uddhav Somnath Lohgale has three acres** (Gat no: 126/1; Village: Dera; Tal: Paithan; Distt: CSN). The farmer has 3 acres (1.2 ha) of land and has a sweet lime orchard on 1.5 acres and sugarcane on 1.0 acres. He constructed a farm pond of 72 lakh litter (720 cubic meters) capacity in the year 2020 through the POCRA scheme. The farmer has spent Rs. 70,000/- from his pocket while the remaining expenses were paid as per POCRA norms. The farmer fills up the farm pond by pumping water from their dug well and also from a nearby Jayakwadi canal. The canal water is pumped into the pond during its flow period and is used for irrigation during the closure period of the canal. The farmer installed a drip system for the sweet lime orchard under the POCRA scheme in 2021. He has installed a drip system for irrigating sugarcane and cotton crops. **The farmer said that earlier he used to irrigate only one acre of land using the surface method, but now because of ample availability of water stored in the farm pond and the use of a drip system, he was able to irrigate all three acres of his farmland**.

Polyhouse

One beneficiary who availed the benefit of polyhouse was interviewed. The respondent reported using an open-vent polyhouse for cultivating vegetables seasonally on around 0.75 acres of his agricultural land. He achieved a total production of around 15 quintals per cycle, which was sold in the market at Rs. 30/- per kilogram. The production cost incurred by the farmer was Rs. 3000/-. Vegetables were grown in the polyhouse twice a year. The total cost of cultivation was reported to be Rs. 32,500, while the income earned last year amounted to Rs. 45,000.

> *In the poly house unit, farmers are observed to be growing seedlings of vegetable crops like brinjal, tomato, chilly, and cucumber. When the age of seedling is reached to 30-35 days, they are selling the seedlings @ Re. 1/- per seed. Farmers are able to grow seedlings of vegetable crops at least 10 times in a year and earn from it.*
>
> - ***Agronomy Expert***

The respondent expressed satisfaction with the availability of technical guidance from AA on the cultivation practices. They mentioned that selling and marketing the produce directly from home was convenient. However, a significant challenge was the high production cost. The respondent was uncertain about the disposal of polyhouse fabric once it degrades.

Additionally, the respondent had availed agricultural insurance for Shimla Mirchi. The insurance had a one-year tenure, with an insured amount of Rs. 5000/-. **The farmer reported experiencing increased income and production because of these initiatives**.

Case Study: "Polyhouse Cultivation of Jarbera Plants –

A Prospective Female Entrepreneur in Marathwada Region"

During the visit to Mrs. Jyoti Govind Jadhav's polyhouse, it was observed that she had constructed the polyhouse in a half-acre area in 2020-21, investing a total amount of Rs. 7.57 lakh. Out of this total amount, she received Rs. 1.57 lakh as a subsidy from the PoCRA project. In the poly house, she planted Jarbera suckers, but due to the lockdown period in 2021-22, she faced difficulties in selling the flowers and incurred heavy losses.

However, in the previous year, she earned a gross return of Rs. 1.50 lakh, out of which 50% was spent on labor costs, inputs, and other management activities. The Jarbera suckers will continue to produce flowers for the next five years, and the losses incurred during the lockdown period may be compensated in the future.

Mrs. Jadhav is efficiently providing all the required plant nutrients to the Jarbera plants through drip fertigation on alternate days. Although water demand for Jarbera plants is easily calculable, proper recording of water usage is not being done.

This enterprise has proven to be highly profitable, especially in an area with low-productivity soils. It is suggested that financial assistance should be granted to a maximum number of farmers for the establishment of poly houses and cultivation of Jarbera plants to boost productivity in the region.

Poly house with Jarbera Plantation in village Radi (Ambejogai, Beed)

Shade Net

In an interview conducted with two shade net beneficiaries, it was found that both of them received training on cultivating with shade nets. They are actively growing vegetables in these shade nets. One of them received technical guidance for improving productivity from an agricultural assistant, while the other received guidance from KVK (Krishi Vigyan Kendra). Both beneficiaries use the shade nets seasonally, and their average investment last year amounted to approximately Rs. 1.5 lakhs. They earned an income of nearly Rs. 2 lakhs from their produce last year. Both beneficiaries successfully sold their produce in nearby town markets, and neither encountered any difficulties in accessing the benefits offered by PoCRA. However, when asked about their disposal strategy for shade net material, both shared that they would burn it. This suggests a lack of awareness regarding environmental safeguards among these beneficiary farmers. Both farmers anticipate several benefits from shade net cultivation, including increased income, higher production, and the ability to cultivate high-value crops.

Production of foundation and certified seeds

Interviews were conducted with nine beneficiaries in the project area and one in the comparison area regarding the production of certified seeds. In the project area, three beneficiaries recently initiated this activity in 2023, while the others have been involved for over a year. In contrast, the respondent in the comparison area started this activity in 2023. The average income generated from this activity in the project area is approximately Rs. 1,59,000/-. Conversely, the farmer in the comparison area earned around Rs. 60,000/- from the same activity.

Horticulture Plantation

Out of the 30 beneficiaries who have access to the benefit, 27 have actively implemented the activity. Among these beneficiaries, seven received training to support their efforts. The Department of Agriculture provided training to six of them, while one beneficiary received training from a progressive farmer. The main crops grown by beneficiaries were sweet lime (30%), lime (19%), custard apple (15%), orange (15%), guava (15%), mango (7%), and pomegranate (4%). The horticulture activity was practiced on an average of two acres of land. The average age of these plantations is around 2.5 years. A total of 11,159 saplings were planted of which 8,365 (around 75%) saplings survived. Half of the beneficiaries sourced their saplings from government nurseries and the rest from the agriculture universities and government-approved nurseries. For the saplings that did not survive, farmers reported several reasons, with 45% of them attributing it to poor sapling quality, 18% of them to damage from birds or animals, and 9% of them to fire damage. All the beneficiaries have installed drip irrigation for efficient use of water. Seven beneficiaries have started production from horticulture activity and can sell their produce in the market. Those who can sell their agricultural produce have experienced an increase in income i.e., from an average annual earning of Rs. 82,463/- to Rs. 1,44,759/-.

Construction of Open Dug Well

Of the three beneficiaries who accessed the benefits from the project, two have received and implemented them. The mean dimensions of the well are as follows: the diameter of the well is 30 feet, and the depth is 45 feet. Farmers shared that the water in the well lasts for two months after full recharge. The farmer can irrigate nearly 3.5 acres of land at least three to four times.

Small ruminants

Interviews were conducted with six beneficiaries in the project area and four in the comparison area regarding the implementation of small ruminant rearing activities. Interestingly, most of the beneficiaries in both areas, specifically five out of six in the project area and all four in the comparison area, reported not having received any training to manage small ruminant activities. In the project area, the reasons cited for not undergoing training included a lack of awareness regarding where to find training resources, unawareness that training was compulsory under PoCRA, and inaccessibility of training sources or centers due to distance. In the comparison area, three respondents expressed a lack of awareness about where to acquire training, while one respondent mentioned plans to undergo training soon. Five out of six respondents in the project area are currently engaged in small ruminant-rearing activities. The sole reason for non-practice among one respondent was limited grazing area and a lack

of feed availability. In terms of animal insurance, four out of six beneficiaries in the project area and two out of four in the comparison area have purchased insurance. Among the four in the project area, three opted for insurance from a private insurance company, while one chose a cooperative society for coverage. Both respondents in the comparison area purchased insurance from private insurance companies. All six respondents in the project area and two out of four in the comparison area reported having access to veterinary services. Regarding the marketing or sale of their produce, five out of six respondents in the project area found it easy, whereas only one in the comparison area reported the same. Further, in the project area, three out of six (50%) sold their products outside the village, two in both the project and comparison areas sold them in rural markets, and one in the project area sold them to village residents. Additionally, five out of six beneficiaries in the project area and three out of four in the comparison area were able to find a market for purchasing goats. All respondents in both the project and comparison areas were aware of the conditions and responsibilities associated with small ruminant activities. In the project area, everyone interviewed was aware of conditions such as continuing the business for at least three years, obtaining insurance, and ensuring vaccination for ruminants. Only one respondent in the project area faced difficulties in benefiting from this activity. The reported difficulties included limited access to fodder, suboptimal price realization, and a lack of para-vet or extension services.

Inland fishery

One beneficiary was interviewed about the activity of inland fishery. The respondent received training and was found to be aware of the conditions of undergoing training. The respondent was currently operating a unit of 50 ft x 50 ft x 10 ft rearing Katala and Rohu. The investment made by the respondent was Rs. 16,000/-. While the respondent did not face any difficulty in accruing the benefit, the production had not started at the time of the interview.

Sericulture

One beneficiary was interviewed about the activity of sericulture. The respondent had not undergone any training citing that the inaccessibility was due to the training source/center being very far. The respondent also mentioned encountering challenges in accessing project benefits, primarily due to the time commitment required for attending training sessions before initiating the activity and the perceived difficulty of accessing saplings from approved nurseries. However, it's worth noting that saplings can be obtained from alternative sources, which may offer more flexibility. Despite these obstacles, the perceived benefits of participating in the project included expectations of increased income and enhanced self-employment opportunities.

Adoption of BBF technology

A total of 21 farmers in the project area and 5 in the comparison area have experienced the benefits of using BBF technology. Farmers in both areas reported several advantages of employing BBF technology, including effective drainage of excess water (91%), promoting root development by preventing water stagnation (76%), seed-saving benefits (38%), maintaining consistent row and plant distances (48%), and aiding in moisture conservation (10%). **These advantages collectively led to an increase in production for 57% of the farmers**. In the project areas, the average cultivated area utilizing BBF technology is 5 acres, with soybean and green gram being the primary crops grown using this innovative approach.

> "Many *farmers learned about the BBF technology through FFS. In year 2022, there has been a good amount of rain, so planting with BBF has benefited the farmers as the excess water that has fallen has gone off the beds, thus increasing the yield. Among the other techniques taught and which interest farmers are zero tillage, care to be taken in pesticide spraying, spraying of biological pesticides, seed treatment, etc.*"
>
> ***Agriculture Supervisor (AS), PoCRA***

Enhancing Agricultural Productivity and Economic Returns through BBF Technology:

A Case Study from Murud Village

During a visit to Murud village on 16th July 2023, discussions were held with the Deputy Sarpanch, Gram Panchayat of Murud, FPC members, and farmers, including beneficiaries. The PoCRA project had implemented limited enterprises and agricultural production technologies in this village. The village have 24 farmers who have adopted BBF technology through PoCRA.

Regarding BBF technology, last year, it was adopted on a large area for soybean crops. However, during the kharif season of 2023, the cropped area under BBF was considerably reduced due to the non-availability of bund maker implements at the proper time. Most farmers started sowing immediately after receiving monsoon as the sowing was already delayed by more than 15 days. Some farmers mentioned that the subsidy of Rs. 400/- per acre for sowing soybean under BBF had been withdrawn by the agriculture department. Consequently, many farmers opted for the flat-bed system and used hand-operated dibbling implements for Rs. 7000/- per implement, with a sowing rate of Rs. 100/- per acre. The dibbler allowed them to complete about two acres of area in one hour. In the BBF planting system, they sowed in either two, three or four rows with a crop geometry of 40-45cm x 15 cm, followed by a wide furrow of 60 cm to drain excess rainwater and avoid waterlogging and crop damage. During this year, approximately 100 acres of land were covered under BBF and 25 acres under the ridge and furrow system. The rest of the soybean area used the flat-bed system.

To assess the impact of BBF, data was collected from a group of farmers regarding the cost of cultivation and economic benefits derived from BBF planting methods. **According to the farmers' accounts, the gross return from the BBF system is significantly higher, ranging from 1.5 to 2 times greater than that of the flat-bed planting system. This indicates that adopting the BBF system has resulted in higher crop yields and increased profitability for the farmers.**

Considering the positive impact of the BBF system on crop production and income generation, it is recommended that the system be disseminated more widely among farmers. To incentivize its adoption, providing a subsidy of Rs 400/- per acre could be an effective measure. This subsidy would serve as an encouraging incentive for farmers to implement the BBF system, leading to enhanced agricultural productivity and improved economic outcomes for them.

BBF Planting in Soybean in Murud Village

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.

A total of 30 hosts and 33 guest farmers were interviewed during the survey. Of the total FFS farmers interviewed, four hosts and three guest farmers were female. For 30 host farmers who were interviewed, the primary source of motivation for participation were agriculture assistants (for 17 farmers), and FFS facilitators (for 12 farmers). One host farmer was motivated by VCRMC. Regarding honorarium, 14 of them have received it. The honorarium for four host farmers is in the process, while 12 host farmers shared that they have not received it. Except for one, the rest of the 29 host farmers found differences in the quality/ cultivation of produce from the demo and control plots.

> *"The yield of crop in demonstration plot is found to be higher and the difference in productivity between the control and demo plots is observed to be significant. Along with the demonstration of increased level of crop yield, farmers were provided guidelines related to seed selection especially to adopt and use the climate resilient varieties."*
>
> ***FFS facilitator, PoCRA***

FFS Demonstration-Participation Analysis: The survey reveals that most of the host farmers are interested in undertaking a demonstration of cotton (45%) followed by soybean (41%), and Rabi jowar (10%). 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 extremely low, with very little or no participation at all in the case of cotton with green gram, cotton with pigeon pea, bajra with pigeon pea, and soybean with pigeon pea. However, soybean with pigeon pea has seen the most participation among the climate-resilient technologies, standing at 7% for host farmers and 6% for guest farmers. This trend is encouraging.

Table 3. 7 Host Farmer Demonstration and Guest Farmer Participation for Key Crops

Crop	Host farmer demonstration (%)	Guest farmer participation (%)
Cotton	45	36
Soybean	41	39
Rabi Jowar	10	9
Chickpea	4	3
Onion	0	3
Cotton + Green Gram	4	0
Soybean + Pigeon Pea	7	6
Total N	**29**	**33**

Reasons for Participation in FFS: The majority of the surveyed guest farmers (78%) shared that they want to learn about the new technologies related to agriculture; they wanted to increase production and income (70%); and 50% of guest farmers wanted to understand ways to reduce their cost of production. The other reasons for participation cited by surveyed guest farmers were to learn how to apply fertilizers and pesticides more effectively (33%), to utilize water more effectively (16%), and to save their crops from climate variation (6%). 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.

Reasons for not Attending FFS Sessions: The key reasons cited by 21 guest farmers for not attending all FFS sessions were being busy with their work in the field, personal work, family commitments, and being not aware of the session's timing.

Table 3. 8 Reasons for not attending all FFS Sessions

Reason for not attending all FFS sessions	FFS participants
	N = 21
Busy with work in the field	10
Had to skip the session due to personal work	6
Family commitments	3
Was not aware of the session's timings	2

Methods Adopted to Inform Guest Farmers about the FFS Session:

The communication related to the next Farmer Field School (FFS) session timing was observed to be quite effective, with approximately 52% of participants receiving notifications through SMS or WhatsApp messages, 37% being informed by the FFS facilitator during the session, and the remaining 11% being personally notified by other project staff like cluster assistants, agriculture assistants, and krishi tai. An overwhelming majority of participants, about 89%, including female FFS farmers, found the timing of the FFS sessions to be convenient.

Guest farmers who attended the FFS sessions reported high levels of satisfaction, as nearly all of them stated that their queries were satisfactorily addressed by the host farmers. Of all the FFS participants, 40% believed that the technologies learned through FFS demonstration sessions have been highly helpful in mitigating the impact of climate vulnerabilities, such as less rainfall and high temperatures. The remaining participants found these technologies helpful to some extent.

Additionally, a significant 94% of participants reported that the information provided by the FFS facilitator was useful, indicating a high level of contentment with the knowledge shared. Furthermore, almost 95% of the FFS participants expressed their willingness to continue using the technologies learned during the sessions, emphasizing their commitment to implementing these practices in their agricultural endeavors.

Table 3. 9 Perceived Benefits from FFS

Benefits from FFS participation	Project (%) Multiple Response (N = 62)
Awareness of good agriculture practices	65
Better awareness of the use of inputs (fertilizers, seeds, etc.)	73
Improvement in soil health	27
Soil moisture was conserved around the crop roots	21
Fewer diseases in crops	39
Better water management for agriculture	11
Increase in crop production or yield	40
Saving in seed input cost	24
Saving in fertilizer input cost	24
Overall reduction in the cost of production	2

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

This sub-section presents the findings from the survey of the community-based NRM interventions based on the quantitative interviews with PoCRA beneficiaries, beneficiaries of similar interventions in the comparison area, and from the qualitative interviews with key project stakeholders. The total sample of beneficiaries of community-based NRM assets in project and comparison villages is 43 and 71 respondents, respectively. All the assets constructed in project villages were found constructed on the site. Most of the surveyed beneficiaries in both project and comparison areas were found to be involved in Compartment /graded bunding under community-based NRM works followed by the Construction of Earthen and Cement Nala Bunds (CNBs). The rest of the components under the community-based NRM works found little to no participation in both project and comparison areas.

Table 3. 10 Community based NRM works done

Community/ NRM works	Project (%)	Comparison (%)
	N = 43	N =71
Construction of Loose bolder Structures	0	6
Construction of Earthen Nala Bunds	19	38
Construction of Cement Nala Bunds	5	11
Compartment /graded bunding	33	40

Nearly 61% of the respondents in both project and comparison clusters reported having planned for the development of community assets while keeping in mind the water balance of their respective villages. Around 56% of the respondents in project villages and 39% in the comparison villages shared that a social audit has been done in their village. Detailed distribution of rating of the quality of constructed assets reported by the beneficiaries in both project and comparison areas is given in Table 3.11.

Table 3.11 Feedback on the Quality of Assets

Feedback on the Quality of Assets	Project (%)	Comparison (%)
	N = 43	N = 71
Very unsatisfactory	0	3
Somewhat unsatisfactory	23	18
Neither satisfactory nor unsatisfactory	7	3
Somewhat satisfactory	63	69
Very satisfactory	7	7
Total %	100	100

Benefits accrued from NRM works: Overall, beneficiaries in project clusters reported relatively better experiences from NRM works. However, it's noteworthy that 61% of respondents in the project clusters and 59% in the comparison clusters noted an increased availability of water for protective irrigation due to the creation of assets through NRM and community works. More than 60% of the respondents in

both project (74%) and comparison (61%) clusters experienced an increase in production followed by a change in cropping pattern. Interestingly, the availability of water during dry spells was found to be more pronounced in project areas compared to the comparison clusters. Similarly, a higher percentage of participants from project areas witnessed an increase in income and a longer duration of soil moisture after the construction of NRM assets, as opposed to those from the 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 summarized in Table 3.12.

Table 3. 12 Benefits from Community based NRM works

Benefits accrued from NRM works	Project (%) Valid N = 43	Comparison (%) Valid N = 71
Increased availability of water for protective irrigation	61	59
Increase in yield/production	74	61
Change in cropping pattern	33	16
Availability of water during dry spells	7	6
Increase in area of cultivation during Kharif Season	19	13
Increase in area of cultivation during Rabi Season	9	13
Increase in income	19	9
Increase in Ground Water Level	7	7
Decreased soil erosion	7	7
Increased soil moisture duration	5	3

Respondents in the project clusters have expressed their willingness and eagerness to be actively involved in the maintenance of the assets constructed post-construction. They are open to contributing to the maintenance activities of NRM works in various ways, including participating in maintenance committees, financially supporting the upkeep of these structures, and providing labor support to ensure the structures remain in good condition. This commitment to ongoing maintenance reflects their dedication to the long-term sustainability and effectiveness of these valuable NRM assets.

Table 3. 13 Maintenance of Community based NRM Works

Maintenance of NRM works	Project (%) N=31
Willing to be part of the structure maintenance committee	45
Willing to pay for maintenance of the structure	45
Willing to provide labor support from self or family for maintenance of the structure	10

3.4.2. Status of Community Farm Ponds (CFPs)

29 beneficiaries were surveyed in project areas to assess their experience from Community Farm Pond (CFP). In project villages, it was observed that generally, three to 11 members motivated by their family members, friends, and relatives, have come together to apply for CFPs. A total of seven CFPs were surveyed. All were found to be fully constructed on the site.

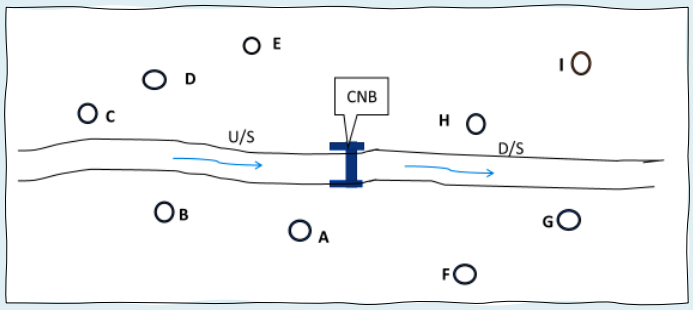
Table 3. 14 Source of Motivation and Support for the Application Process

Source/ Support	Motivation (%)
	N = 29
Self	48
Family members	28
With the help of AA	17
Krushi Tai	4
Other Agri Staff	28

“Transformative impact of CNB”

Shri Pandharinath Dagduba Khaire (Gat no 78 & 86) has 10 acres of land. A Cement Nala Band (CNB) was constructed through POCRA assistance in the year 2022. The farmer had constructed an open dug well (referred to as Well A in Figure 1) in the year 2000. The well has a diameter of 7.6 meters and a depth of approximately 15 meters. Interestingly, this well is jointly owned by two farmers, each of whom has installed a 7.5 HP pump set for irrigation purposes.

Figure 1. Schematic showing location of the Cement Nala Band and the location of wells in the adjacent area.



Since the construction of the CNB in the vicinity, there has been a remarkable increase in groundwater levels. As a result, farmers now have a reliable and assured source of water, allowing them to irrigate their crops throughout the year. Moreover, some farmers have taken advantage of government subsidies available through other schemes and have installed solar pumps on nearby wells (as shown in Figure 2) to further enhance their irrigation capabilities.

Figure 2. A dug well in the vicinity of the CNB. The farmer has installed a solar pump to pump water from the dug well

According to Shri Pandharinath Khaire, before the CNB construction, he could only irrigate about 2 hectares during the Rabi season using two pumps. However, after the CNB was built, he and his brother can now operate both pumps for over 12 hours per day during the Rabi season and about 2 hours per day in the summer season. This has enabled them to irrigate approximately 12 hectares annually, along with a total of 48 hectares in the entire upstream and downstream areas of the CNB.

Moreover, the water yield in their well has increased significantly, about 4 to 5 times, due to the increased water recharge from the nala during the rainy season. Prior to the CNB, they could only provide two irrigation rotations, but now they can offer 4 to 5 rotations for their crops. The crops grown in the Kharif season are soybean and cotton, while during Rabi, they cultivate wheat, jowar, and gram.

Overall, the CNB has had a positive impact, enhancing the irrigated area, increasing crop yields, and ultimately improving the income of the beneficiary farmers like Shri Pandharinath Khaire.

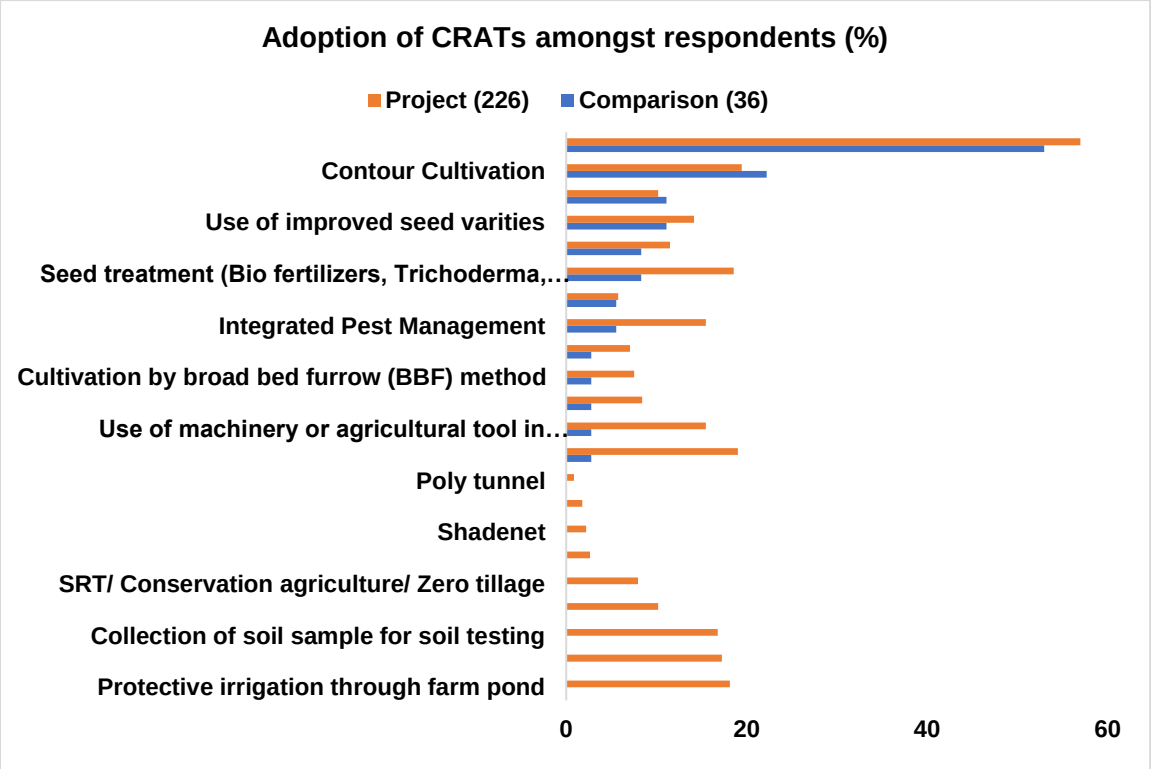
3.5. Adoption of CRATs

The primary objective of the project is to promote and enhance the adoption of CRATs among smallholder farmers through training via FFS. During the interview, the respondents in both project and comparison clusters were asked about the training and adoption of the CRATs in the past year.

Based on the responses received, it is observed that the project areas show a wider range of CRAT dissemination and adoption among farmers than that observed in the comparison areas. For instance, there is negligible uptake of protected cultivation practices such as polyhouse and shadenet, soil amendment practices, conservation agriculture, and IPM practices in comparison areas.

Adaptation of the use of improved variety seeds, seed treatment, integrated nutrients, pest management, BBF method, etc. was found to be reported more in the project than in comparison areas. The technology-wise distribution of its adoption is detailed in Figure 3.1.

Figure 3. 1 Adoption of CRATs



Benefits perceived from CRATs: Slightly more than half of respondents in project clusters and nearly half of respondents in comparison clusters reported benefitting from the adoption of CRATs. Around 65% of the respondents experienced a reduction in the cost of cultivation; 51% experienced better control over pests and diseases; 32% reported improved soil and moisture conservation; and 28% reported improved soil fertility as a result of the adoption of CRATs in project areas. Similar changes are also observed in comparison areas, but the levels are 1-4% higher than those observed in project areas, except for the case of better control over pests and diseases (35% in comparison areas against 51% in project areas). Detailed responses of the beneficiaries in the project and comparison areas regarding benefits gained after the adoption of CRAT are tabulated in Table 3.15.

On average, 60-80% of farmers are following agromet advisory services delivered through WhatsApp. Agricultural weather advice gives information in advance about the changes in the weather and the problems that will arise according to the changing weather. If the amount of rain is going to be high, then the farmers need information so that they can complete the work in the fields in advance. The popularity and usage of climate-friendly pesticides like neem extract, dasaparni, etc. are rising. Information about bird traps, pheromone traps, odor traps, etc. is disseminated. Most farmers have adopted climate-friendly pest management practices.

Table 3. 15 Benefits Perceived from CRATS

Benefits through CRATs	Project (%) Multiple Response (N = 268)	Comparison (%) Multiple Response (N = 102)
Reduced cost of cultivation	65	66
Soil and moisture conservation	34	38
Better control over pests and diseases	51	35
Improved soil fertility	28	29
Optimum use of pesticides and fertilizers	21	15
Improved germination rate	9	7
Increased water availability	16	9
Improvement in coping mechanism	11	8

As reported, farmers in project areas witnessed the following:

- **increase in yield** by an average of 10% (8% in comparison areas);
- **reduction in the cost of cultivation** by an average of 8% (6% in comparison areas) and;
- **reduction in pest and disease attacks** by an average of 8% (6% in comparison areas).

Case Study: "PoCRA enables an increase in income, improvement in livelihood, and generating employment"

In Nawandi village, there is a farmer named Sh. Arjun Hanumantha Rao, who jointly owns about 35 acres of land. His family consists of 13 members, including six males and seven females. He is primarily engaged in horticulture-based activities and has been associated with a government scheme for horticultural development since 1998. Through this scheme, he planted mango and other fruit trees and installed irrigation structures to meet water demands. These interventions proved to be successful in improving the livelihood of him and his family.

Due to the hereditary property being shared among multiple shareholders, it was divided, leading to the creation of marginal and small holdings.

Among these shareholders, one individual participated in PoCRA activities, specifically the pump-set and warehouse schemes. Because of this initiative, his siblings experienced remarkable growth in their horticulture activities. They were able to diversify the enterprise by incorporating ornamental plantations, leading to the establishment of a thriving business focused on fruit tree nurseries and floriculture. This expansion created employment opportunities for both male and female family members. Additionally, the enterprise became a supplier of fruit plants to other beneficiaries involved in horticulture-based activities within the project villages. The success of their business extended beyond the project area, as they also started supplying fruit plants to three adjacent districts, driven by the support and encouragement from PoCRA.

As a result, the annual household income increased on average by Rs. 40000/- and the enterprise generated employment opportunities for labor both within and outside the household.

Some of the respondents in both the project and comparison clusters who were unable to achieve their desired benefits from CRAT reported various reasons for this outcome:

- ***Lack of Technical Knowledge***: A significant portion of respondents, approximately 58% in the project cluster and 57% in the comparison cluster indicated that their limited technical knowledge posed a barrier to realizing the desired benefits.
- ***Difficulty in Applying Technology***: 19% of respondents from the project cluster and 15% in the comparison cluster mentioned difficulties in effectively applying the technology in fields.
- ***Extreme Climatic Conditions***: Around 23% of respondents in the project and 26% in the comparison clusters cited extreme climatic situations as a challenge that hindered them from achieving the desired benefits.
- ***Unavailability of Advanced Agriculture Machinery/Implements***: In the comparison cluster, a very small percentage (2%) of respondents mentioned the unavailability of advanced agricultural machinery or implements as a factor limiting their ability to realize the desired benefits.

These reasons highlight the multifaceted challenges that farmers may face when implementing new technologies and practices, including the need for better technical knowledge, support in applying technology effectively, and consideration of local climatic conditions and resource availability.

Inclusive Participation in FFS: Though the survey shows that farmers from all social categories including SC, ST, OBC, and Nomadic Tribes (NT) have attended training on different CRATs through FFS under POCRA, it is important to note that there exists variation in participation based on the type of training.

Table 3. 16 Percentage of Beneficiaries Receiving Different Training (% by social category)

Types of training	Gen	OBC	SC	ST	NT
Cultivation by BBF method	15	15	40	33	40
Intercropping	23	15	20	0	60
Use of improved seed	30	25	50	33	80
Seed treatment	28	20	20	33	60
Integrated Nutrient Management (INM)	23	10	20	67	60
Integrated Pest Management (IPM)	25	10	40	33	60
Furrow opening	15	10	10	0	40
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	34	25	70	100	60
Drip/Sprinkler	56	45	40	33	80
Protective irrigation through farm pond	28	5	0	0	40
Conservation tillage	15	5	0	0	40
Mulching	12	5	0	0	40
Canopy management in fruit crops	21	10	0	0	40
Shade net	8	10	0	0	20
Polyhouse	6	5	0	0	20
Polytunnel	6	0	0	0	20
Use of machinery	25	25	40	67	60
Use of pheromone traps	23	10	10	67	40
Collection of soil samples for testing	21	15	20	33	20
Seed Germination	24	20	30	100	20
Soil amendments	9	0	0	0	20
Green manures	15	0	0	0	40

Total samples (N) = General-144, Nomadic tribe=9, OBC=43, Scheduled caste=14, Scheduled tribe=12

The proportion of farmers, categorized by landholding size, receiving different types of training are depicted in Table 3.17.

Table 3. 17 Percentage of beneficiaries received different training (% by landholding)

Types of training	Large > 5 Ha	Medium 2 – 5 Ha	Small < 2 Ha
Cultivation by BBF method	17	23	16
Intercropping	33	21	23
Use of improved seed	17	42	30
Seed treatment	17	34	26
Integrated Nutrient Management (INM)	17	28	22
Integrated Pest Management (IPM)	17	28	25
Furrow opening	0	19	14
Foliar spray of 2% Urea at flowering & 2% DAP at boll	0	45	34
Drip/Sprinkler	17	51	57
Protective irrigation through farm pond	17	25	25
Conservation tillage	0	21	13
Mulching	17	19	9
Canopy management in fruit crops	17	25	18
Shade net	17	11	7
Polyhouse	0	11	5
Polytunnel	0	11	4
Use of machinery	17	34	25
Use of pheromone traps	17	28	20
Collection of soil samples for testing	0	27	21
Seed Germination	0	28	24
Soil amendments	0	15	7
Green manures	0	23	12

Total samples (N)= Large farmers: 20, Medium farmers: 126, Small farmers: 304

3.5.1. Use of Agrometeorological Advisory

Around 46.2% of the respondents in project areas received agromet advisory as part of the project, while in comparison areas, only 33.8% of respondents received it. In terms of frequency, around 20% of respondents in the project areas (4% in the comparison areas) received the advisory daily, 37.5% received it twice a week (compared to 34.2% in the comparison areas), and 42.7% received it once a week (61.8% in the comparison areas). Most respondents in both the project area (96%) and comparison area (91%) received advisory on their mobile phones. In addition to mobile advisories, some respondents in the project areas also received agromet advisory information through other sources, such as newspapers (0.9%), television (1.4%), and Interactive Voice Response (IVR) (1.4%). It's worth noting that a significant percentage of respondents in both project clusters (87.5%) and comparison clusters (77.6%) expressed interest in following agromet advisory regularly, indicating a strong willingness to engage with and benefit from these services.

Agromet advisory services is provided to farmers by Agricultural University and IMD, which is beneficial for predicting climate adversities and building resilience. On an average, 60-80% farmers are following agromet advisory services delivered through WhatsApp.

Table 3. 18 Agromet Services Received

Type of Agromet advisory received	Project (%) Multiple Response (N=208)	Comparison (%) Multiple Response (N = 75)
Climate resilient technology advisory	96	83
Weather advisory	99	99
Soil nutrient advisory	82	73
Natural Resource Management advisory	75	64
Crop (Food/ Cash/ Plantation) advisory	75	51
Irrigation advisory	88	65
Certified seed advisory	91	85
Fertilizer (chemical and bio) advisory	87	80
Pesticides (chemical and bio) advisory	88	84
Crop pest/ disease advisory	86	69
Crop residue disposal advisory	67	60
Organic farming advisory	68	52
Horticulture advisory	51	36
Poultry/ Goatry/ Fishery advisory	23	13
Markets for agri-produce advisory	53	48
Agri-business advisory	74	73
Environment safeguards advisory	73	65
Credit advisory	44	29
Insurance advisory	44	28

The usefulness of Agromet Advisory: The usefulness of agromet advisory varies among respondents in project and comparison areas. In the project areas, nearly 79% of respondents who received agromet advisory found it to be useful and relevant. However, in the comparison areas, a slightly lower percentage, 71%, considered the advisory as useful and relevant. On the other hand, the remaining respondents in the comparison areas either regarded the information as general advice or did not find it useful. This suggests that the agromet advisory service is more positively received by beneficiaries in the project areas, where a higher percentage of respondents perceive it as valuable for their agricultural activities.

Perceived Benefits of Agromet Advisory: The agromet advisory received under POCRA has had a substantial positive impact on farmers in both the project area and the comparison area:

- ***Timely Decision-Making***: About 37% of farmers in both project and comparison areas reported that the agromet advisory played a crucial role in helping them make timely decisions, especially during the initial stages of crop. This proactive decision-making has enabled them to avoid future problems such as pests, crop diseases, etc., ultimately enhancing their crop yields.
- ***Irrigation Frequency***: In the project areas, 14% of respondents mentioned that the agromet advisory assisted them in determining the optimal frequency of irrigation. This indicates that the advisory has been valuable in guiding irrigation practices. In the comparison areas, 9% of respondents also found it helpful in this regard.
- ***Seed Variety Selection***: The agromet advisory has aided farmers in both project and comparison areas in selecting certified seed varieties. In the project areas, 14% of respondents mentioned that the advisory had an impact on their seed variety selection, while in the comparison areas, 20% experienced similar benefits.
- ***Contingency Planning***: The agromet advisory has also encouraged farmers, particularly in the project areas, to prepare contingency plans. Approximately 11% of respondents in the project areas reported developing contingency plans based on the advisory's information, compared to 4% in the comparison areas. This proactive planning can help farmers mitigate the impact of adverse weather conditions or other unforeseen challenges.

Moreover, the agromet advisory has proven highly valuable in enabling farmers to market their agricultural produce based on market price information. Nearly 82% of respondents in project areas and 78% of respondents in comparison areas who received Agromet advisory were found to be able to market their agricultural produce based on the market price information they got. In project areas, this has helped 91% of respondents (28% in comparison areas) to realize better selling prices. The preferred mode of receiving the Agromet advisory as reported by respondents in both the project and comparison areas in order of preference is SMS on mobile (65% to 75% of respondents) followed by WhatsApp, through a mobile app, television, and newspaper.

Table 3. 19 Perceived Benefits for Agromet Advisory

Benefits from Agromet advisory received	Project (%) Multiple Response (N =195)	Comparison (%) Multiple Response (N = 73)
Helps in taking timely decisions at initial stage of crop	72	27
Helps in deciding irrigation frequency	27	6
Helps in the selection of crops for certified seed variety	27	14
Helps in the selection of crops for intercropping	12	5
Helps in the control of pests	28	9
Helps in soil health management	4	5
Helps in water management	3	4
Helps in preparing a contingency plan	22	3

Further, when asked more than 90% of the respondents in the project as well as in comparison areas reported being interested in receiving advisories related to climate resilient technology, weather, soil nutrients, irrigation, certified seed, fertilizers, and pesticides.

3.5.2. Integrated Nutrient Management using Soil Health Card Information

As a part of the Environment Management Framework (EMF), PoCRA has set compliance guidelines for Integrated Nutrient Management (INM) for project areas. Compliance with INM guidelines could be achieved by beneficiaries using soil health card information. However, it was observed during the survey that that more respondents in project clusters (16%) as compared to those in comparison (2%) treated the soil using soil health card information. Around 68% of the respondents in project areas reported that they have been encouraged by the PoCRA team to use soil health cards to improve soil quality. About 24% of respondents from the project and 21% in comparison clusters reported that they did not have the technical knowledge to use the soil health information 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-friendly. 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.

3.5.3. 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. Table 3.20 presents the land under climate-resilient seed variety for soybean, pigeon pea, and cotton in both project and comparison areas.

Table 3. 20 Land under Climate-Resilient Seed Varieties for Specified Crops in the Study Area

Crop	Land under production (acres)		Land under climate-resilient seed varieties (acres)		% Land under climate-resilient seed varieties	
	Project	Comparison	Project	Comparison	Project	Comparison
Soybean	731 (N = 200)	295 (N = 109)	586 (N = 153)	247 (N = 87)	80	84
Pigeon Pea	26 (N = 13)	3 (N = 3)	25 (N = 12)	2 (N = 2)	96	66
Cotton	482 (N = 161)	187 (N = 85)	444 (N = 148)	174 (N = 76)	92	93
Overall	**1239**	**485**	**1055**	**423**	**85**	**87**

(An independent two-sample t-test was done to compare the means of land under certified seeds for Soybean, Pigeon peas, and Cotton estimated for CM-IX and CM-VIII rounds. The resulting mean for each crop in the CM-IX round is statistically significant when compared to those estimated using the CM-VII dataset at a 95% confidence level.)*

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.

Project-supported FPC beneficiaries

The FPCs 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 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.

A total of 16 project-supported FPCs were covered, and feedback from a total of 63 FPC respondents (14 FPC directors and 49 members) was taken as part of the quantitative survey of the CM-IX round.

PoCRA-supported SHG beneficiaries

Another key component of PoCRA is to strengthen the existing self-help groups (SHGs) 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.

A total of 8 SHGs were covered, and feedback from a total of 29 SHG respondents (9 SHG presidents and 20 members) was taken as part of the CM-IX round.

4.2. 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 centers (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.

Support to FPCs/ SHGs for undertaking Agribusiness

Eleven FPC directors and six SHG presidents have reported that their groups were involved in agribusiness activities. The year of receiving the PoCRA grants is in Table 4.1 which follows.

Table 4. 1 Year of Grant for Agribusiness to Project-supported FPCs and SHGs

Year of grant	FPC (N=11)	SHG (N=6)
2018-2019	1	1
2019-2020	3	3
2020-2021	6	1
2021-2022	1	1

The majority of the surveyed FPC respondents reported that they receive support from POCRA for developing Custom Hiring Centres (CHCs), followed by godown/warehouse development and seed processing unit, and so on, as seen in Table 4.2. However, SHG respondents informed that they have applied/received support only for custom hiring centers as the agribusiness activity under POCRA.

Table 4. 2 Agribusiness Activity-wise support from PoCRA

Agribusiness activity	FPC Respondent Valid N = 11	SHG Respondent Valid N = 6
Custom Hiring Centre	7	5
Pulse mill	0	1
Cattle Feed Processing Unit	1	0
Turmeric Processing Unit	1	0
Refer Van	2	0

Perceived Benefits from FPCs and SHGs under POCRA

The survey findings indicate that Self-Help Groups (SHGs) have expanded the range of facilities and services they offer compared to those SHGs that were covered during the previous round (CM VIII). While access to farm machinery and equipment remains a prominent service provided by SHGs (76% in this round), they have diversified to offer the following additional services:

- ***Marketing Support:*** Approximately 14% of SHGs now provide marketing support to their members.
- ***Purchase of Seeds*****:** About 10% of SHGs facilitate the purchase of seeds for their members.
- ***Purchase of Fertilizers*****:** Approximately 5% of SHGs assist their members in acquiring fertilizers.
- ***Grading and Sorting*****:** Around 10% of SHGs engage in grading and sorting of agricultural produce.
- ***Value Addition*****:** Around 10% of SHGs are involved in value-addition activities.

On the other hand, Farmers Producer Companies (FPCs) are also in demand for various services by farmers. The highly sought-after services from FPCs include:

- ***Access to Farm Machinery and Equipment***: Approximately 54% of farmers express the need for access to farm machinery and equipment through FPCs.
- ***Marketing Support***: About 44% of farmers look to FPCs for marketing support to sell their agricultural produce.
- ***Purchase of Seeds***: Around 40% of farmers seek assistance in purchasing seeds through FPCs.
- ***Purchase of Fertilizers***: Approximately 28% of farmers wish to procure fertilizers from FPCs.
- ***Grading and Sorting***: About 23% of farmers rely on FPCs for grading and sorting of their agricultural produce.
- ***Value Addition***: A smaller percentage, 12% of farmers, are interested in value-addition services provided by FPCs.

These findings indicate the evolving role of SHGs and the increasing demand for services offered by both SHGs and FPCs, highlighting the importance of these organizations in supporting and empowering farmers in various aspects of agriculture.

Table 4. 3 Facilities/ Services provided by project-supported FPCs and SHGs

Facilities/ Services	FPC Respondent (%) Valid N =57	SHG Respondent (%) Valid N = 21
Marketing support in selling my agricultural produce	25	14
Purchasing seeds through FPC	40	10
Purchasing fertilizers through FPC	28	5
Grading and sorting of my agricultural produce with the support of FPC	23	10
Converting agricultural produce to value-added products (e.g. Converting into Soybean-to-Soybean oil)	12	10
Getting access to equipment/tools for agriculture	54	76
Access to godown facility	12	-

4.3. Assessment of Agri-business activities

Following the field visit conducted by the Agribusiness Expert, several key findings were identified across various businesses, including sericulture, storage units, goat-breeding businesses, and Custom Hiring Centers (CHCs). The details of the visit are given in Annexure. However, the key findings from the visit are summarized as under:

A) Sericulture Business

A visit was made on 10th July 2023 to a women-led FPC engaged in Sericulture - Prathisthan Reshim Farmer Producer Company (FPC) (registered on 18th June 2018 with Registration No. U0110MH2019PTC326910). All the board members are women.

The company made an initial investment of Rs. 25 lakh to establish a silkworm breeding center, with Rs. 20 lakh received from PoCRA to support this initiative. Currently, there are 180 members associated with the FPC, and approximately 70 farmers actively utilize the services offered by the company. The FPC has plans to expand its membership base by including more farmers in the coming years. The Sericulture value chain is explained in detail in the Annexure.

Key observations:

- This FPC is a women-led organization with all female members on its board. It actively engages with most of its members throughout the year, ensuring sustained interest in its business activities.
- The women in leadership positions within the FPC make strategic business decisions based on market demand and other relevant factors.
- Additionally, the women use their extra income for asset creation, such as purchasing land, investing in housing construction, and improving health services and education for their children. For instance, during the visit one of the members reported that she purchased a piece of land with the additional income she earned.

The success of this women-led FPC is not only economically empowering its members but also serving as an inspiration to other community members. It motivates and encourages them to take the lead and initiate their community-based businesses, fostering economic growth and empowerment within the broader community.

B) Custom Hiring Centre Business

Sai Vitthal Farmer Producer Company Limited and Agricross Smart Farmer Producer Company are engaged in the custom hiring business. Both the FPCs have a good member base of around 300 members and have the following machines:

Table 4. 4 Equipment list and details

S. No.	Name of the machine/equipment	Per unit rate (Rs.)	Estimated engagement in a year (Days)
1	Tractor and Trolley	200/trip of 15-25 Km	150
2	Plough	1200/acre with Tractor	10
3	Cultivator	600/acre	30
4	Seed drill	800/acre	45
5	Thresher	3 percent of the total produce	30
6	Rotavator	800/acre	45
7	Tractor operated sprayer	500/day	30

In FY 2020-21 total revenue generated was 1.75 lakh and net profit was Rs. 60,000/-. The revenue increased to Rs. 2.0 lakh and the profit was Rs. 80,000/- in FY 2021-22. The FPC was able to generate employment for local youths and is also planning to add more machines to the CHC unit.

Custom Hiring Centre

Key observations:

- ***Challenges with Machinery:*** The FPC encounters difficulties with its machinery, primarily due to a short operational window and high demand that exceeds the capacity of the available machines. Maintenance challenges after the season add to the operational issues. The cost of running the machines is high, attributed to expensive fuel and operator expenses.

- ***Limited Access to Climate Resilience Services:*** While the CHC provides valuable support in building climate resilience and adapting to changing weather conditions, not all FPC members benefit from these services. This lack of universal access has resulted in dissatisfaction among some farmers.

- ***Recommendations:*** To address these challenges, it is recommended that the CHC business should not operate in isolation but should be integrated with other FPC activities, such as input supply or processing. Integration would allow for a more comprehensive approach to addressing the challenges faced by FPC members. For example, the CHC could collaborate with input supply businesses to provide weather-resistant seeds or with processing units to develop climate-resilient value-added products.

C) Storage Business

Visited Jamuvant Agro Producer Company Limited which has established a godown for grains/pulses, bio-pesticide business, and storage business for onions.

Key Observation:

- The FPC has temporarily suspended its input business, which has resulted in challenges related to ensuring active engagement and involvement of all FPC members. The reasons behind this suspension should be explored further to determine if it is a strategic decision or if there are underlying issues that need to be addressed.

Storage facility

- The FPC is currently using its godown as a pack-house for pomegranates, a venture that yields low profit margins. It is essential to assess whether this utilization aligns with the FPC's long-term goals and objectives, or if there are opportunities to explore more profitable alternatives for utilizing the facility.

- The FPC has purchased onions from its member farmers and stored them in a newly constructed storage facility. This is the first year of operation for this storage facility.

- The CEO of the FPC is optimistic about the returns from the sale of onions, as the current market price is significantly higher than the purchase price. This could be a positive development for the FPC's financial sustainability.

Given the above, it is crucial to further investigate the reasons behind the suspension of the input business and explore strategies for ensuring the active engagement of all members. Additionally, a comprehensive evaluation of the utilization of the godown and the success of the onion storage initiative will be essential for making informed decisions and optimizing the FPC's operations.

D) Goat Breeding business

Tvarita Agritech Farmer Producer Company Limited was visited. This FPC was found to be engaged in the Goat Breeding business.

Key Observations: The FPC has a total of 70 goats. Based on the information received from the Director of the FPC, an attempt has been made to estimate the total expenditure and revenue of breeding one goat. The calculations are undertaken based on the following assumptions:


Goat Breeding

- The female goat kid was purchased at the age of four months for Rs. 1500
- The purchased kid was reared for 300 days before selling further.
- The female goat is sold for Rs. 3500
- A female goat completes two breeding cycles and gives birth to four kids (two male and two female)
- The selling price of a four-month-old female and four-month-old male goat kid is Rs. 1500 and Rs. 2000 respectively.

The analysis indicates that goat breeding is a highly profitable venture. However, it is essential to consider proper healthcare for the herd. One notable challenge is the lack of readily available doorstep veterinary services, which can introduce risks to the business.

Overall, goat breeding can be a lucrative opportunity, but it requires careful management and access to veterinary care to ensure the health and well-being of the herd, ultimately maximizing the profitability of the venture. The estimates are summarized in the table below:

Table 4. 5 Estimates of expenditure and revenue from the sale of a female goat

Expenses and returns per unit of a female goat			
Expenses	**Per day consumption**	**Cost per day (Rs.)**	**Expense for 300 days (Rs.)**
Purchase of goat kid			1500
Straw	1 Kg	5	3000
Wheat flour	250 gm	4	2400
Veterinary medicines			250
Lump sum labor cost			1200
Total expenses (A)			**8350**
Returns	**Total units**	**Sale price per unit**	**Total Returns**
Sale of kids (female)	**2**	1500	3000
Sale of kids (male)	**2**	2000	4000
Sale of the mother goat	**1**	3500	3500
Milk	Milk is neither sold nor consumed by the household. It is used for feeding goats.		
Manure	Selling goat manure is not a practice. It is used at the farm		
Total Returns (B)			**10500**
NET RETURNS (B-A)			**2150 (Profit)**

Assessing Progress and Challenges: A Revisit to Manjaram and Naogaon Villages

During the recent visit of Environment expert to the selected villages, Manjaram and Naogaon were revisited, having been previously visited in September 2021. This revisit provided an opportunity to analyze the progress of PoCRA activities in these villages. Unfortunately, during the last visit, two shadenet beneficiaries reported that their structures were completely damaged shortly after establishment due to heavy winds. It is observed that, neither the structures were re-established, nor the farmers compensated for their losses. As a result, the affected land remains uncultivated.

Another shadenet beneficiary, who had been optimistic about profits during the previous visit, shared that they are now facing losses due to fungal infections in different seasons. Interestingly, they are only getting profitable outputs from cucumber cultivation. Presently, the farmer has shifted their focus to soybean cultivation, which is proving to be profitable enough to sustain their family.

In another village, Nawandi, a community warehouse for crop storage was established during the previous visit, near Gadga. However, it was found that the warehouse is not functioning at its full capacity. Additionally, the president of the community, who is also a PoCRA beneficiary with a horticulture crop (1 acre), had initially planted guava under the PoCRA benefit. Surprisingly, during this visit, it was discovered that the same land is now being used as a nursery for Mango plantation. Moreover, it was previously recorded that plastic bottles and plastic lining materials were scattered around the shadenet and various places in the fields. However, this time, those plastic materials were not found. The farmers informed that they have been regularly selling the plastic waste to collectors.

These observations highlight both the successes and challenges faced by the beneficiaries and the PoCRA project in these villages. **Proper attention and support are required to address the issues of damaged structures, fungal infections, and underutilized facilities, ensuring sustainable agricultural practices and better livelihoods for the farmers.**

Feedback from FPC Representatives

An interview with the Directors of a total of 16 FPCs was conducted to get feedback on the implementation of the agribusiness component of the project. The detailed fact sheet for all 16 FPCs is presented in Annexure 13. The key findings from the interviews are as follows:

Activities of FPCs before and after PoCRA intervention: Before PoCRA support, out of 16 FPCs seven FPCs supported farmers in their agriculture activities, three FPCs were involved in agriculture commodity trading, other three FPCs were engaged in seed and grain processing, and the remaining four FPCs were not involved in any activity. Post PoCRA investment of around Rs. 3.55 crores, these 16 FPCs were engaged in agribusiness activities in a focused way. 11 FPCs established CHC, four FPCs established commodity processing unit, and two FPCs were engaged in operating a refer van, Of the 11 FPCs running CHC, three FPCs were engaged in an additional agribusiness activity with support from PoCRA. One of them established a turmeric processing unit, another one a feed mill, and one FPC established a geranium oil extraction plant.

Source of funding: For the implementation of agribusiness activities, all 16 FPCs raised funds from the contribution of board members and member farmers. Five FPCs also took support from the bank. This reflects that there remains scope for improving and easing access to credit for FPCs through formal financial institutions like banks.

Current status of agribusiness activities: All the above-mentioned PoCRA-supported agribusiness activities are established and operational. Most of the established CHCs are well-equipped with tractors, trolleys, ploughs, rotavators, sowing machines, cultivators, and threshers. Machines in CHCs are hired by members as well as non-member farmers at different rates. Non-member farmers are charged at least 50% more than what members pay. Farming implements help farmers get their work done on time. Commodity processing units have enabled farmers to add value to their agricultural produce and realize better market prices. For managing the operations of the agribusiness activities, some of the FPCs have provided full-time employment to local youth

Participation and Decision Making: It is observed that not all members participating in group meetings contribute to the decision-making. Some efforts like providing membership discounts, and constituting smaller groups are made to encourage the participation of women, the tribal population, and other marginalized groups

Record-keeping and operations: Records of registration, attendance, proceedings, audit, stock, and financial transactions are maintained in all the FPCs. Generally, the book of records is maintained by the chairman and secretory. Some FPCs have hired full-time workers to manage day-to-day operations.

Capacity building: It is observed that board members and member farmers of 11 FPCs have received some kind of formal training post-PoCRA intervention. The training covered the aspects of business planning, financial management, market linkage, waste management, and environmental safeguards. Depending on the type of agribusiness activity undertaken by the FPCs, the training was usually conducted by agriculture departments, KVKs, NGOs, national horticulture training centre, warehouse corporations, etc. It was shared during the interviews that FPC members expect exposure visits to successful interventions to gain practical knowledge related to the agribusiness activity of interest.

Environmental safeguards: All FPCs are built in environmentally safe locations i.e., away from drainage channels, away from forest reserves, above flood lines, etc. Except for four, all remaining FPCs were equipped with fire safety standards and were aware of waste and water management.

Support from PoCRA staff: All FPCs received good guidance and support from project staff, especially from agriculture assistants.

5. Institutional Development, Knowledge, and Policy for CRA

5.1. Village Climate Resilient Management Committee (VCRMC)

A total of 14 FGDs of the VCRMCs were conducted during the survey. The response to the FGD was satisfactory with the presence of at least seven VCRMC members in each of the FGD.

VCRMC composition and functioning

The Village Community Resource Management Committees (VCRMCs) were established in accordance with the project guidelines, with a notable feature being 50% women participation in each committee. Participation from every community was observed in the VCRMCs as per the stipulated guidelines. While reviewing the functionality of the VCRMCs, it was observed that most of them diligently maintained the required documents, including the proceeding register, cash book, advance register, and cheque/DD register. However, it is worth noting that only four out of the 14 VCRMCs have engaged in any form of financial transactions since their formation. For those VCRMCs that did not conduct financial transactions, various reasons were cited. These reasons included the non-activation of accounts, the non-submission of necessary documents by certain committee members, and the recent establishment of the committee itself. In terms of meeting frequency, it was observed that all VCRMCs, except for two, held meetings either once or twice a month. Additionally, VCRMCs convened additional meetings as needed. The primary objective of these meetings typically revolved around discussing the status of applications on the Direct Benefit Transfer (DBT) portal.

Capacity building through training

Four of the 14 VCRMCs confirmed receiving the capacity building training received under the project. The training was mainly related to holding awareness generation, and adoption of climate-friendly technologies. Further, these trainings had participation from female members of VCRMC. Moreover, when asked about their need for training, most of the VCRMCs highlighted that their members need to be trained (either offline or online), especially in the areas of administrative finance and knowledge to ensure the sustainability of the impact generated through the PoCRA project. Further, water balance management and understanding and knowledge of climate-friendly agricultural technologies were the two additional areas suggested for training the VCRMC members to improve their efficiency in terms of delivery of their responsibilities. Awareness about the environmental safeguards amongst the interviewed VCRMC members was found to be limited to only the felling of trees and tree plantation drives in the village. During the discussion, there was no mention of the prescribed standard of material to be used, site selection norms for construction activity, or INM/ IPM guidelines. This warrants the need for more training and handholding of VCRMC on awareness related to environmental safeguards. Except for two, in all other surveyed VCRMCs have reported good and active participation of women members in meetings, committee work, and decision-making processes. However, to improve the quality of VCRMC suggestions have been received in terms of encouraging women to participate more and also to build their capacity. All the surveyed VCRMCs have reported that the groundwater level has improved in their villages post-implementation of the project. Complaint boxes are not installed in around 50% of the VCRMCs interviewed. These VCRMCs use gram sabha and panchayat meetings as a platform to solve the grievances/ complaints of the beneficiaries or village residents.

Challenges

- ***Rejection of Grant Applications:*** Errors in documents, non-availability of the area of farmers, sharing of land with other villages, incorrect information in the application, etc. are some of the reasons cited by VCRMCs for rejection of the grant applications.
- ***Delay in Approval of Grant Applications:*** Delay in receiving funds, technical problems, network issues, non-availability of funds, lack of proper follow-ups by designated officers, etc. were some of the reasons cited by VCRMCs for the delay in the approval of grant applications.
- ***Financial Constraints:*** Financial constraints have emerged as the biggest hindrance factor for beneficiaries not starting the work despite receiving the pre-sanctions from the project.
- ***No NRM work:*** All of the VCRMCs have reported that no NRM work has started in their village.

Mobilization and Efforts for Making Village Climate Resilient

Panchayat meetings, gram sabha meetings, social media platforms like WhatsApp, door-to-door visits, holding special farmer meetings, VCRMC meetings, etc. are some of the actions undertaken by VCRMC members to sensitize and mobilize eligible farmers about the benefits that can be availed as part of PoCRA. Farmers who are yet to start work after pre-sanction are supported through awareness, guidance, or facilitating linkage with shops for asset purchase on credit/based on faith.

5.2. Maharashtra Climate Innovation Centre

In July 2022, M/s Ernst and Young are onboarded for conducting a feasibility study to establish the climate innovation center. To date, three consultative workshops have been conducted with various stakeholders including government institutions, agri-tech startups and SMEs, and financial institutions. Based on the feedback from workshops and various field visits to the key stakeholders, a gap analysis report has been submitted to the PoCRA. Currently, the preparation of the feasibility report is in progress.

5.3. Project Management

Feedback from DSAO/ PD ATMA

Two in-depth interviews (IDIs) were conducted with DSAO/PD ATMA in the districts of CSN and Nanded to understand the implementation status of different activities undertaken under PoCRA and to garner feedback for improving outcomes. The DSAO/PD ATMAs were asked about PoCRA interventions such as climate-resilient technologies, information dissemination, community/NRM activities, capacity building, and environmental safeguards.

Adoption of Technology

The adoption of technology was promoted through Farmer Field Schools (FFS). Compared to all fifteen (15) districts in Maharashtra, CSN has shown the highest achievement in both individual and community benefits. The distrcit was able to reach approximately one lakh farmers through individual benefits. Under individual benefits, irrigation techniques, water storage, orchard farms, and other activities were practiced. In community benefits, they were able to help nearly 700 FPCs and SHGs. As effective implementation is necessary to increase the adoption of climate-friendly technologies, it is important to enhance their coverage. Therefore, the Project Director (PD) ATMA/ DSAOs are obtaining the services of a technology coordinator on an emolument basis for coordination and control in each sub-division. PD ATMA in Nanded reported that the information provided by technology coordinators is monitored and checked regularly. They report to Sub-Divisional Agriculture Officers (SDAOs) daily and update them about their work.

Information Dissemination

DSAO, CSN highlights that the taluka-wise weather forecast and agricultural advisory on the FFS portal is the most important contribution of PoCRA[14]. Agricultural advisory on the FFS portal helps farmers decide on harvesting or any other farming operation. While there is a potential concern that weather predictions can be incorrect at times, the DSAO CSN emphasizes that in their experience, the forecast accuracy is exceptionally high, with a reported accuracy rate of 99%. This high level of accuracy has resonated positively with farmers, who find this advisory technique highly appealing.
The availability of accurate and timely weather forecasts and agricultural advice on the FFS portal not only empowers farmers to make informed decisions but also enhances their overall agricultural practices, productivity, and resilience to changing weather conditions. This feature exemplifies the positive impact and practical utility of technology-driven agricultural support systems in modern farming practices.

[14] The reason given for such a claim is that no other scheme has ever introduced such a concept. Earlier, there was a dependence on IMD (Indian Metrological Department) or Skymet Weather Services.

In CSN, technical knowledge is provided through FFS on various aspects including crop harvest management, increasing productivity, polyhouse, shade net, as well as cattle and goat-rearing. To ensure the most effective application of this knowledge, the information is categorized into different phases based on the crop's growth stage. This categorization allows farmers to receive relevant advice at the appropriate stage of their crop's development, simplifying their agricultural practices and decision-making. It's important to note that the project primarily focuses on providing technical knowledge and support to farmers and does not encompass market-led extension services. The PD ATMA Nanded reported that all the messages are conveyed to farmers through the PoCRA WhatsApp group. These include success stories, educational videos, and other informative content. Additionally, information is disseminated at the village and end-user levels through practical demonstrations, FFS, and by encouraging farmers to utilize technology in smaller areas to minimize risk.

Challenges and Suggestions

Concerning the disbursement of funds, the DSAO in CSN reported that initially, the Direct Benefit Transfer (DBT) portal faced issues, but these were subsequently addressed and resolved by the Project Management Unit (PMU). This has resulted in smoother fund disbursement processes. Further, CSN has faced an unusually high number of applicants, leading to a significant workload at the organizational level. This influx of applicants is in contrast to other districts where there is a lower demand for these benefits. In Nanded, the PD ATMA reported that there are systemic issues related to fund management due to limited or no financial authority at the district level. In terms of implementation, the respondents were asked about all three types of benefits, i.e., individual, community, and FFS. The DSAO CSN reported that instead of understanding and focusing on the requirements of their land, farmers often prefer to follow and replicate what other farmers are doing. Education and awareness among farmers regarding their specific needs are crucial to orient them to adopt suitable technologies. In terms of community benefits, the PoCRA project has contributed to several initiatives that support the local farming community. These include the establishment of CHCs, cleaning and grading centers, oil extraction centers, and goat breeding centers. Such infrastructural support can significantly enhance the overall agricultural ecosystem by providing farmers with access to essential resources and services to enhance their agricultural practices.

PD ATMA from Nanded shared the following challenges:

- Over ambitious project plan reflects underperformance.
- Distribution of pipes, engines, and tractors, which was initially implemented, was later stopped.
- CHCs and processing units had a positive impact on farmers but were subsequently closed.
- Social inequality among beneficiaries is highlighted due to the priority-based application approach for accessing benefits.
- Delays in the estimate and sanctioning process for community benefits.
- Difficulty in obtaining loans based on the credit score of FPCs or the pre-existing credit of individual members.
- Reimbursement policy for SHGs requiring them to spend money upfront.

Following suggestions were provided by PD ATMA, Nanded to overcome the above-mentioned challenges:

- Implement a system with a set of target households in each village, rather than relying on a priority-based demand-driven application approach for benefit distribution.
- Optimize the official procedures for estimating and sanctioning community works to expedite project goals.
- Diversify project components beyond CHCs.
- Increase the funding cap from Rs. 20 Lakhs to Rs. 30-40 Lakhs to enable farmers to engage more in activities like constructing godowns and processing units.
- Provide SHGs with a lump sum amount upfront instead of reimbursement to ensure flexibility and thereby improved adaptation in the project.

As informed by DSAO from CSN, community-based NRM works were outsourced in the initial years. A detailed project report was also created. However, when a third-party agency implemented the activities, there was a lack of staff for monitoring the same which resulted in underperformance.

Another notable challenge is the reluctance of small and marginal farmers, who make up the majority (84%) of the total farming population, to part with their land for area treatment or compartment bunding. This reluctance has led to a shortfall in the utilization of land designated for these purposes. For instance, instead of the targeted 50 hectares, only 20-30 hectares are being utilized for compartment bunding. In terms of capacity building, DSAO CSN suggested that areas such as weather forecasting, market-led extension, and the agriculture marketing sector must have greater focus. In Nanded, the suggestions included the need for reporting to the same officer to make monitoring more streamlined. Further, in terms of manpower, a shortage of technical staff and data entry operators was reported. It was also reported that computers provided by PoCRA do not function well. Other suggestions included provisioning maintenance funds for technical equipment such as computers and printers and increasing marketing and vehicle expenses which are utilized for the project activities.

"Farmers know how to increase crop productivity; they mainly struggle with making the produce reach the market." – DSAO CSN

Feedback from Project Specialists (PS)

Discussions were held with Project Specialists for the districts of CSN, Hingoli, Nanded, and Parbhani to investigate the current status of the implementation of the project and get feedback on project implementation for further improvement of the program. The PS comes from different fields such as Procurement, HR, Agriculture, and Agri-Business. Their views have been summarized below:

Feedback from PS Procurement

The PS agreed that the PoCRA project has proven to be beneficial for the farmers while also empowering small farmers and marginalized communities. In the Parbhani district, for instance, PoCRA has helped 275 households including marginal landholders, small farmers, Self Help Groups (SHGs), and suicide-affected families. Efforts are being made to increase the participation of women and other marginalized sections in the project. Field visits are used as opportunities to educate these groups about the project's objectives and benefits. He further shared that the project is particularly attentive to the considerable population of SC/ST in each taluka within the 240 villages of Hingoli. Door-to-door education is being provided with the assistance of krushi-tai and cluster assistants to ensure that these communities are informed and included in the project. As a result of these efforts, there has been a noticeable increase in the participation of the SC/ST population in the PoCRA project. The PS expressed appreciation for the PoCRA project's ground-up implementation strategy and its commitment to regular monitoring and evaluation. No challenges were reported in capacity-building activities except in Nanded where the employees were unwilling to spend their own money on training, and poor coordination between SDAO and PD ATMA led to the delay in organizing training programs. Furthermore, the reach of training to women was observed to be lacking in Nanded. Some of the implementation challenges reported include excess burden of processing applications in CSN, low mobilization of farmers, unsatisfactory number of SHGs and FPCs, and farmers' focus on individual agriculture and dividends as opposed to a community gathering in Parbhani, low payment to Agriculture Assistants in Nanded, and multiplicity of responsibilities taken up by Agriculture Assistants in Hingoli. The training was imparted to PS Procurement and was found to be sufficient and useful.

Feedback from PS Human Resources Development

Around 60 VCRMC meetings were conducted in CSN and Parbhani in the last six months with random visits in Nanded. Weekly sub-division meetings were conducted for cross-learning and sharing of knowledge on project-related information. These meetings were praised for opening new feedback channels and the evolution of shared learning. The frequency of visits to the field in the past month varied from district to district. While the HR Specialist in CSN visited the field 12 times, the Specialist in Parbhani visited four times. Additionally, the female HR Specialist of Nanded reported that her gender, the length of the journey, the interior location of the villages, and office responsibilities restricted her number of field visits to six. The performance of districts in conducting

exposure visits was in line with the frequency of visits. Exposure visits were conducted only in CSN while the farmers in Parbhani were sent to Krishi Mahotsav for exposure. The PS HRD CSN also outperformed other districts in stabilizing the VCRMC data and ensuring the quality of data in the assessment of Krushi Tais, digital training of women stakeholders under PMGDISHA, and facilitating alternative sources of income for the tribal community. The other PS HRD was not available to comment on the performance of these parameters.

Feedback from PS Agriculture

NRM activities were not implemented in CSN owing to the load of paperwork. In Nanded, bandhs constructed under NRM have been able to increase the water level, but implementation overall has been limited with no activities undertaken in command areas. Only 20-30% of planned activities were implemented. Even in Hingoli, the work majorly focused on increasing the depth of the sewers which enables water storage for irrigation. Therefore, **NRM implementation has been unsatisfactory**. Forecasts from agromet advisory services do not benefit all farmers equally, with more educated farmers and those owning mobile phones benefiting the most. Efforts are needed to increase the reach of these services to other farmers as well. Suggestions from PS Agriculture include appointing more cluster assistants in CSN to handle the load of applications, and more SDAOs and other organizational staff in Hingoli to increase the effectiveness of interventions under the project.

Feedback from PS Agri-Business

Various initiatives were undertaken to increase farmers' incomes, create employment, and improve climate resilience. In Parbhani, a marketing hub and seed hub along with FPCs and SHGs were created to enhance the supply chain. In Nanded, the focus has been on CHCs with 125-130 CHCs currently in place. The tools are used by FPCs and lent to other farmers to create new income opportunities. In Hingoli, post-production processing was introduced for turmeric with 15-16 groups formed for turmeric processing. VCRMC meetings were conducted in the four tribal villages of Hingoli to educate the villagers. These villages now have CHCs and two pulse mills. In Nanded, however, the setting up of FPCs, SHGs, and FIGs in the tribal area of Kinwat Mahur ran into problems with financing.

"To establish an FPC, we usually need finance of Rs. 30,000/- to Rs. 40,000/-, which tribal community finds difficult to raise. PoCRA should provide larger amounts to fund the tribal areas for the creation of SHGs and FPCs as their financial struggle is harder than the rest of the farmers. Increasing the amount from 60% to 70%-75% might help. Convergence with the tribal department which gives 90% amount can also be explored". – PS Agri-Business Nanded

The Specialists expect that nearly 30% of the projects supported by FPCs, SHGs, and FiGs should be able to be sustained. Suggestions to improve sustainability include providing basic infrastructural support to FPCs by creating godowns and processing units to wean them off government support in the long run, as opposed to the creation of CHCs which are limited by depreciation of the tools. They also flagged the possibility of these groups running into financial trouble which will affect the sustainability of the project. PoCRA has contributed to increasing the farmers' income by mechanization facilitated by subsidized tools and lending under CHCs, formation of Krushi Nivishthha Kendra and Krushi Seva Kendra, facilitation of seed and fertilizer procurement by FPCs, and enabling self-sufficiency of villages throughout the harvest cycle. These have led to improvements in supply chains which in turn have generated employment for drivers, FPC employees, and so on. In Parbhani, there has been a healthy participation of women in PoCRA with women employed as CEOs of FPCs, FPC marketing teams, and promotion of farm products through SHGs. PoCRA is also seen to have increased climate resilience by promoting alternative sources of income, women empowerment, and the use of seasonal crops while also increasing productivity.

"PoCRA is an exceptional project for the districts of Maharashtra"- PS Agri-Business Parbhani

Feedback from FFS facilitator

Through FFS, it is observed that enthusiastic farmers were eager to learn climate-resilient agriculture technology especially BBF and organic farming. Women participation, as reported by FFS facilitator of Tandakhurd village of Paithan taluka in CSN district, was good and they were motivated to adopt the CRATs as well as form more SHG groups so that they could avail the benefits of PoCRA.

Feedback from Technical Coordinator

Currently, the project has more focus on the promotion of CRATs especially BBF, zero tillage, seed production, preparation, and use of organic fertilizers and pesticides. Various social media methods like YouTube, WhatsApp, etc. are being used to increase the dissemination of CRAT knowledge among the farmers in project villages. With support from VCRMC in the village, farmer group meetings are organized, and progressive farmers who have benefitted from PoCRA are invited to share their experiences with other farmers. We are in the process of developing IEC material for extension activity. Monthly review meetings are held at the district office to review the progress of the extension activity.

Feedback from TAO

Adequate and consistent manpower at the Taluka level will ensure efficient allocation of workload under the project. TAOs emphasized that more efforts are needed to promote BBF and zero tillage so that more farmers start adopting the technologies. TAOs did not face any irregularities like duplication of application, during the implementation of the project in their respective talukas. During the interviews, TAOs highlighted that farmers are approaching them to avail the benefits since the PoCRA project desk is now closed. To keep them motivated, TAOs encourage them to use the MahaDBT portal. Since there has been consistent demand coming from farmers in project villages, TAOs opined that the project should be reinitiated as soon as possible so that farmers can access the benefits,

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

Indicator No.[15]	Indicator	Measurement technique and data source	Progress at CM Round IX
5	*Number of farmers reached with agricultural assets or services (% of female)*	The data on the number of farmers reached with assets or services has been collected from the project MIS, associated applications, and relevant project personnel from PMU. The number of direct beneficiaries of the PoCRA includes:	Total number of registrations till 31st March 2023 was reported to be 6,54, 936 (*Male = 5,07,450 and Female = 1,46,486*) Female Participation = 22%
		1. The data on individual grant beneficiaries has been taken from the DBT portal.	Total Disbursed Applications = 3,78,982
		2. The data of beneficiaries of FFS has been taken from the FFS application.	Total number of FFS participants to date are 2,54,546 *(28,409 female farmers and 2,26,137 male farmers)* Female participation = 11% Total number of guest and host farmers are 2,46,191 and 8,355 respectively
7	*Area provided with new/improved irrigation or drainage services (in ha)*	The data of area with new or improved irrigation services and drainage services through individual activities under the project have been taken from the DBT portal report. The data on community-level new/improved irrigation services has been taken from Project Specialists of the project districts.	Area provided with 1. Sprinkler area =1,88,828 Ha 2. Drip area = 1,54,708 Ha 3. Area under drip for Horticulture = 27,321 Ha. Total Drip area = 1,82,029 (Which includes 1,54,708 Ha of individual drip + 27,321 Ha of drip under horticulture plantation) Total Area under Micro-Irrigation = 3,70,857 Ha
		Total area under Irrigation Projects= IP (Irrigation Project)$_1$*Area under irrigation project+ IP (Irrigation Project)$_2$*Area under irrigation project+ IP (Irrigation Project)$_n$*Area under irrigation project	
8	*Surface water storage capacity from new*	The data on individual-level farm ponds will be taken from DBT portal report. The data on community farm ponds has been taken from DBT Portal.	28181.45 (1000 *m3)*

[15] as per PoCRA Results Framework

Indicator No.[15]	Indicator	Measurement technique and data source	Progress at CM Round IX
	farm and community ponds (in 1,000 m3)	Total Water storage capacities of new Farm Ponds = FP (Farm Pond) $_1$*Storage capacity of FP+ FP $_2$*Storage capacity of FP+……+ FP $_n$*Storage capacity of FP	
		Total Water storage capacities of new Community Ponds = CP (Community Pond) $_1$*Storage capacity of CP+ CP $_2$*Storage capacity of CP+……+ CP $_n$*Storage capacity of CP	
11.	*Number of projects-* *supported FPCs with* *growth in annual profits*	With the support of PS agriculture, the FPC representatives were contacted and their annual profit details for the current and last year were enquired. Based on the analysis of the change in annual profits of the supported FPCs this indicator was to be calculated	A total of 1000 FPCs are supported through PoCRA in the Marathwada region until 30th September 2022. Of the 317 project-supported FPCs in Jalna, details on profit and loss from audit statements of 172 FPCs for FY 2021-22 were received from PS AB of Jalna. Of these 172 FPCs, 82 FPCs registered profit during FY 2021-22. Also, 18 out of 27 FPCs in other districts of the Marathwada region registered profit during FY 2020-21. Note that the RF indicator implying the number of project-supported FPCs with growth in annual profit can only be estimated after analyzing their audited statements for at least three consecutive financial years. The remaining FPCs will be subsequently included in the analysis over the next monitoring rounds once their audited financial statements are available.
14	*Number of approved participatory mini watershed plans implemented / under implementation*	This indicator will be reported as an absolute number of participatory mini watershed plans approved by Gram Sabha. The information is collected by the microplanning agencies from the offices of the SDAOs. The microplanning agencies submit the validated mini watershed plans to the PMU where the data is recorded by the M&E specialist.	In the eligible 533 villages, the microplanning has been completed. For these 533 villages, participatory mini watershed village development plans have been prepared and are under implementation.

7. Insights from PoCRA MIS data

This section presents the analysis of the project's MIS data during the period - from 1st October 2022 to 31st March 2023. This would help to understand the current implementation status of the project and draw insights from the same.

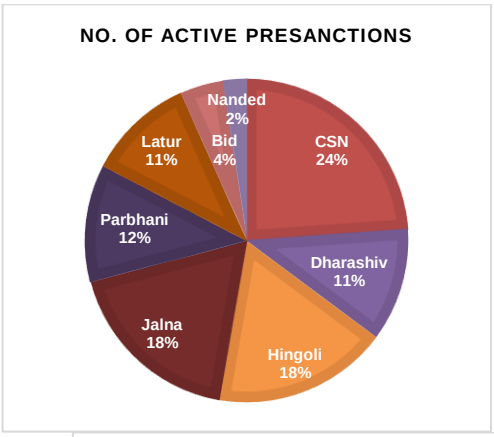
Direct Benefit Transfer (DBT)

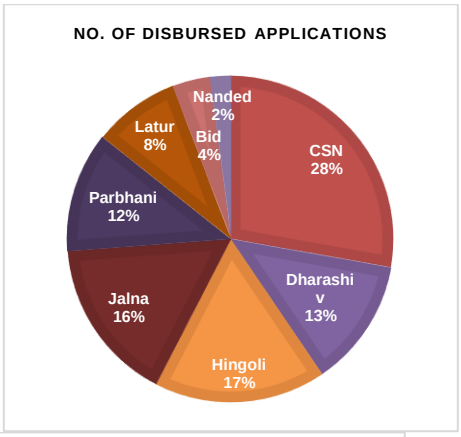
Overall Analysis

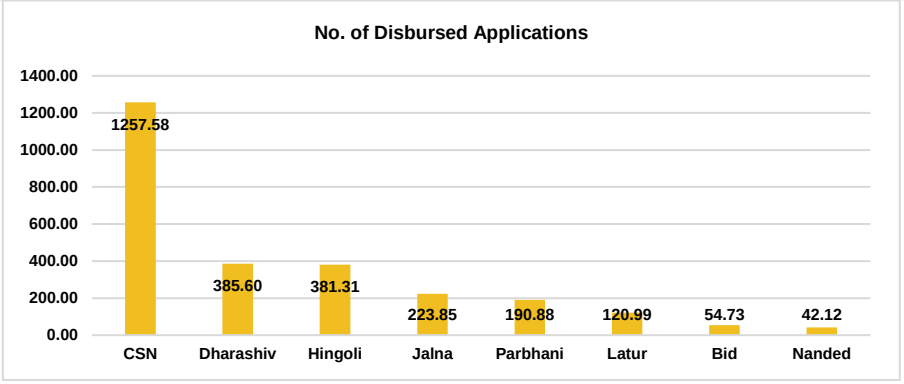
The PoCRA initiative has been successful in engaging with over 9,000 farmers within the Marathwada region (till March 2023). As the project has now advanced into its subsequent stage, it is of paramount importance to recognize that the ongoing monitoring rounds emphasize assessing the impact of the interventions being executed under the PoCRA framework.

As of March 31st, 2023, the aggregate count of farmers with active pre-sanction applications under the PoCRA scheme stands at 9,940. Among this total count of active pre-sanction applications, approximately 56.23% of the applications have been effectively disbursed as part of the PoCRA initiative, translating to a monetary sum of Rs. 26.58 crore. Notably, within the cohort of pre-sanction applicants, 81.78% are identified as male, while 18.09% represent female farmers, and a minor contingent of 0.12% falls under the 'Others' category. Furthermore, around 2% of pre-sanction applications pertain to farmers belonging to the Scheduled Caste (SC) category, while 1.6% are attributed to tribal farmers, and the remaining majority 96% belong to the Others category.

Concerning the categorization of farmers, nearly 7% of the applications are attributed to Small farmers, approximately 29% to Marginal farmers, a fractional 0.2% to landless household farmers, and approximately 24% of the applications are affiliated with the 'Other' category of farmers. Furthermore, Phase 2 of the PoCRA initiative has garnered the highest volume of applications, accounting for a share exceeding 60%, followed by Phase 3 with 30.9%, and Phase 1 with 7.8%. The figures below show that out of the 8 project districts, CSN has the highest share in both presanction applications and disbursed applications, followed by Dharashiv in case of disbursed applications and Hingoli in case of presanction applications.

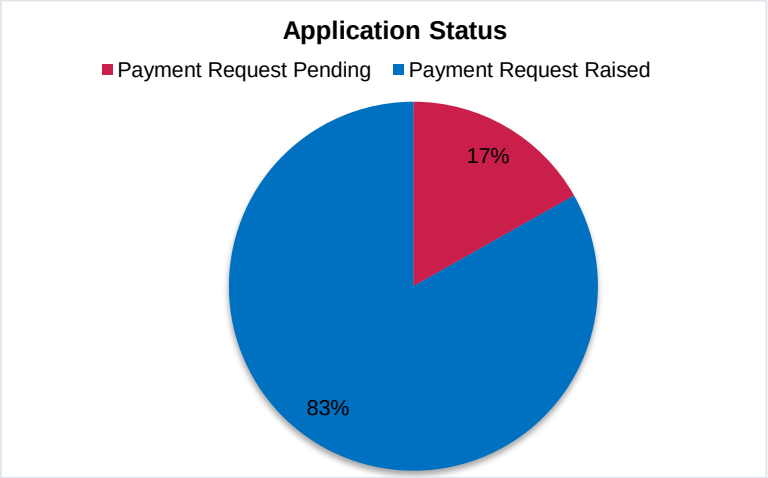






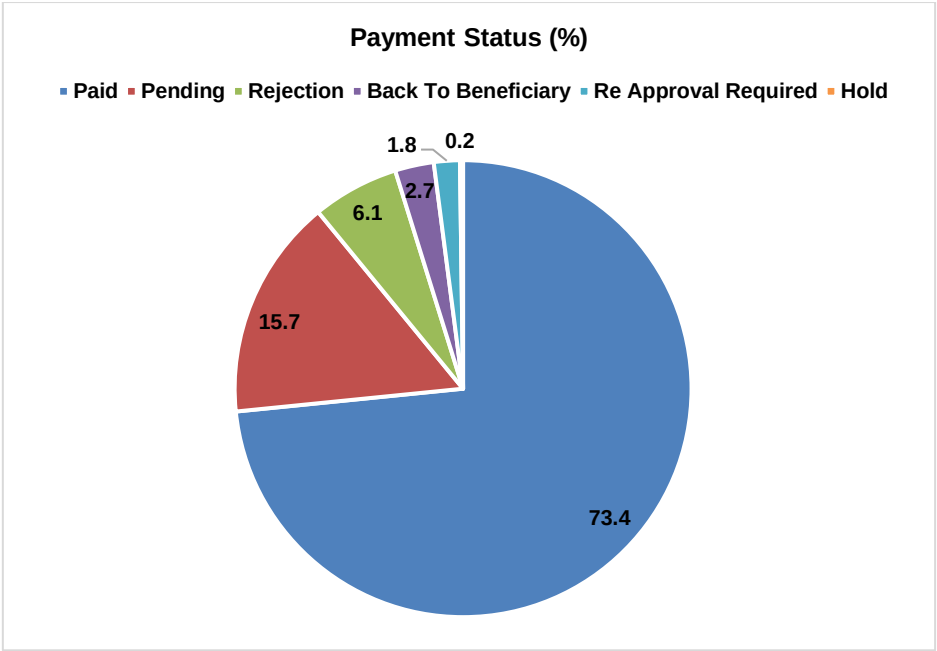
Application Payment Status Analysis

Out of 9,940 applications received under the PoCRA project for 83% of the applications, a payment request has been raised. In other words, more than 8,000 applications (amounting to Rs. 3.3 crore) have been processed for payment and are at different stages of payment processing.



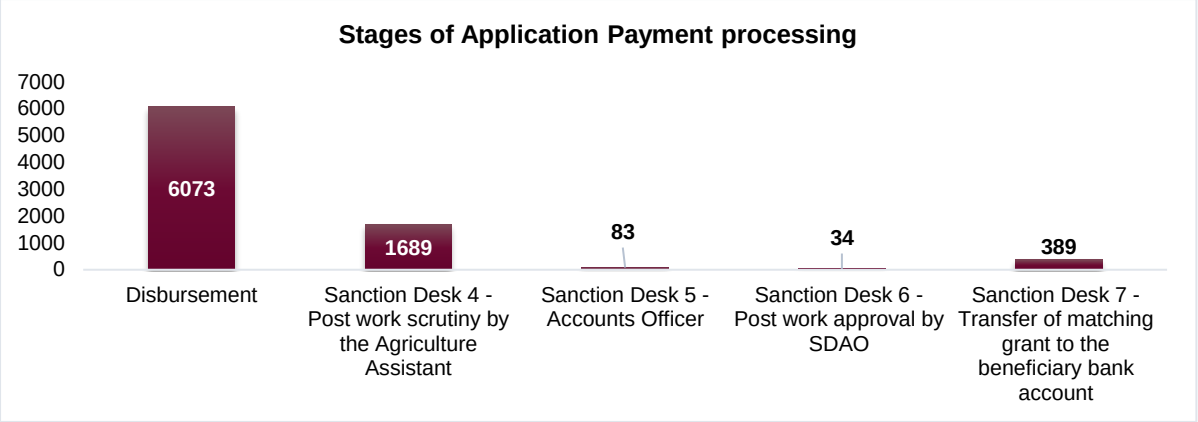
Source: MIS Data

Out of the 8,268 applications raised for payment, payment for 73.45% of the applications have been paid/disbursed indicating that around Rs. 2.67 crore have been transferred/disbursed to the farmers as a benefit under the PoCRA project. While 15.7% of the applications are pending payment, 0.2% of the applications are on hold. Around 6% of the applications have been rejected. 2.7% of the applications have been sent back to the beneficiary and 1.8% of the applications require re-approval.



Source: MIS Data

389 applications (4.7%) the matching grant has been transferred to the beneficiary bank account (i.e., Sanction Desk 7 stage). However, 20.4% of the applications are at the Sanction Desk 4 stage indicating that 1,689 applications are yet to be scrutinized by the Agriculture Assistant. Similarly, 83 applications are at the level of accounts officer and 34 applications are yet to be approved by SDAO for further processing of the application for final payment.



Source: MIS Data

Delay in Payments

According to the MIS data as of 31st March 2023, the average processing time for payment requests is 119 days. After processing, the average time for the final disbursement of the payment is 3 days. Consequently, it takes approximately 4 months (122 days) in total for the final payment to reach the beneficiary following their request. This emphasizes the necessity of a comprehensive examination of the payment request review process to identify and rectify the underlying causes of delays.
District-wise delay is tabulated below:

District	Avg time taken between Payment Request & Payment Process	Avg time taken between Payment Process & Payment Done	Avg time taken between Payment Request & Payment Done
CSN	97 days	4 days	101 days
Beed	126 days	3 days	129 days
Hingoli	106 days	3 days	109 days
Jalna	132 days	3 days	135 days
Latur	133 days	2 days	135 days
Nanded	116 days	6 days	122 days
Dharashiv	137 days	3 days	140 days
Parbhani	136 days	5 days	141 days

The duration for the final payment to reach the beneficiary after the request is made varies in the range of 101 days in CSN to 141 days in Parbhani district. This disparity underscores the importance of examining the practices implemented in districts with shorter durations between request and final payment. By replicating these practices in other districts experiencing longer processing times, it is possible to enhance the institutionalization of the process within the project and improve overall efficiency. Such measures will contribute to ensuring a more effective and streamlined payment system. The table below presents the analysis of the time taken between the request made and the final payment done in terms of different categories – gender, caste, and type of farmers.

Further at the village level, Loni village in Dharashiv takes 229 days i.e. more than 7 months on average to process and disburse the payment after a request is made. This is followed by Wadi Siradhon village in Jalna district, Kharbi village in Nanded village, and Kanadi Bk. Village in Beed district with 176 days, 167 days, and 157 days respectively. On the other hand, Devsinga Nal village in Dharashiv, Rajawadi village in Hingoli district, Dapshed village in Nanded district, and Hawargaon village in Dharashiv district disburse the final payment in less than 90 days after the request has been made. District-wise Village level analysis of the duration between payment request made and final payment is given in Annexure 12.

Category	Avg time taken between Payment Request & Payment Process	Avg time taken between Payment Process & Payment Done	Avg time taken between Payment Request & Payment Done
SC	104 days	2 days	106 days
ST	115 days	9 days	124 days
Others	119 days	3 days	122 days
Gender			
Male	120 days	3 days	123 days
Female	114 days	4 days	118 days
Others	109 days	2 days	111 days
Type of Farmers			
Small	111 days	4 days	115 days
Marginal	107 days	3 days	110 days
Others	149 days	3 days	152 days
Landless	130 days	2 days	132 days

Activity-wise Analysis

The table below reveals that activities related to 'Climate Smart Agriculture and Resilient Farming' And 'Promoting an Efficient and Sustainable Use of Water for Agriculture' have caught the maximum attention of the farmers, as more than 85% of the applications have been received under these 2 components. This indicates the success of the PoCRA project in terms of the increased willingness of farmers to adopt more climate-resilient and sustainable agriculture practices. Drip Irrigation, Sprinkler Irrigation, Agroforestry, and Seed Production together account for 84.3% of the total applications. Within the type of farmers, small, marginal, and other farmers applied majorly for drip irrigation, sprinkler irrigation, agroforestry, and seed production. Landless farmers applied mainly for small ruminants, followed by backyard poultry and sprinkler irrigation.

Activity	No. of Applications	%
Drip Irrigation	2830	28.5
Sprinkler Irrigation	2584	26.0
Horticulture Plantation / Agroforestry	1592	16.0
Seed Production	1376	13.8
Pipes	317	3.2
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	206	2.1
Water Pumps	201	2.0
Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	192	1.9
Farm Mechanization	132	1.3
Farm Pond (Individual)	107	1.1
Sericulture	87	0.9
Shadenet House	67	0.7
Farm Pond Lining	58	0.6
Apiculture	52	0.5
Compost (Vermicompost / NADEP / Organic input production unit)	41	0.4
Inland Fisheries	31	0.3
Well	24	0.2
Small ruminants	17	0.2
Polyhouse/ Polytunnels	10	0.1
Planting material in Polyhouse / Shadenet house	7	0.1
Recharge of open-dug wells	6	0.1
Backyard Poultry	3	0.03

District-wise Analysis

District-wise the top 3 activities receiving the maximum demand from farmers are tabulated below:

District	Top 3 Activities
CSN	Drip Irrigation, Horticulture Plantation / Agroforestry and Pipes
Beed	Horticulture Plantation / Agroforestry, Drip Irrigation and Sprinkler Irrigation
Hingoli	Seed Production, Horticulture Plantation / Agroforestry and Sprinkler Irrigation
Jalna	Drip Irrigation, Sprinkler Irrigation, and Horticulture Plantation / Agroforestry
Latur	Seed Production, Sprinkler Irrigation, and Drip Irrigation
Nanded	Drip Irrigation, Sprinkler Irrigation, and Horticulture Plantation / Agroforestry
Dharashiv	Sprinkler Irrigation, Horticulture Plantation / Agroforestry and Drip Irrigation
Parbhani	Sprinkler Irrigation, Horticulture Plantation / Agroforestry, and Drip Irrigation

FFS

A total of 97 host farmers organized the FFS to train and impart knowledge to farmers on climate-resilient agriculture practices under PoCRA. A total of 2,874 FFS guest farmers attended the FFS sessions. The table below reveals that the PoCRA project has proved to be inclusive wherein not only female farmers are encouraged to participate but participation from other genders has also been witnessed in some districts.

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

District	Gender	FFS Host Farmers (No.)	FFS Guest Farmers (No.)
CSN	Male	15	477
	Female	4	57
	Others	.	3
	Total	19	537
Beed	Male	8	114
	Female	1	32
	Others	.	1
	Total	9	147
Hingoli	Male	9	276
	Female	2	6
	Total	11	282
Jalna	Male	7	263
	Female	5	22
	Others	.	1
	Total	12	286
Latur	Male	9	215
	Female	2	93
	Total	11	308
Nanded	Male	5	207
	Female	2	38
	Total	7	245
Dharashiv	Male	14	355
	Female	3	97
	Total	17	452
Parbhani	Male	10	576
	Female	1	41
	Total	11	617

8. Key Recommendations

1. **Emphasize water resources management in micro-planning:** It is important to focus more on the water resource management plan in the micro-action plan of the village. The project area is water scarce and there is a possibility of availability of canal water from nearby reservoirs. Farm ponds are the most desired activity in the area which has brought uncultivated areas under cultivation as water is available now. In the next phase, the focus should be kept on such activities together with water conservation, harvesting, and utilization.

2. **Empower Community-Based Organizations (CBOs):** It has been observed that the project benefits are reaching majorly to larger and more well-off farmers among the beneficiaries. To address this, there is a need for the project to actively engage and empower Community-Based Organizations (CBOs) such as Village Climate Resilience Management Committees (VCRMCs), Farmer Interest Groups (FIGs), Self Help Groups (SHGs) and Farmer Producer Companies (FPCs).

3. **Promote linkage with financial institutions:** Most of the project interventions require significant capital investments. Small-scale landholding farmers express a strong desire to participate and reap the advantages, but they encounter obstacles in gathering the initial funds. For example, there is a huge demand for sprinkler sets in the villages, however, due to the non-availability of finance and the time-consuming process of subsidy reimbursement, most farmers are deprived of this water and labor-saving technology. Thus, a recommendation is put forth to establish connections between these farmers and formal financial institutions, enabling them to secure loans at more affordable interest rates. This step would facilitate their engagement in the project and alleviate the financial barrier they currently face.

4. **Capacitate Farmers' Field School (FFS):** Special attention needs to be directed towards encouraging farmers' active participation in Farmers' Field School (FFS) sessions. Organizing exposure visits to successful and progressive farmers' plots can serve as a source of motivation for other farmers to take on the role of host farmers. Ensuring punctual disbursement of honorariums or transparently communicating their status can contribute to maintaining a positive relationship between the FFS and its host farmers and fostering goodwill within the farming community. Additionally, a strong emphasis on enhancing the skill set of FFS facilitators is essential, underscoring the importance of their capacity building.

5. **Offering guided assistance to Farmer-Producer Companies (FPCs):** It is crucial to provide guided assistance to Farmer Producer Companies (FPCs) through a comprehensive capacity-building program focused on business development. The absence of a strong business plan has resulted in limited success for these organizations, potentially leading to reduced member enthusiasm over time. To address this, it's crucial to offer handholding support during the initial phase to guide FPCs toward financial sustainability. The proposed initiative includes orientation and training sessions that emphasize value addition for produce, covering storage, transportation, and marketing. This would benefit FPC members. Creating market linkages is essential, and the establishment of localized value chains for different products could boost their value, increase income, and provide carbon credit benefits to farmers. Additionally, the idea of developing a digital platform for FPC members and stakeholders is suggested. Such a platform would enhance FPC management, improving operational efficiency and effectiveness.

6. **Enhance compliance with environmental safeguards:** It is recommended to conduct separate orientation and training on environmental safeguards and their compliance of key stakeholders including beneficiary farmers, project staff, VCRMCs, project-supported FPCs, SHGs, and FIGs. Different ways of promoting environmentally friendly interventions like organic farming, controlled grazing, plantation, etc. should also be promoted.

7. **Promote renewable/ solar energy initiatives:** Farmers have reported concerns about the inconsistent and insufficient electricity supply, which restricts pumping hours and negatively affects crop production. This irregular power supply hinders timely water application from available wells, leading to inefficiencies. Additionally, electricity being supplied during nighttime in certain weeks proves inconvenient for optimal system operation and poses safety risks for

farmers. Considering these challenges, it is recommended to explore alternative sources of electricity like solar energy.

8. **Promote initiatives for the sustainability of project interventions:** Ensuring the sustainability of project interventions stands as a critical concern within PoCRA. Field observations underscore that farming communities prioritize economic outcomes over environmental considerations. Therefore, it is recommended that the project staff should start emphasizing and sensitizing the local communities about the project's sustainability, and intervention strategies should be reviewed from the sustainability angle of the project interventions.

Annexure 1: List of Sample Project and Comparison Villages

Cluster code	District	Subdivision	Taluka	Census code	Village	Project/ Comparison	Phase
515_gv-53_01	CSN	CSN	Paithan	549521	Tanda Kh.	Project	3
515_gp-5_01	CSN	Sillod	Sillod	548611	Pirola	Project	2
515_te-28_01	CSN	Sillod	Soegoan	548441	Nimbhora	Project	2
515_gp-1_01	CSN	Sillod	Kannad	548262	Mehun Puranwadi	Project	2
515_gv-44_02	CSN	Sillod	Kannad	548327	Rithi	Project	2
523_sa-5b_03	Beed	Beed	Ashti	558845	Kanadi Bk.	Project	3
523_mr-18_01	Beed	Ambejogai	Ambejogai	560027	Selu Amba	Project	2
523_sa-11_03	Beed	Beed	Ashti	558836	Nimgaon Chaubha	Project	3
512_gv-92a_02	Hingoli	Hingoli	Basnath	546335	Rajawadi	Project	2
512_gp-63_04	Hingoli	Hingoli	Basnath	546276	Adgaon	Project	2
512_gp-60_01	Hingoli	Hingoli	Aundha Nagnath	546014	Matha	Project	2
514_te-6b_01	Jalna	Jalna	Bhokardam	547262	Mehgaon	Project	3
514_gv-63_02	Jalna	Partur	Gahansawangi	547962	Bhadregaon	Project	3
514_gv-60_02	Jalna	Partur	Ambad	547838	Dhalaskheda	Project	3
514_gp-26_01	Jalna	Partur	Ambad	547815	Wadi Siradhon	Project	2
514_gp-41a_01	Jalna	Jalna	Jalana	547625	Borgaon	Project - NRM	1
524_mr-39_01	Latur	Udgir	Chakur	560485	Gharni	Project - NRM	3
524_mr-18_02	Latur	Latur	Renapur	560229	Andalgaon	Project - NRM	1
524_mr-45_05	Latur	Latur	Nilanga	560870	Tambalwadi	Project	2
511_npg-5_01	Nanded	Kinwat	Hadgaon	544542	Kharbi	Project	2
511_gv-104_01	Nanded	Nanded	Loha	545227	Dapshed	Project	3
525_sa-29a_04	Dharashiv	Bhum	Paranda	561103	Loni	Project	2
525_bm-131_02	Dharashiv	Dharashiv	Tuljapur	561619	Devsinga Nal	Project	2
525_sa-34_02	Dharashiv	Dharashiv	Tuljapur	561530	Dhekri	Project	1
525_mr-9_02	Dharashiv	Bhum	Kalamb	561299	Hawargaon	Project - NRM	3
525_mr-22_02	Dharashiv	Dharashiv	Dharashiv	561485	Borgaon raje	Project	3

Cluster code	District	Subdivision	Taluka	Census code	Village	Project/ Comparison	Phase
513_gp-43_02	Parbhani	Parbhani	Sailu	546498	Tidi Pimpalgaon	Project	2
513_gp-37_04	Parbhani	Parbhani	Sailu	546483	Ravalgaon	Project	2
513_gp-48_01	Parbhani	Parbhani	Jintur	546528	Kawi	Project - NRM	1
513_gp-62_03	Parbhani	Parbhani	Parbhani	546779	Paralgavhan	Project	2
515_gp-17'_01	CSN	CSN	CSN	548901	Pimpri Bk	Comparison	
515_gp-1_03	CSN	Sillod	Kannad	548280	Jamdi (ja)	Comparison	
523_gv-56_01	Beed	Manjlegaon	Georai	559097	Patharwala kh.	Comparison	
523_gv-64_01	Beed	Manjlegaon	Georai	559138	Kolher	Comparison	
512_ppg-1_01	Hingoli	Hingoli	Sengoan	545717	Wadhona	Comparison	
512_ppg-5_01	Hingoli	Hingoli	Hingoli	545976	Hanwatkheda	Comparison	
514_gp-27_01	Jalna	Jalna	Jafferbad	547442	Rupkheda Kh	Comparison	
514_gp-14_02	Jalna	Jalna	Bhokardam	547370	Hasanabad	Comparison - NRM	
514_gp-9_01	Jalna	Jalna	Badnapur	547688	Bhakarwadi	Comparison	
524_mr-39_02	Latur	Udgir	Chakur	560474	Kadmuli	Comparison - NRM	
511_mr-64_01	Nanded	Deglur	Deglur	545607	Malegoan	Comparison	
525_mr-10_02	Dharashiv	Bhum	Kalamb	561369	Sanjitpur	Comparison - NRM	
525_sa-33_05	Dharashiv	Dharashiv	Dharashiv	561457	Dharashiv	Comparison	
513_gv-89_03	Parbhani	Parbhani	Gangakhed	547021	Margalwadi	Comparison	
513_gv-83_03	Parbhani	Parbhani	Sonpeth	546935	Lohigram Tanda	Comparison	

Annexure 2: Verification of Agribusiness Assets

SN	District	Village	FPC Name	Remark	Photo
1	CSN	Rewoolgaon	Shri Ganesh Farmer Producer Company	The equipment was found in good condition and presently in use. Date: 12/06/23 Time: 15:58 Lat: 20.38951 Long: 75.22877	
2	Jalna	Sevali	Baliraja Farmer Producer Company	The equipment was in good condition and presently in use. Date: 13/06/23 Time: 17:31 Lat: 19.81512 Long: 76.26511	
3	Wardha	Lingapur	Sapna Farmer Group	The equipment was found in good condition and operational Date: 22/06/23 Time: 10:54 Lat: 19.39561 Long: 77.73433	 
4	Latur	Limbala	Farmer Producer Company	The atta mill was found in good condition and operational. Date: 21/06/23 Time: 12:51 Lat: 19.68674 Long: 77.10666	

SN	District	Village	FPC Name	Remark	Photo
5	Beed	Rajiv Nagar	Farmer producer company	The equipment was found in good condition and operational. Date: 16/06/23 Time: 16:59 Lat: 18.95922 Long: 75.74272	 
6	Beed	Mudegaon	Narsingh Farmer Producer Company	The equipment was in good condition and operational. Date: 16/06/23 Time: 11:20 Lat: 18.62593 Long: 76.39134	
7	Latur	Udgir	Farmer Producer Company	Godown was found in good operational condition. Date: 24/06/23 Time: 10:31 Lat: 18.16787 Long: 76.8174	
8	Latur	Rajewadi	Zaheer Agro Producer Company	The equipment was found in good operational condition. Date: 24/06/23 Time: 14:19 Lat: 18.08762 Long: 76.87628	

SN	District	Village	FPC Name	Remark	Photo
9	Latur	Kharola	Farmer Producer Company	The equipment was available and was in good operational condition Date: 24/06/23 Time: 15:01 Lat: 18.51114 Long: 76.6577	
10	Nanded	Telki	Telki Farmer Producer Company	The equipment was found in good operational condition. Latitude and Longitude could not be captured due to the network	 

Annexure 3: Field Visit Notes of Team Leader and M&E Expert

As part of the 9th concurrent monitoring round of the PoCRA project, between 7th to 9th June 2023, selected villages in Chhatrapati Sambhaji Nagar (CSN) and Jalna districts were visited by the Team Leader & M&E Expert.

Key Observations

- The project's focus has shifted towards emphasizing the utilization, impact, and sustainability of the interventions. Initially, the emphasis was on establishing the system and streamlining processes.
- The project interventions have now been firmly established. The community is well-informed about the application, disbursement, and utilization processes for the benefits.
- Community members have expressed concerns about the delayed disbursement of the subsidy component, leading to challenges for them. Incurring a high initial investment cost, they took loans with the expectation of timely disbursement after submitting their bills. However, due to these delays, interest payments are accumulating.
- The Village Community Resource Management Committees (VCRMCs) are functioning effectively, although the issue of non-payment or delayed payment to Krushi Tai persists.
- As per feedback from the community, the online application portal for accessing benefits under PoCRA has been user-friendly. Almost all beneficiaries reported a smooth experience when it came to registering and applying for matching grants through the online portal.

Key Recommendations:

1. ***Emphasis on Intervention Sustainability***: As the project nears its conclusion, a pivotal focus should lie in empowering community institutions such as VCRMCs, FPCs, and SHGs to autonomously take and execute decisions. Equally essential is their exploration of alternative avenues for financial support through institutional partnerships. Leveraging the project's demonstrated successes, garnering financial support from institutions, or securing loans should be relatively feasible.
2. ***Addressing Disbursement Bottlenecks***: Recent observations indicate a slowdown in the disbursement of subsidies (DBT). Community members have highlighted that there's a notable delay in the progression of files at specific stages. It is imperative to identify the underlying reasons for this delay and subsequently enhance the efficiency of the disbursement process.
3. ***Establishing linkages with Financial Institutions***: A significant proportion of the project interventions entail substantial capital investment, often exceeding the means of small or medium-scale farmers. Consequently, they often resort to private investors who levy high charges. Therefore, it is crucial to facilitate connections with formal financial institutions that can provide loans at more favorable interest rates.
4. ***Convergence with other Government Schemes***: Recognizing that not all project beneficiaries can access PoCRA interventions, particularly agricultural assets, efforts should be directed towards aligning with other existing government schemes. This would broaden the reach and impact of the interventions, ensuring a wider distribution of benefits.

<u>Detailed Visit Report</u>

Participation in Training to Survey Team

I participated in the training session for survey teams, which were divided into separate groups for quantitative and qualitative surveys. Over the initial two days, we meticulously reviewed each survey question and addressed any queries or uncertainties raised by team members. On the final day, we engaged in a practical exercise involving mock interviews and role-playing scenarios. Here, team members assumed the roles of enumerators and community members, guided and supported by the Sambodhi team and field

supervisors. This activity proved invaluable in resolving doubts and enhancing their preparedness for the impending field survey.

Subsequently, I joined the survey team in the field the following day, observing them as they conducted real-time surveys and interviews. This experience not only provided me with valuable insights into the field conditions but also afforded me a deeper comprehension of the proficiency exhibited by our field team in executing surveys and interviews effectively.

Discussion with VCRMC members at Dudhad:

The VCRMC members expressed their positive views on how PoCRA has remarkably benefitted nearly every individual in the village. From a total of 1977 applicants for Direct Benefit Transfer (DBT) in this village, 470 received pre-approval, and 373 were granted the subsidy. The Sarpanch reported that initial enthusiasm among villagers was high, but the rate of pre-approval was hindered by the inability of many to submit all necessary documents. Inquiries into the disparity between pre-approval and disbursement revealed various factors, with the most significant being the villagers' struggle to gather the required finances to initiate the activities.

Within this village, the highest disbursements were allocated to drip irrigation (158 beneficiaries) followed by horticulture plantation (124). Polyhouse and shadenet beneficiaries were minimal, with only 2 and 4 beneficiaries respectively. The primary reason for the limited number of applications and disbursements was attributed to the considerable initial costs, compounded by the farmers' challenges in securing the necessary funds.

The VCRMC members expressed curiosity about the project's future and its next phase. Members were asked whether the same level of support was still necessary for them. With an emphasis on the fact that the project has illuminated a path for them, the VCRMC members were to utilize the knowledge and accomplishments gained from the project's guidance and implementation to progress independently.

Discussion with VCRMC members at Konewadi and Jalgaon Feren:

The VCRMC, an established entity with 13 members working together for several years, noted a change in disbursement speed. They recalled that disbursements were initially quicker, taking around 2-3 months after final bill submission. However, delays have become pronounced now. For instance, Mr. Pundlik Namdev, a villager, completed his sericulture project and submitted the final receipt 9 months ago, yet his disbursement remains pending.

Highlighting the situation, the VCRMC explained that a majority of villagers have resorted to high-interest unsecured loans, and the extended disbursement timeline is placing severe financial strain on them. The primary delay, as revealed by the VCRMC, is centered around desks 5 and 6. They also mentioned the inconvenience caused by different point persons at each table, necessitating multiple follow-ups. Their suggestion is to implement a Single Window scheme similar to those in banks and other institutions, where a single designated point person could streamline communication. This, they believe, would greatly enhance efficiency by allowing a knowledgeable and responsive point person to promptly address their queries.

Similar observations were made by the VCRMC members in Jalgaon Feren village regarding disbursement delays for DBT. The Sarpanch, Mr. Sandeep J. Shelke, expressed concern that these delays are causing a decline in farmers' interest and engagement with the project.

Performance of Krishi Tai

In the four project villages that were visited (Dhaod and Konewadi in C.S.M Nagar, and Tupewadi and Bawnepangari in Badnapur taluka of Jalna), high appreciation was expressed by the VCRMC members and villagers towards the Krushi Tai. It was observed that Krushi Tais have been successful in integrating with the women members and have been able to establish themselves as akin to family members within most households. Nonetheless, a notable challenge that persists is the delay in providing an honorarium to the Krushi Tai. For instance, residents of Bawne Pangari shared that the previous Krishi Tai (Ms. Chayabai G. Joshi) might have left due to a lack of honorarium, and the present Krishi Tai (Sumanbai) is grappling with a similar predicament.

Benefits from Drip Irrigation

I visited two farmers who have drip irrigation facilities. In Bawne Pangari, Mr. Sharad P. Bawne has implemented drip irrigation across his 2-acre farmland. In the previous year, he cultivated cotton followed by wheat, achieving yields of 20 quintals per acre for cotton and 15 quintals per acre for wheat. When inquired about his pre-drip irrigation yields, he explained that he used to exclusively cultivate cotton during the Kharif season, with uncertain outcomes. He estimated a maximum yield of 10-12 quintals per acre. With the introduction of drip irrigation, his income has significantly multiplied — approximately 4-5 times — owing to the doubled yield and the opportunity to cultivate two crops instead of one. Mr. Sandeep Prabhu Shinde, another farmer from the same village, shares a similar narrative. He too has embraced fruit plantation through the utilization of drip irrigation.

Benefits from Shade-net:

The success stories of farmers with shade-net are truly inspiring which I have covered as case studies given below:

<u>Case Study – Sanjay Bawane – Shade-net</u>

An evident query that arose was how farmers manage the substantial costs associated with shadenet and polyhouse. According to PoCRA guidelines, farmers must complete the structures and submit final bills, with the subsidy disbursed only after bill verification and physical inspection.

While some financially well-off farmers could arrange funds from family and friends, the plight of the majority—small and poor farmers—remained uncertain. In my previous visits, I had encountered whispers about contractors offering their assistance by taking a modest initial sum from farmers, with the remainder settled after subsidy release. Yet, no one was willing to divulge their experiences.
However, during my recent visit to Bawane Pangari in Badnapur block of Jalna, a contractor named Mr. Sanjay Bawane agreed to share his story. He had ventured into this role but eventually ceased the service.

Mr. Sanjay Bawane (pictured far left) operates a modest shop in Badnapur. During the initial stages of PoCRA, he recognized the financial hurdles tied to shadenet, polyhouse, and other project endeavors. He identified an opportunity as a service provider and sought support from friends, securing a subsidized loan. He also negotiated discounted rates with suppliers for prompt payments. Conversations with farmers led to an agreement: a down payment (around 15%-20%) and a commission for installing the shadenet or polyhouse. The understanding was that farmers would settle the remaining amount once their PoCRA subsidy was received.

Initially, Mr. Bawane prospered as PoCRA promptly released subsidies within 3-4 months. However, recent disbursement delays have been extensive. Having borrowed funds with interest from friends, the accrued interest surpassed his earnings through commissions. Mr. Bawane highlighted that he's not alone; numerous contractors and service providers like him have refrained from such undertakings due to these challenges.

Annexure 4: Field Visit Notes of Agribusiness Expert

Details of the Field Visit by the Agribusiness Expert

Day 1 (July 10th, 2023):

1. ***Prathisthan Reshim Farmer Producer Company*** (Registered on 18.06.2018 with Registration No. U0110MH2019PTC326910) - a women-led FPC engaged in the Sericulture business.
2. ***Sai Vitthal Farmr Producer Company Limited*** (Registered on 12-11-2020 with Registration No. U01100MH2020PTC350065) - engaged in Custom Hiring Farm Machinery business.

Day 2 (July 11th, 2023):

3. ***Jamuvant Agro Producer Company Limited*** (Registered on 28.09.2018 with Registration No. U01100MH2018PTC314633) - engaged in mixed (Storage and agriculture input) business.
4. ***Agricross Smart Farmer Producer Company*** - engaged in Custom Hiring Farm Machinery business.
5. ***Tvarita Agritech Farmer Producer Company Limited*** - engaged in Goat Breeding business

Key Findings

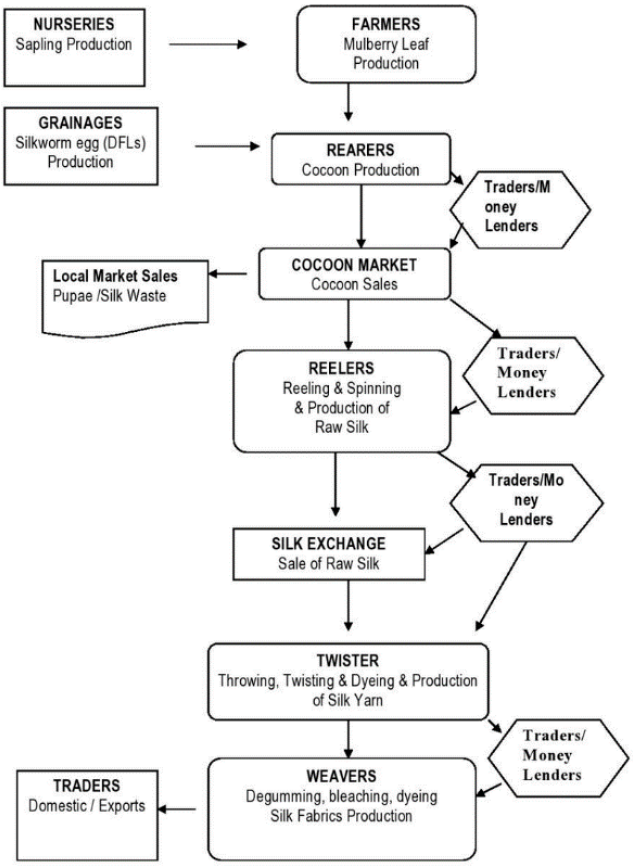
- The sericulture business exhibits a year-round engagement that sustains the interest of all the participants. Women are positioned as decision-makers, steering business choices aligned with market demands. Their endeavors serve as inspiration for other community members, encouraging them to step forward and foster community business.
- Women channel their earnings into asset creation. Notably, one member used her additional income to purchase a plot of land. Others invested in house construction, while a significant portion directed their earnings toward healthcare services and their children's education.
- The operational window for the CHC in the case of sericulture is limited. Unfortunately, due to a limited number of available machines, the rapid spikes in demand cannot be met effectively. Furthermore, after the season concludes, the maintenance of these machines becomes a complex challenge. The cost of operating these machines remains notably high due to elevated fuel costs and expenses related to operators.
- During periods of peak demand, the CHC faces constraints in adequately serving the requirements of all its members, resulting in dissatisfaction among the participating farmers. Conversely, during periods of lower demand, the machinery remains idle and unused.
- As an independent enterprise, the CHC lacks viability. To enhance its sustainability, it should be integrated with other operations, such as input supply or processing activities.
- The warehouse function typically fails to engage all members effectively. There exists an opportunity to serve all members by supplying agricultural inputs.
- Goat breeding emerges as a highly lucrative endeavor provided herd health is meticulously managed. The absence of readily available doorstep veterinary services introduces an element of risk to this venture.

Key Recommendations

- A capacity-building initiative focusing on the development of Business Plans is essential for the members of Farmer Producer Companies (FPCs). The absence of well-structured business plans has led to FPOs attempting various activities without achieving significant success. This approach could potentially result in waning interest over time and potential disengagement of farmers.
- FPCs should strategize their business activities to engage members consistently throughout the year. Activities such as godown and CHC, which involve members for short periods, could contribute to the development of disinterest among the members. This circumstance can result in a scenario where the Board and members operate in isolation, lacking effective collaboration.

- The project should consider the development of a digital platform to facilitate the management of FPO members and other stakeholders. Such a platform would enhance the operational efficiency of FPOs.
- Initiatives like goat rearing demand the assistance of services like veterinary support. Therefore, the development of such businesses should be strategically planned and executed within a value chain framework. This approach would allow for the engagement of business enablers based on specific needs.

Sericulture Value Chain



Prathisthan Reshim Farmer Producer Company purchases DFL boxes containing 50 DFLs (each DFL containing 600 eggs) from Silk Board at the rate of Rs. 13 per DFL (total Rs. 800/- per box including transportation cost of Rs. 150/- per box). These eggs are incubated for 4-5 days at a 26-degree temperature and 80 percent relative humidity in a brushing tray. One brushing tray costs Rs. 100 and can be used multiple times. Eggs are kept in a brushing tray before 48 hours of hatching and covered with tissue paper and black cloth. This process is known as black boxing. After 48 hours of black boxing tissue papers are removed and eggs are covered with a brushing net. The cost of the brushing net is around Rs. 10/- per net. 30-35 days-old mulberry leaves are chopped and placed over the net. The larvae move over and feed on mulberry leaves. The larvae are fed twice a day. After 3 days/ 6 feedings the first instar larvae come out which goes into the second molt after 5-6 feedings. The second instar larvae are distributed to member farmers.

Farmers place these second instar larvae on the rack and feed them 6-7 times to get the third instar and 8-9 times to get the fourth instar. The fourth instar is fed 14 times or seven days to convert into a cocoon. In 4-5 days, the cocoon gets maturity and is sold in the Jalna, Beed, and Ramnagar markets.

The unit can breed 8000 DFLs at a time. 100 DFLs produce 80 Kg Cocoon which is sold at the rate of Rs. 3000 per kg. If the unit operates at full capacity, 2.4 lakh cocoons can be produced from a single batch. The FPC saves around Rs. 40, 000/- per batch. In a year, breeding is conducive from June to March/April giving away 28-30 batches with a saving potential of Rs. 11.20 lakh to Rs. 12 lakh.



Pictures (from left to right):
Smt. Mangal Santosh Waghmare
DFL pack
Brusingh Tray
Brushing Net

Annexure 5: Field Visit Notes of Agronomy Expert

As part of the 9th concurrent monitoring round of PoCRA, an Agronomy expert visited four villages each in the Beed and Latur districts of the Marathwada region from 16th to 18th July 2023. The objective was to assess the impact of the project intervention by collecting information concerning various issues and agricultural technologies adopted by the farmers/group of farmers in those villages as part of the PoCRA project.

The implementation of various agronomic technologies took place in four selected villages, considering factors such as soil types, available resources of the beneficiaries, prevailing climatic conditions, and management challenges in those districts. However, the intensity of implementing Climate Resilience Technologies varied across the villages due to constraints faced by individual farmers.

The list of agronomic technologies implemented in the selected districts includes the following:

i. BBF technology for Soybean cultivation in deep, medium, and light soils.
ii. Improved seed varieties.
iii. Contour furrow and bund cultivation.
iv. Intercropping.
v. Integrated pest and nutrient management.
vi. Mulching.
vii. Conservation tillage.
viii. Protected cultivation.
ix. Micro-irrigation (drip and sprinkler).
x. Farm pond

However, the implementation of these activities through agricultural departments faced delays, resulting in many eligible farmers not receiving the full benefits on time. Consequently, they requested an extension of the PoCRA Project beyond March 2024.

Key observations/findings:
To assess the impact of the project, information was collected from farmers and farmers' groups. The relevant findings and discussions from these interactions are summarized below:

Adoption of CR technologies: Farmers in the area have embraced several Climate Resilience Technologies to enhance their agricultural practices. These technologies include BBF for Soybean cultivation, utilization of improved seed varieties, adoption of farm mechanization, the use of pipes for surface irrigation to reduce conveyance loss, implementation of drip irrigation and sprinkler irrigation systems, the establishment of shadenets and polyhouses, engaging in horticulture and floriculture, creating individual farm ponds, and lining the farm ponds to prevent water seepage.

Notably, the implementation of pipes, sprinkler systems, drip irrigation, and seed multiplication components has been carried out with remarkable intensity. As a result, their positive impact is readily evident.

Agronomic benefits gained by the farmers: The farmers have experienced significant benefits, especially from the shadenet unit, seed multiplication program, and the implementation of pipes and pressurized irrigation systems. These specific components have proven to be particularly advantageous, leading to substantial positive outcomes for the farmers. Additionally, other components of Climate Resilience Technologies have also brought benefits to the farmers, and these benefits are closely linked with the aforementioned activities.

Improvement in yield due to the adoption of CR technologies: Indeed, the implementation of the pressurized irrigation system and other important technologies has resulted in visible improvements in both crop yields and water conservation. These advancements have positively impacted the agricultural productivity and efficiency of the farmers. Moreover, the adoption of shadenet/ polyhouse techniques and the seed multiplication of improved varieties have played a crucial role in substantially increasing the net income of the farmers. These interventions have proven to be particularly effective in enhancing profitability and providing economic benefits to the farming community.

Improved climate change adaptation and coping mechanism: The farmers were found to be well-informed about the various technologies adopted to address different climatic constraints. However, during the kharif season of 2023, most farmers faced challenges with a delayed onset of monsoon, resulting in the late sowing of soybean and other field crops in the first week of July 2023. To mitigate the impact of such climatic variations, it is recommended to apply 20-25% extra nutrients along with implementing best crop management practices. This approach can potentially enhance crop growth and compensate for the yield loss caused by late sowing. Additionally, adopting an intercropping system may prove beneficial in recovering yield losses. Intercropping involves growing two or more crops together in proximity, which can help maximize productivity and reduce the risk associated with climate-induced fluctuations.

Looking ahead to the ensuing rabi season of 2023-24, farmers are advised to widely adopt the pressurized irrigation system for Bengal gram (chickpea, especially under seed multiplication) and high-value cash crops. This technology will enable the farmers to recover from crop losses resulting from delayed sowing and early withdrawal of the monsoon. The pressurized irrigation system can efficiently supply water to crops even during challenging climatic conditions, ensuring better crop growth and yields.

Positive behavioral changes in Agricultural practices: The beneficiaries were observed to have embraced advanced and well-established agricultural practices intending to enhance their overall income. By adopting these innovative techniques, they sought to improve their agricultural productivity and profitability, resulting in a positive impact on their income levels.

Resilience to absorb climate shock: The beneficiaries demonstrated a proactive approach in navigating through adverse climatic conditions. They were found to be well aware of the potential risks associated with adopting new technologies, especially in the face of severe crop damage. However, despite the challenges posed by the delayed monsoon during the ongoing Kharif season, they have remained vigilant and resilient.

Due to the reduced area under cultivation in the current Kharif season, the farmers are considering increasing the cultivation area during the upcoming rabi season. This decision is contingent on the availability of adequate monsoon rainfall, which is essential for recharging the groundwater reserves. If the monsoon brings sufficient rainfall and replenishes groundwater levels, the farmers will be able to exploit the resources effectively during the rabi season. This strategic approach allows them to adapt and optimize their agricultural activities based on prevailing climatic conditions.

Soil Types and Rainfall Distribution Pattern of the Visited Districts

In both districts, a significant portion of cultivated land consists of shallow black soil with a depth of up to 63 cm and deep black soil with a depth of up to 110 cm. The clay content in shallow soil ranges from 33% to 51%, while deep black soil contains 62.3% to 66.5% clay[16]. The shallow soil has low water

[16] Soils of Maharashtra, NBSS LUP publication 2012

storage capacity and limited nutrient availability, making it challenging for crops to sustain during dry spells. In contrast, deep black soil supports crops even during dry periods due to its better water retention and nutrient content. The distribution of soil types in the two districts is given below:

Table 1: Soil types in Beed and Latur

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	Beed	29.53	11.62	58.85

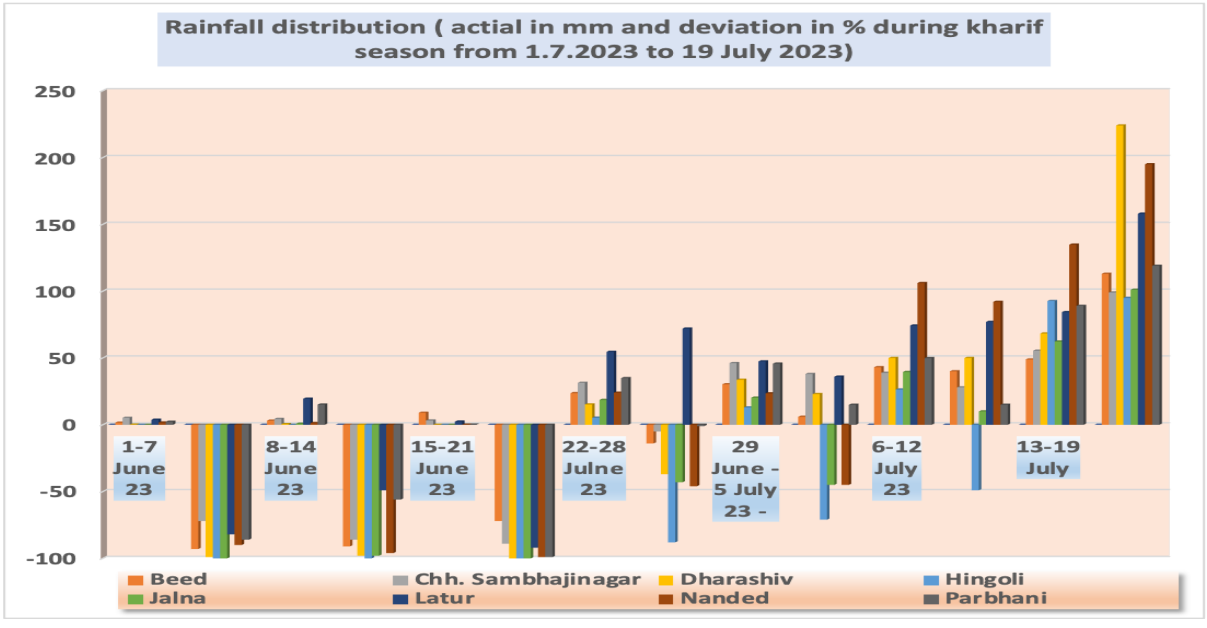
Considering the soil conditions, farmers grow shallow-rooted crops like sorghum, soybean, urd, and moong in shallow black soil. Soybean is also commonly grown in medium soil. Sugarcane dominates in black soil due to its ability to thrive under long dry spells. During the kharif season, soybean is a major crop, covering about 80% of the cultivated area. However, soybean productivity is relatively low in these districts. After harvesting kharif crops, farmers cultivate chickpea, wheat, and pre-rabi jowar using available irrigation sources.

In deep black soil, sugarcane is the main crop due to its ability to withstand extended dry periods. Nevertheless, the average sugarcane production remains modest at around 35-40 tons per acre.
To address these challenges and improve crop yield and farm income, the PoCRA project introduced advanced agricultural crop production technologies and subsidiary enterprises in selected villages of these two districts of Maharashtra. This initiative has led to increased crop yields and enhanced income for the beneficiaries of both Beed and Latur.

Impact of CR Technologies:

Rainfall Scenarios

In the Marathwada region, the onset of monsoon typically occurs between the 11th and 16th of June each year, and farmers begin sowing their kharif season crops once they receive 75-100 mm of rainfall. However, in the kharif season of 2023, the monsoon was significantly delayed, arriving more than 15 days later than usual (Fig 1).



Due to the delayed monsoon, farmers in the region started sowing rainfed kharif crops from 29th July 2023 onwards. Fortunately, the crop stand was satisfactory despite the delayed sowing. To ensure a

successful crop yield despite the delay, farmers are now implementing improved crop management technologies.

To support the farmers in adopting these advanced technologies and to mitigate the potential impact of delayed sowing on crop yield, it is essential to provide them with timely and relevant crop advisories. These advisories should be disseminated through various digital platforms, ensuring that farmers receive the necessary guidance and information every week. This proactive approach will help farmers optimize their crop management practices and improve overall crop yield despite the challenges posed by the delayed monsoon.

Findings from Murud Village:

BBF Technology:

During a visit to Murud village on 16th July 2023, discussions were held with the Deputy Sarpanch, Gram Panchayat of Murud, FPO group, and farmers, including beneficiaries. The PoCRA project had implemented limited enterprises and agricultural production technologies in this village. These included drip irrigation (beneficiaries: 142), farm mechanization (2), individual farm pond (1), BBF technology (24), horticulture plantation/agroforestry (34), planting material in polyhouse/ shadenet (13), polyhouse (3), seed production (16), sericulture (2), shade net (17), and sprinkler systems (251). However, the consultant's assessment covered only a few of these units.

Regarding BBF technology, last year, it was adopted in a large area for soybean crops. However, during the kharif season of 2023, the cropped area under BBF was considerably reduced due to the non-availability of bund maker implements at the proper time. Most farmers started sowing immediately after receiving monsoon as the sowing was already delayed by more than 15 days. Some farmers mentioned that the subsidy of Rs. 400 per acre for sowing soybean under BBF had been withdrawn by the agriculture department. Consequently, many farmers opted for the flatbed system and used hand-operated dibbling implements for Rs. 7000 per implement, with a sowing rate of Rs. 100 per acre. This dibbler allowed them to complete about 2 acres of area in one hour. In the BBF planting system, they sowed two/three/four rows with a crop geometry of 40-45cm x 15 cm, followed by a wide furrow of 60 cm to drain excess rainwater and avoid waterlogging and crop damage.

During this year, approximately 100 acres of land were covered under BBF and 25 acres under the ridge and furrow system. The rest of the soybean area used the flatbed system.

To assess the impact of BBF, data was collected from a group of farmers regarding the cost of cultivation and economic benefits derived from BBF planting methods. Detailed information can be found in Table 2.

Table 2: Comparative performance of soybean under BBF and flat-bed system

Performance indicator	BBF planting	Non BBF planting
Crop yield	12 -13q/acre	5-7 q/acre
Seed rate	13-15 kg /acre	25-30 kg/acre
Spacing (raised bed 1.50 m followed by 60 cm furrow)	Four lines were used with a row spacing of 40 cm and plant spacing of 15 cm	45 cm row-to-row and 15 cm plant-to-plant spacing.
Drip Irrigation during the dry spell	One drip lateral was used for irrigating 4 crop rows. However, they did not elaborate on the quantity of irrigation water applied	Rainfed
Cost of cultivation (Rs /acre)		
Seed cost	Rs 1300-1500	Rs 2500-3000

Performance indicator	BBF planting	Non BBF planting
Fertilizer	Rs 1500	Rs 2000
Sowing	Rs 1000	Rs 1200
Pesticides used	Rs 1600	Rs 1800
Drip irrigation cost	Not furnished	Not applicable
Intercultural operation and manual weeding	Rs 2000	Rs2000
Labor charge (Harvesting)	Rs 2500	Rs 3000
Threshing	Rs 1200	Rs 1200
Cleaning	Rs 50/q =Rs 600-650	Rs 250-350
Transportation charges to MPAC (Village is 35 km from Latur)	Rs 2500-Rs 3000	Rs 2500-3000
Total expenditure	**Rs 14200-16250**	**Rs 16450-17550**
Gross return at rate of Rs 4300 per quintal	**Rs 51600-55900**	**Rs 21500-30100**
Net return	**Rs 37400-39650**	**Rs 5050-12550**

According to the farmers' accounts, the gross return from the BBF system is significantly higher, ranging from 1.5 to 2 times greater than that of the flat-bed planting system. This indicates that **adopting the BBF system has resulted in higher crop yields and increased profitability for the farmers**.

Considering the positive impact of the BBF system on crop production and income generation, it is recommended that the system be disseminated more widely among farmers. To incentivize its adoption, providing a subsidy of Rs 400 per acre could be an effective measure. This subsidy would serve as an encouraging incentive for farmers to implement the BBF system, leading to enhanced agricultural productivity and improved economic outcomes for them.

a) BBF Planting in Soybean in Murud Village

b) BBF planting at Radi Village.

c)Flat- bed system in Yelda village (organic farming), Beed, d) BBF planting in Borgaon village(Latur).

e) Soybean dibbler at 6-inch distance (plant-to-plant)

Organic Cultivation of Soybean under BBF Planting System and Seed Multiplication:
In the village of Murud, 22 farmers have adopted the BBF planting system for soybean crops, utilizing organic fertilizers such as Earthworm compost, Neem ark, and Jeevamrut. They are selling their produce to the registered FPO/Society and earning an additional Rs. 200-300 per quintal, surpassing the MSP rate or the current market rate. However, there have been delays in receiving payments.

During the rabi season, the same BBF planting system is used for growing chickpeas, which are irrigated through drip and sprinkler systems. The farmers sell their organically produced chickpeas to the registered society. Some farmers engage in seed multiplication programs and sell their produce to MAHABEEJ, earning 25% extra income. However, the quality of their seeds sometimes gets rejected by MAHABEEJ due to not meeting the standard quality criteria. The farmers were advised to improve the quality of their farm produce to meet MAHABEEJ's standards and avoid rejection.

In the deep black cotton heavy soil, the BBF planting method is recommended to address poor internal drainage and crop damage caused by standing water. It is also suggested to adopt the BBF method for other seasonal kharif crops in areas with poor drainage to increase cultivation in deep black cotton soil.

Shadenet /Polyhouse:
One of the shadenet and polyhouse units owned by Nagnath Namdeo Chaudhary and Smt. Vaijantabai Nagnath Chaudhary was visited. The polyhouse measures 60m x 68m, while the shade net unit spans 56m x 60m. In the polyhouse unit, they cultivate seedlings of various vegetable crops such as Brinjal, Tomato, Chilli, and Cucumber. Once the seedlings reach 30-35 days old, they sell them at Rs. 1 per seedling. They grow seedlings of all vegetable crops ten times a year, generating significant earnings. Additionally, they grow fruit crops like Mango and Coconut seedlings, which are sold to farmers when they reach three years of age.

In another unit, they cultivate mulberry sets for sericulture purposes. Besides, they produce single-eye bud sugarcane seedlings of improved varieties and sell them to farmers at Rs. 2.50 each. Through these enterprises, the farmer achieves a gross return of Rs. 1 crore, with total expenses amounting to approximately Rs. 90 lakh and net returns of Rs. 10 lakhs. The total construction cost of the polyhouse was Rs. 57.5 lakh, of which PoCRA's share was Rs. 21.50 lakh and their share was Rs. 36 lakhs.

There is another shade net unit covering a 1-acre area, constructed with an expenditure of Rs. 41.27 lakh (with Rs. 18.27 lakh from PoCRA's share and Rs. 23.00 lakh from their contribution). The same farmer has been cultivating vegetable crops in this unit since 2021-22. This year, they have allocated a quarter of the area for mulberry sets, which are now ready for sale. Details of vegetable production, total income, and net income for the growing year of 2021-22 are provided below for reference.

Name of vegetable crop	Total fruit Yield (ton/ha)	Gross return Rs in lakh	Expenditure Rs in lakh	Net return Rs in lakh	Average Rate Rs /kg
Capsicum	25	5.60	3.00	2.60	22.40
Tomato	40	5.50	2.50	3.00	13.75
Cucumber	30	4.50	2.00	2.50	15.00

Currently, there are a total of 8 shadenet/ polyhouse units in Murud village. Out of these, 2 units have been installed with financial support from PoCRA. The beneficiaries of these polyhouse units are cultivating various vegetable crops and engaging in floriculture under controlled conditions. As a result, they are earning substantial income from their endeavors. Polyhouse with vegetable seedling and floriculture in shed net unit at Murud Village.

Farm Pond:
In 2021-22, the farmer received financial support from the National Horticulture Mission to construct a farm pond measuring 34m x 34m x 3m. The total construction cost was Rs. 6.50 lakh, with the farmer contributing Rs. 3.50 lakh and NHM providing Rs. 2.50 lakh. The farm pond is utilized to provide irrigation water to the polyhouse and shade net unit through a pressurized irrigation system.

The pond is regularly filled with well water through a pipeline, which extends 3500 ft from the existing pond. During the summer months, it takes approximately 2 months to fill up the pond using a 7.5 Hp electric pump. However, due to the low discharge rate of well water, particularly in the summer, it takes longer to fill the pond. This farm pond has played a crucial role in ensuring the farmer can harvest yields of all crops at their potential yield rate. Such structures are vital for the upliftment of rural communities and contribute significantly to enhancing agricultural productivity and water resource management.

Farm pond at Murud village near polyhouse, shade net unit, being used for irrigation. It is refilled with well water.

Mulching

Through the PoCRA project, plastic mulch technology was introduced to conserve water, suppress weed growth, reduce competition between crops and weeds for nutrients and water, and create an optimal root environment for crop growth. Farmers have implemented mulching both at the field level and in polyhouse/ shade net units for vegetable cultivation.

During a visit to two farmers' fields, it was observed that polythene mulching was used for newly planted chili and smooth gourd crops using 25-micron thickness plastic mulch for two crop seasons. Since it was the first year for these crops, specific outcomes were not yet available.

According to the farmers' comments, they are using a combination of water-soluble inorganic fertilizers and organic fertilizers (BVG) through fertigation. They are well aware of the benefits of mulching and the drip irrigation system, as they explained the advantages, such as water savings of up to 85%, reduced intercultural operations, increased fertilizer use efficiency, and weed suppression.

Based on these observations and farmers' feedback, it can be assumed that farmers are open to adopting various crop production technologies to enhance farm production and overall income, taking into consideration the changing climatic factors over time. The adoption of these technologies can lead to improved agricultural practices and increased resilience in the face of evolving climate conditions.

Mulching with the drip in the gourd and green chili

Farm Mechanization

The farm implements in a group, consisting of eleven members, are efficiently managed and used both by the members and on a custom hiring basis. The Director of the group highlighted that all farmers in the community are benefiting from the facilities created through the PoCRA project. In the first phase of the project, PoCRA provided Rs 30.00 lakh in January 2021, which was utilized to purchase various farm implements, including a tractor, threshing machine, plough, rotavator, drilling machine, BBF planter, cultivator, and reaper. Subsequently, in the second phase, they received Rs. 5.93 lakh, which was used to acquire a tractor trolley, sprayer, and mulching laying machine.

This active group is committed to supporting the farming community, providing their implements to needy farmers on a rental basis. The charges for their services are as follows: Rs. 1200/acre for ploughing, Rs. 1200 for sowing, and Rs. 1600 for rotavator per cycle. For threshing, they charge Rs. 150 for one bag of produce (50 kg each). For other smaller implements, they charge a minimum rate, although specific details were not reported.

By making their farm implements accessible to others on a custom hiring basis, the group contributes to the efficient use of resources, enabling farmers to access the necessary equipment for their field operations at affordable rates.

Photo: Farm Implements in Murud Village

Findings from Borgaon Village:

On 18th July 2023, Borgaon village was visited, and discussions were held with the Sarpanch, farmers, and other beneficiaries of the PoCRA project at the Gram Panchayat office.

Key findings from the discussion are summarized below:

- The implementation of the project in this village faced significant delays, but some farm activities were successfully carried out by the farmers.
- Out of the 21 farm activities planned, certain components were prioritized due to the semi-arid nature of the region and limited water availability. Sprinklers, drip irrigation, seed multiplication program, and pipes were given more importance, as they play a crucial role in conserving water and improving crop production.
- **BBF Technology:** About 50 acres of land in the village were cultivated using this method for soybean crops, resulting in higher yields compared to flat-bed systems. One farmer, Shri Shrikant Bharat Pawar, achieved a yield of 21 quintals per acre using BBF, while the flat-bed system yielded only 8 quintals per acre. The adoption of BBF increased seed yield by 162.5% and saved 16 kg of seeds, amounting to Rs. 1600 in cost. Farmers were advised to follow BBF planting and utilize manual dibblers available at the village level.
- **FPO:** The FPO (Farmer Producer Organization) in the village is functioning effectively and providing technical support to around 400 members. However, due to the delayed implementation of the PoCRA project, the outcomes have been limited so far.
- **Pipes:** The use of pipes for irrigation has been beneficial for farmers, as they have been able to increase their irrigated area during the rabi season with the same available water. This has resulted in reduced field application losses and increased field application efficiency to 100%.
- **Planting material for shadenet/ polyhouse:** Farmers in the village have taken the initiative to purchase planting material for shade net/polyhouse units using their resources. However, they are facing delays in receiving the promised subsidy money.
- **Shadenet:** About 8 farmers have constructed shade net units, but they have not yet received the expected funds for the past 6 months, as they reported. One of the farmers has successfully grown smooth gourd in this shade net unit, and the crop is currently in the fruiting stage. As this is the farmer's first crop in the shade net unit, there is no available data on the yield or monetary return at this point.
- **Drip Irrigation:** Approximately 100 farmers have submitted their requisitions for the system, but the proposal is currently pending at desk no.7. Meanwhile, in the shade net/poly house units, the drip system and fogger are being effectively used to maintain optimal humidity levels.
- **Mulching:** Around 10 farmers have already purchased and utilized mulching materials in both polyhouse and open field settings, primarily for vegetable crops. However, they are still awaiting payment from the PoCRA project for their investment.
- **Sericulture:** Three farmers have constructed houses for sericulture units, but the payment has not been disbursed yet. Despite this, they are managing the sericulture activities using their resources.
- **Integrated Pest & Nutrient Management:** The integrated pest and nutrient management components are being employed by farmers in various crops, both in open fields and shade net/poly house units. This approach has proven to be cost-effective, saving substantial amounts on nutrient application and pest control measures.

In a nutshell, farmers in Borgaon Village are embracing modern agricultural practices and utilizing various technologies to enhance their farming methods. However, the delayed subsidy disbursement and payments from the PoCRA project are posing challenges for them. Timely financial support is essential for farmers to continue effectively implementing these beneficial technologies and improving their agricultural practices. The delayed implementation has affected the overall results of the PoCRA project in the village, despite positive outcomes observed in certain farm activities. To ensure sustained progress, improvements are required in providing timely support and disbursing subsidies to the farmers.



Sericulture components: Mulberry plant and rearing house is under construction at Borgaon village.

Findings from Karkatta Village:
On 18th July 2023, Karata village was visited, and discussions were held with farmers and a Panchayat member at the Gram Panchayat office, with the objective to gather relevant information about the PoCRA activities. Unfortunately, the Agriculture Assistant and Cluster Assistant were unavailable for the meeting and field visit due to their prior assigned duties.

During the visit, there was light rainfall, which made it challenging to physically observe the ongoing demonstrations in the field. However, according to the Gram Panchayat member, the following activities were underway in the field:

- **BBF Planting**: Last year, a significant number of farmers adopted the BBF method and achieved higher seed yields of 12-15 quintals per acre compared to 8-9 quintals per acre in the flatbed system. Given that about 80% of the area is under soybean crops and the rest is cultivated with maize, archer, and jowar, the extensive use of the BBF method is recommended over the flatbed system.
- **Intercropping System**: To offset yield losses caused by severe moisture stress, farmers are implementing intercropping with 4 rows of soybean and 1-2 rows of red gram. This practice has resulted in good crop yields for the intercrop. However, this year, due to the delayed monsoon, there might be lower yields for both the main crop and intercrop due to insufficient residual moisture after the monsoon recedes.
- **Sprinkler and Drip Irrigation**: Many farmers have received and are using sprinkler and drip irrigation systems in both open fields and in polyhouse and shade net units.
- Unfortunately, the farmers in the village have neglected to avail subsidies for Farm Mechanization, FPO, Farm Ponds, Pipes, and other enterprises, both in the village itself and nearby villages.
- **Sericulture**: There are four units available, but they are still in the initial stages of receiving benefits through this unit.
- Furthermore, two dairy farms have been established in the village, providing vermicompost and decomposed cow dung for organic farming. However, immediate steps need to be taken to start organic farming on soybean and other field crops to effectively utilize decomposed cow dung.

In summary, various agricultural practices are being implemented in Karata village, including the successful adoption of BBF planting and intercropping systems. However, some areas require attention, such as availing subsidies for various enterprises and promoting organic farming practices.

Findings from Radi Village, Beed

On 17th July 2023, Radi village was visited, and discussions were held with farmers, members of FPO, and other beneficiaries about the various farm activities being implemented through the PoCRA project. The major components being adopted in the village include Drip irrigation, farm pond, horticulture plantation, pipes, polyhouse, shadenet, farm ponds, seed production, sprinkler irrigation, and water pumps. The implementation intensity of these components is described briefly below, based on the discussions with the beneficiaries.

During the discussions, the farmers raised several relevant points concerning the implementation of various agricultural technologies:

- **Farm Pond Subsidy**: The subsidy provided for farm ponds is considered too low, as the material cost and labor charges have increased. Farmers are requesting an increase in the subsidy to make farm pond construction more financially feasible.
- **Increased Irrigation Area**: Due to the adoption of pipes for irrigation, an additional 35-40% area has been brought under irrigation during the rabi season. Farmers suggest increasing the subsidy amount for pipes to support this expansion.
- **Seed Multiplication Programme**: Farmers request an increase in the scale of the seed multiplication programme and urge for clear guidelines with MAHABEEJ to expedite the release of funds once satisfactory seed quality criteria are met.
- **Timely Payments for Polyhouse Planting Material**: Farmers are purchasing planting material for polyhouses from their sources but are facing delays in receiving payments. They recommend timely disbursement of funds for purchased material.
- **Infrastructure for Seed Storage:** Farmers suggest creating infrastructure, such as warehouses, for storing produced seeds. The current market rates are not satisfactory due to the influx of farm produce, and proper storage facilities would help in better marketing.
- **Increased Subsidy for Polyhouse and Shadenet Units**: Farmers, especially marginal and small-scale farmers, find it difficult to invest a significant amount at once for constructing poly houses and shade net units. They request an increase in the subsidy to make these structures more affordable.
- **Solar Pump Supply**: Since electric supply at the village level is irregular, farmers request the supply of solar pumps to meet their irrigation needs effectively.
- **Harvesting Rainwater:** Farmers propose the initiation of compartmental bunding, nala bunding, and other Natural Resource Management (NRM) activities to harvest rainwater efficiently and improve water availability for agriculture.

Overall, the farmers' valuable feedback highlights the need for adjustments and improvements in subsidy amounts and the timely disbursement of funds to ensure the successful implementation of various agricultural technologies in Radi Village.

BBF Planting in Soybean:

In Radi village, around 100 hectares (approximately 250 acres) of land is being cultivated using BBF methods of planting. The farmers are also utilizing drip and sprinkler irrigation for soybean crops during prolonged dry spells, as many of them have adopted these systems. However, due to the delayed monsoon in the kharif season of 2023, there is a concern about insufficient soil moisture during the critical pod development stage, particularly in light to medium soil types. Therefore, implementing pressurized irrigation systems during this growth period could be a profitable option for marginal farmers.

Previous year's data indicates that farmers using the BBF method have harvested significantly higher soybean seed yields of 10-15 quintals per acre compared to only 6-7 quintals per acre under the flatbed system. By adopting sprinkler/drip systems, farmers have the potential to further increase their yields. After harvesting soybean, farmers continue to utilize the BBF setup to grow chickpeas without disturbing

the arrangement, resulting in yields of 10 quintals per acre compared to 4-5 quintals per acre under flood irrigation with a single pre-sowing irrigation.

Moreover, the farmers have extended the use of the BBF setup with pressurized irrigation for seed multiplication programs on a large scale, leading to substantial benefits and improved agricultural outcomes.

BBF in soybean (KDS 992) in village Radi)

Drip Irrigation:

During the visit to Shri Anna Saheb Manik Savase's farm, it was observed that he had implemented drip irrigation on 2 acres (0.8 hectares) of sugarcane fields in January 2023, investing Rs. 1.10 lakh. However, he is facing a delay in receiving the 85% subsidy from the PoCRA project due to pending clearance on submitted bills.

In the drip irrigation system, the crop row spacing is 1.20 meters, and each lateral serves a single crop row with an emitter spacing of 0.40 meters. Shri Savase is practicing irrigation rotation, providing 8 hours of irrigation every 8 days in May and 6-7 hours of irrigation in the March-April months.

Previously, under flood irrigation and rainfed conditions, he used to harvest 35-40 tons per acre of sugarcane. With the implementation of drip irrigation, he expects to increase the sugarcane yield up to 70-80 tons per acre. However, Shri Savase mentioned that he lacks sufficient knowledge of the precise amount of irrigation water being delivered, which makes it challenging to estimate water use efficiency under the drip system.

Despite this, Shri Savase is well aware of the potential increase in yield with the use of drip irrigation, and he eagerly awaits the subsidy clearance to continue benefiting from this modern irrigation practice.

Sugarcane under drip irrigation in village Radi (Ambajogai, Beed**)**

Findings from Yelda Village, Beed

On July 17, 2023, a visit was made to Yelda village, which is located in the foothills of a hilly area and has light-textured, poor-quality soil resulting in relatively low crop yields. In the past, farmers grew rainfed cotton, pre-rabi sunflower, safflower, and rabi jowar. However, now they have shifted to growing soybean, jowar, and bajra during the kharif season, and chickpea and wheat in the rabi season, particularly in low-lying areas with slightly better black soil. The presence of wild animals, like deer, poses a problem for field crops.

Under the PoCRA project, only a few activities have been implemented in Yelda village, including drip irrigation, individual farm ponds, BBF, horticulture plantation, pipes, sprinkler irrigation, and electric water pumps. However, the benefits have been limited to a small number of farmers, and it is suggested that subsidies and support be extended to more farmers in the next phase.

Recently, a group of seven farmers in the village has taken up organic farming in soybean, adopting both flatbed and BBF methods, and using Jeevamrut, a type of organic fertilizer made from fresh leaves of various plants. They are selling their organic produce to registered organic produce purchasers, earning higher income from their farm produce.

To address water scarcity issues, it is recommended to implement rainwater harvesting at the field level through contour cultivation, construct more farm ponds, and build cement bandhas across drainage channels to support rabi crops, which currently face water shortage. Other natural resource management components may also be initiated to improve agricultural practices in the village.

Annexure 6: Field Visit Notes of Agri-economy Expert

Background

As part of the 9th round of concurrent monitoring, visits were made to Manjram, Nawandi, and Biloi in Nanded and Nawkha and Wai villages in the Hingoli district of Marathwada region during the second week of July. The villages have been selected based on the implementation status of various project activities under PoCRA.

The primary objective is to assess the resilience built within the community through PoCRA specifically in terms of:

i. Adoption of climate resilient technologies,
ii. Improved skillsets of farmers due to the use of CR technology,
iii. Improved climate change adaptation and coping mechanisms,
iv. Positive behavioral change in agricultural practices,
v. Resilience to absorb sudden climate shock,
vi. Resilience to market price fluctuations
vii. Development of youth entrepreneurship and
viii. Achievement of sustainability in terms of livelihood enhancement, employment generation, reduction in migration, etc.

The participatory approach which includes group discussion, and interaction with the project implementing staff deployed at the field level and senior management staff, was followed to collect the information relating to the impact of project activities at the ground level and problems in project implementation.

Status of Implementation of Project Activities

Under the provisions of PoCRA, multiple activities were implemented across the selected villages with a view of extending benefits to the target groups, including marginal and small farmers. Around 13 project activities are being implemented in the selected villages under PoCRA. During the field visits, it was found that the status of implementation of the project activities varies across the villages owing to variations in demand for activities by farmers and the local natural resource availability across the selected villages. Table 1 details the status of the implementation of 13 project activities in the selected villages of Nanded and Hingoli. The table reveals that around 1,249 beneficiaries are using the PoCRA benefits with 437 beneficiaries in Nanded and 812 beneficiaries in Hingoli district. It further indicates that there exists wide variation in the number of beneficiaries against each activity across the villages. Sprinkler irrigation was found to be the most preferred adopted activity amongst the farmers in villages of both Nanded (49.4%) and Hingoli (39.7%), followed by drip irrigation being adopted by 25.6% and 35.3% beneficiaries in the selected villages of Nanded and Hingoli districts respectively.

A striking observation from the field is that out of the total beneficiaries who adopted sericulture (2% of total beneficiaries in both Nanded and Hingoli), some have shut down their activities due to market failure-related problems.

Table 1. Status of implementation of different Project Activities

Project Activities Implemented	Nanded Villages		Hingoli Villages		Overall Villages	
	Numbers	Percentage Distribution	Numbers	Percentage Distribution	Numbers	Percentage Distribution
Compost (Vermicompost / NADEP / Organic input production unit)	0	0	7	0.86	7	0.56
Drip Irrigation	112	25.63	303	37.32	415	33.23
Farm Mechanization	1	0.23	5	0.62	6	0.48

Project Activities Implemented	Nanded Villages		Hingoli Villages		Overall Villages	
	Numbers	Percentage Distribution	Numbers	Percentage Distribution	Numbers	Percentage Distribution
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	2	0.46	5	0.62	7	0.56
Horticulture Plantation / Agroforestry	7	1.60	56	6.90	63	5.04
Pipes	36	8.24	48	5.91	84	6.73
Planting material in Polyhouse / Shadenet house	1	0.23	1	0.12	2	0.16
Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	3	0.69	12	1.48	15	1.20
Seed Production	3	0.69	1	0.12	4	0.32
Sericulture	10	2.29	19	2.34	29	2.32
Shade-net House	3	0.69	18	2.22	21	1.68
Sprinkler Irrigation	216	49.43	322	39.66	538	43.07
Water Pumps	43	9.84	15	1.85	58	4.64
Total	**437**	**100.00**	**812**	**100.00**	**1249**	**100.00**

Source: The village-level data

Agricultural Practices and Adoption of Climate-Resilient Technological

The present section deals with the discussion on the impact of climate-resilient technologies on agricultural practices such as changes in the cropping pattern and crop productivity observed by the farmers in the selected villages in the Nanded and Hingoli districts of Marathwada region.

Changes in Cropping Pattern: An attempt has been made to understand changes in cropping patterns after the implementation of various activities under PoCRA. It is important to note that the farm practices in Nanded and Hingoli Districts differ significantly from other project areas like CSN and Jalana districts in the Marathwada region. Before the implementation of various activities under PoCRA, the farmers in Nanded and Hingoli regions were predominantly sowing major crops like cotton, pulses (Tur and moong), maize, soybean, and kharif jowar during the Kharif season. They were also allocated a significant portion of their land for wheat, gram, and rabi jowar cultivation.

After the project intervention, the cropping pattern in the region remained similar, but **significant changes were observed in the allocation of land to various crops**. During the discussion, farmers reported that the areas under cotton and soybean increased by one-third, which was surprising as cotton had decreased in other project areas due to agronomic and economic factors. Furthermore, it was observed that in the villages of Nanded and Hingoli, cotton became a preferred major commercial crop for farmers owing to not only the agronomic and environmental factors but also because of the PoCRA support in terms of irrigation infrastructure. Table 2 summarizes the changes in cropping pattern post-POCRA implementation based on the discussion with farmers of the selected villages of Nanded and Hingoli.

Table 2: Cropping Pattern Followed by the Farmers Before and After the Project

Before the project	After the Project	
Crops Grown	**Crops Grown**	**New Crops Emerged**
Kharif: Cotton, Tur/moong, Soybean, maize, jowar, and so on. **Rabi:** Wheat, Gram, rabi jowar	**Kharif:** Cotton (+ 33%), moong (Constant), Soybean (+ 33%), Tur (-5%) maize (20%), and jowar (-80%). **Rabi:** Wheat (-15%), Gram (constant), rabi jowar (-75%), Turmeric (50%)	Tomatoes, Capsicum, Cucumber, Turmeric, and other cash crops including Horticulture (citrus, Papaya & vegetables)

Source: Discussion with beneficiaries in Nanded and Hingoli villages

The table reveals the following:

- The area under pulses like moong and Tur either remained constant or slightly reduced.
- Maize cultivation area decreased by about one-fifth.
- In the rabi season, the wheat cultivation area was reduced by 15 percent, while the area under gram remained constant due to its cost-effectiveness and favorable farm gate price.
- Fodder crop cultivation, especially jowar, decreased considerably, leading to the emergence of new crops in the region. Horticulture crops like vegetables, citrus, and papaya gained prominence. Turmeric cultivation also saw a considerable increase.

Interestingly, the changes in cropping patterns, as a result of PoCRA implementation, were not just a shift from one crop to another but involved bringing new land under cultivation. Farmers engaged in both intensive and extensive cultivation practices, indicating their active involvement in farm activities.

Crop Productivity: Crop productivity is one of the major indicators of agriculture development in the farm economy. After the project intervention, a substantial increase in the productivity of major crops was experienced in the project villages. From the discussion with beneficiaries of the selected villages, it was found that yield per hectare showed expansion ranging from about 33% to 61% across different crops grown by farmers. Cotton and soybean experienced the highest increase in productivity, with expansion proportions of about 62% and 63% respectively (see Table 3).

Adoption of climate-resilient technologies, improved farm practices, application of recommended inputs, and increased availability of irrigation water after the project intervention, has led to an increase in productivity of Maize crops by one-third, followed by pulses like Tur. Resultantly, **in the selected villages, the growing demand for maize in the consumptive sector has led to its multiple uses, resulting in its recognition as a cash crop that contributes to increasing household income.**

Table 3: Changes in Crop Productivity (Quintal/Ha.)

Crops	Productivity before intervention	Productivity after intervention	Proportionate (%) Change
Cotton	9.75	15.75	61.54
Moong	6.50	9.75	50.00
Maize	21.00	28.00	33.33
Soybean	9.50	15.50	63.16
Tur	14.50	20.00	37.93
Wheat	13.50	20.20	49.62
Gram	10.00	15.50	55.00

Source: Discussion with the group of beneficiaries in the selected villages in Nanded and Hingoli districts

Status of Cost Structure of Major Crops: An attempt has been made to assess the cost structure of various crops grown by the farmers by following different climate-resilient technologies in the cultivation of both traditional cropping systems and new crops. These techniques include (i) traditional practices used for the cultivation of food and non-food crops, (ii) Shade net intervention (followed in vegetable cultivation), and (iii) Inter-cropping practice.

Cultivation of Traditional Crops: The present sub-section deals with the economic aspect of the cultivation of major crops during both kharif and rabi seasons. These crops include wheat, maize tur, cotton soybean, and vegetables. The cost and returns for traditional crops were found to be generally similar, with a few exceptions. Farmers have reduced the area under fodder crops.

The cost structure for wheat, maize, tur, cotton, and soybean ranged from Rs. 20 thousand to about Rs. 27 thousand. Similarly, the revenue earned from these crops followed a similar pattern. Net returns of 14 thousand were earned by farmers from wheat, about 20 thousand from tur, and 37 thousand from oil seed crops such as soybean (see Table 4).

Shadenet Intervention: The Shadenet is a crucial intervention activity under PoCRA, ensuring optimal sunlight, moisture, and air for proper plant growth. It is highly subsidized, with over 75 percent support. Farmers in the project area use Shadenets for cultivating cash crops like vegetables etc.

Using the data from the field, the analysis of vegetable cultivation shows an average cost of about Rs. 2.68 lakh per hectare, with an average revenue of about Rs. 6.56 lakh per hectare. This results in an average net return of around Rs. 3.88 lakh per hectare for the farmers (see Table 4).

The analysis further reveals that in commercial crop cultivation, human labor constitutes a significant share (one-fourth) of the total cost, followed by seed and crop nutrients like Farm Yard Manure (FYM) and chemical fertilizer. The use of chemical fertilizers and plant protection materials varies across crops, with certain crops showing more notable usage. Additionally, farmers typically apply FYM once during the crop year.

Table 4 shows that different crops have different input-output ratios, indicating a lack of systematic consistency. For example, for Wheat, the input-output ratio is 37:63, indicating that 37% of the revenue is used for input costs and 63% is the net return. Whereas for vegetables, it is 29:71, implying that 71% is the net revenue. **During the interaction held with a group of farmers, the farmers expressed a demand for increased support for shadenet activities to benefit more individuals. It was also observed that farmers who are more aware, possess more knowledge, and are progressive with strong management skills were found to benefit significantly from this intervention**.

Table 4. Cost of Production of Major Crops (Figures in Rs.)

Particulars	Major Crops					
	Wheat	Maize	Tur	Cotton	Soybean	Vegetables
Labor Cost						
Machine	3500	2500	3600	1500	3750	16000
Animal	0	1260	1500	1625	1500	4667
Human	2500	6100	3000	11888	7025	53333
Material Cost						
Seed	2000	2000	300	4188	5975	38000
Fertilizer	400	3560	3600	10000	3375	33333
FYM	1200	2500		2000	3750	40000
Pesticides/ Insecticides	2000	2000	3000	9938	8750	23333
Irrigation	1667	550	1500	625	1500	8000
Harvesting	2000	2680	1500	2000	3750	12667
Packing Material	1500	600	700	1200	300	20000
Transportation Cost	1600	2230	560	800	900	16000
Marketing Cost	1500	650	750	1500	250	2500
Total Cost	**19867**	**26630**	**20010**	**20500**	**22350**	**267833**
Total Revenue	**34000**	**50000**	**39900**	**40000**	**60000**	**656000**
Net Returns	**14133**	**23370**	**19890**	**19500**	**37650**	**388167**
Input-Output ratio	**37:63**	**35:65**	**33:67**	**34:66**	**27:74**	**29:71**

Source: Field Observation

The analysis reveals that cultivating commercial crops, such as vegetables, resulted in substantial net returns compared to traditional crops. **Project interventions, particularly the Shadenet infrastructure, played a crucial role in increasing farm income and generating employment**. As one can see from Table 4, human labor and chemical inputs, including fertilizers and pesticides constitute the major portion of the total cultivation cost. The labor cost was found to be highest for vegetables at Rs. 53,333, and the lowest for cotton at Rs. 11,888. Further, the excessive and improper use of chemical inputs poses a challenge to climate-resilient agriculture. It may be because of the lack

of awareness among the beneficiaries towards rational input use[17]. Hence, there is a **need to scale up the extension services to address this issue**.

Adoption of Climate Resilient Technological Options/ Farm Practices: There are various technological options for crop production to make agricultural practices climate resilient as well as minimize the cost of production of different crops. An attempt has been made to understand how these technological options impact the cultivation costs of various crops. Through discussions with various farmers' groups, it has been revealed that different farming techniques are being utilized by the farmers, which are significantly affecting the cultivation costs of crops.

During a field visit, it was observed that farmers were engaging in inter-cropping practices on limited land sizes, which, although traditional, are now being approached scientifically to minimize environmental risks. Farmers prioritize inter-cropping practices, leading them to use combinations like Soybean + Pigeon Pea, Cotton + Soybean, Maize + Cotton + Moong, and others (see Table 5). These carefully selected practices play a crucial role in determining the cultivation costs of different crops.

Table 5: Cost of Cultivation of Selected Crop Combination in the Project Villages (Figures in Rs.)

Particulars	Soybean+ Pigeon Pea	Cotton+ Soybean	Maize+ Cotton+ Moong	Traditional Practices	BBF
Labor Cost					
Machine	1600	3125	2571	6250	6250
Animal	1067	1500	2143	3250	3250
Human	1600	14286	22143	16200	16200
Material Cost					
Seed	1227	1313	1750	2625	2625
Fertilizer	2800	1813	1250	3625	3625
FYM	1333	0	1500	500	500
Pesticide/ Insecticides	2667	1875	3750	2850	2850
Irrigation	6667	2500	4000	1250	1250
Harvesting	2480	2800	3211	2670	2670
Other	1867	2750	3750	860	860
Total Cost	**23308**	**31962**	**46068**	**40080**	**40080**
Total Revenue	**81000**	**95625**	**94286**	**58800**	**94000**
Net Return	**57692**	**63663**	**48218**	**32720**	**56930**
Input-Output ratio	**29:71**	**33:67**	**33:67**	**41:59**	**30:70**

Source: Field Observation

The analysis reveals that farmers gained significant benefits from certain crops, mainly due to PoCRA's support, which includes micro-irrigation (drip and sprinklers) and water tanks for irrigation. Other crop combinations also showed considerable benefits. It is important to note that a separate estimation of the cost of production was complex and, therefore, has not been considered in this context (Table 5).

The Farmer Field School (FFS) played a key role in promoting innovative and efficient cultivation practices. As a result, farmers have been able to adopt various cultivation practices, such as maintaining appropriate gaps between rows of different crops, etc., depending on crop varieties, and sowing/maturity timings. These practices resulted in noteworthy institutional intervention performance. Further, Broad Bed Furrow (BBF) practices played a crucial role in expanding production. Though the

[17] Chouksey Rachit (2021) "Adaptation of Farmers Regarding Climate Resilient Technologies in Rewa Block of Rewa District in Madhya Pradesh", Indian Journal of Extension Education Vol. 57, No. 1, Pp. 26-31. It is also emerged from the field investigation that farmers were more concerned with sound extension services at time to time.

cost of adopting BBF remained similar to traditional practices, it resulted in a significantly higher crop production scale compared to other traditional practices.

Keeping in view the foregoing discussion, it can be concluded that the farmers were found to be more concerned with attaining maximum and possible profits rather than the usage of resources in a sustainable manner such as irrational use of chemical inputs application. Consequently, the ultimate project objective of sustainability is not fully met. **Therefore, to address this profitability over sustainability farming community strategy, there is a need to strengthen the capacity-building program to make project interventions more climate resilient.**

Improved Skillsets of Farmers Due to the Use of Climate-Resilient Technologies

Farmers possess a range of valuable skills, such as problem-solving, interpersonal, farm management, and organizational abilities. These skills find application in diverse tasks, from communicating with farmhands to tending crops and repairing machinery. The Ministry of Agriculture and Farmer Welfare, Govt. of India, has launched a skill development program for rural youth, aimed at imparting skill-based capacity building in agriculture-based vocational training, intending to promote livelihoods among them. In this regard, institutions like KVKs and Agricultural Universities play a crucial role in enhancing the skills of the local workforce, particularly the farming community.

Notable interventions have been made under PoCRA to enhance capacity building such as exposure visits, and fostering social relationships among farming communities, representatives of agriculture departments, allied departments, and project staff in the selected project villages. These interventions were noticeable in the project villages. Modern technologies, particularly in processing farm products, were provided to the farmers and formed farmers' groups that benefited from value chain facilities. One such instance of the use of modern machinery for processing turmeric and grading and packaging pulses was observed during the field visit (see Fig.1).

The pictures of Processing Units installed at Wai Village in Hingoli district.
Figs.1

Some farmers were found to be accessing market and farm-related information using internet facilities, leading to the establishment of information centers in the villages. Some farmers reported that training sessions and individual understanding sessions have equipped them with knowledge about the

operation and repair of farm implements. It was also observed that there were groups of farmers constituted at the family level who were found to be enjoying the benefits of the PoCRA at the family level rather than at the village level. In such cases, the role of progressive farmers as well as PRIs and other politically active individuals becomes important as they are required to give due attention while implementing the project activities. Public organizations like MANAGE, Hyderabad, and local organizations like KVKs have played a significant role in farmers' capacity building, and improving the economic viability of agricultural enterprises.

Mobile technology is also playing a pivotal role in enhancing the skills of both farmers and farm laborers in tackling various farm-related challenges. Farmers acknowledge the importance of modern farm technologies, including information technology, to address the problems they often face in farm production. They emphasize **the need for such technology to provide information on disaster warnings and weather forecasting at the local levels**.

In conclusion, the discussion highlights the importance of technology in enhancing farmers' skills in modern farm operations and marketing of both raw and processed farm products and agricultural inputs. The capacity-building program has played a vital role in enhancing the skills of the entire farming community. However, **special attention is needed to focus on skill development-related interventions for comprehensive growth.**

Positive Behavioral Change in Agricultural Practices

In the present section, an attempt has been made to understand the behavior change among the beneficiaries that determine the future directions 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, performance of institutions associated directly and indirectly with project activities, efficiency of capacity-building programs in terms of training and exposure visits, demonstration effect, extension services provided by the project and department of agriculture.

The success of the project can be attributed to various activities adopted by the farming communities, particularly the implementation of drip and sprinkler irrigation at the project's initial stage. These practices resulted in significant increases in farm production and income from limited land areas. The representatives of the project implementing agency and the group of farmers in the selected villages of Nanded and Hingoli villages shared that the essential institutional support in terms of supplying farm inputs and extension services provided by the project implementing agencies and allied departments has contributed a lot in ensuring the sustainability of farmers' interest.

Capacity-building institutions also played a crucial role in bringing about behavioral and attitudinal changes among the beneficiaries, which was the ultimate objective of the project. As a result, there was an improvement in social relationships among the village communities and other formal and informal institutions.

Regular visits by experts from KVK, along with their timely suggestions, contributed to the beneficiaries' confidence and positive behavior toward the project activities. Continuous interaction with the farming community was seen as essential for building trust and generating positive outcomes.

On the contrary, the sericulture activities implemented in some of the project villages in both Nanded and Hingoli districts proved to be a failure. During the discussion, farmers indicated that market failures were the main reasons for the adverse implications, leading many to discontinue sericulture activities. However, it is interesting to note that a small number of farmers remained positive and continued sericulture activities (Fig 2) in both districts. These farmers either expanded the area under mulberry cultivation or sustained the project based on their rich experience and past expertise in sericulture activities.

Sericulture activity in Singdi in Hingoli District

Sericulture activity in Nawandi in the Nanded district

Figs. 2

Overall, the findings suggest that positive behavioral changes in farm practices are not solely influenced by technologies but also by institutional arrangements and self-confidence. Therefore, achieving long-term sustainability requires a harmonious alignment between target groups, other stakeholders, and institutions, including market forces.

Resilience to Market Price Fluctuations

The present section deals with the discussion on the resilience to price fluctuations and market behavior. Agricultural development is usually subject to large shocks to marketing market practices and the supply of farm produce, 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 and gaps against the declared prices of various crops across the seasons and to visualize the strategies adopted to cope with such situations, particularly under the PoCRA interventions.

Selected crops were analyzed in-depth, and the market institutions were found to be generally efficient, benefiting the farmers as expected. However, some farmers expressed satisfaction with the prices offered, which were at par with the Minimum Support Price (MSP), but they were covering only the paid-out costs and not the full C2[18] cost structure. This issue was particularly noticeable in vegetable production, where there is no MSP system in place. Farmers realized that only a limited number of crops had MSP provisions, while commercial crops like fruits, vegetables, and spices were subject to market forces for price determination. During FGDs with farming communities in the project villages, it was observed that such reliance on market operations often made the farmers' economy non-viable and led to distress.

The study suggested that agricultural marketing issues should be addressed locally to have a national impact. In contrast, **PoCRA interventions, such as providing assured irrigation through efficient methods like drip and sprinkler, as well as shade-net technology, proved beneficial for farmers, especially marginal and small-scale ones. Those using shade-net systems and efficient irrigation methods received fair compensation through rational market prices**.

[18] C2 cost cover the paid-out cost plus rent on land and expenses incurred on other fixed farm assets used in crop production

Table 4: Gaps between MSP and Price received for Marketed Produce (figure in INR)

Crop	Minimum Support Price (MSP)	Price attained by the Farmers	Gap between MSP and Price Attained	Proportionate (Percent) Differences
Cotton	6080	7000	920	15.13
Moong	7755	8000	245	3.16
Maize	1962	2000	38	1.94
Soybean	4300	5000	700	16.28
Tur	6600	9000	2400	28.79
Wheat	2015	2500	485	24.07
Gram	5230	5000	-230	-4.40

Source: CACP Reports FGDs with the farmers

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 helps improve the living conditions of farmers by providing an alternative source 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 to.

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. During the visit, it was found that many rural youths have engaged in agriculturally based businesses, such as transport facilities, farm inputs supply, and repair centers. Surprisingly, electronic and information technology-based shops are also thriving in these villages. Discussions with farmers and individuals involved in non-farm-based businesses revealed a substantial scope for agri-based businesses like input supply and farm machinery. Additionally, there is an opportunity for developing value chain businesses, such as food processing units, to address the issue of emerging unemployment among the youth[19].

There is an opportunity to leverage information and communications technologies (ICT) and social media to promote and raise awareness among the youth about the essence of agriculture and the potential prospects it offers as a career. This initiative can bring significant benefits to the agricultural industry[20]. Hence, the Government should encourage farmers by providing attractive schemes and minimum support prices for all crops. Offering loans to those interested in agri-business will serve as a result-oriented initiative to encourage more youth to participate in the agriculture sector.

It can be concluded from the foregoing discussion that PoCRA has multi-dimensional implications in the emergence and strengthening of entrepreneurship in not only project areas but also outside the project area. This entrepreneurship has also resulted in enhancing employment opportunities and improving household income.

Achievement of Sustainability in Terms of Livelihood Enhancement, Employment Generation, Reduction in Migration, etc.

Sustainability is a critical aspect of PoCRA interventions. Specific activities, such as providing assured irrigation with water-saving technologies and installing shade nets and water tanks (both community and individual), have played a significant role in conserving and regenerating resources in the project villages. However, it has been observed that the farming communities are more concerned about the economic viability of crop cultivation over sustainability (i.e. optimal use of resources). Thereby creating

[19] Based on the discussion with the groups of farmers and representatives of various stakeholders across the selected villages and out-side the villages.
[20] https://ap.fftc.org.tw

an urgent need for the adoption of suitable technological options and institutional reforms, including strengthening capacity-building programs to ensure sustainability. These measures are essential to maintain the long-term viability and effectiveness of PoCRA interventions.

Generation of Employment Opportunities:
PoCRA has proven successful in generating substantial employment opportunities for both males and females. This is evident from the fact that human labor constitutes a significant proportion of the total production cost across various crops. Certain interventions have played a crucial role in absorbing the growing labor force within and outside households. As a result, PoCRA interventions have effectively provided employment opportunities to the increasing workforce.

Migration: PoCRA has had significant implications on labor migration both within and outside the villages. The migration from the project villages has notably decreased as a result of the PoCRA interventions. Before the project interventions, these were a substantial proportion of households of the total households that were resource-poor and landless migrated elsewhere for wage employment. This proportion was estimated as one-third to two-fifths of the total households varying across the villages. After the project intervention, the outmigration of workers who were involved in farm-based activities was almost reduced to negligible. Only those households migrate, those involved in other than farm activities. There has been a substantial demand for labor to carry out farm activities throughout various crop seasons, leading to a considerable influx of labor from non-project areas to the project villages. Both intensive and extensive agriculture has pushed up the demand for farm labor. After halting the out-migration from the project villages, about one-fifth of the labor demand is met from non-project villages. The substantial reduction in out-migration from the project villages and increase in in-migration into these areas are indications of the positive impact PoCRA has had on labor dynamics in the region. It can also be stated that PoCRA has not only benefited the direct beneficiaries and project villages. But other resource-poor households residing in both project and non-project villages benefited.

Assets Creation and its Uses
The present section deals with a discussion on assets created and their uses in the selected villages. Under this intervention, a group of farmers in the respective villages were constituted and assets were arranged as a common pool resource. These assets include godowns, tractors, and tractor-driven implements such as trollies, rotavators, cultivators, and so on. Additionally, in certain villages, assets were also established for livestock rearing, primarily for breeding purposes. It is noteworthy that these assets were created under the provisions of Farmer Producer Organizations (FPOs).

Construction of Godowns: In the village of Nawandi (Khandgaon), a group of 18 farmers formed an association and established a godown facility. The construction of the structure took place during the year 2020-21, with financial assistance amounting to Rs. 32.15 lakh, including a 60 percent subsidy. The group leased the land for 22 years, paying an annual rent of Rs. 20,000.

According to the group's leader, all members had access to the godown at reasonable tariff rates. Other individuals outside the group could also use the storage facilities if they had surplus produce to market. During discussions, it became evident that not only the group members but also other farmers benefited by obtaining better prices for their agricultural produce. The facility allowed farmers to store their produce and obtain remunerative prices for most crops.

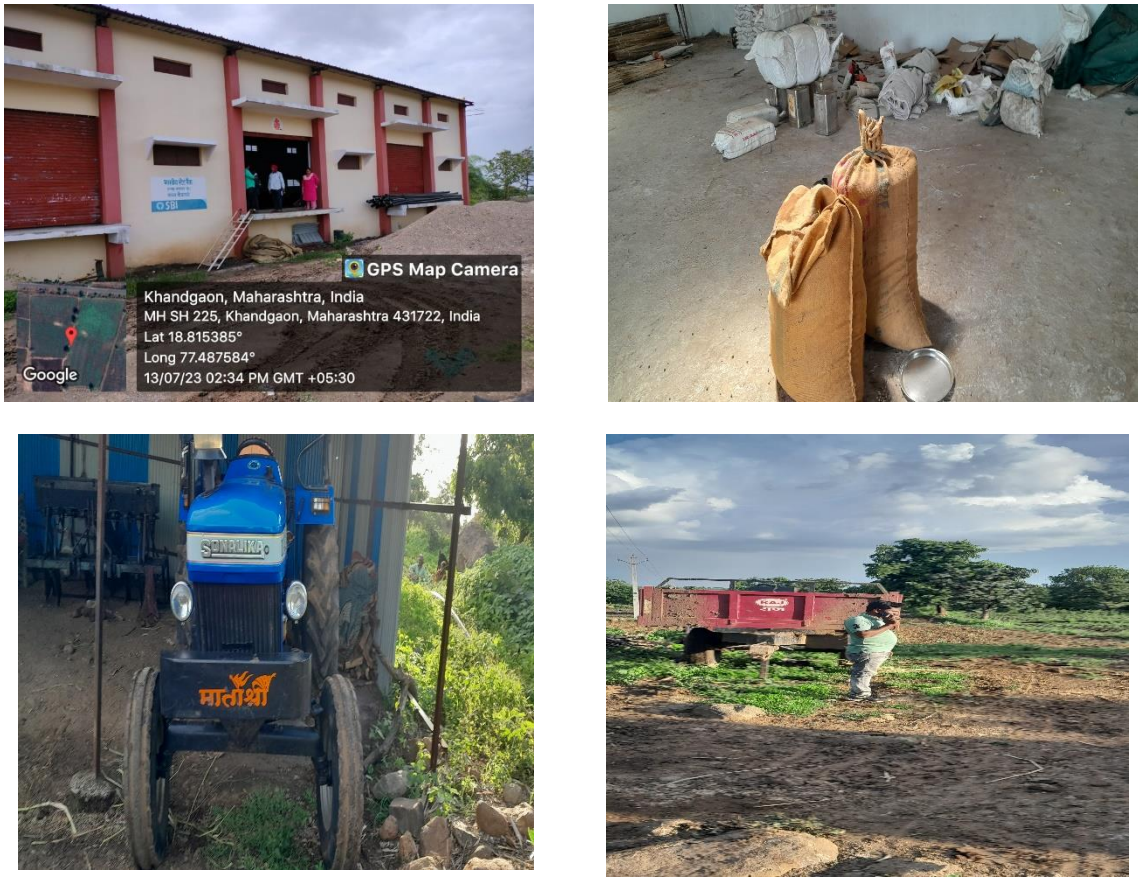
However, there were challenges in the market that led to a price crash for stored commodities like soybean, causing farmers to miss out on the expected benefits. Despite such instances, the overall experience showed that the godown facility was beneficial for farmers in achieving better prices for their produce.

Farm Implements: The provision of farm implements has emerged as a significant village asset creation. This facility was made accessible not only to the group members but also to other resource-poor farmers at an affordable rental amount. The group established certain provisions for the usage of available implements for farm operations, following a first-come-first-served approach.

Moreover, individuals were provided training in operating sophisticated machines that are essential for value chain operations. Through capacity building programs, the implement operators received training

from relevant agencies to enhance their skills and efficiency in using the farm implements effectively. This approach has proven beneficial in empowering farmers with access to modern agricultural machinery and improving their overall productivity.

Pulses Processing/Grading Units: In the Wai villages of Hingoli district, a pulses processing unit was established with a financial support of Rs. 20 lakhs, with 75 percent of the total amount being covered by a subsidy. The group of farmers operating the unit experienced significant profit margins after processing pulses, particularly moong, and tur. The value chain processing of these pulses proved to be highly beneficial for the farmers, contributing to their economic well-being and overall prosperity.



Pictures of Assets Created in Common Pools at the selected villages of Nanded and Hingoli District

Goat Breading Centre: In Wai village, a goat breeding intervention was established with an initial investment of around six lakhs for 55 animals. The group managing the project demonstrated a sound financial position. The total investment for the goat breeding project was approximately Rs. 10 lakhs, with a subsidy of around Rs. 4 lakhs, covering the cost of animals and shed construction. The group invested around Rs. 6 lakhs specifically for acquiring the animals, with their value determined by weight.

In a nutshell, at the household and farm level, significant assets were created, including drip and sprinkler irrigation structures, pump sets, pipes, and other related infrastructure. **These assets played a crucial role in resolving crises and elevating the living standards of rural and resource-poor households, lifting them out of poverty. The introduction of these assets proved to be impactful, contributing positively to the economic well-being of the communities involved**.

Concluding Observations

From the discussions and experiences, the following conclusions can be drawn, which will be useful in making suggestions and recommendations:

1. There were significant variations in the implementation of project activities across districts and villages. The popularity and demand for certain activities, like shade-net intervention and micro-

irrigation, were influenced by local natural resource availability and farmers' preferences in farm practices and technologies.

2. Sericulture activities did not yield the desired results, and farmers showed reluctance to continue with them due to market failures (cited as the major reason) resulting in their withdrawal from sericulture.
3. Climate resilient technologies and farm practices demonstrated positive outcomes in resource conservation and economic gains, benefiting both new emerging cropping patterns and traditional crop cultivation.
4. Asset creations like godowns, agriculture implementation centers, and processing units faced challenges from a social perspective. The groups formed for these purposes consisted of single families and close relatives, posing a threat to the project's sustainability and ultimate objectives.
5. Wildlife has emerged as a major problem in the project area, causing crop damage. Effective intervention is required, including discussions with the wildlife department, to develop mechanisms for crop protection beyond traditional methods employed by farmers.

Based on these conclusions, it is recommended to focus on diversifying and adapting project activities to the local context, ensuring market linkages and proper support for farmers in undertaking sericulture activities. Additionally, more extensive consultations with stakeholders, including wildlife authorities, are needed to address challenges related to asset creation and wildlife damage, fostering sustainability and overall project success.

Annexure 7: Field Visit Notes of Hydrology Expert

As part of the 9th concurrent monitoring round of the PoCRA project, a field visit was conducted by the hydrology expert from 12th to 15th July 2023.

During the three-day field survey, farms of 12 farmers were visited from four villages in the Jalna & CSN districts, all of whom were the beneficiaries of various schemes under PoCRA. The key observations, highlights, and constraints related to the impact assessment of NRM structures (CNB, Farm ponds, Compartment bunds), as well as sprinkler and drip irrigation are detailed below:

(a). Impact Assessment of Cement Nala Band (CNB), Farm Ponds, and Compartment bunding

Due to the construction of the CNB in the project area, there has been a significant increase in the groundwater levels and farmers now have an assured source of water to irrigate their crops around the year. A few farmers have installed solar pumps through other government schemes A case study of a CNB in Borgaon village (Paithan taluka) is presented in this report, where nine wells are situated along the upstream and downstream stretches of the CNB.

Farmers reported that the water yield in their dug wells has increased by almost 4 to 5 times due to the enhanced water recharge from the nearby nala during the rainy season. Before the CNB's construction, only two irrigation rotations were possible, but now, 4 to 5 rotations are feasible, allowing the irrigation of 48 hectares annually in the CNB's influence zone. This has significantly boosted cropping intensity, especially during the Rabi season, leading to increased crop yields and income for the beneficiary farmers.

As regards the compartment / graded bunding, the farmers expressed positive views. In normal rainfall years, CB retains rainwater in the fields for extended periods, increasing soil moisture and enhancing groundwater recharge. This has enabled farmers to grow crops like wheat/gram during the Rabi season, resulting in increased income. CB effectively prevents soil erosion caused by high-intensity rainfall, and the eroded soil is deposited along the bund side, allowing it to be redistributed back into the field. The soil texture has shown improvement, and the CB helps retain soil nutrients, preserving soil productivity. Additionally, CB facilitates the safe removal of excess runoff from fields to nearby streams/nalas, further benefiting agricultural practices and water management.

(b). Impact assessment of sprinkler and drip irrigation as regards their benefits of water and energy saving, fertigation, and increasing income

The majority of farmers prefer sprinkler systems as they are portable and can be easily used to irrigate various crops such as cotton, jowar, wheat, and gram by shifting from one field to another. On the other hand, a drip system is favored for fruit trees, like in the case of Sweet lime plantations, and sugarcane. Interestingly, it was observed that farmers adopted intercrop crops like cotton in Sweet lime orchards for the first four years.

Based on discussions with farmers and actual field observations, sprinkler systems have led to water savings of 40 to 50 percent, while drip irrigation, especially in orchards, has achieved water savings of 60 to 80 percent. These water savings have increased in irrigated areas compared to traditional surface/flood irrigation methods. Additionally, both sprinkler and drip irrigation have reduced the operating hours of pumps, resulting in energy savings ranging from 40 to 60 percent. However, it's essential to note that farmers do not directly benefit from energy savings, as they are charged for electricity based on horsepower (HP) and not actual consumption.

Regarding crop yields, farmers reported an increase of 40 to 50 percent with both sprinkler and drip irrigation. They emphasized that water-saving irrigation technologies have allowed them to irrigate more land with the same amount of water previously withdrawn from dug wells and other sources. This increase in cropped areas has led to higher yields and, subsequently, higher income for the farmers. Therefore, **the slogan 'More Crop per Drop' has been practically achieved through the POCRA initiative**.

(c). Additional observations

- The CNB structure was observed to be silted and overgrown with vegetation, negatively impacting its water harvesting and retention capacity. As a result, the recharge to groundwater is reduced. It is therefore necessary to regularly maintain both upstream and downstream areas of the CNB to achieve its intended objectives.
- Farmers lack guidance on when and how much water to apply through drip/sprinkler irrigation, as well as on chemigation (application of fertilizers and chemicals through irrigation), and the operation and maintenance of drip/sprinkler systems. This lack of information can affect the efficient use of irrigation systems.
- Erratic and insufficient electric power supply poses a significant challenge in operating irrigation systems. Even if the water is available in adequate quantity in farm ponds, it cannot be used as required in the absence of electricity. Farmers are required to adjust irrigation hours as per the availability of power supply.

The nuisance of wild animals, such as wild pigs and Neel cows, has increased, causing damage not only to standing crops but also to the drip laterals of the irrigation system. As a result, farmers are required to guard their fields during night times, which poses a challenging task. The details of the project villages visited are given below:

Details of the project villages visited

The field survey was carried out in the four villages of POCRA in Jalna and CSN districts from 12th to 15th July 2023 as shown in **Table 1.**

Table 1. Details of the project villages, no. of farmers interacted.

Date of visit	District	Taluka	Name of the village (s)
12 July & 13 July 2023	Jalna	Jalna	Borgaon
20 January 14 & 15 July 2023	CSN	Paithan	Dera (Dawarwadi); Indegaon; Nandur

Assessment of Cement Nala Bunds

In Borgaon village, there are three completed Cement Nala Bunds (CNB), three works of Compartment/ graded bunding, three works of Deep Continuous Contour Trenches (CCT), and two recharge shafts with recharge trenches. Besides, there is also one individual Farm Pond in the jurisdiction of Borgaon village. During the field visit one CNB structure and one Farm Pond could be visited.

Shri Pandharinath Dagduba Khaire (Gat no 78 & 86) has 10 acres of land. A Cement Nala Band (CNB) was constructed through POCRA assistance in the year 2022 (Figure 1). As there were no adequate rains during the previous weeks in Jalna taluka, there was no water flow in the Nala on the day of the visit.

Figure 1. CNB, Borgaon village

The farmer had constructed an open dug well in the year 2000. The well has a diameter of 7.6 meters and a depth of approximately 15 meters. Interestingly, this well is jointly owned by two farmers, each of whom has installed a 7.5 HP pump set for irrigation purposes.

Since the construction of the CNB in the vicinity, there has been a remarkable increase in groundwater levels. As a result, farmers now have a reliable and assured source of water, allowing them to irrigate their crops throughout the year. Moreover, some farmers have taken advantage of government subsidies available through other schemes and have installed solar pumps on nearby wells to further enhance their irrigation capabilities.

There are 5 dug wells upstream of the CNB and 4 dug wells downstream. The distance from the nala and average are irrigated annually is shown in Table 2.

Table 2. Location of the wells and area irrigated by dug wells on the upstream and downstream of the CNB along the nala

Upstream of the nala			Downstream of the nala		
Well	**Distance from the nala (M)**	**Average area irrigated (ha)**	**Well**	**Distance from the nala (M)**	**Average area irrigated (ha)**
A	15	12	F	30	4.0
B	10	5.7	G	10	6.0
C	10	4.0	H	10	4.0
D	30	3.2	I	45	3.2
E	45	7.23			

According to Shri Pandharinath Khaire, before the CNB construction, he could only irrigate about 2 hectares during the Rabi season using two pumps. However, after the CNB was built, he and his brother can now operate both pumps for over 12 hours per day during the Rabi season and about 2 hours per day in the summer season. This has enabled them to irrigate approximately 12 hectares annually, along with a total of 48 hectares in the entire upstream and downstream areas of the CNB.

Moreover, the water yield in their well has increased significantly, about 4 to 5 times, due to the increased water recharge from the nala during the rainy season. Before the CNB, they could only provide two irrigation rotations, but now they can offer 4 to 5 rotations for their crops. The crops grown in the Kharif season are soybean and cotton, while during Rabi, they cultivate wheat, jowar, and gram.

Overall, the CNB has had a positive impact, enhancing the irrigated area, increasing crop yields, and ultimately improving the income of the beneficiary farmers like Shri Pandharinath Khaire.

Assessment of Farm Pond

A community farm pond was constructed for the benefit of five farmers including Shri Pradeep Babasaheb Jaibhaye, and others in 2019 in gut no 74 of Borgaon village under POCRA. The size of the farm pond is 41 mm x 41 m X5 m having a storage capacity of about 8000 cubic meters. The pond is lined with plastic sheets and also provided with wire mesh fencing at the periphery for protection (Figure 4).

Figure 4. Community Farm Pond, Borgaon

The total cost of the construction was reported as Rs. 6,20,000/- while the farmers have received a subsidy amount of Rs. 4,60,920/-. The farm pond is mainly filled up by groundwater pumped from an open well and a borewell.

Shri Pradeep Jaibhyae, who was present during the field visit, shared that the farm pond is typically filled with groundwater during the rainy season and sometimes in the summer season as well. He mentioned that all five farmers have greatly benefited from the farm pond as they can now irrigate a total of 10 hectares of land, compared to the previous 5 to 7 hectares. **This increased irrigation capacity has resulted in higher crop production and ensured a reliable water supply**. When asked why they don't irrigate directly from the groundwater, Shri Pradeep explained that the discharge from the open and dug wells is too low to efficiently irrigate his fields. Therefore, he irrigates his crops using a sprinkler set obtained under the POCRA scheme. Additionally, groundwater availability declines significantly during the summer season.

The crops irrigated with the farm pond water include soybean and cotton during the Kharif season, gram during Rabi, and okra and watermelon during the summer season. These improvements in irrigation practices have led to increased income for the farmers. However, Shri Pradeep expressed concerns about the non-availability and erratic power supply, which limits the extent of the irrigated area.

Shri. Uddhav Somnath Lohgale, a farmer with 3 acres of land (1.2 hectares) in Gat no: 126/1, Dera village, Paithan taluka, CSN district, has a Sweet lime orchard on 1.5 acres and sugarcane on 1.0 acres. In the year 2020, he constructed a farm pond with a capacity of 72 lakh liters (720 cubic meters) through the POCRA scheme. While the total cost of the construction was covered by the POCRA subsidy, the farmer contributed Rs. 70,000 from his funds. The farm pond is filled up by pumping water from his dug well and also from a nearby Jayakwadi canal. The canal water is pumped into the pond during its flow period and is utilized for irrigation during the canal's closure period. In 2021, the farmer installed a drip system for the Sweet lime orchard under the POCRA scheme. He also installed drip systems for irrigating the sugarcane and cotton crops. This shift to drip irrigation and the ample availability of water stored in the farm pond has allowed him to irrigate all three acres of his farmland. Previously, he could only irrigate one acre of land using surface methods.

Shri Bhagwan Vishnu Lohagade, residing at Gat no. 126/3, Village Dera, Tal: Paithan, CSN district, constructed a farm pond with a capacity of 720 cubic meters (25m X 25 m X 3 m) in 2019 under the POCRA scheme. He received a subsidy of Rs. 1,38,050 for this project. The farm pond is filled by lifting water from Jayakwadi Projects' Left Bank Canal (PLBC) from October to May whenever the canal flows. Additionally, the pond is also filled with water from a dug well during the rainy season as required. He owns 6 acres of land, where he cultivates sweet lime on 2.5 acres, sugarcane on 1.5 acres, and other seasonal crops like cotton, wheat, and gram on the remaining area. He has installed a drip system for the sweet lime orchard. The farmer highlighted the significant benefits of the farm pond, stating that the water stored in it acts as a buffer stock, particularly during the summer months (March to May) when water is in high demand for the crops. **The combination of the farm pond and drip irrigation has**

proven to be a great boon for farmers like him. With this facility, Shri Lohagade has been able to irrigate 2 hectares of land effectively, leading to improved agricultural productivity and water conservation.

Shri Suresh Balu Raut, residing at Gat no. 166/1 in Nandur village, Tal: Paithan, CSN district, has constructed a farm pond with a capacity of 720 cubic meters (25m X 25 m X 3 m). In the year 2019-20, Shri Raut availed subsidies for (a) planting sweet lime plants, (b) constructing the farm pond, and (c) installing a drip system for sweet lime trees. The farmer uses the pond for one or two irrigations during the kharif season, once a week during the rabi season, and every 3 to 5 days during the summer season. He plans to shift the drip system from cotton crops to the sweet lime orchard for more efficient water and fertilizer use. The system has led to an estimated 40 percent energy reduction in irrigation, and Shri Raut expects a fruit yield of 15 to 20 tons per acre, with a gross income of Rs. 2 lakhs from the first-year harvest. **This showcases the positive impact of farm ponds and drip irrigation in improving agricultural productivity and income**.

Furthermore, the direct application of water-soluble fertilizers at the root zone minimizes fertilizer wastage, resulting in improved nutrient delivery efficiency to the crops. Additionally, the farmer estimated that using drip irrigation enables him to irrigate the same area in a shorter time, resulting in a significant energy reduction of up to 40 percent. This showcases the effectiveness of drip irrigation in conserving water and energy resources while optimizing crop growth.

Shri Dnyaneshwar Bhagwan Pankhede (Gat no 107 & 108; Village Indegaon; Tal: Paithan; Distt: CSN). Shri Pankhede has a total land of 24 acres and cultivates sugarcane in all areas. His farm is located alongside the Paithan Left Bank Canal (PLBC) of the Jayakwadi irrigation project. In the year 2019, he received financial assistance to construct a farm pond and also to purchase a pipeline and a pump set under POCRA. The farm pond has a storage capacity of 720 cubic meters and it is filled -up by pumping water from a dug well as and when required. The farm pond is fully lined by a plastic sheet. The farmer has installed a unique drip-cum-gated pipe system to irrigate sugarcane crops.




Farm ponds in farmers' fields

1. Assessment of Compartment Bunding

The compartment / graded bunding is a simple but effective soil and water conservation measure in medium to deep Vertisols soil. The main objective of the compartment/ graded bund is to enhance the capacity to manage runoff and surface drainage to protect land against soil erosion from intense rainfall. The compartment bunds are preferred in those watershed areas where the average annual rainfall is less than 750 mm and the land slope is less than 4 percent. The size (base width, top width, and height) of the compartment bunds is decided based on the type of soil and land slope. PVC pipes of 15 cm diameter are provided as outlets in the bund section at a certain height (normally 30 cm) from the ground level to remove excess runoff during the rainy season. The compartment bunds are laid both across and along the slope of the field depending upon the field situation. The Table 3 provides the details of observations/ discussion about the impact of compartment bunds on soil, water, and crops

Compartment bunding

Table 3. Assessment of the benefits of the Compartment Bunding

Name of the farmer Village, Taluka, & Gat no	Area covered by the compartment bunding	Benefits of the CB as told by the farmer
Shri. Uddhav Somnath Lohgale (Gat no: 126/1; Village: Dera; Tal: Paithan; Distt: CSN)	The CB was constructed in 2019 under POCRA. Bunds were prepared by the JCB machine.	• Retains rainwater in the field, leading to increased soil moisture. • Enhances groundwater recharge, resulting in higher water levels in dug wells. This enables the cultivation of crops like wheat and gram in the Rabi season, leading to increased farmers' income. • Prevents soil erosion caused by runoff during high-intensity rainfall. The deposited surface soil along the bund side can later be spread back over the field, retaining soil nutrients and preserving soil productivity. • Facilitates the safe removal of excess runoff from fields to nearby streams or nalas. • Improves soil texture, benefiting crop growth and overall agricultural productivity.
Shri Bhagwan Vishnu Lohagade (Gat no. 126/3, Village Dera, Tal: Paithan; Distt: CSN	The CB was constructed on 6 acres of land in 2019 under the POCRA scheme. A JCB was used to prepare the bunds. The slope of the field is about one percent.	
Sainath Subhas Lohagade (Gat no 126), Village: Dera, Tal: Paithan; Distt: CSN	The farmer has 7 acres of land and the compartment bunding was done in 2019 under the POCRA scheme with a 100 percent subsidy. The land has about one percent lope. The CBs were prepared by JCB. All his field plots are connected by a pipe outlet to remove excess runoff from one field to another. The farmer cultivates cotton, tur (arhar), bajara (pearl millet) and wheat. The farmer also has sweet lime plantations and sugarcane.	

Table 4. Assessment of benefits of sprinkler irrigation

Particulars	Ashok Sampatrao Kale (Gat no 443), Borgaon, (Tal & Distt: Jalna)	Dadarao Baburao Musale (Gat no 176) Borgaon, (Tal & Distt: Jalna)	Nivruti Janardhan Babar (Gat no 113), Indegaon
Description of Irrigation method	The farmer used sprinkler irrigation to irrigate jowar in the Rabi season of 2022-23. He has a dug well (6 m dia and 20 m deep). He has a 5 HP pump set and one standard portable sprinkler set. He has 1.2 ha of land which is light/ coarse in texture. He has applied three irrigations through sprinklers to the jowar crop.	The farmer has 2 acres (0.8 ha) of land and grew gram in Rabi 2022. He irrigated the crop twice (1st after 15 days of sowing and later after 40 days of sowing). His soil is coarse-textured and has shallow depth. The source of water is dug well. A 5 HP pump set is used to pump the water for irrigation.	The farmer has used sprinkler irrigation to irrigate cotton in the Kharif/ Rabi season of 2022-23. He has a dug well (4 m dia and 17 m deep). He has a 5 HP pump set and one standard portable sprinkler set. He has 2.0 ha of deep black soil land. The cotton growing period is 160 days, while irrigation is required for the first 90 days. He has applied six irrigations at an interval of 10 to 15 days as per the need of the crop.
Water saving (Compared to surface/ flood method)	The implementation of sprinkler irrigation resulted in significant water savings of 40-50% when compared to other irrigation methods, including surface or flood irrigation.	By using the pump for approximately 3 to 4 hours per session, as opposed to the 8 hours required for surface irrigation, the water usage was reduced by 50 percent.	According to the farmer, using the surface/flood irrigation method requires 8 hours to irrigate one acre of land, whereas, with the sprinkler system, the same area can be irrigated in 3 to 4 hours, resulting in a water-saving of 40 to 50 percent.
Energy saving (Compared to surface/ flood method)	The farmer mentioned that due to the reduced water requirement for irrigation, the pump operates for a shorter duration compared to the surface method. Consequently, there is an estimated energy saving of 40 to 50 percent. However, the farmer did not factor in the energy-saving aspect because the electricity charges are based on horsepower (HP) and not on actual energy consumption.	The farmer observed that using the surface/flood method for irrigation takes 8 to 10 days to cover the same area that can be irrigated in just 2 days with sprinkler irrigation. This significant reduction in irrigation duration leads to an estimated energy saving of 50 to 60 percent. However, since the energy charges are based on horsepower (HP) rather than actual energy consumption, the farmer does not directly benefit from the energy-saving aspect.	The farmer has installed a 5 HP pump set. With the sprinkler system, the pump is required to be operated for almost half of the time compared to the surface method of irrigation, resulting in an estimated energy saving of 40 to 50 percent.
Fertigation	No fertilizers are applied through the sprinkler system.	No fertigation through the sprinkler system.	No fertigation through the sprinkler system.
Increase in yield (Compared to surface/ flood method)	The farmer achieved a good yield of 10 quintals per acre, which is approximately 40 percent higher than the traditional surface method of irrigation. Additionally, the adoption of sprinkler irrigation allowed the farmer to irrigate a larger area.	Before using sprinkler irrigation, the farmer cultivated gram crops without irrigation, yielding about 3 quintals per acre. After adopting sprinkler irrigation, the yield increased almost twofold to 6 to 7 quintals per acre.	The farmer obtained an impressive yield of 10 quintals per acre for the cotton crop, which is nearly two and a half times higher than the yield obtained using the traditional surface method of irrigation.
Increase in income	The farmer earned a total gross income of Rs. 75,000 from his 1.2 hectares of land by selling Jowar at the rate of Rs. 2,500 per quintal.	From the two acres of land irrigated by sprinklers, the farmer earned a gross income of Rs. 48,000 by selling grams at the rate of Rs. 4,000 per quintal.	For the cotton crop, the farmer sold it at the rate of Rs. 8,000 per quintal and earned double the gross income compared to the surface method due to the doubled yield.

Table 5. Assessment of the benefits of drip irrigation

Particulars	Sainath Subhas Lohagade (Gat no 126), Village: Dera, Tal: Paithan,; Distt: CSN	Dnyneshwar Balasaheb Khule Village: Nandur Tal: Paithan,; Distt: CSN
Description of Irrigation method	The farmer has installed a drip system on 1 ha of his Sweet lime (sweet lime) orchard. The farmer has multiple sources of water (dug well, farm pond, and pumping from the canal). The orchard was planted four years back and this was the first year of fruit bearing. The plant-to-plant and row-to-row spacing is 15 m X 15 m. There is one lateral per row and two drippers of 4 LPH per plant. The farmer has been cultivating intercultural crops for the last four years but will stop taking them from the current year onward. The farmer irrigates the Sweet lime crop at an interval of about 15 days in the Kharif & Rabi seasons but during the summer season, he irrigates the orchard every alternate day. The soil is coarse/ light textured and has a shallow depth (20 cm).	The farmer has 2.5 ha of land and installed a drip irrigation system for Sweet lime orchard in 2021-22. The trees were planted at a spacing of 12 ft X 16 ft. The source of water is the dug well (16 ft dia & 80 ft deep). A 5 HP pump is installed Fin the well. The farmer said that if the pump is operated for 8 hours the water level depletes by 20 ft. (about 112 cubic meters. The farmer cultivates a cotton crop as an interculture crop in between the sweet lime rows. The dripper discharge is 8 LPH. Presently, there is only one dripper per plant. As the plant's water requirement will increase next year, the farmer add one more dripper for each tree. Usually, no irrigation is required in the khariff season, while one irrigation per week is applied in the Rabi season and once in three days in the summer season.
Water saving (Compared to surface/ flood method)	The farmer mentioned that with the traditional basin method of irrigation, a significant amount of water was needed to irrigate his orchard. However, with the drip method, he could give 15 irrigations using the same amount of water that was previously used for one irrigation rotation in the entire orchard. This resulted in a water saving of approximately 70 to 80 percent.	The farmer highlighted that the use of drip irrigation allowed him to expand the Sweet lime orchard to a larger area. As a result, he estimated a water saving of about 60 to 70 percent compared to the traditional basin method.
Energy saving (Compared to surface/ flood method)	The farmer was not able to quantify the energy-saving benefits of drip irrigation as he paid electricity charges based on horsepower (HP) rather than actual power consumption. However, it can be estimated that drip irrigation resulted in an energy saving of approximately 40 to 50 percent.	Since the farmer was not aware of the energy-saving aspect due to the billing system based on HP, the exact energy savings were not considered or realized by him.
Fertigation	The farmer mentioned that he applies soluble fertilizers (such as 19:19:19) through the drip system using a pump. He observed that this method resulted in a 30 to 40 percent reduction in fertilizer usage compared to the conventional method where fertilizers are applied separately. Additionally, he noted that the conventional method led to the hardening of the soil surface.	The farmer revealed that he has not yet tried applying fertilizers through the drip system.
Increase in yield, (Compared to the surface method)	The farmer said that he is expecting 30 to 40 percent higher yields of Sweet lime due to the use of drip irrigation.	As the orchard is young, the fruiting will start in the fourth year.
Increase in income	The farmer had high expectations of achieving a yield of 25 tons per hectare using drip irrigation. With the prevailing market rate of Rs. 17,000 per ton, he was pleased with the potential income generation made possible by adopting drip irrigation.	As the orchard is young, the fruiting will start in the fourth year.

Sprinkler and Drip systems on farmers' fields

Annexure 9: Field Visit Notes of Environment Expert

As part of the 9th concurrent monitoring round of the PoCRA project, between 12th to 15th July 2023, selected villages in Nanded and Hingoli districts were visited by the Environment expert. The villages included Manjaram, Naigaon, Nawandi, and Kinala in Nanded district and Sindgi, Nawakha, and Wei in Hingoli district.

Key Observations from the field visit:

- Most PoCRA activities in the visited villages are focused on farmers with large land areas, often officially divided among family members.
- The Village Cluster Resource Management Committees (VCRMC) were found to be non-functional in some villages, like Singadi in Hingoli district.
- Crop residue management has improved in the PoCRA villages compared to the earlier visit.
- The villagers in the third phase of PoCRA felt deprived of certain activities that were discontinued during this phase.
- Some necessary Natural Resource Management (NRM) activities were not included in the microplanning by VCRMC, despite being long overdue in some villages.
- The water level has improved in most villages, which could be attributed to increased rainfall and other watershed management programs along with PoCRA.
- Farm fencing is essential in most villages to protect crops from damage caused by wild animals.
- Farm ponds are required to enhance water availability in the area.
- Farmers expressed the need for long-term support programs, lasting at least five years, from PoCRA or other sources, as the subsidy is for a one-time establishment.
- Market linkages for farmers need to be strengthened to ensure better access to markets for their produce.

Key Recommendations

1. Integrating the water resource management plan into the village's micro-action plan holds significant importance. Given the scarcity of water in the region, there's potential for accessing canal water from a nearby reservoir.
2. The introduction of farm ponds has proven immensely beneficial in the region, transforming previously uncultivated land into productive farmland through improved water availability. Moving forward, it's advisable to continue emphasizing such initiatives alongside water harvesting and efficient usage.
3. In the region facing water scarcity, there's a pressing need for pipes and motors. Regrettably, the subsidy program for these items, initially proposed under the PoCRA project, was discontinued before implementation in the third phase villages. As most villages fall under this category, the project could aid farmers in securing bank loans or financial support from alternative schemes to acquire the necessary equipment.
4. Establishing connections to markets and developing local value chains for various products can significantly enhance their value. This not only boosts farmers' income but also opens avenues for carbon credit benefits while contributing to overall agricultural advancement.

Key Insights from Village Visits in Nanded and Hingoli Districts:

During the visit to Nawandi and nearby villages, it was observed that sericulture plays a crucial role in agricultural activities. One beneficiary of sericulture was interviewed, who had already established a sericulture plantation on 1 acre of land with the support of PoCRA subsidy. However, **the farmer expressed concern about not receiving any formal training on sericulture from PoCRA or any other organizations**.

Instead, the farmer acquired knowledge through working with fellow sericulture farmers in the vicinity and studying the market dynamics. Despite this, the farmer remains optimistic about the potential profitability of sericulture over cotton cultivation, aiming for an expected profit of Rs. 3 lakhs in a year after the establishment of sericulture.

The expenditure incurred by the sericulture farmer includes Rs. 3000/- per batch for larvae (six batches in a year), Rs. 5000/- for manure annually, and Rs. 1500/- for DAP (50 Kg). The plantation requires 4 hours of irrigation per day for three days a week, incurring a daily cost of about Rs. 90/-.

In addition to sericulture, the farmer cultivates Haldi, Mung, Soybean, and cotton. However, due to the rise in LPG cylinder prices, the farmer mostly relies on traditional challah cooking, utilizing residues of crops like cotton and soybean.

The farmer expressed satisfaction with the PoCRA subsidy amount and support from the agriculture department staff. Nonetheless, the farmer emphasizes the need for consistent support from PoCRA, particularly in the areas of training, disease identification, and maintenance of the sericulture shed.

In Kinala village, the VCRMC members were interviewed, and it was found that a Custom Hiring Center (CHC) was established under the PoCRA project by a group of thirteen members, including four women farmers. The CHC provides rental services for various agricultural machinery, with prices ranging from Rs. 1500/- to Rs. 2000/- per acre for members and non-members, respectively.

Beneficiary farmers in the village with access to drip irrigation facilities reported cultivating new crops like Rajma in the Rabi season, resulting in about 30% increased production of Tur. The water depth in the village has reduced from over 300 ft to 30-40 ft, possibly due to increased precipitation in the area over the last few years.

At Singadi village in the Hingoli district, farmers expressed their worries regarding challenges associated with the lack of response from cluster assistants in enrolling them for the DBT scheme and assisting them in completing the beneficiary applications. **Some PoCRA beneficiaries in the village have not received subsidies despite sanctions and timely completion of work, particularly for horticulture crops.**

The villagers expressed a requirement for canal water from a nearby canal, specifically from Isharpur Dam, which they believe would greatly benefit the village. However, the VCRMC discussions and meetings have been insufficient, leading to a lack of NRM (Natural Resource Management) activities in the village. Additionally, the unavailability of pipes and motors under the PoCRA program has resulted in fewer applications from PoCRA beneficiaries. Villagers also reported that Singadi village missed out on many PoCRA benefits as it is categorized as a third-phase PoCRA village.

The farmers highlighted the positive impact of watershed management projects along with PoCRA in improving water levels. To protect crops from wild animal attacks, the villagers are seeking support or subsidies for farm fencing under PoCRA or similar programs.

During the visit, it was evident that most sericulture farmers in the area have shifted to cotton or soybean farming due to a lack of market opportunities and lower profit margins after the COVID pandemic. Previously, there were about twenty-two farmers engaged in sericulture, but presently, none of them are undertaking sericulture activities.

In the village of Nawkha, located in the Hingoli district, soybean cultivation has experienced a significant decline of approximately 30% over the past few years, mainly due to pest attacks. To combat this issue, some farmers have taken advantage of the PoCRA initiative and established shadenets to grow Mirchi, Capcimum, and Cucumber. This diversification has been a positive step for these farmers, allowing them to explore alternative crops and protect them from pests. However, despite their efforts, soybean farmers in the village still face challenges, as they receive about 20% less value for their soybean produce compared to the Minimum Support Price (MSP).

In Wei village, a community activity was visited, and a group of 15 farmers came together to form a custom hiring center. This center is equipped with a Tractor, Seed drill, Thresher, Cooker, and trolley. The cooker is mainly used for processing turmeric. The rental charges for these agricultural machines are 500/acre for members and double the price for non-members. This initiative has proven to be beneficial for the farmers, providing them with access to essential machinery without the burden of ownership.

Furthermore, in the same village, another community activity has been established, where a group of fifteen farmers set up a grading and cleaning machine under the PoCRA program. They utilize post-processing residues as fodder for animals or poultry feed. Additionally, some of these residues are used as manure for their fields, contributing to sustainable agricultural practices. In the past, the farmers used to burn cotton crop residues, but now they are repurposing them in the Cooker to process turmeric. As a result of these initiatives, the farmers have been able to sell soybeans at a higher price of Rs. 200/Kg, compared to the previous rate of Rs. 150/Kg.

In addition to these activities, the same group of farmers established a goatry under the PoCRA, housing fifty female and five male goats. With each female goat producing at least two baby goats in six months, the farmers have successfully sold around 30 goats in the last year, fetching prices ranging from Rs. 8000 to Rs. 10000 each. Presently, there are fifty-five goats in the goatry, indicating the success and sustainability of this initiative.

However, despite the positive developments, there are some challenges in the village related to the utilization of common land. The VCRMC or panchayat has not undertaken any plantation in these common lands, leaving farmers with no choice but to move their goats to distant areas for grazing. Addressing this issue and implementing proper land management practices could further enhance the overall agricultural productivity and animal husbandry in the village.

Overall, the visits revealed mixed progress in PoCRA activities across the villages, with some successful implementations and challenges that need to be addressed, such as subsidy delays and water scarcity. Market linkages and long-term support programs are suggested to enhance farmers' livelihoods and sustainable agriculture practices.

Annexure 10: Field Visit Notes of Sociology Expert

Villages visited –

- Nanded district – Manjiram, Nawandi and Biloli
- Hingoli district - Singdi, Nawkha and Wai

Method of data collection –

- Key person interview - Krushi Tai, women VCRMC members, sarpanch
- Focus group discussion – VCRMC
- Date of field visit – 12th to 15th July, 2023

Broad objectives of the visit

1. As an institution is the VCRMC relevant or not?
    - Has the VCRMC sufficiently represented the community?
    - Is the VCRMC empowered for the decision-making process?
    - Is there transparency and accountability in the VCRMC functioning?
2. The administrative capacity of VCRMCs which is built through training to undertake their role and responsibilities will be studied. Whether training to VCRMC is effectively applied in reality and assess its utility.
3. Ways to further strengthen the involvement of VCRMC members in project implementation are to be suggested.
4. How have PoCRA interventions affected and changed the social ecosystem of a village?

Findings

Relevance of VCRMC

VCRMC remains relevant as a responsive body to benefit the larger community, especially the poor and marginal farmers and the members of the Scheduled Castes and Tribes. In all the study villages, it was stated that VCRMC was actively working to ensure the marginalized benefitted from the project, through awareness generation regarding the DBT system and facilitating registration and application process through portal/mobile. Small and marginal farmer's applications (including women) were considered favorably even though there was a delay in disbursement. The beneficiaries, who had received disbursement for micro-irrigation (drip/sprinkler/pipes/pumps) and horticulture plantation expressed that they have benefited from these assets. These technologies have led to water conservation and also saved their crops during less water availability in the dry season in addition to increased productivity and income. Few small farmers have also ventured into sericulture due to the benefits of micro-irrigation systems.

VCRMC's relevance is also due to its approach where there is no upper limit for the number of applications that can be submitted from each village, so a sense of unhealthy competition does not exist among farmers.

Administrative capacity

In most of the visited villages, the composition of VCRMC was representative of the mandated representations from SC/ST/marginal farmers, women farmers (4-5), and women SHG members. With such significant representation from all sections, there is a huge opportunity to advance gender-responsive and socially inclusive governance processes, enabling women and marginalized to exercise their rights. However, women were not aware of their roles and responsibilities and heavily relied on men (VCRMC members) or agriculture assistants to make decisions on applications. Some of them had attended the initial orientation training but were not confident enough to discharge their responsibilities. The knowledge transfer during these training sessions was found to be minimal, with little awareness of the rules, regulations, and finances of VCRMC. Women were also unable to attend the online training conducted by the POCRA team since they did not have smartphones or faced connectivity issues.

Suggestion to further strengthen the involvement of VCRMC members

1. In principle, the members of this committee are supposed to be selected by the Gram Sabha and represent various stakeholders at the village level. However, during the field visit, it was observed that

some of the women members were selected as a token representation without their consent. Often male members of the family represented them and made decisions on their behalf. The women also expressed their lack of interest in becoming members of VCRMC. Therefore, their knowledge about the preparation of village micro-plans or facilitating the social of the project activities was found to be poor. This shows that significant gains in quantitative representation have not been transformed into a qualitative representation of women in the decision-making processes. Hence, one of the major suggestions would be to motivate and induct women who are earnestly interested in taking up leadership roles or community representation activities.

2. During the field visit it was noted that there is a heavy dependency on agriculture assistants/ cluster assistants by the VCRMC members to maintain project accounts, lead the processes of planning, and make decisions on applications. There seems to be complacency among the members and unwillingness to get actively involved in the functioning of VCRMC. Moreover, VCRMC members vary in their competencies, educational qualifications, and interest levels, forming a spectrum of capabilities, mindsets, and attitudes. Therefore, specialized training (audiovisual/hands-on exercises) is required for different VCRMC members depending on their capabilities.
3. Currently, there are no monitoring or evaluation mechanisms to understand the impact of the training conducted on the VCRMC members. Hence, it is imperative to design a structured mechanism to understand their performance and get regular feedback.
4. Digitalization of VCRMC activities (including maintaining minutes of the meeting) can be an effective tool to bring efficiency, accountability, and transparency to the functioning of the VCRMC.

PoCRA and the social ecosystem of a village

The major objective of PoCRA is to enhance climate-resilient agricultural practices by introducing transformational changes in the sector through climate-smart technologies and practices at the farm and watershed levels. However, the emphasis is on boosting the profitability of smallholder farming systems and vulnerable populations whose livelihood is impacted by changing climate conditions and climatic uncertainties. The project approach is also mandated to be inclusive by focusing on women for better participation and decision-making along with benefitting from the project interventions. There is also an exclusive strategic focus on greater inclusion and proportionate representation of tribal in non-scheduled areas and their active association in project interventions in scheduled / tribal-dominated areas. All these components have the potential to bring about some changes in the social ecosystem of the village.

The PoCRA interventions in the Maratwada region has without a shred of doubt benefitted small and marginal farmers (including women) through various kind of support such as micro-irrigation, community work (nala bunds), custom hiring center, poly house, shade net, goat rearing and beekeeping among others. The VCRMC was also representative of the mandated representations from SC/ST/marginal farmers, women farmers, and women SHG members.

Institutional change is the most important aspect of social change. However, in most of the villages, it was observed that women sarpanch and some members, unfortunately, served as token leaders (proxy representation) and exhibited a lack of knowledge regarding VCRMC working, and were unaware of the objectives and goals of the project. The performance of Krishi Tai who is supposed to be an interface between the project team and the marginalized (marginal/small farmers/women) was also not satisfactory. VCRMC women and Krushi Tai's participation is considered merely to take care of women's issues. They face an information backlog about planning, budgeting, and important meetings. Often they are sidelined or dominated by their male counterparts in the meeting. The ability of women to capitalize on their newfound position is challenged by the prevalent discrimination at the household level. The root cause of exclusion is the structural discrimination emanating from socio-cultural traditions, norms, and practices that are deeply embedded in community and organizational cultures. Gendered social norms thus severely limit women’s voice and agency, access to and control over resources including knowledge and information.

Moreover, some of these villages are already riddled with internal political issues and stratified due to social issues. These aspects are also manifested in local institutions like Panchayat. Therefore, in these villages which are already characterized by weak institutions, even a proactive project like PoCRA cannot herald major changes in the social ecosystem of the villages. This indicates that despite enacting rules for participation and inclusion, it is difficult to attain a total change in the social ecosystem.

Annexure 11: Field Visit Notes of Agri-Engineering Expert

As part of the CM IX Round initiative, an Agri-Engineering expert conducted a field visit to Chittegaon and Chitte Pimpalgaon in the Aurangabad district on August 28, 2023. During this visit, productive discussions took place with cluster assistants and members of the farming community. Additionally, physical inspections were carried out on Farm Pond projects, one in Chittegaon (initiated in 2020 and completed by 2023) and another in Chitte Pimpalgaon (initiated in 2021 and completed in 2023).

Chittegaon encompasses a total geographical area of 632 hectares, with a net sown area of 504.76 hectares. Within the village, there have been 226 applications for agroforestry, 130 for drip irrigation, 15 for farm mechanization, 77 for individual farm ponds, and 16 for shadenet houses. The community is comprised of 400 small and marginal farmers, 411 belonging to the SC category, and 24 to the ST category.

Chitte Pimpalgaon occupies a total geographical area of 632.32 hectares, with a net sown area of 505.08 hectares. In this village, there have been 240 applications for agroforestry, 157 for drip irrigation, 31 for farm mechanization, 81 for individual farm ponds, and 16 for shadenet houses. The village is home to 510 small and marginal farmers.

The results of our field visit and interactions with cluster assistants and farmers can be summarized as follows:

i. Both Chittegaon and Chitte Pimpalgaon predominantly rely on a pressurized drip irrigation system, which utilizes water stored in ponds within the overall command area for field irrigation.

ii. Following the implementation of the PORA intervention, which involved the construction of farm ponds and the installation of drip irrigation systems in both villages, there has been a significant shift in the cropping pattern. The majority of the command areas are now dedicated to the cultivation of perennial horticultural fruit crops, with only a small portion allocated for the cultivation of annual field crops such as wheat, soybean, cotton, and fodder crops. In Chittegaon's command area, the predominant fruit crops are sweet lime, guava, and custard apple. In Chitte Pimpalgaon's command area, sweet lime and guava are the primary crops.

iii. Farmers have reported a progressive increase in the annual yield of fruit crops and appear to be quite satisfied with the results. It's worth noting that the planted fruit trees are yet to reach full maturity in the command area, so there is an expectation of even higher crop yields in the future.

Figure 1 – Farm Pond (Individual Farm) in Chittegaon and Chitte Pimpalgaon Farming Area

Figure 2. Napier grass for animal feed, horticulture fruit, and other field crops in the command area

Annexure 12: District-wise Analysis of Average Delay in Payment

District-wise Village level analysis of the duration between payment request made and final payment

District	Village	Avg time taken between Payment Request & Payment Process	Avg time taken between Payment Process & Payment Done	Avg time taken between Payment Request & Payment Done
CSN	Mehun Puranwadi	99 days	3 days	102 days
	Nimbhora	106 days	4 days	110 days
	Pirola	90 days	4 days	94 days
	Rithi	89 days	3 days	92 days
	Tanda kh.	105 days	4 days	109 days
Beed	Kanadi Bk.	155 days	2 days	157 days
	Nimgaon Chauba	122 days	2 days	124 days
	Selu Amba	114 days	5 days	119 days
Hingoli	Adgaon	110 days	3 days	113 days
	Matha	106 days	4 days	110 days
	Rajawadi	82 days	4 days	86 days
Jalna	Borgaon	147 days	4 days	151 days
	Mehgaon	150 days	3 days	153 days
	Dhalaskheda	123 days	3 days	126 days
	Bhadregaon	110 days	2 days	112 days
	Wadi Siradhon	174 days	2 days	176 days
Latur	Andalgaon	99 days	3 days	102 days
	Tambalwadi	141 days	2 days	143 days
	Gharni	144 days	2 days	146 days
Nanded	Kharbi	160 days	7 days	167 days
	Dapshed	81 days	6 days	87 days
Dharashiv	Loni	226 days	3 days	229 days
	Devsinga Nal	77 days	3 days	80 days
	Dhekri	119 days	6 days	125 days
	Hawargaon	87 days	2 days	89 days
	Borgaon raje	88 days	4 days	92 days
Parbhani	Paralgavhan	103 days	3 days	111 days
	Ravalgaon	143 days	7 days	150 days
	Tidi Pimpalgaon	148 days	3 days	151 days
	Kawi	142 days	2 days	144 days

Annexure 13: Factsheets of 16 FPCs

FPC Details	1	2	3	4	5	6
Name	Shree Ganesh FIG	Mandavkhel FPC	Deepankur FPC	Mankarnika Agro FPC	Fegde Patil FPC	Siddhnath FPC
Location	Aurangabad	Beed	Beed	Beed	Hingoli	Hingoli
Year of registration	Aug-21	Aug-21	Jan-18	Aug-19	Mar-19	Aug-20
List of key activities before PoCRA	Agricultural work	Agricultural work	Traditional farming	Agricultural work	No activity	Agricultural work
Source of information about PoCRA	Agriculture assistant and TAO	Agriculture assistant	Agriculture assistant	Agricultural assistant	Friend	Agriculture department and PoCRA project staff
PoCRA supported activities	CHC	CHC & Refer van	CHC and Geranium oil extraction plant	CHC	CHC and Feed mill	Commodity processing unit
Cost of PoCRA-supported activities	Received: Rs. 9.60 lakhs	Received: Rs. 15 lakhs	Received: 34.25 lakhs	Received: Rs. 11.64 lakhs	Received: Rs. 21.65 lakhs	Received Rs. 12 lakhs
Source of funding	Own investment	Own investment and bank loan	75% of funds were raised from the board members; the remaining 25% amount from the bank	Own investment	Own Investment	Own funding
Current status activity	Project established and operational; Three male members are working full time; No female member works; Machines available: 50 hp tractor, Plough,	CHC and Refer van are operational. All members have access to the CHC and refer van facilities. Nearly 50-60 non-members also access both facilities. Refer van can be	CHC and the Oil extraction plant are operational. Geranium oil extraction rate for members is Rs. 3000/- per ton and Rs. 3500/- per ton. Of the total processing capacity of	CHC is operational. Machines available: Plough, Tractor, Trolley, Thresher, Rotavator, Cultivator.	CHC and feed mill are operational. Members can hire machines from CHC at the rate of Rs. 800/- per day and non-members can hire them at Rs. 2000/- per day. Machines available:	Unit is established and operational. Total processing capacity is 10 tons per year and on average around capacity of 6 tons per year is utilized. Four men are full-time employed for operating

FPC Details	1	2	3	4	5	6
Name	**Shree Ganesh FIG**	**Mandavkhel FPC**	**Deepankur FPC**	**Mankarnika Agro FPC**	**Fegde Patil FPC**	**Siddhnath FPC**
	Cultivator – 9 tyne, Seed driller, Trolley.	hired at the rate of Rs. 12/- per km by members and Rs. 15/- per km by non-members.	22 tons per day, currently, 15 tons per day capacity is utilized. The oil extraction unit is insured.		Sowing machine, plough, tractor, cultivator 5 and 9 tyne, and rotavator. Feed unit has a capacity of 1 ton and generates feed for poultry and cattle. Three men are full-time employed to run the unit. 50 Kg pack of feed is sold at Rs. 60/-. Monthly around 100 – 120 packs are sold.	the unit at the wage of Rs. 400/- per day. Raw commodity is picked up from farmers and nearby markets.
Participation and decision-making						
Average attendance in group meetings	12 out of a total of 15 members	20-25 members of total 250 members	All members	50-60 members	40-50 members	–50-60 members
Participation of members	Some members speak	Every member speaks	Every member speaks	Some members engage and speak	All members support and participate	Every member engage
Efforts for participation of women, vulnerable and tribal community farmers	Ask them to join	Invited and encouraged to speak	Tell women to increase their participation	No tribal community in our village. Females are encouraged	No tribal community in the village	Invited and encouraged to speak
Book-keeping and records						

FPC Details	1	2	3	4	5	6
Name	**Shree Ganesh FIG**	**Mandavkhel FPC**	**Deepankur FPC**	**Mankarnika Agro FPC**	**Fegde Patil FPC**	**Siddhnath FPC**
Types of records maintained	Accounts, stock, and cash register	Stock register, proceeding book, cash book, general ledger book	Stock register, proceeding book, cash book, general ledger book	Attendance, stock, cash register, audit statements	Attendance, stock, cash register, audit statements	Stock and Cash register
Records maintained by	Chairman	Director	Director and Secretary	Chairman	Chairman	Chairman
Training/ Capacity building of members.						
Number of trained members	All members need training	12 members	No member is trained	–3-4 members	All members need training	5-6 members
Place of training	Expected near village	KVK, Ambejogai	Expected near village	Pune	Expected near village	Sahyadri
Topics of training	Market linkage, Operationalizing rental activity	management Application of farm implements, Business planning, Financial and marketing management	Income-generating activities, Operation and maintenance of CHC and oil extraction unit	Machinery rental and agriculture	On strategies for procuring raw materials for the feed unit and marketing the final product	Business plan, financial management, and market linkage
Impact due to training	Training will improve coordination and efficiency in running CHC	Was useful in operationalizing CHC, understanding business and markets	Training will improve our efficiency	Timely agricultural work helped increase income and production	Training will improve coordination and efficiency in running CHC and feed unit business	Training was good however more training is needed
Further training requirements	Members need basic training first, then we can think of further training.	Want training on commodity processing, and value-addition activities	Members need basic training first, then we can think of further training	None	None	Post-harvest value chain activity-related training and market linkage

FPC Details	1	2	3	4	5	6
Name	**Shree Ganesh FIG**	**Mandavkhel FPC**	**Deepankur FPC**	**Mankarnika Agro FPC**	**Fegde Patil FPC**	**Siddhnath FPC**
List of environmental safeguards followed	No trees were felled during the construction of the CHC centre	Environmental safeguards were followed during the construction of CHC and operating refer van	Did plantation activity	Planted trees, and followed environmental protection	Constructed toilets, provided hand washing facilities, managed wet and dry waste. No trees were felled during construction activity.	No environmental damage during project construction; Build sheds away from the forest
Site Specifications of FPC/FPO from environmental perspective	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place
Fire safety standards and water management strategies	Equipped with fire safety standards and aware of water management work	Equipped with fire safety standards	Equipped with fire safety standards and aware of water management work	Equipped with fire safety standards and aware of water management work	Not equipped with fire safety standards, but aware of water management work	Equipped with fire safety standards and aware of water management work
Benefits due to PoCRA	Currently, around 15 members are availing the CHC facility at the rate of Rs. 1500/- per acre.	With the help of Refer van, farmers can transport vegetables to CSN (i.e., Aurangabad), Hyderabad, Nanded, and Mumbai and can realize better prices for them. Also, losses have been reduced as the shelf life of vegetables has improved.	Farmers benefited by adopting Climate-friendly technology like using organic fertilizers, machine helped finish all the farm work on time	Farmers have reported saving in labor costs and time	Farmers have reported saving on labor costs and time. FPC has provided employment through these activities.	FPC has provided employment through these activities.

FPC Details	1	2	3	4	5	6
Name	**Shree Ganesh FIG**	**Mandavkhel FPC**	**Deepankur FPC**	**Mankarnika Agro FPC**	**Fegde Patil FPC**	**Siddhnath FPC**
Challenges faced	Allocation of machines is challenging some time when same machine is demanded at same time by multiple members.	Bank linkage and market link, delay in getting loan from the bank	Delay in loan sanction from bank	Allocation of machines among members is challenging	Face challenge in operating feed unit because of erratic power supply, and irregular supply of raw material.	Face challenge in operating processing unit because of erratic power supply, and irregular supply of raw material.
Feedback on FPO portal	None	It is useful portal with all necessary information	Portal and App is good, accessible and easy to use	Portal is good	Portal is good and useful	Very good
Feedback on project staff	Good cooperation from project staff like Agriculture Assistant, TAO	Received proper guidance from project staff	Agriculture Assistant was prompt & helped us throughout the process.	Agricultural assistants and other staff cooperated and timely sharing of information	Very good cooperation, but only document takes time	Earlier the project staff was efficient. Recently appointed officials are laggard and delay the process.
Suggestions for PoCRA	None	None	Erratic supply of electricity has been a major challenge. Request project to come up with solar based power solution.	Request to continue the project activities	None	Request to continue the project activities and focus more on the post-harvest vale addition activities.

FPC Details	7	8	9	10	11	12
Name	**Akansha Agro FPC**	**Amol Borkar FPC**	**Ravini Agro FPC**	**Venkatesh FIG**	**Daneshwari Agro FPC**	**Gaur Agro FPC**
Location	Jalna	Jalna	Latur	Latur	Latur	Latur
Year of establishment	Aug-21	Jan-22	Feb-21	Aug-17	Sep-17	Dec-19
List of key activities before PoCRA	No activity	No activity	Grain storage	Commodity trading	Commodity trading	Commodity trading
Source of information about PoCRA	Agricultural assistant	Cluster Assistant	Agriculture Assistant	Project staff especially Agriculture Assistant and Agriculture department	Agriculture Assistant	Agriculture Assistant, VCRMC members
PoCRA supported activities	Refer Van	CHC	Commodity storage and processing unit	Seed processing unit with godown	Seed storage/ Godown	CHC
Cost of PoCRA-supported activities	Received: Rs. 19 lakhs	Received: Rs. 11.99 lakhs	Received: Rs. 19.60 lakhs	Received: Rs. 93 lakhs	Received: Rs 42 lakhs	Received: Rs. 11 lakhs
Source of funding	Own fund and bank loan of 21 lakhs at interest rate of 11.5%	Collection from all members	Own investment; No bank loan	Owned and bank loan of 72 lakhs	Bank loan	Own fund
Current status activity	Refer van is operational. We charge Rs. 15 -20/- per km as rental cost. 70% of the bank loan is settled.	Installed and working	Processing unit is established and operational. Total capacity is 100 tons and five men are employed for its operation.	Took 2.5 years to establish. Project established and operational. Godown is used for storage as well as for commodity trading. Total capacity of godown is 750 MT. Four men are employed full-time for managing. Godown is insured.	Took 4 years to establish. Total capacity is 7500 MT. Soybean is a key crop stored in the godown. Two men are full-time employed to manage the godown.	Project established; took 3 months to set up
Participation and decision making						

FPC Details	7	8	9	10	11	12
Name	**Akansha Agro FPC**	**Amol Borkar FPC**	**Ravini Agro FPC**	**Venkatesh FIG**	**Daneshwari Agro FPC**	**Gaur Agro FPC**
Average attendance in group meetings	8-10 members	40 members	Few members	All Members	85% members	8-9 members
Participation of members	Every member do not engage and speak	All members engage	All members do not engage and speak	Every member engages	All members engage and speak	Each member shares their opinion
Efforts for participation of women, vulnerable and tribal community farmers	No initiatives are planned yet	Implements provided at lower cost	Encourage them to be members of FPC and shareholders	Motivate them to attend the meeting	Arrange special meetings and motivate them	Inform them about the importance of participation
Book-keeping and records						
Types of records maintained	Attendance, stock, and cash register	Attendance, stock, annual audit, and cash register	Attendance, stock, and cash register	Attendance, proceeding, stock, and cash register	Proceeding, stock, and cash register	Attendance, proceeding, stock, and cash register
Records maintained by	Secretary	Chairman	Chairman	Secretary	Chairman	Chairman and Secretary
Training/ Capacity building of members.						
Number of trained members	No training	No training	10 members	Chairman	2-4 members	Few members
Place of training	NA	NA	Pune	KVK	Warehouse corporation	Gaur village in Latur
Topics of training	NA	NA	Business plan, market linkage, commodity processing.	Business plan, market linkage, Godown management	Construction of godown, Business plan, Financial planning	Training on how to create a market link and business plan and how to grow the business

FPC Details	7	8	9	10	11	12
Name	**Akansha Agro FPC**	**Amol Borkar FPC**	**Ravini Agro FPC**	**Venkatesh FIG**	**Daneshwari Agro FPC**	**Gaur Agro FPC**
Impact due to training.	NA	NA	Could streamline business operations	Helped streamline the business operations	Helped in improving the management of godown	More informed about business operations
Further training requirements	Not aware	Not aware	Exposure visits to successful commodity processing units	Exposure visits are needed	Training in managing storage of crops like pigeon pea and green gram.	Training on post-harvest value chain activities needed
List of environmental safeguards followed	No construction activity is undertaken.	No trees were felled during project construction	Availability of toilet facility and handwash, solid and liquid waste management, pollution management	Availability of toilet facility and handwash, solid and liquid waste management, pollution management	Provided toilet and hand washing facilities during the construction of the processing center, wet and dry waste management to avoid environmental damage	Don't know
Site specifications of FPC/FPO from environmental perspective	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place
Fire safety standards and water management strategies	NA	Not equipped	Equipped with fire safety standards and aware of water management work	Equipped with fire safety standards and aware of water management work	Equipped with fire safety standards and aware of water management work	Equipped with fire safety standards and aware of water management work
Benefits due to PoCRA	Refer van has helped farmer improve the marketing of their perishable produce, especially vegetables. This has improved their income.	Saved labor costs and time. Farmers can access the farm implements at low cost as follows: Plough = Rs. 500/- per acre, Rotavator = Rs. 1000/- acre	FPC generated employment. Soybean and green gram farmers have benefited because of the processing unit.	Farmers can realize better market prices because of storage facility	Farmers have benefited from storage facility by securing their produce for a longer duration of time until the market price is suitable for trade. FPC has generated employment.	CHC is established and operational. 50-60 members access and use it. Farmers are able to complete their work on time and also save labor cost.

FPC Details	7	8	9	10	11	12
Name	**Akansha Agro FPC**	**Amol Borkar FPC**	**Ravini Agro FPC**	**Venkatesh FIG**	**Daneshwari Agro FPC**	**Gaur Agro FPC**
Challenges faced	No challenge faced	Bank linkage was not received, project staff and officers were busy with their work	Market linkage and management of funds	Organizing funds required for the project	Bank related work is bit challenging	More farmers are approaching the CHC and hence allocation becomes a challenge
Feedback on FPO portal	Easy to use	No information	Not Aware	Good and informative	Satisfactory and useful	No Information
Feedback on project staff	Good guidance from project staff	Only SDO helped, while other employees were not that helpful	Guidance received from agriculture assistant	Well supported by Agriculture assistant	Very supportive and considerate	VCRMC members have been very helpful
Suggestions for PoCRA	None	Delay in sanction should be reduced	None	Project staff should guide in raising capital	Project should continue and provide benefit to farmers	Project should continue to provide the benefits

FPC Details	13	14	15	16
Name	**Bhagwati Devi FPC**	**Satbara FPC**	**Telki FPC**	**Dharni FPC**
Location	Nanded	Nanded	Nanded	Nanded
Year of establishment	Aug-19	Jan-21	Jan-21	Aug-19
List of key activities before PoCRA	No activity	Seed production and processing	Supported and guided farmers in their farm activities	Supported and guided farmers in their farm activities
Source of information about PoCRA	Agricultural Assistant	PD ATMA	ATMA and Agriculture assistant	Agriculture Department
PoCRA supported activities	CHC and Turmeric Processing Unit	CHC	CHC	CHC
Cost of PoCRA-supported activities	Received: 20 lakhs	Received: Rs. 10.69 lakhs	Received: Rs. 10 lakhs	Received: Rs. 11.70 lakhs
Source of funding	Own investment	Members sourced funds	Raised funds from all the members	Board of Directors and members sourced funds
Current status activity	CHC and turmeric processing is established and operational. Total capacity of the processing unit is 10 tons. 10 men are employed at a wage rate of Rs. 300/- per day for operating the unit	CHC is established and operational. Machines available: Rotavator, plough, tractor, BBF, trolley, and cultivator.	Project established, took 3-4 months for the setup; CHC is established and operational. Machines available: Sowing machine, rotavator, plough, tractor, BBF, trolley, and cultivator.	CHC is established and operational. Machines available: Plough, sowing machine, rotavator, trolley. Members can hire at the rate of Rs. 800/- per acre and non-members can hire at the rate of Rs. 1200/- per acre.
Participation and decision making				

FPC Details	13	14	15	16
Name	**Bhagwati Devi FPC**	**Satbara FPC**	**Telki FPC**	**Dharni FPC**
Average attendance in group meetings	5-7 members	70% of members	7-8 members	7-8 members
Participation of members	All members	All members engage	Yes, actively participate	All members participate
Efforts for the participation of women, vulnerable and tribal community farmers	Encourage by discussion	Provide implements on lease at lower price motivate them to attend	No tribal community.	No tribal community. Women farmers are given discounts on hiring machines.
Book-keeping and records				
Types of records maintained	Farmers register, machine lease, stock, and proceeding register	Attendance, stock, audit, and cash register	Attendance, stock, and cash register	Stock, proceeding, Audit, and cash register are maintained
Records maintained by	Secretary	Secretary	Chairman and Secretary	Chairman
Training/ Capacity building of members.				
Number of trained members	7members	2 members	Few members	7 members
Place of training	Agriculture department	National Horticulture Training Centre, Pune	KVK and Paani foundation	Pune

FPC Details	13	14	15	16
Name	**Bhagwati Devi FPC**	**Satbara FPC**	**Telki FPC**	**Dharni FPC**
Topics of training	Seed processing, financial management, market linkage, waste management	Business planning, managing nursery, financial management, market linkage, waste management, seed processing, and management	Business planning, financial management, market linkage, waste management, seed processing and management	Business planning, financial management, market linkage, waste management, seed and commodity processing
Impact due to training.	Have improved knowledge of farm activity management	Two members who received training later trained other farmers.	Increased efficiency in the use of farm implements, water management	Members were motivated to train other members
Further training requirements	Advanced climate resilient technology, shade net, polyhouse, food processing	Need training on CRATs	Business development and expansion	Need training on post-harvest value-addition activities
List of environmental safeguards followed	CHC and processing unit have been constructed on vacant land and no trees have been cut, toilets have been constructed	No tree felling during construction activity	No trees were cut and plantation activities,	Built the project by taking care of the environment
Site Specifications of FPC/FPO from an environmental perspective	Built in an environmentally safe location, away from drainage channels, away from forest reserve, above flood lines, etc.	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place

FPC Details	13	14	15	16
Name	**Bhagwati Devi FPC**	**Satbara FPC**	**Telki FPC**	**Dharni FPC**
Fire safety standards and water management strategies	Equipped with fire safety standards and aware of water management work	Not equipped with fire safety standards and aware of water management work, waste management	Equipped with fire safety standards but aware of water management work	Equipped with fire safety standards and aware of water management work
Benefits due to PoCRA	Farming implements help get work done on time and increase profits. Farmers can add value to their turmeric produce and realize better market price. Migration has also reduced.	Machines helped save time and money	Generated employment, farmers are saving on labor costs and time. All members are taking benefits of CHC.	Machines helped save time and money
Challenges faced	None	Not aware of any challenge	Raising funds was challenging	No challenge
Feedback on FPC portal	Not used. Project staff helped.	Useful	Good and useful	Informative and useful
Feedback on project staff	Staff cooperation was good	Project staff was supportive	Staff gave guidance from time to time while filling out the form, but we faced network issue	They are helpful and cooperative
Suggestions for PoCRA	Project should continue and include new villages	Project should continue to provide the benefits	Support in bank linkage	Project should be restarted.

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