# **Concurrent Monitoring – Round VIII Report**

(For the period of 1<sup>st</sup> April 2022 to 30<sup>th</sup> September 2022)

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



In Association with



## Acknowledgement

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

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

We would also like to acknowledge the support received from PoCRA's ground-level project staff comprising Agriculture Assistants, Agriculture Supervisors, Cluster Assistants, Technical Coordinators, FFS Facilitators, Krushi Tais, Taluka Agriculture Officer (TAO), along with Village Climate Resilience Management Committee (VCRMC) members.

We would also like to thank all the respondents and their families for agreeing to participate in the survey for this round of Concurrent Monitoring, patiently responding to the questions, and sharing their experiences.

# Content

Acknowledgement	2
List of Tables	5
List of Figures	6
Abbreviations	7
Executive Summary	8
1. Introduction	13
1.1. Project Background	13
1.2. Overview of the Study Area	15
1.3. Objectives of the Concurrent Monitoring of PoCRA	15
1.4. Overarching Monitoring Framework	16
1.5. Methodology for Conducting Concurrent Monitoring	17
1.6. Sampling Methodology	19
1.7. Samples Covered during CM-VIII Round	23
2. Profile of Respondents during CM-VIII Round	26
2.1. Demographic Details	26
2.2. Land Ownership and Cultivation Practices	28
3. Promoting Climate Resilient Technologies and Agronomic Practices	30
3.1. Progress on Matching Grant	30
3.2. Status of Individual Benefits	33
3.3. Progress of Farmer Field School (FFS)	38
3.4. Climate-resilient Development of Catchment Areas	42
3.4.1. Status of Natural Resource Management (NRM) Works	42
3.4.2. Status of Community Farm Ponds (CFPs)	45
3.5. Adoption of CRATs	46
3.5.1. Use of Agrometeorological Advisory	50
3.5.2. Treating Soil using Soil Health Card Information	52
3.5.3. Land under Certified Seeds	52
3.5.4. Adoption of CRATs and their Impact	52
3.5.5. Improved Water Use Efficiency in Project Areas	54
4. Post-harvest Management and Value Chain Promotion	58
4.1. Promoting FPCs, FIGs, and SHGs	58
4.2. Strengthening Emerging Value-chains for Climate-resilient Commodities	58
4.3. Boost Pre-and-Post-harvest Activities through Project Support	63
5. Institutional Development, Knowledge, and Policy for a Climate-resilient Agriculture	68
5.1. Village Climate Resilient Management Committee (VCRMC)	68
5.2. Maharashtra Climate Innovation Centre	72
5.3. Project Management	72

6. Progress Monitoring based on Results Framework (RF) Indicators	75
7. Insights from PoCRA MIS data	77
8. Key Recommendations	83
Annexure 1: List of Sample Project and Comparison Villages	85
Annexure 2: List of Stakeholders Interviewed	86
Annexure 3: Verification of Agribusiness Assets	89
Annexure 4: Field Visit Notes of Team Leader and M&E Expert	93
Annexure 5: Field Visit Notes of Agronomy Expert	96
Annexure 6: Field Visit Notes of Agri-engineering Expert	106
Annexure 7: Field Visit Notes of Hydrology Expert	107
Annexure 8: Field Visit Notes of Agri Economy Expert	111
Annexure 9: Field Visit Notes of Environment & GIS Expert	121
Annexure 10: Field Visit Notes of Sociology Expert	124
Annexure 11: Factsheets of 16 FPCs	126

## **List of Tables**

Table 1. 1 Category of study tools	
Table 1. 2 Sample Distribution	
Table 1. 3 Planned quantitative samples	
Table 1. 4 Planned qualitative samples	
Table 1. 5 District-wise quantitative sample coverage in the project and comparison villages	
Table 1. 6 Category-wise quantitative sample coverage in the project and comparison villages	
Table 1. 7 Qualitative respondents	
Table 1. 8 Schedule of key expert's field visit	
Table 2. 1 Social category of respondents	
Table 2. 2 Educational background of respondents	
Table 2. 3 Source of income of respondents (multiple sources)	
Table 2. 4 Average annual income of respondents	
Table 2. 5 Category of farmers covered in the household survey	
Table 2. 6 Source of irrigation	
Table 3. 1 Status of application	
Table 3. 2 Reasons for applying for a benefit	
Table 3. 3 Feedback on DBT application processes	
Table 3. 4 Purpose of pipes and pumps	
Table 3. 5 Irrigation system used with pipes and pumps	
Table 3. 6 Benefits perceived from drip, sprinkler, pipes, and pumps	
Table 3. 7 Crop-wise host farmer demonstration and guest farmer participation	
Table 3. 9 Reasons for not attending all FFS sessions	
Table 3. 11 Perceived benefits from FFS	
Table 3. 12 Community NRM works done	
Table 3. 13 Feedback on the quality of assets	
Table 3. 14 Benefits from NRM works	
Table 3. 15 Maintenance of NRM works	
Table 3. 16 Source of motivation and support for the application process	
Table 3. 18 Benefits perceived from CRATS	
Table 3. 19 Percentage of beneficiaries received different training (% by social category)	
Table 3. 20 Percentage of beneficiaries received different training (% by landholding)	
Table 3. 21 Agromet services received	
Table 3. 22 Perceived benefits for Agromet advisory	51
Table 3. 23 Land under climate seed varieties for specified crops in the study area	

Table 4. 1 Year of grant for agribusiness to project-supported FPCs and SHGs	
Table 4. 2 Agribusiness activity-wise support from PoCRA	
Table 4. 3 Facilities/ Services provided by project-supported FPCs and SHGs	59
Table 4. 4 Type of machines available in PoCRA-supported FPCs and SHGs	60

Table 5. 1 Feedback on project satisfaction	73
---	----

# List of Figures

Figure 1. 1 PoCRA strategic overview, thematic linkages and expected outcomes	13
Figure 1. 2 Nanaji Deshmukh Krushi Sanjivani Prakalp (PoCRA) project area and villages	14
Figure 1. 3 Overarching methodology	16
Figure 1. 4 Concurrent Monitoring methodology steps	17
Figure 1. 5 Spatial distribution of sample beneficiaries in project and comparison clusters	24

# 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
DBT	Direct Benefit Transfer
DSAO	District Superintending Agriculture officer
FFS	Farmer Field School
FPO	Farmers Producers Organisation
FPC	Farmers Producers Company
GF	Guest Farmer
GF HF	Guest Farmer Host Farmer
GF HF IDI	Guest Farmer Host Farmer In-Depth Interview
GF HF IDI M&E	Guest Farmer         Host Farmer         In-Depth Interview         Monitoring and evaluation
GF HF IDI M&E MIS	Guest Farmer         Host Farmer         In-Depth Interview         Monitoring and evaluation         Management Information System
GF HF IDI M&E MIS NRM	Guest Farmer         Host Farmer         In-Depth Interview         Monitoring and evaluation         Management Information System         Natural Resource Management
GF HF IDI M&E MIS NRM PDO	Guest FarmerHost FarmerIn-Depth InterviewMonitoring and evaluationManagement Information SystemNatural Resource ManagementProject Development Objective
GF HF IDI M&E MIS NRM PDO PoCRA	Guest FarmerHost FarmerIn-Depth InterviewMonitoring and evaluationManagement Information SystemNatural Resource ManagementProject Development ObjectiveProject on Climate-Resilient Agriculture
GF HF IDI M&E MIS NRM PDO PoCRA PS	Guest FarmerHost FarmerIn-Depth InterviewMonitoring and evaluationManagement Information SystemNatural Resource ManagementProject Development ObjectiveProject on Climate-Resilient AgricultureProject Specialist
GF HF IDI M&E MIS NRM PDO POCRA PS SDAO	Guest FarmerHost FarmerIn-Depth InterviewMonitoring and evaluationManagement Information SystemNatural Resource ManagementProject Development ObjectiveProject on Climate-Resilient AgricultureProject SpecialistSub-Division Agriculture Officer
GF HF IDI M&E MIS NRM PDO POCRA PS SDAO SHG	Guest Farmer         Host Farmer         In-Depth Interview         Monitoring and evaluation         Management Information System         Natural Resource Management         Project Development Objective         Project on Climate-Resilient Agriculture         Project Specialist         Sub-Division Agriculture Officer         Self Help Group
GF HF IDI M&E MIS NRM PDO POCRA PS SDAO SHG TAO	Guest FarmerHost FarmerIn-Depth InterviewMonitoring and evaluationManagement Information SystemNatural Resource ManagementProject Development ObjectiveProject on Climate-Resilient AgricultureProject SpecialistSub-Division Agriculture OfficerSelf Help GroupTaluka Agriculture Officer

## **Executive Summary**

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

Sambodhi, 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, which is conducted bi-annually for six years. Concurrent Monitoring aims at finding bottlenecks in the implementation of each project component and suggesting solutions for the same. It also aims to get beneficiaries' feedback on the key processes of the different project components.

Further, Concurrent Monitoring also aims to assess the progress of the project on key indicators as per the results framework which are measurable through Concurrent Monitoring rounds. The first Concurrent Monitoring was conducted for the period starting from the beginning of the project till 31st March 2019. With a plan to conduct a total of 12 rounds of concurrent monitoring, at the rate of once every six months, the current round, i.e., the eighth round of concurrent monitoring, has considered the period from 1<sup>st</sup> April 2022 to 30<sup>th</sup> September 2022.

#### Methodology

Like previous rounds of concurrent monitoring, the current concurrent monitoring-VIII (CM-VIII) 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 to benefit the farming community of the project area including Natural Resource Management works and community farm ponds, farmer producer organisations, and self-help groups 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, satisfaction in project planning, microplanning, support from project staff, support received and expected by the FPOs/FPCs, etc., was also analysed in the project and control villages. The project MIS data for the period was also analysed 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. Aurangabad, Beed, Nanded, Hingoli, Latur, Osmanabad, Parbhani and Jalna.

A mixed-method approach has been adopted for all the Concurrent Monitoring surveys of PoCRA conducted to date. The CM-VIII round 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 from the current round. A quantitative survey tool for the beneficiaries and qualitative interview schedules for the other key project stakeholders were finalised in discussion with the PoCRA PMU team.

The survey for the eighth round of Concurrent Monitoring 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 306 covered for individual interventions and 144 for community interventions. In the comparison area, a total of 225 samples were covered with 172 beneficiaries from individual benefits and 53 from community benefits. This sample was proportionately spread in all eight districts. Also, as part of the qualitative component, a total of 150 samples (33 FGDs and 117 in-depth interviews) comprising 20 Focus Group Discussions with VCRMC members, three with Project Specialists and 10 with farmers in project villages; and key-informant in-depth interviews of two SDAOs, 28 Cluster assistants, 22 Agriculture assistants, one DSAOs, 16 FPC representatives, 10 FFS Facilitators, five Technical Coordinator, 13 Krushi Tais, 13 Agriculture Supervisors, and seven Taluka Agricultural officers were conducted.

The quantitative estimates in the report provide a broad indication and the estimate may not provide statistical precision as the sampling is not entirely random, and for some categories, the sample size is not adequate to capture the difference between different rounds or the changes over time.

Therefore, a mix of quantitative estimates and qualitative insights have been used to conclude the point of view of monitoring the project.

### Summary of Key Findings in Concurrent Monitoring Round VIII

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<sup>1</sup>. 49% of the landholdings in the State fall in the marginal category, with less than 1 ha of land. Most of these poor farmers with small and unirrigated land holdings are vulnerable to climate shocks. PoCRA aims to reduce such vulnerability and improve the profitability of smallholder farmers by addressing issues related to water scarcity, degraded land resources, high production cost, low profitability due to low productivity, and lack of market access. To this end, the PoCRA project has made significant progress in addressing the above issues and its achievements are evident from the key findings of CM round VIII detailed in this report.

#### Improvement in Cultivation and Irrigation Practices

In the last 12 months, almost 10% more beneficiaries (in the project cluster) had their land under irrigation compared to comparison clusters. For instance, the data collected as part of the CM-VIII round reveals that while in project clusters, on average 4.0 acres of land with Kharif crop, 3.5 acres of land with Rabi crop, and 2.7 acres of land with Summer crop were under irrigation. During the CM-VII round, in project clusters, on average 3.7 acres of land with Kharif crop, 3 acres of land with Rabi crop, and 2 acres of land with a Summer crop were under irrigation. Therefore, the land under irrigation during the CM-VIII round has increased by approximately 10%. In comparison clusters, the land under irrigation was found to be low with an average of 3.6 acres of land with Kharif crop, 3.3 acres of land with Rabi crop, and 2.3 acres of land with Summer crop 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, Chickpea, and Sorghum. The most common Rabi crops cultivated in both project and comparison clusters included Chickpea, Sorghum, and Wheat. Vegetables like onions and tomatoes are mostly grown in Summer. Bananas, papaya, guava, sweet lime, lemon, and orange are common crops grown annually. Post PoCRA intervention, various crops such as chillies, capsicum, cucumber, and other cash crops including horticulture (grapes, citrus pomegranate, vegetables) and floriculture have gained popularity amongst the farmers.

#### Increase in Adoption of Climate Resilient Technologies

It is observed that there is higher adoption of CRATs in the project as compared to comparison clusters. Around 60% of respondents in project clusters and 25% in comparison clusters reported benefiting from the adoption of CRATs. An average of 24% increase in yield and a 22% reduction in the cost of cultivation and pest and disease attack was reported by the respondents in project areas as compared to the levels before the adoption of CRATs. During CM-VII, an average of 24% increase in yield and a 16% reduction in the cost of cultivation and pest and disease attack as compared to the levels before the adoption of CRATs was observed in project areas as reported by the respondents. Similar changes are also observed in comparison clusters, but the levels are about 7% less than those observed in project areas.

#### Increase in the Use of Certified Seeds

Compared to CM VI and CM-VII rounds, CM-VIII round witnessed a slight increase in the percentage of land under certified seeds for various crops including Soybean, Pigeon Pea, Chickpea, etc. The overall percentage of land under certified seeds for these three crops in the project and comparison areas was found to be 74% and 79%, respectively. The area under cultivation using climate-resilient certified seeds for Chickpea was 67% in the project and 64% in comparison areas. The land under certified seeds for Soybean was higher in comparison area (90%) as compared to project areas (81%). The same was the case for Pigeon Pea with 57% cultivation area in comparison and 55% in project clusters.

#### Improvement in the Use of Agrometeorological Advisory

Beneficiaries in the project and comparison cluster reported that they received the Agromet advisory in the area of climate resilience, weather, soil nutrient, natural resource management, crop, irrigation, fertilisers, pesticides, certified seed, etc. It is observed that nearly 95% of respondents in project areas who receive Agromet advisory find it useful and relevant in contrast to 75% in comparison areas. More than 50% of the farmers in the project area reported that the Agromet advisory received under POCRA has helped them in taking timely decisions especially related to the initial stage of crop cultivation which in turn helped them avoid

<sup>&</sup>lt;sup>1</sup> Source: PoCRA Project Implementation Plan (PIP) document

future problems such as pests, crop diseases, etc., thereby enhancing their crop yield. A similar trend was reported by 47% of the respondents in comparison areas also.

Further, nearly 80% of respondents in both project and comparison areas who received Agromet advisory were found to be able to market their agricultural produce based on the market price information they get. 85% of respondents in project areas and 69% in comparison areas reported having realised better selling prices for their produce due to the Agromet advisory received under PoCRA. 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 (85 to 90% of respondents), mobile app, WhatsApp, and newspapers.

#### Status of Matching Grant

Regarding the status of the application for individual benefits in project clusters, nearly 75% of respondents had received the matching grant in their bank account. It was observed that the percentage transfer of matching grants in the CM-VIII round has been maintained since CM-VII and has improved by 13% as compared to the CM-VI round. All the beneficiaries are aware of their application status, which is a positive trend.

Moreover, out of the 244 beneficiaries interviewed for the CM-VIII round, around 98% of beneficiaries reported having constructed assets at the site. Rest have either not started the activity due to financial issues or the assets are under construction. Almost all the beneficiaries reported having a good experience with the application process.

#### Benefits Accrued from Activities at an Individual Level

Feedback from project staff and key experts suggests that amongst all the activities of individual benefits, micro-irrigation systems (i.e. drip and sprinkler) and shade nets gained more popularity in the farming community as both technologies have helped farmers in increasing their income by improving their crop yield and reducing their cost of cultivation. The beneficiaries of micro-irrigation systems (including drip, sprinkler, pipes, and pumps) during the household survey have reported availability of water during dry spells during the Kharif season, availability of water for irrigation during Rabi and Summer season, increase in area under cultivation, and in their annual incomes. The demand for micro-irrigation has spurred because of numerous advantages like labour savings and the convenience of operation during night hours besides water savings, and increased crop yields as compared to traditional surface irrigation methods. This has also led to increased water-use efficiency in the project villages.

Experts have also observed that because of the availability of farm pond water, farmers are switching to horticulture plantations, cultivating vegetables, and practicing pisciculture which are positive outcomes of the PoCRA project.

Feedback from AAs and agronomy experts suggest that farmers found BBF technology to be the most useful as it enabled them to safe drainage of water through furrows and root development by avoiding water stagnation, and moisture conservation, thereby aiding the prevention of crop damage to a great extent, in case of excessive rain. Further, as reported by the farmers, BBF technology has also helped them in improving their crop productivity.

From the survey data, it is observed that both host and guest farmers found that the technologies learned through Farmer Field School (FFS); demonstration sessions have been very helpful in reducing the impact of climate vulnerability (less rainfall, high temperature). Hence, farmers are willing to continue using these technologies.

#### Benefits Accrued from Activities at the Community Level

Feedback from project staff, agri-engineering expert, and farmers in general suggests that there are positive impacts in terms of reduction in soil erosion, increased groundwater levels, improved soil fertility, increased availability of water in both agriculture seasons, etc. as a result of soil and water conservation structures under NRM works, including community farm ponds.

NRM works under PoCRA have resulted in better surface drainage resulting in the elimination of the problem of surface water logging of cropped fields, thereby improving the quality of yield. Also, a substantial rise in the groundwater table is reported by beneficiaries (79% in project clusters and 69% in comparison clusters) ensuring year-round availability of irrigation water in the wells, thereby enabling farmers to undertake Rabi, Summer, and horticulture crop cultivation in the project area. During the previous round, around 77% of respondents in project clusters and 75% of respondents in comparison clusters reported an increase in groundwater level after the construction of NRM structures. When the respondents in the project clusters were asked about their willingness to be involved or involvement in the maintenance of these assets post-construction, 75% responded positively. In 98% of the project cases, the asset was found on-site.

#### Benefits Accrued from Agribusiness Activities

PoCRA has been successful in promoting the participation of around 1000 FPCs, 1005 farmer groups, and 381 SHGs in the Marathwada region in emerging value chains for climate-resilient commodities. Investment in this component has contributed to climate co-benefits by focusing on value chains for climate-resilient commodities, promoting green technologies in primary processing (including for storage), and encouraging the selection of fuel and technology-efficient farm machinery and equipment. Of the 172 FPCs whose audit statements for the FY 2021-22 were scrutinized, 82 FPCs (nearly 48%) have registered profit.

For the CM-VIII round, 16 project-supported FPCs were surveyed and analysed. The membership analysis reveals that nearly 33% of the total members are female farmers, 16% of members belong to SC and 9% of members are ST farmers. Further, small and marginal farmers constitute 45% of the total members of the project-supported FPCs. The participation of members in General Body Meetings and decision-making is reported to be healthy. Though nearly 60% of members have received training on financial planning, leadership development, and skill upgradation, there is still scope for improving farmers' participation in training. A total of 26 SHG respondents (8 SHG presidents and 18 members) from 8 SHGs were interviewed for the CM-VIII round. The survey reveals that more than 60% of SHG members have received training, especially on skill upgradation and farm technologies, and 63% of respondents have noted that their SHGs are undertaking income generation agribusiness activities such as Custom Hiring Centres (CHCs).

Further, the survey reveals that while SHGs are being used by farmers only for getting access to farm machinery and equipment, farmers are enjoying several agri-business services from FPCs. Some of the highly demanded services include purchasing seeds through FPC (46%), getting marketing support for selling their agricultural produce (44%), purchasing chemicals fertilisers from FPC (44%), grading and sorting their agricultural produce (34%) and getting access to farm machinery and equipment (31%).

#### More Inclusive Uptake across Social Categories

The survey reveals that farmers from all social categories including SC, ST, OBC, and Nomadic Tribes (NT) have attended training on different CRATs through FFS under POCRA. Further, during the expert's visit, it was observed that indirect benefits in terms of improved water availability and agricultural productivity have been received by the pastoral community of Marthwada due to POCRA intervention. In the 16 project-supported-FPCs, 986 members belong to the SC category and 568 members belong to the ST category.

#### Increased Resilience in Project Villages

Through experts' interaction with beneficiary farmers, it is observed that PoCRA has been successful in reducing yield variability, stabilizing income, generating employment opportunities for youths, and reducing seasonal migration to a certain extent, thereby improving the coping mechanism of vulnerable farmers resulting in increased resilience in project villages. PoCRA's efforts in capacitating farmers with Agromet advisories, and promoting the use of climate-resilient agriculture technologies and seed varieties through FFS demonstrations have helped to establish climate resilience in project villages.

#### Improvement in the Economic Well-being of Farmers

As mentioned earlier, the estimates of income are only indicative in Concurrent Monitoring rounds. The average annual income of households in project clusters has gradually improved by 35% (i.e., from Rs. 1,47,513/- in 2019 during the first CM round to Rs. 1,99,591/- in 2022 during the CM-VIII round). During the discussion with the village head of a high disbursement village that is Tupewadi in Jalna district, it was found that there has been significant improvement in the living standards of farmers with an increase in assets such as bikes/scooters, four-wheelers, TVs, and pucca houses. This implies that PoCRA has significantly impacted the economic well-being of farmers in its target areas.

### **Key Recommendations**

The project crossed its mid-term phase in the year 2022 and is heading towards an end-term assessment of its impact in 2024. Keeping this in mind, the key recommendations are as follows:

#### Strengthening Institutional Capacity to Achieve Sustainability

Strengthening institutions and individuals through capacity-building activities is an important step toward achieving sustainability. Training sessions for VCRMCs especially which are newly formed need to be conducted. This should be regularized by introducing and provisioning refresher training sessions. Also, the

linkage of VCRMCs with block and district-level offices should be strengthened for improving its administrative capacity. FPCs and SHGs are another set of institutions that are supported by PoCRA and must be encouraged to participate in training related to agribusiness activities. The curriculum for all training should be dynamic to accommodate the changing needs of the project. Apart from strengthening institutions, the key project implementation staff should be provided refresher training from time to time.

#### Motivating and Empowering KTs

Being the female mobilisers at the village level, there is a need to motivate and educate Krushi Tais (KTs) on important components and initiatives of the project especially those which are related to women's empowerment. To keep them motivated in carrying out their roles and responsibilities efficiently, the delay in payments of their remuneration should be addressed. Appreciation letters for their outstanding work should be given.

#### **Building Capacities of Beneficiary Farmers**

Technical project staff like AS, AA, and CAs and to some extent, trained KTs should be involved in training farmers in the accurate use of CRATs, especially micro-irrigation systems. There is a need to focus more on exposure visits and social relationship-building across communities for demonstrating the effects of climate-resilient agriculture technologies. This will help in increasing the adaptation of such technologies in the farming community. The farmers need to be further trained in following the weather advisory, along with other advisories from different sources like market price information, etc. which can help them in better planning their cultivation activities.

#### Need for Introducing a Waste Disposal System

PoCRA has provided the farmers with shade nets, poly-houses, PVC pipes, etc. which has significantly increased the use of plastic materials. It is estimated that in a single village like Tapovan, 6-10 tons of plastic waste are generated every year. If we add the PVC pipes used in drip and sprinkler irrigation as well as in the motor pump, the quantity will increase further. A poly house film or shade net is expected to last for at least three years and drip laterals for nearly five years. Hence, a life cycle assessment (LCA) of plastics in use including that which is used for lining farm ponds and mulching should be undertaken. While adopting protected cultivation as a tool for climate resilience, it is recommended that a waste disposal mechanism should be developed like monthly collection of plastic waste and sending it to recycling. There are small-scale industries involved in the collection, sorting, and re-use of plastics in Maharashtra. The PoCRA project can develop collaboration with them for the re-use of plastic waste being generated through the project. The mechanism shall be developed for collecting small charges from the farmers who are using plastics for safe disposal which can be given as an incentive to the small industries involved in the collection and re-use of the plastics. The project staff also reported that they observe willingness amongst the farmers for adopting and using the waste plastic or torn shade net as shade / thatching material for vermicompost and NADEP unit for farm waste management in their respective villages which needs to be encouraged.

#### Awareness and Education on the Safe Use of Pesticides

It is observed that farmers and farm workers do not use of protective cover during pesticide application. They did not cover their faces, not use hand gloves or indulge in proper hand washing during and after pesticide application. It is recommended that the use of pesticides should be pragmatic, and all activities concerning pesticides should be based on scientific judgement and not on commercial considerations. The PoCRA team should develop health education packages based on knowledge, aptitude, and practices and disseminate them within the farming community to minimise human exposure to pesticides. The use of biopesticides should also be encouraged over chemical pesticides.

#### Taking Note of the Positive Spillover Effect of PoCRA's Success

POCRA's success can be assessed from the fact that improvement in productivity from shade-net intervention has generated demand from the farmers in the non-project areas for this intervention. For instance, in Tapovan and Tupewadi villages, some of the non-beneficiaries have installed shade-nets houses at their expense by using the local low-cost materials, resulting in the number of users of shade-net houses being much higher than that of the official record (to be nearly 15 percent). Accordingly, there is a need to devise a strategy to cater to the demand for expanding shade-net intervention in the non-project areas. Convergence or collaboration with other government programs could be the way forward.

# **1. Introduction**

### **1.1. Project Background**

The Government of Maharashtra, in partnership with the World Bank, conceptualized the Project on Climate Resilient Agriculture (PoCRA) for 5220 villages in 16 districts of Maharashtra<sup>2</sup>. The Project Development Objective (PDO) of PoCRA is to enhance climate resilience and profitability of smallholder farming systems in selected districts of Maharashtra<sup>3</sup>. 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<sup>4</sup>.

The project is built around a comprehensive, multi-sectoral approach that focuses specifically on building climate resilience in agriculture through scaling-up tested technologies and practices. This project attempts to bring transformational changes in the agriculture sector by scaling up climate-smart technologies and practices at the farm and (micro) watershed levels.

The overall project vision is to contribute towards three critical impact areas: a) Water Security, b) Soil Health, and, c) Farm Productivity and Crop Diversification. The project aims to contribute to drought-proofing and management of lands in the state's most drought and salinity/ sodicity-affected villages.

The project has been implemented in 15 districts in Maharashtra, which include 8 districts of the Marathwada region (Aurangabad, Nanded, Latur, Parbhani, Jalna, Beed, Hingoli, Osmanabad), 6 districts of the Vidarbha region (Akola, Amravati, Buldana, Yavatmal, Washim, Wardha), Jalgaon district of Nashik Division, and approximately 932 salinity affected villages in the basin of Purna river spread across Akola, Amaravati, Buldana and Jalgaon districts<sup>5</sup>. Figure 1.1 highlights the villages where the project is being implemented. This project will be implemented in six years from 2018-2024<sup>6</sup>. Out of the 15 districts where PoCRA is implemented, this report is based on the Concurrent Monitoring conducted in 8 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. 1 PoCRA Strategic Overview, Thematic Linkages and Expected Outcomes

<sup>2</sup> Source: PoCRA Project Appraisal document; Malegaon taluka from Nashik district was included in project in year 2022.

- <sup>3</sup> Source: ibid
- <sup>4</sup> Project implementation status report as on 31<sup>st</sup> March 2021, Maharashtra PoCRA
- <sup>5</sup> Source: PoCRA-Terms of Reference

6 Source: ibid



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 Area with less than 750 mm of the annual average rainfall<sup>7</sup>. 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 8 districts: Aurangabad, Beed, Latur, Osmanabad, Parbhani, Jalna, Nanded, and Hingoli.

The region has a population of about 1.87 crores and a geographical area of 64.5 thousand sq. km<sup>8</sup>. 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<sup>9</sup>, 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<sup>10</sup>, 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 realised 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.

<sup>&</sup>lt;sup>7</sup> Hydrology and Water Resources Information System for India, National Institute of Hydrology, Roorkee <u>http://nihroorkee.gov.in/rbis/India\_Information/draught.htm</u>

<sup>&</sup>lt;sup>8</sup> Census 2011, <u>http://shodhganga.inflibnet.ac.in/bitstream/10603/152935/11/11\_chapter%204.pdf</u>

<sup>&</sup>lt;sup>9</sup> 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".

<sup>&</sup>lt;sup>10</sup> 'Marginal Farmer' means a farmer cultivating (as owner or tenant or sharecropper) agricultural land up to 1 hectare (2.5 acres). 'Small Farmer' means a farmer cultivating (as owner or tenant or sharecropper) agricultural land of more than 1 hectare and up to 2 hectares (5 acres)

### **1.4. Overarching Monitoring Framework**

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



Figure 1. 3 Overarching Methodology

### **Building the Premise for Concurrent Monitoring**

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

#### **Limitation of Concurrent Monitoring**

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

### **1.5. Methodology for Conducting Concurrent Monitoring**

The methodological approach for conducting Concurrent Monitoring has the following steps illustrated in Figure 1.4.



Figure 1. 4 Concurrent Monitoring Methodology Steps

Like previous rounds of concurrent monitoring, the CM-VIII focused on the concurrent process and progress monitoring for the six-month period from 1<sup>st</sup> April 2022 to 30<sup>th</sup> September 2022 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 organisations (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-VIII 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 finalised in discussion with the PoCRA PMU team. The survey for CM-VIII 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-VIII, it was ensured that project to comparison respondent ratio remained at 2:1.

Also under qualitative survey, a total of 150 samples, comprising 30 Focus Group Discussions (FGDs) and 140 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 draw conclusions about the project. Feedback on the functioning of the Village Climate Resilience Management Committee (VCRMC), Krushi Tai, satisfaction in Project Planning, Microplanning, support from project staff, support received and expected by the FPOs/FPCs, etc., was also analysed in the project and control villages. The project MIS data for the period was also analysed 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. Aurangabad, Beed, Nanded, Hingoli, Latur, Osmanabad, 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 VIII in November 2022. 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-VIII round. The study tools were finalised after the incorporation of comments/suggestions from PMU as well as key experts.

### Primary Data Collection from the Field

The primary data has been collected in December 2022, 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 analysed to see if the project implementation is progressing according to the plan. The project performance is assessed on the key performance indicators, including the results framework indicators, that need to be assessed on a semi-annual or annual basis. A consultative approach has been adopted to resolve queries related to indicators on which data is required from the PMU MIS team and other relevant stakeholders. The details of district-wise implementation of the project activities are presented.

### 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-VIII 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 or 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 Nabscon 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 were 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 round in consultation with PMU. The data collection software program (CAPI) was revised and tested in the last week of November 2022 before starting the field team training on the 4<sup>th</sup> of December 2022.

### **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 the span of 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 VIII. The list of the sample project and comparison clusters and villages has been provided in a separate annexure.

		Round wise clusters to be covered												
SI. No	Districts	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	Aurangabad	3	5	5	5	5	5	5	5	5	5	5	5	58
2	Bid	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	Osmanabad	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 pro	ject clusters	20	27	30	30	30	30	30	30	30	30	30	30	347
Total con	mparison clusters	10	14	15	15	15	15	15	15	15	15	15	15	174
Total pro	oject sample	300	405	450	450	450	450	450	450	450	450	450	450	5205
Total con	mparison sample	150	210	225	225	225	225	225	225	225	225	225	225	2610
Total ber	neficiary sample	450	615	675	675	675	675	675	675	675	675	675	675	7815

#### Table 1. 2 Sample Distribution

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

### **Selection of Project Clusters**

30 clusters were sampled for Concurrent Monitoring Round VIII 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**

15 comparison clusters are selected for Concurrent Monitoring Round VIII. 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.

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/ Farmer Producers Organisations (FPCs/FPOs)

d) members of project-supported Self-Help Groups (SHGs)

The sample frames of NRM work implemented, community farm ponds developed, and project-supporting FPCs 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 1.3.

Activity Category	Activity	Sample per Village	Total Sample (Project)	Total Sample (Comparison)	Remarks
Individual Beneficiaries		10	300	150	Total of 450 individual beneficiaries proposed to be
	DBT Matching Grant beneficiaries				surveyed
	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 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
	FPC members		48	24	3 members (2 board member+1 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 are planned to be surveyed

#### Table 1. 3 Planned Quantitative Samples

#### Table 1. 4 Planned Qualitative Samples

Target Respondent	Sample and Approach	Enquiry Technique	Remarks
VCRMC Representatives	- 30	<ul> <li>Discussion with VCRMC Representatives</li> </ul>	Investigation of all project activities implemented in the village (viz. capacity building, implementation, challenges, and suggestions for course correction)
Agriculture Assistant (AA)(AA)	- 30	<ul> <li>IDI with AA</li> </ul>	Investigation of all project activities implemented at the village level (viz. implementation, challenges, and suggestions for course correction)

Target Respondent	Sample and Approach	En	quiry Technique	Remarks
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/ Organisation (FPC/FPO) Representatives	<ul> <li>16</li> <li>2 FPO/FPC</li> <li>representative</li> <li>interviews per</li> <li>district</li> </ul>	_	IDI with FPC/FPO Representatives (Board of Directors)	Investigation on support from PoCRA (viz. support received, process bottlenecks, and suggestions for course correction)
Project Specialists (PS Agriculture, PS Agribusiness, PS HRD) implementing PoCRA in districts	<ul> <li>8</li> <li>Discussion with</li> <li>PS in all 8 project</li> <li>districts</li> </ul>	_	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)	<ul> <li>8</li> <li>1 SDAO randomly selected from the list of SDAOs of sampled sub-divisions in each district</li> </ul>	-	IDI with SDAO	Investigation of all project activities implemented in their district (viz. implementation, challenges, and suggestions for course correction). Feedback on the role of Agriculture Supervisor and Takula Officer
Krushi Tai (KT)	<ul> <li>15</li> <li>Randomly selected from the 30 sampled PoCRA villages</li> </ul>	-	IDI with KT	Feedback on project-related activities implemented by KT
Farmer Field School (FFS) Facilitator	<ul> <li>15</li> <li>Randomly selected from the 30 sampled PoCRA villages</li> </ul>	-	IDI with FFS Facilitator	Investigation on implementation of FFS at the village level (viz. implementation, challenges, and suggestions for course correction)
FFS Coordinator	<ul> <li>8</li> <li>1 FFS coordinator randomly selected from the list of FFS Coordinators of sampled villages in each district</li> </ul>	-	IDI with FFS Coordinator	Investigation on implementation of FFS in their district (viz. implementation, challenges, and suggestions for course correction)
Agriculture Supervisor (AS)	<ul> <li>8</li> <li>1 AS was</li> <li>randomly selected</li> <li>from the list of ASs</li> <li>of sampled</li> <li>villages in each</li> <li>district</li> </ul>	_	IDI with AS	Investigation of project activities which are part of the scope of the AS (viz. implementation, challenges, and suggestions for course correction)
Taluka Agriculture Officer (TAO)	<ul> <li>8</li> <li>1 TAO was</li> <li>randomly selected</li> <li>from the list of</li> <li>TAOs of sampled</li> <li>villages in each</li> <li>district</li> </ul>	_	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)	<ul> <li>– 8</li> <li>IDI with DSAO and PD ATMA in all 8 project districts</li> </ul>	_	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-VIII 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, 306 respondents belonged to the category of individual interventions and 144 belonged to the category of community interventions. In the comparison area, of the 225 respondents, 172 beneficiaries belonged to the category of individual benefits and 53 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	e Coverage in the	Project and	Comparison	Villages

District	Project	Comparison	Total
Aurangabad	63	45	108
Beed	48	30	78
Hingoli	41	15	56
Jalna	75	30	105
Latur	48	30	78
Nanded	50	30	80
Osmanabad	69	30	99
Parbhani	56	15	71
Total	450	225	675

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

District	Project	Comparison	Total
Individual	306	172	478
DBT (pre-sanction and following stage)	61	11	72
DBT (disbursement received)	184	159	343
FFS- Host Farmer	30	1	31
FFS- Guest Farmer	31	1	32
Community	144	53	197
NRM Community works/ Community Farm ponds	75	53	128
FPC Member	48	0	48
SHG Member	21	0	21
Total	450	225	675

The spatial distribution of GPS locations of the sample beneficiaries covered during the CM-VIII survey is presented in Figure 1.5.





Figure 1. 5 Spatial Distribution of Sample Beneficiaries in Project and Comparison Clusters

### **Qualitative Data**

For collecting qualitative data, key project stakeholders from the sampled project clusters were interviewed. A total of 150 samples (30 FGDs and 120 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-VIII. 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.

S.No.	Research Tool	Samples Covered
1	FGD with VCRMC Members	20
2	IDI with AA	22
3	IDI with CA	28
4	IDI with FPC representatives	16
5	IDI with TAO	7
6	IDI with AS	13
7	IDI with SDAO	2
8	FGDs with PS	3
9	IDI with DSAO/PD ATMA	1
10	IDI with FFS Facilitator	10
11	IDI with Technical Coordinator	5
12	IDI with Krushi Tai	13
13	FGD with farmers	10
Total		150

#### Table 1. 7 Qualitative Respondents

### **Expert Field Visits**

Expert field visits were also conducted to get insights into project implementation. The team leader-cummonitoring-and-evaluation expert, environment expert, sociology expert, agronomy expert, hydrology expert, agri-engineering expert, agri-economist, agribusiness expert, and GIS expert visited the field as per the schedule mentioned in Table 1.8.

Key Expert	Domain	Date	Place of Visit
Jitendra Sinha	Team Leader / M & E Expert	17-19 January 2023	Project Villages in Aurangabad, Beed, and Jalna
S. Kulkarni	Hydrology	19-21 January 2023	Project Villages in Nanded, Parbhani, and Hingoli
Arindam Datta	Environment	5-6 February 2023	Project Villages and FPCs in Beed and Jalna
R. Singandhupe	Agronomy	19-21 January 2023	Project Villages in Nanded, Parbhani, and Hingoli
Dalbir Singh	Agri Economy	17-18 January 2023	Project Villages in Aurangabad and Jalna
Vijay Agarwal	Agri Engineering	17-18 January 2023	Project Villages in Aurangabad
Deodatt Singh	Agribusiness	13-14 February 2023	Project FPCs in Beed and Jalna
Mini Govindan	Sociology	8-9 March 2023	Project Villages in Aurangabad and Beed
Santosh Muriki	GIS	5-6 February 2023	Project Villages in Beed and Jalna

#### Table 1. 8 Schedule of Key Expert Field Visit

# 2. Profile of Respondents during CM-VIII 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 87% of respondents in the project and 96% of respondents in comparison clusters were male beneficiaries.

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

Social Category	Project (%)	Comparison (%)
	N=450	N=225
General/ Open	71	68
Other backward class (OBC)	12	8
Scheduled Caste (SC)	3	7
Scheduled Tribe (ST)	7	7
Others	1	0
Total (%)	100	100

#### Table 2. 1 Social Category of Respondents

**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 10% of respondents in the project area and slightly more than 10% 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	10	12
Primary school (up to class 5th)	15	21
Middle school (up to class 8th)	13	13
Secondary school (up to class 10th)	20	22
Senior secondary school (up to class 12th)	20	20
Diploma but not graduate	6	3
Graduate	13	8
Post-graduate	3	1
Total	100	100

**Poverty Status:** Around 54% of respondents in the project and 48% in comparison belonged to the Above Poverty Line (APL) category as per their ration card status, 44% in the project and 51% in comparison belonged to the Below Poverty Line (BPL) category, and the rest 1% in comparison clusters were not aware of their poverty level category.

**Marital Status:** Around 95% of respondents in both the project and comparison areas were married and about 5% of the respondents in both the project and comparison villages were unmarried. The sample also included 9 widows in the project and 4 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 5. Nearly three-fourths of respondents in both the project and 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 labour, 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.

Source of Income	Project (%)	Comparison (%)
	Valid N=450	Valid N=225
	(Multi response)	(Multi response)
Farming/Agriculture	84	92
Goat-rearing	0.5	-
Dairy	7	4
Poultry	0.5	-
Sericulture	0.5	-
Fisheries	0.5	-
Unskilled wage labor (construction, brick kiln labour, etc.)	0.5	-
Non-agriculture labour	0.5	0.5
Agricultural Labourer	4	2
Skilled worker (tailoring, masonry, electrician, plumbing, carpentry, welding, driving, etc.)	0.5	-
Salaried worker (teachers, AWW, etc.)	1	-
Contractual or task-based work	0.5	0.5
Micro-enterprises (kirana shops, dhabas, mobile shops, ferry shops, etc.)	1	-

Table 2. 3 Source of Income of Respondents (multiple sources)

Annual Income: The average annual income (from all sources) for the respondent households in project and comparison clusters is Rs. 199591/- and Rs. 155173/- respectively.

Table 2. 4 Average Annual	Income of Respondents
---------------------------	-----------------------

Cluster	N	Mean Income (RS.)	Std. Dev	95% (	CI
Project	450	199591	8381	183119	216063
Comparison	225	155173	10609	134267	176080

### 2.2. Land Ownership and Cultivation Practices

**Land Ownership:** All respondent households in the comparison and almost all the respondent households (except one) in the project area owned agricultural land. Women, in about 35% of respondent households in project clusters owned agriculture land, while in comparison clusters, the proportion for the same was 25%. The average agriculture landholding in the project cluster is 4.5 acres, and that in comparison cluster is 4.3 acres. Of the average agriculture land holding in both types of clusters, nearly all lands are cultivable. 14 respondent households in project clusters have leased-in an average of 1.5 acres of agricultural land, while in comparison clusters 10 respondent households have on an average leased-in land size of 0.5 acres. 3 respondent households in project clusters have leased out an average of 2.6 acres of agricultural land, while in comparison clusters, 7 respondent households have an average leased-out land size of 0.8 acres. As can be seen in Table 2.5, nearly two-thirds of the respondent households in the project (67%) and comparison (69%) belonged to small and marginal farmers (those who owned less than 2 Ha of land).

Category of farmers	Project (%)	Comparison (%)
	N = 450	N = 225
Small & Marginal (less than 2 Ha)	67	69
Medium (between 2 to 5 Ha)	30	28
Large (more than 5 Ha)	3	3

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

**Cultivation:** In the project cluster, in the Kharif season, nearly 98% of the total respondents cultivated their land with an average of 4.1 acres per household. Similarly, 85% of the total respondents cultivated Rabi crops with an average of 3.5 acres per household, and 3% of respondents cultivated Summer crops with an average of 2.6 acres per household in the last 12 months. Around 15% of farmers in project clusters cultivated horticulture crops on an average of 2.6 acres of land. In the comparison cluster, in the Kharif season, nearly 94% of the total respondents cultivated their land with an average of 4 acres per household. Similarly, 71% of total respondents cultivated Rabi crops on an average of 3.3 acres per household, and 1% of respondents cultivated Summer crops on an average of 3.3 acres per household in the last 12 months. Around 11% of farmers in comparison clusters, cultivated horticulture crops on an average of 3.7 acres of land.

**Irrigation:** Nearly 94% (an increase of 4% compared to the CM IV round) of respondents in project clusters had access to irrigation sources, while in comparison 84% had an irrigation facility. No change is observed when compared to CM-VII round for project clusters. In project clusters, the sources of irrigation in order of adoption by respondent households are open-dug well, borewell, farm pond, canal/ river, and earthen/check dam. While in comparison clusters, the order of adoption for the source irrigation is open-dug well, borewell, canal/ river, earthen/check dam, and farm pond. Both in the project and comparison clusters, open-dug well and borewell were found to be major sources of irrigation, as Table 2.6 reflects. However, borewell is more prominent in project clusters (30%) than comparison clusters (15%). Also, a little more than one-tenth of the respondents in project areas reported farm ponds as a major source of irrigation which was found to be less in comparison clusters (4%).

#### Table 2. 6 Source of irrigation

Source of irrigation	Project (%)	Comparison (%)
	Valid N = 416 (Multi response)	Valid N = 201 (Multi response)
Open dug well	75	79
Borewell	30	15
Farm pond	12	4
Canal/river	4	10
Earthen/ check dam	1	3
Total (%)	100	100

Average Irrigated area under different Cropping Seasons: In project clusters, on average 4.0 acres of land with Kharif crop, 3.5 acres of land with Rabi crop, and 2.7 acres of land with Summer crop were under irrigation in the past 12 months. Similarly, in comparison clusters, on average 3.6 acres of land with Kharif crop, 3.3 acres of land with Rabi crop, and 3.3 acres of land with Summer crop were under irrigation in the past 12 months. All the land under the horticulture plantation was under irrigation.

### **Crops Grown in Different Seasons:**

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

**Rabi Season:** The most common Rabi crops cultivated (in both project and comparison clusters) included Chickpea, 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.

# **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 climateresilient 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, nearly 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.

Of the total 244 applicants interviewed, 80% applied for the benefits to increase water supply in agriculture followed by those who applied for matching grants (77%) to increase their production as well as income, and 48% applied to make their farming practices climate-friendly. Details of the survey are given in Table 3.2.

Status of application	N = 244	%
Application for a matching grant through DBT application	4	2
Verification of application by Cluster Assistant	4	2
Desk-1 - Approval by the VCRMC committee	14	5
Desk-2 - Spot Verification by Agriculture Assistant	12	5
Desk-3 - Approval and Pre-sanction by SDAO	27	10
Desk-6 – SDAO Post work Approval	1	0.5
Transfer of Matching Grant to the Beneficiary Account	182	75

#### Table 3. 1 Status of Application

TILO		C A I .	C D C''
Table 3. 2	2 Reasons	for Applying	for a Benefit

Reasons for applying for the benefit	Project (%) Multiple Response (N = 244)	Comparison (%) Multiple Response (N = 169)
It will help increase the water supply for agriculture	80	83
It will help increase production and income	77	71
These practices are climate-friendly	48	44
Was suggested by my friends/family	32	22
The process of application is simple	14	5
The grant is received quickly	9	7

### Feedback from Agriculture Assistants (AA)

It was found that most of the AAs are handling 2 to 4 villages at a time. They were also able to regularly monitor and provide proper guidance to Krushi Tai (KT) in regularising her work. They further informed that the estimates have been prepared for the NRM works as per the DPR and the work will be executed this Summer.

It was observed that all of the Agriculture Assistants (AAs) have been able to undertake and complete their assigned activities including the preparation of village action plans, mobilising farmers to create more awareness about climate resilient (CR) technologies by using various methods such as Transect walk, Mashal Feri, Mahila Sabha, Sanjeevani Samiti, and PRA Tool, arranging field visits of the Technical Coordinator, identification, training, and appointment of a resource farmer for dissemination of CR related knowledge and encouraging farmers to adopt CR technologies through incentive structure.

All the surveyed AAs informed that farmers found BBF technology to be the most useful as it enabled them in undertaking safe drainage of water through furrows and thereby helped them in saving crop damage to a large extent in case of excessive rain.

Amongst other CRATs, Drip/ Sprinkler Irrigation and Shade Nets gained more popularity in the farming community as both technologies have helped farmers in increasing their income by improving their crop yield and reducing their cost of cultivation.

VCRMCs are promoting activities related to soil and water conservation, reducing fertiliser and pesticide use, promoting the use of organic fertilisers, the importance of cemented dams and community farms, etc.

Positive impacts in terms of reduction in soil erosion, increased groundwater levels, improved soil fertility, increased availability of water in both agriculture seasons, etc. have been reported as a result of soil and water conservation structures under NRM works.

Surveyed AAs were found to be aware of the environmental safeguards/checklist to be complied 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:

- Difficulty in mobilising some members of the committee belonging to a particular caste and women in the village
- VCRMCs are not receiving funds timely for undertaking miscellaneous expenses. Further, many KTs have not received their remuneration, thereby affecting their work.
- Difficulty in improving women's participation, especially in the committee.
- One AA carrying out the responsibility of a large number of villages, internet connectivity, and other technical issues were cited as reasons for a delay not only in approval/spot verification of individual grant applications but also in the delayed implementation of community/NRM works.
- Unwillingness of farmers to give their land for community benefits, especially in the case of farm ponds, has been reported as one of the major constraining factors in effective implementation and far reach of the impact of POCRA interventions.
- Unavailability of farmers to attend the agriculture training due to their work or fieldwork came out as a challenge.
- Despite follow-up, lower participation of women in committee meetings, training, etc.
- In some of the villages, the water budgeting app faced various technical issues.

Some AAs highlighted the need for training them on water budgeting and calculations using the app under POCRA, which will further help them in making farmers more aware of water budgeting.

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.

### Feedback from Agriculture Supervisors (AS)

The extension activities related to the promotion and adoption of CR technologies to the farmer are carried out on a large scale at the field level without any difficulty.

Almost all of the Supervisors said that they have completed the action plan for the promotion and adoption of CR technologies and have provided the handouts and booklets in the Gram Panchayat (GP)s related to CR technologies.

They further informed that the process of Grant disbursement to the farmers registered on PoCRA DBT for implementing the zero tillage and BBF technology has been completed without any difficulty.

Some of the challenges highlighted by ASs are:

- Not receiving the booklets on CRATs for distribution in Gram Panchayat (GP)s from SDAOs.
- Unavailability of the farmers in the field during post verification as well as network issues during the spot verification were cited as challenges hindering the efficiency of the program.

### Feedback from Cluster Assistants (CA)

CA shared that the reasons for the rejection of applications are as follows:

Farmers submitting wrong documents, land size being more than 5 ha, unavailability of water source for drip and sprinkler, and further uploading of improper or incomplete documents are causing delays in presanction to the farmers.

All the CAs who were interviewed shared that they have received timely training from the experts of PMU.

Most of the CAs found the training related to the BBF and zero tillage useful. Technical glitches, internet connectivity issues, and problems in uploading photos in the app were cited as some of the main challenges faced by CAs

As shared by CAs, BBF, Shade Net, Drip/Sprinkle irrigation, pest management techniques, and zero tillage gained popularity amongst the farmers in the villages.

Shivar Pheri, Farmers Group Discussion, Women's Meetings, and Sanjeevani Samiti Meetings were some of the methods used by them for dissemination of the benefits of POCRA activities and creating more awareness about CR Technologies.

Aadhaar linkages, lack of finances to arrange for initial capital, not having desired land holding, etc. were cited as some of the major reasons why some eligible farmers were not applying for individual benefits through DBT.

Due to personal financial constraints, and lack of sufficient funds, many farmers who have received presanction for individual activities have not been able to procure or construct the individual asset.

A majority of the CAs reported that the DBT application suffers from various technical glitches and issues which require immediate attention to improve the efficiency of the project.

All the CAs shared that they found willingness amongst the farmers in their respective villages for adapting and using the compost and NADEP unit for waste management. As cited by them, the number of farmers interested in waste management technology varies between 5 to 50 farmers in the project villages.

In some villages, the problem of Aadhaar linkage of farmers accounts, lack of integration of farmers, insufficient participation of farmers, insufficient integration of people in the village, low participation of members female as well as members belonging to different social categories turned out to be the hindering factors in effective implementation of individual activities in the project areas.

All CAs were found to be aware of the environmental safeguards/checklist to be complied as part of the project implementation through the village development plan/cluster development plan.

Almost all CAs were found to have attended the online webinars/training conducted by the project. Further, a suggestion was provided to introduce the provision of training Group facilitators.

### 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 244 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, almost all the beneficiaries had a good experience with the application process.

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

#### Table 3. 3 Feedback on DBT application processes

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 41 beneficiaries who have applied for project grants for drip irrigation systems, 27 (66%) have received and established irrigation systems. Out of 27 beneficiaries, 16 of them (59%) used their irrigation set only when required. 3 beneficiaries use the set regularly, while the remaining use the set seasonally. The mean area irrigated using drip irrigation is 2.8 acres. Most of the farmers used drip irrigation to irrigate Cotton (48%), Soybean (26%), Chickpea (41%), and Pigeon Pea (11%). Other crops include Sugarcane, Sorghum, Wheat, Maize, and Onion. Besides this, all horticulture plantations including fruit crops have invariably used drip irrigation.

#### Visit to Onion Farmers in Pishor, Kannad Taluka, Aurangabad

Shri Sunil and other farmers have taken mulching and drip irrigation support from the POCRA project. He purchased mulching materials @Rs.1400 per bundle (25 micron). He informed that Mulching has helped him in increasing his income as last year he was able to sell Onion seeds worth Rs.1.5 lakh, with an estimated profit of around Rs.70,000-Rs.80,000.

Out of the 27 beneficiaries, who have used the grant for establishing the irrigation system, some belonged to OBC and General categories. While those beneficiaries acknowledged getting benefits from using drip irrigation, however, they reported that they faced various difficulties in accessing the benefit, especially in terms of obtaining a micro-irrigation quotation/plan from the dealer (43%), getting geotagged photos with the asset examiner (57%), providing proof of permanent water supply (14%), and providing agreement/consent in case of the common source of water supply (14%).

### Sprinkler Irrigation System

A total of 73 beneficiaries, who had accessed the sprinkler irrigation system under the project were surveyed. 64 of them (88%) have implemented it in their fields. Out of these, barring 16, all of them used sprinkler sets only on the requirement. The mean area irrigated using sprinkler irrigation is 2.8 acres. Common crops that are irrigated using sprinkler irrigation include Soybean (40%), Chickpea (51%), Sorghum (13%), Wheat (13%), Cotton (25%), and Maize (10%). Other crops include Pigeon Pea, and Onion. Like drip irrigation beneficiaries, 10 (9 farmers from the general category, and 1 from NT) reported difficulties in obtaining a micro-irrigation plan from the dealer while accessing the project benefits.

### **Pipes**

13 beneficiaries who have accessed the benefit of pipes from PoCRA were surveyed. All of them have received the benefit. Three of them were found using it as per the requirement. Three beneficiaries were found to be using it regularly and the rest seven seasonally. The mean land irrigated by pipes is 4 acres. Except for 1 beneficiary from the scheduled tribe, none reported any difficulty in taking benefit of the pipe.

### Water Pumps

Of the five beneficiaries who have accessed water pumps as a project benefit and were surveyed, three of them used water pumps only on the requirement, and the rest used them regularly. The mean land size irrigated using water pumps is 3.4 acres. Of the five beneficiaries interviewed, two beneficiaries used the water pump with a power rating of 3HP, while the remaining three used pumps with 5 HP power. Three of them used capacitors. All knew the diameter of the pipes they used. The diameter of pipes ranged from 0.5 inches to 1.5 inches.

It is observed that on average, the pump is operated for 5.4 hours per day during the Kharif season and 5 hours during the Rabi season. Except for one, none of the respondents reported difficulties in accessing the benefit.

Purpose	Pipes Respondent (%)	Pumps Respondent (%)
Lifting of water from river/canal	8	58
Transport water from the well to the pond	92	14
Transport water from the pond to the field	0	14
Draw groundwater	0	14
Total %	100	100
Valid N	12	5

#### Table 3. 4 Purpose of Pipes and Pumps

#### Table 3. 5 Irrigation System used with Pipes and Pumps

Irrigation system	Pipes Respondent (%)	Pumps Respondent (%)
	Valid N=13	Valid N=5
Drip/ Sprinkler	18	60
Flood irrigation	52	20
Sprinkler Irrigation	18	-
Furrow irrigation	12	20

As Table 3.6 reflects, an increase in income was reported by more beneficiaries of drip and sprinkler irrigation than beneficiaries of pipes and pumps. Other major benefits reported were increased availability of water, increase in the area of cultivation in both Kharif and Rabi seasons, change in cropping season, and availability of water in dry spells. The benefits accrued from the above four individual benefits are listed in Table 3.6.

Benefits Perceived	Drip (%)	Sprinkler (%)	Pipes (%)	Pumps (%)
Increase in income	96	89	69	80
Increase in production	70	73	77	100
Increased availability of water	52	64	77	20
Change in cropping pattern	33	45	54	20
Availability of water during dry spells	26	40	31	20
Efficient use of water	26	31	46	20
Increase in quality of agricultural produce	22	18	0	-
Increase in area of cultivation during Kharif	30	15	46	80
Increase in area of cultivation during Rabi	33	4	46	40
Increased water availability during Rabi	0	7	-	-
Timely availability of water for irrigation	6	-	31	60
Total %	100	100	100	100
Valid N	27	64	13	5

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

### SC/ST uptake in Micro-irrigation systems

During the planning processes, most often special needs of SC and ST communities were assessed, and attempts were made to integrate them into the implementation processes. The major benefit availed by progressive SC and ST farmers was support for micro-irrigation systems (drip/sprinkler) for horticulture plantations. They did not face any hurdles in pre-sanction or fund disbursement. Farmers also reported an increase in their farm yields due to micro-irrigation. A concern was raised about the full upfront investment at the initial stage of asset creation. Thus, the major concern for the farmers is financial liquidity.

-Sociology Expert

#### **Individual Farm Pond**

23 beneficiaries who accessed the benefit of an individual farm pond were interviewed. 16 of them received and implemented the benefit. Seven farm ponds have an inlet and outlet of which six has grass cultivation on their bund. According to half of the respondents, once the farm pond is filled with water, it lasts for around 52 days. All the respondents use the water as per requirement. Currently, none of the beneficiaries is using the farm pond for inland fishery activity. Except for six, the beneficiaries did not face any difficulty in accessing the benefit from PoCRA. The beneficiary has experienced an increase in income through increased agriculture production of Cotton, Soybean Chickpea, Sorghum, Maize, Sugarcane, and Wheat and increased availability of water for irrigation.

### **Benefits from Farm Ponds**

Field visits were conducted in Nalwandi Villages of Beed District on the 5th of January. Farmers stated during the interaction that the farm ponds were extremely beneficial to them. This structure is useful during the Summer and other non-rainy seasons. Four to five farmers benefit from these farm ponds. The farmer farms Cotton on 15 acres of land. The farmer grows Soybeans during the Rabi season. Crop yield and revenue have both increased because of these farm ponds. They provide water from the farm pond when other farmers require it. Because of the availability of farm pond water, they were planning to switch to vegetable cropping. Under the PoCRA program, one beneficiary farmer in Sevali village established a farm

pond (15m X25m X 15m), shade net, and Onion storage he also has a dug well with a solar-powered water pump. The shade net is irrigated with water from the farm pond. In the farm pond, the farmer practices pisciculture. There is no shortage of water on the farm.

### Shade Net

All 11 shade net beneficiaries who were surveyed have received training on how to practice cultivation with shade net. Seven shade net beneficiaries are growing vegetables in their shade net, and two of them were also involved in nursery activity. Five got technical guidance on how to cultivate to achieve better productivity with the help of an agriculture assistant. Four of them were using it regularly, and three had reported that they used it seasonally. The average investment is around Rs 75000 last year. All beneficiaries sell their produce easily directly via haat or retail mode and through local dealers.

### Increase in Income due to Switch to Shade Net farming under POCRA

A farmer from Samnapur village, Beed district shifted to shade net-based farming following loss in Cotton farming. The farmer invested RS. 13 lakhs to build the shade net after getting sanction under the PoCRA program. He has received RS. 8.18 lakhs through DBT under the PoCRA program. The diesel operated pump to irrigate the shadenet consume at least 30 to 50 litre of diesel during a season. 20 quintal fertiliser used in a season through drip irrigation.

He is growing Capsicum in the shadenet built on 0.4 acre land area. However, his Capsicum crop was getting infected with pest like Black Thrive. In order to resolve the problem of pest attack, he received advice/suggestions from local KVK. During last season, 15 ton of capsicum was produced in the shadenet and he was able to book around Rs. 1.25 lakhs as profit from his capsicum cultivation.



None of the Shade net beneficiaries faced any difficulty in accessing the benefit from PoCRA. All of them anticipate the benefits of an increase in income, production, ability to produce a high-value crop, and an increase in employment opportunities for locals.

#### SC/ST uptake of Shade Net Intervention

SC and ST farmers expressed a desire to avail benefits of polyhouse and shade net but stated that it required a much higher amount of investment, and therefore becomes difficult for them to take it up at the individual level. The Agriculture Assistant (AA) also said that the response to polyhouse and shade nets in villages dominated by tribal populations has been poor.

Sociology Expert

#### **Developing a Waste Disposal mechanism**

PoCRA has provided the farmers with shade nets, polyhouse, PVC pipes, etc. which has significantly increased the use of plastic materials. For example, in Tapovan villages, 197 shade nets, five polyhouse, and 15 farmers with PVC pipes have been provided to the farmers by the project. While interacting with the farmers, it was learned that in each shade net and polyhouse, 4-5 bundles of plastic mulch (30 kgs per bundle) are being used which are usually replaced after each crop, sometimes 2-3 times a year. Therefore, it is estimated that in a single village like Tapovan, 6-10 tons of plastic waste are generated every year. If
we add the PVC pipes used in drip and sprinkler irrigation as well as in the motor pump, the quantity will increase further. Unfortunately, at present there is no waste disposal mechanism in the area. The farmers normally dispose of them in and around the village. In Pishor village (Kannad Taluka, Aurangabad), a few shade net farmers claimed that municipal vehicle comes in a year or two to take these waste materials, however, this claim was not verified.

Therefore, it is recommended that the PoCRA should develop and implement a strategy for the collection and safe disposal of plastic waste being generated through its interventions. There are small-scale industries involved in the collection, sorting, and re-use of plastics in Maharashtra. The PoCRA project can develop collaboration with them for the reuse of plastic waste generated through the project. A mechanism shall be developed for collecting small charges from the farmers who are using plastics for safe disposal which can be given as an incentive to the small industries involved in the collection and re-use of the plastics. Normally, these industries collect, sort, and shred waste plastic. These shredded materials are melted and often extruded into the form of pellets which are then used to manufacture other products. These recycled plastics are also used in road construction.

## Horticulture Plantation

Of the total 23 beneficiaries who have access to the benefit, 8 were found to have received training. The source of training was the Department of Agriculture (four beneficiaries), KVK (one beneficiary), and rest three received it from progressive farmers.

## Switch to Horticulture and Inter-cropping Practice

A farmer from Nalgundi village, Beed district got benefited from the POCRA Project. Earlier the farmer was a Cotton farmer, but the non-availability of water was a challenge for him. This led him to avail a farm pond and switch to a horticulture crop plantation. Two years ago, under POCRA Program, the farmer was able to gain knowledge about various climate-resilient-technologies which help in improving crop yield and thereby farmer's income. Accordingly, the farmer has availed individual farm pond under the PoCRA scheme. The farm pond water is used for irrigating the horticulture plantation through drip system. The water is also used for pisciculture. A solar pump is used to lift water from the farm pond. The farmer has 2 acres of land under horticulture crops where he has planted sweet lime, guava, and lemon. He is also using only farm-yield manure in place of chemical fertiliser. He is expecting to harvest fruits from this year of at least RS. 4,00,000/- annual income from the fruit crop.



The main crops grown by beneficiaries were Mango (17%), Custard apple (22%), Pomegranate (9%), Guava (26%), and Sweet lime (35%). The activity was practised on an average of 2 acres of land. The average age of 23 horticulture plantations is around 2 years. Half of the beneficiaries sourced their saplings from government nurseries and the rest from the agriculture university and government-approved nurseries. A total of 16,567 saplings were planted of which 15,848 (around 96%) saplings survived. For the saplings that did not survive, farmers cited damage due to birds or animals, and poor quality as reasons. 19 respondents have installed drip irrigation for efficient use of water. All the 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 earning of Rs. 90631/- to Rs. 134357/-.

## Agroforestry

One out of three (33%) beneficiaries who accessed the benefit from the project received and implemented it in the year 2022. The farmer has planted 300 teak wood saplings on 0.5 acres of land. Of the total, around 290 plants survived. He had procured the sapling from a private agro company.

## **Construction of Open Dug Well**

Eight beneficiaries who accessed the benefit from the project have received and implemented them. The mean

#### **SC/ST Participation in FFS**

Participation of SC and ST farmers in FFS was not found to be promising, although agricultural assistant and FFS coordinator had motivated them to avail this benefit. Key challenge in availing FFS benefits was lack of awareness and motivation. Some farmers who attended few demonstrations mentioned that they did not find the session useful and found the technology difficult to understand. – Sociology Expert

diameter of the well is 30 feet and the depth is 45 feet. The water in the well will last for two months after full recharge. The farmer can irrigate nearly 3 acres of land about 4 times. All beneficiaries anticipated the benefit of an increase in income, an increase in the availability of water for protected cultivation, and a change in cropping pattern.

## Adoption of BBF technology

111 farmers in the project and 11 in comparison have benefitted from the use of BBF technology. It is reported by farmers in both project and comparison areas that BBF technology helped in the drainage of excess water, root development by avoiding water stagnation, and moisture conservation. This led to an increase in production. The average area cultivated using BBF technology in project and comparison areas is 1 acre and 0.5 acres respectively. Cotton, Pigeon Pea, and Soybean were primarily grown using this technology.

## 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.

The total number of FFS participants to date is 2,54,546. The total number of guest farmers is 2,46,191 and the host farmers were 8,355. During CM-VIII round beneficiary survey, a total of 61 FFS farmers were surveyed from project villages which included 31 host farmers and 29 guest farmers. Of the total 61 FFS farmers who were surveyed, 6 host and 1 guest farmers were female.

Looking at the cropping-season-wise distribution, 70% of the guest farmers participated during Kharif, and the rest 30% during Rabi.

Among the 31 host farmers, 17 farmers were motivated by agriculture assistants, 13 farmers were motivated by FFS facilitators, and 1 farmer was motivated by VCRMC. Regarding honorarium, 13 of them have received it. The honorarium for 2 host farmers is in the process, while 16 host farmers shared that they have not received it. Except for one, the rest 30 host farmers find differences in the quality/cultivation of produce from the demo and control plots.

**FFS Demonstration-Participation Analysis:** Survey reveals that the majority of the host farmers are interested in undertaking a demonstration of Soybean (45%) followed by Cotton (31%) and Chickpea (26%). 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.

Further, it is important to note that none of the surveyed host farmers were found to be interested in demonstrating inter-cropping practice in the case of Rabi with Jowar and Cotton with Black Gram. Such low or no interest in the demonstration of inter-cropping practices could be attributed to either lack of training/knowledge on inter-cropping practices or the crops were relatively less profitable for the farmers compared to the crops having higher participation such as Soybean, Cotton, and Chickpea.

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

Сгор	Host farmer demonstration (%)	Guest farmer participation (%)
Cotton	39	31
Soybean	45	41
Chickpea	26	21
Onion	10	7
Cotton + Green Gram	7	4
Total N	31	29

**Reasons for Participation in FFS:** On asking what motivated them to participate in FFS, the majority of the surveyed farmers (82%) shared that they want to learn about the new technologies related to agriculture; 72% of both host and guest farmers wanted to understand ways to reduce their cost of production; 71% participated intending to enhance their knowledge on how to increase crop production and thereby their income levels. The other reasons for participation cited by 61 surveyed farmers were to learn how to apply fertilisers and pesticides more effectively (43%), to utilise water more effectively (33%), and to save their crops from climate variation (23%). 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:** On asking if they have attended all technology sessions conducted under PoCRA FFS, 12 of 29 FFS guest farmers responded in affirmation. The rest of the FFS guest farmers could attend 3 to 4 FFS sessions on average and cited the various reasons for not being able to attend all sessions. The most common reason for not attending FFS was the priority of their fieldwork or other personal work.

Reason for not attending all FFS sessions	FFS participants
	N = 17
Had work on field	11
Had to skip the session due to personal work	4
Family commitments/personal work	3
Was not aware of the session's timings	1

#### Table 3. 8 Reasons for not attending all FFS sessions

**Means & Ways Adopted to Inform Guest Farmers about the FFS Session:** It was observed that the time of the next FFS session was informed to nearly 58% through SMS or WhatsApp message, 37% were informed by the FFS facilitator during the FFS session and the rest 5% were informed in person by other project staff such as cluster assistant, agriculture assistant, and Krushi Tai. Nearly 60% of the participants including female FFS farmers find the timing of the FFS session convenient. 36% of all the sample guest farmers have reported that their queries were satisfactorily answered by FFS host farmers.

Of the total FFS participants, including host and guest farmers, 66% found that the technologies learned through FFS demonstration sessions have been very helpful in reducing the impact of climate vulnerability (less rainfall, high temperature). The rest found the technologies helpful to some extent. All the participants reported that the information provided by the FFS facilitator was useful. Nearly 96% of the FFS participants are willing to continue using the technologies. The female FFS farmers highlighted to have benefitted from FFS participation in terms of their improved understanding of using water, fertilisers, and seeds efficiently, thus saving cost. Also, the adoption of technologies taught in FFS has resulted in time-saving in the case of female progressive farmers. This has enabled them to efficiently manage family, children, and household chores along with entrepreneurial activities.



#### Table 3. 9 Perceived Benefits from FFS

Benefits from FFS participation	Project (%) Multiple Response (N = 59)
Awareness of good agriculture practices	85
Better awareness of the use of inputs (fertilisers, seeds, etc.)	75
Improvement in soil health	64
Soil moisture was conserved around the crop roots	66
Fewer diseases in crops	56
Better water management for agriculture	46
Increase in crop production or yield	42
Saving in seed input cost	34
Saving in fertiliser input cost	8
Overall reduction in cost of production	3

## Use of Pesticides in PoCRA villages

Although pesticides are beneficial for crop production, extensive use of pesticides can possess serious consequences because of their persistent nature. Pesticides can contaminate soil, water, and vegetation. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds, fish, beneficial insects, and non-target plants. Pesticides can reach surface water through run-off from treated plants and soil.

During the field investigation, it is estimated that in each shade net, farmers use pesticides worth Rs.1000-Rs.1500/- every alternate day either through the spray method. Pesticides are also being used indiscriminately in open fields in PoCRA where commercial crops (Cotton, vegetables, etc.) are being grown. The high-risk groups exposed to pesticides include farmers and farm workers.

Though the PoCRA field team informed that they conducted orientation and training on the safe use of pesticides, these were not being followed. Almost in all the fields, the M & E team found no use of protective cover during pesticide application. The workers did not cover their faces and did not use hand gloves or proper hand wash during and after pesticide application. Upon enquiry, they either ignore the harmful effect or tried to bypass the question by stating that they haven't come across any harmful effect.

The M & E team is of the view that it is imperative to use pesticides to increase production and reduce crop loss due to insects, pests, and diseases, and it would be expedient to accept a reasonable degree of risk. However, the PoCRA approach to the use of pesticides needs to be more pragmatic. All activities concerning pesticides should be based on scientific judgement and not on commercial considerations. POCRA needs to develop a strategy focusing on making farmers and other farm workers more aware of the harmful effects of excessive use of pesticides for crops as well as for humans.

The PoCRA team should also develop health education packages based on knowledge, aptitude, and practices and disseminate them within the farming community to minimise human exposure to pesticides. Encouraging the use of biopesticides over chemical pesticides could also be a good alternative.

## Feedback from the FFS facilitator

The FFS Facilitators interviewed were found to be well aware of their roles and responsibilities under the project. They shared that they have been involved in mobilizing farmers for FFS, making farmers aware of the C technologies, and ways to reduce the cost of cultivation and increase income.

As informed by the FFS facilitators, the most popular demonstrated activities were found to be Intercropping and BBF. They further shared that during the rainy season, the draining of water through the subsurface also became popular amongst the farmers.

Almost all the facilitators said that they train the farmers for the disposal of empty pesticides in the FFS. The most used disposal method was found to be burying the bottles in the ground.

It was observed that female participation has been lower relative to males. As shared by the FFS facilitators, priority given to domestic work over FFS was found to be the major reason cited by women for non-participation.

In some cases, it was also found that the women find the morning time inconvenient to attend the FFS. Accordingly, in some cases, the time for FFS was set keeping in mind the convenience of women in villages. The FFS was also arranged in many villages exclusively for women.

## Feedback from Technical Coordinators (TC)

All the technical coordinators reported that through technology adoption farmers have gained benefits in terms of an increase in production, a reduction in pest attacks, etc.

TCs further informed that farmers found the adoption of BBF and zero tillage technologies to be most useful.

Monthly review meetings are conducted by the district office to review the progress of the extension activity done by the Technical Coordinators.

## **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 achieve 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 Concurrent Monitoring of the NRM community interventions based on the quantitative interviews with PoCRA NRM intervention 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 56 and 48 respondents. All the assets constructed in project villages were found constructed on the site.

The majority of the surveyed beneficiaries in both project and comparison areas were found to be involved in Compartment /graded bunding under community/NRM works followed by the Construction of Cement Nala Bunds. The rest of the components of community/NRM works found little to no participation in both project and comparison areas.

#### Table 3. 10 Community NRM works done

Community/ NRM works	Project (%)	Comparison (%)
	N = 56	N =48
Construction of Loose bolder Structures	2	-
Construction of Earthen Nala Bunds	5	5
Construction of Cement Nala Bunds	20	12
Recharge shaft	0	-
Desilting of old water storage structure	5	-
Compartment /graded bunding	66	31

Nearly 85% 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.

Around 75% of the respondents in project villages and 63% in the comparison villages shared that a social audit has been done in their village. Respondents in the project cluster were found to be more satisfied with the quality of assets than in comparison areas. 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 = 56	N = 48
Very unsatisfactory	13	17
Somewhat unsatisfactory	13	12
Neither satisfactory nor satisfactory	2	8
Somewhat satisfactory	62	56
Very satisfactory	10	7
Total %	100	100

**Benefits accrued from NRM works:** Overall, beneficiaries in project clusters reported relatively better experiences from NRM works. However, 80% of respondents in the project and 69% in comparison clusters shared that there was increased availability of water for protective irrigation because of asset creation under NRM/community works.

More than 60% of the respondents in both project and comparison clusters experienced an increase in yield/production followed by a change in cropping pattern. The availability of water during dry spells, as a benefit, was found to be more in project areas than in the comparison cluster. Similarly, more participants from project areas witnessed an increase in income as well as an increase in groundwater levels after the construction of NRM assets compared to those from comparison clusters.

Based on the feedback from the respondents, the distribution of benefits accrued through the constructed community NRM works in both project and comparison clusters is as follows in Table 3.12.

Table	3. 12	<b>Benefits</b>	from	NRM	works
-------	-------	-----------------	------	-----	-------

Benefits accrued from NRM works	Project (%) Valid N = 56	Comparison (%) Valid N = 48
Increased availability of water for protective irrigation	80	69
Increase in yield/production	64	69
Change in cropping pattern	57	60
Availability of water during dry spells	57	44
Increase in area of cultivation during Kharif Season	36	33
Increase in area of cultivation during Rabi Season	34	19
Increase in income	37	17
Increase in Ground Water Level	20	12
Decreased soil erosion	5	8
Increased soil moisture duration	3	4
Do not think will benefit from this NRM work	-	8
Total	100	100

When the respondents in the project clusters were asked about their willingness to be involved or involvement in the maintenance of these assets post-construction, 75% (42 of 56 respondents) responded positively. They would like to contribute to the maintenance activity of NRM works in terms of being part of the maintenance committee, paying for the maintenance of the structure, and providing labour support for maintaining the structure.

#### Table 3. 13 Maintenance of NRM works

Maintenance of NRM works	Project (%)
	N=42
Willing to be part of the structure maintenance committee	52
Willing to pay for maintenance of the structure	19
Willing to provide labour support from self or family for maintenance of the structure	29
Expecting maintenance by local government institutions	-

## Impact of NRM works

An expert field visit was made to Sires village and Sirafpur village in Gangapur Tahsil in Aurangabad to assess the impact of Mini Watershed Planning and Water Budgeting as part of the POCRA Project. Discussions were held with cluster assistants and the farmer community. The interventions implemented as part of the POCRA project in these villages are - i. Compartment bunding and, ii. Creation of pumped pressurised Drip irrigation system. The following observations emerged from the discussions held:

Compartment bunding work was started in 2019 and was expected to be completed in 2022. It was observed that compartment bunding work has been completed in only 49% of the planned/ targeted area. The major reason behind the low percentage of area covered, as reported by the executing agency, is the non-availability of land due to the unwillingness of landowners to give their part of the land for the construction of compartment bunding in the area. It was also observed that the already constructed compartment bunding is well-maintained and utilised in the project area.

Open wells were the only source of irrigation in the project area before POCRA Intervention. Discussions with cluster assistants and farmers reveal that the introduction of a deep pressurized irrigation system has considerably benefitted farmers. POCRA intervention has resulted in:

- Better surface drainage resulted in the elimination of the problem of surface water logging in their cropped fields, thereby improving the quality of their yield.
- Substantial rise in groundwater Table ensuring year-round availability of irrigation water in the wells and thereby enabling farmers to undertake Rabi as well Kharif season crop in the project area.

Change in cropping pattern. Before the POCRA intervention, farmers were cultivating single Kharif crops such as Bajra. However, post-intervention, farmers are cultivating Cotton and Maize in Kharif Season; Onion, Wheat, and Maize in the Rabi season, and are cultivating Sugarcane on an annual basis.

## **3.4.2. Status of Community Farm Ponds (CFPs)**

19 beneficiaries were surveyed in project areas to assess their experience from Community Farm Pond (CFP). In project villages, it was observed that generally, 2 to 10 members come together to apply for CFPs. Of the seven CFPs which were surveyed, 6 were fully constructed and one was under construction. Further, it was found that the majority of the participants were motivated by their family members to apply for the CFPs, followed by friends and relatives.

Source/ Support	Motivation (%)
	N = 19
Self/ Family members	47
With the help of cluster Assistant	63
With the help of Neighbors/friend	68
With the help of Gram Panchayat (GP) members	95

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

#### Benefits from Farm Pond under POCRA.

There are 3 individual farm ponds established under the PoCRA program at Kolwadi village. 3 individual dug wells are sanctioned under the program and the construction have not yet started. Soyabean, Tur, Cotton are major crops grown during Kharif season. In Rabi season, Gram and Wheat are the preferred crops. Local market is about 5 Km away from the village; however, the market for Cotton is about 40 Km away from the village.

Farm of one of the beneficiary farmers of farm pond was visited. The farmer is a traditional Cotton grower. After establishing the farm pond under the PoCRA program, he has started Banana cultivation in 2 acre of land. The farmer is undertaking Cotton farming in 10 acre of land and producing 100 quintal of Cotton per year. During the Rabi season, the farmer grows Soybean crop.

He has also established drip irrigation with water supply from the farm pond. He is also a beneficiary of Mukhyamantri Saur Krushi PumpYojana and received solar power pump under the scheme.

The farmer follow natural farming. The farm is having 12 cows. Farm yard manure is produced inside the farm and applied to the field annually after dry season @1 ton/ acre.



## **3.5. Adoption of CRATs**

One of the key aspects of the project is to promote CRATs through training via FFS and thereby increase willingness among the farmers to adopt the same. Accordingly, the respondents in both project and comparison clusters were asked if they have adopted any of the CRATs in the past year.

It is observed that there is a higher willingness for the adoption of CRATs not only in the project but also in comparison clusters, indicating a good intensity of the impact created by POCRA interventions. The survey lists the CRATs which are majorly adopted by beneficiaries in both project and comparison areas. It includes – contour cultivation, inter-cropping, BBF method, drip/sprinkle irrigation, integrated nutrient management,

integrated pest management, zero tillage, seed germination, seed treatment, and use of improved seed varieties. However, it is important to note that in some technologies, the uptake differs across project and comparison clusters. For instance, adaptation of the BBF method was found to be reported more in the project than in comparison areas, whereas adaptation of the use of improved seed varieties was found to be reported more in comparison areas compared to project areas. The technology-wise distribution of its adoption is detailed in Figure 3.1.



Figure 3. 1 Adoption of CRATs

**Benefits perceived from CRATs:** Around 60% of respondents in project clusters and 25% in comparison clusters reported benefitting from the adoption of CRATs. An average of 24% increase in yield and a 22% reduction in the cost of cultivation, pest, and disease attack as a result of the adoption of CRATs has been reported by the respondents in project areas. Similar changes are also observed in comparison areas, but the levels are 6-8% less than those observed 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.

Table 3. 15 Benefits Perceived from CRAT	S
--	---

Benefits through CRATs	Project	Comparison
	Multiple Response (N = 449)	Multiple Response (N = 57)
Reduced cost of cultivation	69	58
Soil and moisture conservation	55	40
Better control over pests and diseases	69	68
Improved soil fertility	51	49
Optimum use of pesticides and fertilisers	43	33
Improved germination rate	24	16
Increased water availability	17	9
Improvement in coping mechanism	8	2

However, there were some respondents, in both project and comparison clusters, who were not able to realise the desired benefits of CRAT. The reasons cited by them include lack of technical knowledge (project 66% and comparison 71%), difficulty in applying technology in the field (project 15% and comparison 7%), unavailability of advanced agriculture machinery/ implements (project 3% and comparison 4%), and extreme climatic situation (project 16% and comparison 18%).

*Inclusive Participation in FFS:* The survey reveals that farmers from all social categories including SC, ST, OBC, and Nomadic Tribes (NT) have attended training on different CRATs through FFS under POCRA.

However, it is important to note that there exists variation in participation/attendance by training type. Further, it was observed that more percentage of NTs did not attend the training in comparison to the overall percentage of non-attendance and percentage of non-attendance under other caste categories.

|--|

Types of training	Gen	овс	SC	ST	NT
Contour cultivation	40	22	40	25	63
Cultivation by BBF method	25	17	40	25	63
Intercropping	37	30	40	25	63
Use of improved seed	50	56	60	25	63
Seed treatment	45	47	100	25	63
Integrated Nutrient Management (INM)	40	39	20	25	63
Integrated Pest Management (IPM)	39	39	60	25	63
Furrow opening	29	30	40	25	63
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	39	26	60	-	63
Drip/Sprinkler	49	43	60	_	63

Types of training	Gen	OBC	SC	ST	NT
Protective irrigation through farm pond	27	17	60	-	54
Conservation tillage	22	13	60	-	63
Mulching	16	4	66	-	36
Canopy management in fruit crops	24	8	60	-	54
Shade net	17	4	20	-	36
Polyhouse	12	4	40	-	36
Polytunnel	11	39	20	-	27
Use of machinery	26	9	20	-	36
Use of pheromone traps	19	17	20	-	45
Collection of soil sample for testing	19	21	20	-	45
Seed Germination	21	13	20	-	54
Soil amendments	16	8	20	-	36
Green manures	9	-	40	-	18

Total samples (N) = General-162, Nomadic tribe=11, OBC=23, Scheduled caste=5, Scheduled tribe=4

Within each category of farmers by landholding size, the proportion of farmers receiving different types of training has been analysed as depicted in Table 3.17. As can be seen, more than 50% of farmers with different landholding sizes have not received training. It warrants more focus to cover farmers from all categories under different training programs.

Table 3. 17 Percentage	of beneficiaries	received	different	training	(% by	landholding)
0				<u> </u>		9/

Types of training	Large > 5 Ha	Medium 2 – 5 Ha	Small < 2 Ha
Contour cultivation	8	30	45
Cultivation by BBF method	12	28	26
Intercropping	12	38	38
Use of improved seed	25	52	54
Seed treatment	12	43	51
Integrated Nutrient Management (INM)	25	38	43
Integrated Pest Management (IPM)	12	36	45
Furrow opening	12	30	33
Foliar spray of 2% Urea at flowering & 2% DAP at boll	12	41	38
Drip/Sprinkler	25	49	51
Protective irrigation through farm pond	25	27	29

Types of training	<b>Large</b> > 5 Ha	Medium 2 – 5 Ha	Small < 2 Ha
Conservation tillage	12	28	21
Mulching	12	20	15
Canopy management in fruit crops	12	27	21
Shade net	37	20	16
Polyhouse	12	12	13
Polytunnel	12	8	12
Use of machinery	13	27	11
Use of pheromone traps	13	13	22
Collection of soil sample for testing	12	17	22
Seed Germination	12	23	23
Soil amendments	12	16	18
Green manures	0	12	10

Total samples (N)= Large farmers: 8, Medium farmers: 73, Small farmers: 124

## 3.5.1. Use of Agrometeorological Advisory

Slightly more than half of respondents (54%) in project areas received Agromet advisory as part of the project, while in comparison areas, 37% of respondents received it. Around 5% of them receive the advisory daily, 15% receive it twice a week, and 80% receive it once a week. Around 95% of respondents in the project areas (80% in comparison) received advisory on mobile. Other sources from where respondents in project areas receive Agromet advisory are the VCRMC, Television, Newspaper, and Gram Panchayat (GP) notice board. It is observed that 81% of respondents in project clusters, as compared to 73% in comparison clusters, showed interest in following the Agrometeorological advisory regularly. Beneficiaries in the project and comparison cluster reported that they received the Agromet advisory in the area of climate resilience, weather, soil nutrient, natural resource management, crop, irrigation, fertilisers, pesticides, certified seed, etc.

Type of Agromet advisory received	Project	Comparison
	Multiple Response (N=243)	Multiple Response (N = 84)
Climate resilient technology advisory	96	96
Weather advisory	94	92
Soil nutrient advisory	76	67
Natural Resource Management advisory	72	67
Crop (Food/ Cash/ Plantation) advisory	74	65
Irrigation advisory	79	63
Certified seed advisory	81	80
Fertiliser (chemical and bio) advisory	78	74

Pesticides (chemical and bio) advisory	83	75
Crop pest/ disease advisory	76	70
Crop residue disposal advisory	62	52
Organic farming advisory	60	46
Horticulture advisory	52	38
Poultry/ Goatry/ Fishery advisory	41	34
Markets for agri-produce advisory	48	38
Agri-business advisory	51	47
Environment safeguards advisory	48	34
Credit advisory	34	29
Insurance advisory	40	29

**Usefulness of Agromet Advisory:** It is observed that nearly 95% of respondents in project areas who received Agromet advisory find it useful and relevant in contrast to 75% in comparison areas. The rest of the respondents in comparison areas either find the information as general advice or not useful.

**Perceived Benefits of Agromet Advisory:** More than 50% of the farmers in the project area reported that the Agromet advisory received under POCRA helped them in taking timely decisions especially related to the initial stage of crop cultivation which in turn helped them avoid future problems such as pests, crop diseases, etc. and thereby enhancing their crop yield. A similar trend was reported by 47% of the respondents in comparison areas also. Further, nearly 80% of respondents in both project and comparison areas who received Agromet advisory were found to be able to market their agricultural produce based on the market price information they get. In project areas, this has helped 85% of respondents (69% in comparison areas) to realise 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 (85 to 90% of respondents), through a mobile app, WhatsApp, and Newspapers.

Benefits from Agromet advisory received	Project Multiple Response	Comparison Multiple Response
	(N =243)	(N = 84)
Helps in taking timely decisions related to the initial stage of crop cultivation	57	48
Helps in deciding irrigation frequency	7	7
Helps in the selection of crops for certified seed variety	10	12
Helps in the selection of crops for intercropping	3	-
Helps in the control of pests	16	27
Helps in soil health management	1	1
Helps in water management	4	3
Helps in preparing a contingency plan	0.5	1

#### Table 3. 19 Perceived Benefits for Agromet Advisory

## 3.5.2. Treating Soil using Soil Health Card Information

Nearly 97% of respondents in comparison clusters did not have soil health cards as compared to 84% of respondents in the project. It was observed that more respondents in project clusters (14%) as compared to those in comparison (3%) treated the soil using soil health card information. Around 2% of project clusters did not find the information on soil health cards useful. About 23% of respondents from the project and 15% in comparison clusters reported that they did not have the technical knowledge to use the soil health information. A similar trend was also found by some of the experts during their field visits. Therefore, there is a need for PoCRA to focus more on training farmers on soil health cards, given its importance in making agricultural practices more climate-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. It was observed that the overall area under certified seeds was relatively higher in comparison villages as compared to project villages. The area under cultivation using climate-resilient certified seeds for Chickpea was 67% in the project and 64% in comparison areas. The land under certified seeds for Soybean was higher in comparison area (90%) as compared to project areas (81%). The same was the case for Pigeon Pea, wherein it was observed that the comparison sample had a higher percentage of the land (57%) under certified seeds as compared to the project (55%). The overall percent of land under certified seeds for these three crops in the project and comparison areas is 74% and 79%, respectively. However, when compared to CM VI and CM-VII rounds, the percentage of land under certified seeds for these three crops occurred to be slightly increased.

Сгор	Land under production (acres)		Land under climate-resilient seed varieties (acres)		% Land under climate- resilient seed varieties	
	Project	Comparison	Project	Comparison	Project	Comparison
Soybean	1030	475	833	428	81	90
	(N = 285)	(N = 130)	(N = 236)	(N = 115)		
Pigeon	102	57	57	32	55	57
Реа	(N = 41)	(N = 21)	(N = 26)	(N = 11)		
Chickpea	770	282	514	181	67	64
	(N = 228)	(N = 95)	(N = 156)	(N = 58)		
Overall	1902	814	1404	641	74	79

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

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

## 3.5.4. Adoption of CRATs and their Impact

The key observations from the Agronomy expert field visit are as follows. After considering the soil type, available resources, climatic situations, and prevailing management issues in the selected districts, the following Climate Resilient (CR) Technologies were implemented (with different intensities) in the 6 selected villages:

- BBF technology (in the case of Soybean in deep and light soil)
- Improved seed varieties

- Contour furrow and bund cultivation
- Intercropping
- Integrated pest and nutrient management
- Mulching
- Conservation tillage
- Protected cultivation
- Micro-irrigation (drip and sprinkler)
- Farm pond

Based on the discussions with the beneficiaries, the following emerged:

- Increased adaptation of CR technologies by farmers
- Farmers experiencing an increase in the crop yield and thereby in their net income as a result of CR technology implementation.
- Beneficiaries willingly take up advanced and well-established agricultural practices to increase their overall income, indicating a positive change in their behaviour.
- Beneficiaries were found to be well aware of the steps to be undertaken and more confident in addressing the shock introduced by the adverse climate environment.
- Creation of irrigation resources has motivated farmers in allocating areas for cultivation to some new crops such as Turmeric, Sugarcane, and Summer Soybean.
- Implementation of BBF technology has enabled farmers to save significant expenditure against the total cost of cultivation, especially for Rabi crops.
- In-depth knowledge of mulching has been imparted to farmers by the technical experts from the Agriculture department/ agricultural university and also from FFS.
- After using sprinkler irrigation system, farmers were able to save a significant amount of irrigation water and witnessed an increase in crop yield as compared to flood irrigation.
- In the Sayad village of Nanded district, project interventions including pipes, drip, and sprinkler systems have boosted crop yield and increased additional cropped area under Rabi crops to the extent of 50- 60%.
- Through POCRA interventions, farmers have been able to bring 100 acres of horticultural fruit crops under a drip system.

Despite the significant achievement, various challenges were also faced by farmers such as erratic rainfall distribution, etc. affecting the crop performance and crop yield significantly. Despite submitting all the relevant documents, various small and marginal farmers were still waiting to receive the benefits from the PoCRA project in some of the selected villages.

Farmers have also reported that though BBF technology helps in increasing crop yield but it fails in case of heavy rainfall due to the creation of stagnant water destroying the crops.

Suggestions have been received for the expansion of the intervention on a large scale basis so that maximum farmers can enjoy the benefits. There is a need to mobilise FFS for teaching farmers how to calculate the amount of irrigation water to be applied during different crop growth stages to ensure resource conservation and generation.

"Implementation of BBF method has not only given me additional seed yield of 4-5 q/acre but has also helped in saving 16 Kg seed material cost as well as fertiliser cost." – Farmer from Nanded District "Financial assistance received through POCRA Project for constructing Shade Net has helped me in increasing the yield and thereby earning Rs. 4.80 lahks in profit in one year." – Farmer from Hingoli District

## **Benefits from Various Interventions under PoCRA**

At the Sivli village, one beneficiary farmer has established one shadenet (0.4 acre), one Onion storage (110 ton) and a farm pond (15m x 25m) under the PoCRA program. He also has a dug well with solar power water pump established under the Mukhyamantri Saur Krushi PumpYojana.

The water from the farm pond is used to irrigate the shadenet. The farmer undertake pisciculture in the farm pondas he does not face any issue issue related to water availability.

The farmer undertake capsicum and cucumber cropping in the shade net. 9 to 10 ton capsicum and 30 ton of cucumber were produced during last season. 2 quintal of fertiliser is applied to crop in the shadenet annually. The fifteen member FPO uses the Onion storage facility.

## 3.5.5. Improved Water Use Efficiency in Project Areas

Field investigation by Hydrology Expert reveals that there has been an increase in the number of dug wells in all project villages except for Sayal. It was further found that farmers are also opting for borewells, which are deep (>100 m) and often get dry in a couple of years resulting in loss to the farmers. Therefore, there is an urgent need to provide proper training to farmers regarding investment as well as maintenance of the borewells.

Name of the	Year	Dug well	Bore well	Lift irrigation no
village		no	no	(Area under
				irrigation, ha)
Aalegaon	2019-20	80	102	54 (110)
	2020-21	110	150	67 (150)
	2021-22	150	190	83 (185)
	2022-23	170	225	90 (187)
Chudawa	2019-20	85	110	11(25)
	2020-21	120	145	13 (35)
	2021-22	160	188	27 (44)
	2022-23	180	204	30 (48)
Ganpur	2019-20	15	21	6 (74)
	2020-21	26	31	8 (36)
	2021-22	32	40	9 (33)
	2022-23	42	68	11(28)
Mendhala(bk)	2019-20	12	24	17 (82)
	2020-21	17	31	14 (40)
	2021-22	23	37	7 (29)
	2022-23	34	52	8(23)
	2019-20	89	120	15
	2020-21	140	185	25
	2021-22	178	230	30

Table 3.21 Year-wise Growth of Groundwater and Surface-water Sources

The major irrigated crops grown by farmers in three seasons are shown in Table 3.22.

Table 3.21: Season-wise irrigated crops are grown in the project villages

Kharif	Rabi	Summer	Perennial/ A	nnual
Soybean, Vegetables	Wheat, Gram, Jowar, Fodder, Vegetables	Groundnut	Sugarcane, Banana, Sweet o	Turmeric, range

There are two types of irrigation area categories viz., (i) Seasonal irrigation - where seasonal crops like Wheat, gram, Soybean, and Groundnut which are of short duration are irrigated, and (ii) Perennial irrigation which is for long-duration crops like Sugarcane, Turmeric, and orchards. In some of the surveyed villages, seasonal irrigation dominates, while in others it is the perennial crops like Turmeric and Sugarcane which are preferred by the farmers for irrigation. Table 3.33 shows the year-wise growth of groundwater and surface water sources across surveyed villages. It can be seen from the Table that all the project villages have experienced an increase in their irrigated areas by 50% to 100% in both Kharif and Rabi seasons during 2018-19 to 2021-22.

Table 3.33 Year-wise and season-wise irrigated area of different crops in the project villages

Name of the	Year	Seasonal irrigation (ha)		Perennial irrigation (ha)	
village		Kharif	Rabi	Summer	Perennial/Annual
Aalegaon	2018-19	20	45	0	75
	2019-20	15	55	0	100
	2020-21	50	80	0	120
	2021-22	30	75	0	100
Chudawa	2018-19	17	65	0	100
	2019-20	15	70	0	80
	2020-21	30	75	0	75
	2021-22	35	80	0	80
Ganpur	2019-20	40	185	15	35

Name of the	Year	Seasonal irrigation (ha)		Perennial irrigation (ha)	
village		Kharif	Rabi	Summer	Perennial/Annual
	2020-21	42	188	18	38
	2021-22	48	192	20	42
	2022-23	48	199	21	48
Mendhala	2019-20	17	170	8	3
(bk)	2020-21	24	210	14	7
	2021-22	28	221	16	22
	2022-23	34	244	28	28
Limbgaon	2018-19	45	90	0	250
	2019-20	60	92	0	280
	2020-21	68	105	0	320
	2021-22	75	122	0	320

#### Sprinkler and Drip Irrigation Development

It was found that all the surveyed farmers in the project villages have received drip and or sprinkler irrigation sets through POCRA. They are using the drip system mainly for Turmeric, Sugarcane, and Sweet Orange (Mosambi) irrigation; and sprinkler sets are used for irrigating seasonal crops like Soybean, Gram, Wheat, and Groundnut.

As can be seen in Table 3.34, the adoption of micro-irrigation technology (sprinkler or drip) and the area under it has increased in the last couple of years in the surveyed villages. It was learned that more farmers are keen to obtain the sets through POCRA, but because of the condition that the farmer needs to pay the entire cost of the system upfront has discouraged them from availing the benefit of the project. The sprinkler and drip sets require a large initial investment which most small-holder and resource-poor farmers simply cannot afford.

Name of the	Year	Sprinkler Irrigation		Drip irrigation	
village		No. of sets	Area (ha)	No. of beneficiaries	Area (ha)
Aalegaon	2019-20	4	7	1	0.5
-	2020-21	5	7	1	0.44
	2021-22	47	55	9	6.25
	2022-23	10	13	0	0
Chudawa	2019-20	6	8	1	0.5
	2020-21	6	9	1	1
	2021-22	37	45	5	7
	2022-23	14	17	0	0
Ganpur	2019-20	12	7.2	7	6.5
	2020-21	10	6.3	6	3.8
	2021-22	9	11.0	5	2.8
	2022-23	4	3.0	2	1.4
Mendhala(bk)	2019-20	3	1.8	3	2.4
	2020-21	5	3.0	5	4.0
	2021-22	4	2.4	12	10.0
	2022-23	3	1.8	3	2.0
Limbgaon	2018-19	6	3.6	16	11.75
	2019-20	3	1.2	0	0
	2020-21	16	7.2	28	21.8
	2021-22	30	13.5	42	28.8

Table 3.34. Sprinkler and Drip Irrigated Sets and Area in the Surveyed Villages

#### **Computation of Water Use Efficiency**

PoCRA has undertaken digital lysimeter-based studies through SAUs to redefine crop coefficients to have more precise crop water requirements as compared to FAO constants of important crops in the PoCRA area. This will help to define location-specific crop water requirements based on the weather forecast (IMD), soil characteristics (NBSS&LUP), and crop coefficients (SAUs).

As per the State of Food and Agriculture (FAO, 2020), in irrigation, water-use efficiency is the ratio between estimated irrigation water requirements (through evapotranspiration) and actual water withdrawal. It is dimensionless and can be applied at any scale (plant, field, irrigation schemes, basin, country, etc.). Efficient

use of water in agriculture can be pursued by reducing water losses in transmission and distribution or by increasing crop yields, changing planting dates, and using different crop varieties, among others. Water-saving irrigation methods and practices, especially the use of sprinkler and drip irrigation have been proven to enhance the water use efficiency substantially at the field level.

As mentioned earlier, a few farmers in the surveyed villages availed of the subsidized sprinkler and drip sets, although more and more farmers are interested to install these systems. The demand has spurred given the numerous advantages like labor savings, the convenience of operation during night hours apart from water savings, and increased crop yields as compared to traditional surface irrigation methods.

A schematic of the concept of computing water use efficiency in this report is shown in Figure 3.2. Here, the water use efficiency is presented as the percentage saving in groundwater in on-farm application through sprinkler/drip methods compared to conventional surface methods of irrigation.



#### Figure 3.2. A Schematic Presentation of Water-use Efficiency Concept

d> d1> d2

As illustrated in Figure 3.2, more volume of water is applied in the surface method than that of sprinkler and drip method for the same area of the cropland. This has been validated through the following case studies taken from the served farmers.

#### **Case Studies on Water Use Efficiency**

#### Case Study 1

While Shri Hariji Dhumal, a farmer from Sayal village of Nanded District (see details of the farmer in Annexure) holding 0.55 ha of land, uses the porTable sprinkler set received under POCRA in 2020, for irrigating Groundnut. His neighbour uses the traditional gravity (border strip) method for irrigation of the same crop. Analysis reveals that by sprinkler irrigation Shri Hariji was able to save almost 80% of groundwater in one irrigation.

#### Case Study 2

Shri Datta Bharkad, a farmer from Mendhla village of Nanded District (see details of the farmer in Annexure) uses the sprinkler system for irrigating the gram and drip system for Turmeric crop which he had obtained through POCRA. The farmer informed that through the traditional surface method, he was able to irrigate one ha of land in 4 days, but through drip irrigations, he has been able to complete irrigation of one ha crop in 2 days resulting in saving at least 70 percent of groundwater. He also experienced an increase in yield due to drip ( 30 quintals/acre) as compared to the surface method (20 quintals/ acre). A similar case was also observed in the Gangpur village of Nanded District where the farmer was able to save around 70% of the water and increase the yield of Turmeric by double by adopting the drip method of irrigation.

#### Case Study 3

Shri Shivajirao Kadam, a farmer from Limbgaon of District Nanded constructed a farm pond in the year 2019-20 under POCRA (see details in Annexure). Besides the rainwater storage during rainy periods, the pond also receives water from two bore wells constructed nearby the pond area. He shared that the construction of the pond has enabled them to have an assured water supply for irrigation during the Rabi season.

#### Case Study 4

Shri. Manoj Chourate of Aalegaon village, District Parbhani has a total land of 6 ha divided among three brothers equally (see details of farmer no 5 of Annexure). Manoj has obtained a porTable sprinkler set through the POCRA at the total cost of Rs. 28,000, of which he received back an amount of Rs.17,500/ as a subsidy. The source of water is a dug well and had installed a 5 HP open well submersible pump. He irrigates Soybean in the Kharif season, and gram in the Rabi season. During the visit, it was observed that the farmer had just finished the irrigation of the gram crop. Manoj said that he irrigates 0.20 ha in one setting of 8 hours. He applies three irrigations to the gram. 1<sup>st</sup> irrigation of hours per set, while 3<sup>rd</sup> and 4<sup>th</sup> irrigation of six hours each per set.

Earlier Manoj used to irrigate the crop by the conventional surface method which took about 4 days (8 hours/ day) to irrigate one acre. While now, he can irrigate one acre of cropland in half of the time i.e., in two days (8 hours/day). Thus, we can safely say that the water use efficiency achieved through the sprinkler method is twice that of the surface irrigation method.

Manoj also cultivates Sugarcane crops on one ha farmland. He has installed a drip system for Sugarcane through POCRA. The drip consists of 16 mm dia laterals along each crop row at a spacing of 1.2 meters and inline drippers of 4 LPH embedded at a spacing of 40 cm. He told that by irrigating Sugarcane by drip, he was able to irrigate his one ha area in 2 days (8 hrs/day), while by surface method (furrows) about 4 days (8 hrs/day) were required. Measuring the dimensions of the dug well and drawdown depth, each day, it was estimated that the farmer has applied 300 cubic meters on one ha through the drip, while he used to apply about 800 cubic meters per ha through the surface method. Thus, there is a saving of 37.5% of water. He uses this saved water to irrigate another one ha farmland.

#### Case Study 5

Shri Parmeshwar Bandale of Ganpur village, district Nanded has a total farmland of 2 ha (see details of the farmer no7 of Annexure). He obtained a sprinkler set through POCRA in 2021. He also purchased additional three risers and sprinklers besides the eight included in the standard set. He has a dug well and a 5 HP open well submersible pump set. He has grown gram on one ha of land. The lateral and sprinkler spacing was 12m X 12m. The farmer told that earlier he is to irrigate the crop by surface method and could irrigate about 0.1 ha area per day (8 hrs/day), but now with the sprinkler set (11 sprinklers), he was able to irrigate 0.2 ha per day (8 hrs/ day). By measuring the drawdown depth of water and the well diameter, it was estimated that about 170 cubic meters of groundwater were required to irrigate 0.1 ha of land by surface method, while 125 cubic meters of water was applied on 0.2 ha of the area through sprinkler method. Thus, there was about 65% saving in water compared to the surface method.

#### Case Study 6

Shri Vitthal Bhard of Village Mendhala (bk)of Nanded District has installed a drip irrigation system to his Turmeric field on an area of 2 acres (see details of Farmer no 9 of the Annex) The crop was planted on 1 July 2022. He uses groundwater from his dug well using a 7.5 HP open well submersible pump set. Earlier he was using the sprinkler method to irrigate his Turmeric crop. For the present Turmeric crop, he installed an inline drip system on 31 July 2022. With this change he said that he could perform a single irrigation in 85 cubic meters through a drip; while earlier the groundwater used by a sprinkler system to irrigate the same area was double (170 cubic meters). Thus, there was a saving of 50% of water by the drip method compared to the sprinkler method.

## 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 by 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 projects-supported FPCs were covered, and feedback from a total of 48 FPC respondents (16 FPC directors and 32 members) was taken as part of the quantitative survey of CM-VIII round.

These 16 project-supported FPCs have 3997 male members, 2170 female members, 986 members from the SC category, and 568 members from the ST category. This membership comprises 2757 small and marginal farmers. The year of establishment of FPCs is as follows: 2010(n=1), 2016 (1), 2018(1), 2019(4), 2020(8) and 2021(1). All respondents shared that their FPC has both male and female members and agreed that their FPC is operational. During the survey, 94% of 32 members shared that they always participate in general body meetings of their FPCs, and the rest 6% sometimes attend them. Nearly 88% of members participate in the decision-making process of their FPCs. Nearly 59% of all 48 FPC respondents, including directors and members, have received training on financial planning (34%), leadership development (6%), and skill upgradation (66%). 81% (26 of 31) members were aware of the business plans prepared by the FPC.

#### **PoCRA-supported SHG beneficiaries**

Another key component of PoCRA is to strengthen the existing self-help groups in their entrepreneurial ventures by providing them with financial support. This is aimed to strengthen the post-harvest activities and value chain of the major crops and to strengthen the supply chain for the climate-resilient crop varieties in the project area.

The SHGs that have applied to receive support or have received support through PoCRA were sampled from each district, and feedback from their members was taken to understand the current activities undertaken by the SHGs and get feedback on the support received through PoCRA till now. One SHG who has received/applied for support from PoCRA was randomly selected from each district. A total of 8 SHGs were covered, and feedback from a total of 26 SHG respondents (8 SHG presidents and 18 members) was taken as part of the CM-VIII round. The year of establishment of SHGs is as follows: 2013(n = 1), 2014(1), 2019(2), 2020(2), 2021(1) and 2022(1). 63% of respondents shared that their SHG has both male and female members.

Nearly 50% of all 26 SHG respondents, including the president and members, have received training on especially skill upgradation (38%), and farm technologies (12%). The training on business establishment was received through the agriculture department. 86% (18 of 21) of respondents shared that they save regularly every month, while the rest reported that they are not currently saving regularly. The average monthly saving is approximately Rs. 257. 63% of respondents noted that their SHGs are involved in income generation agribusiness activities such as custom hiring centres.

## 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 centres (CHC) for agricultural machinery. This component contributes to climate co-benefits by focusing on value chains for climate-resilient commodities, by promoting green technologies in primary processing (use of solar energy, including for storage), and by encouraging the selection of fuel-efficient (less energy) and technology efficient (loss reducing) farm machinery and equipment.

## Support to FPCs/ SHGs for undertaking Agribusiness

2021-2022

15 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.

Year of grant	FPC (N=15)	SHG (N=6)
2018-2019	1	1
2019-2020	5	1
2020-2021	9	3

\_

Table 4. 1 Year of grant for agribusiness to project-supported FPCs and SHGs

The majority of the surveyed FPC respondents reported that they receive support from POCRA for developing Custom Hiring Centres, followed by godown/warehouse development, seed processing unit, etc. However, SHG respondents informed that they have applied/received support for custom hiring centres as the agribusiness activity under POCRA.

1

Agribusiness activity	FPC Respondent Valid N = 15	SHG Respondent Valid N = 6
Custom Hiring Centre	9	6
Godown	4	-
Seed processing unit	4	-
Pulse mill	1	-
Grain Processing (Cleaning and grading)	1	-
Goat Breeding center	2	-
Spice Unit	1	-
Marketing of Agribusiness Produce	1	-

**Perceived Benefits from FPCs and SHGs under POCRA**: Survey reveals that while all SHGs are being used by farmers only for getting access to farm machinery and equipment, farmers are enjoying several agribusiness services from FPCs. Some of the highly demanded services include purchasing seeds through FPC (46%), getting marketing support for selling their agricultural produce (44%), purchasing chemicals fertilisers from FPC (44%), grading and sorting their agricultural produce (34%) and getting access to farm machinery and equipment (31%).

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

Facilities/ Services	FPC Respondent (%) Valid N =47	SHG Respondent (%) Valid N = 6
Marketing support in selling my agricultural produce	44	-
Purchasing seeds through FPC	46	-
Purchasing chemicals fertilisers through FPC	44	-
Grading and sorting of my agricultural produce with the support of FPC	34	-

Facilities/ Services	FPC Respondent (%) Valid N =47	SHG Respondent (%) Valid N = 6
Converting agricultural produce to value-added products (E.g Converting into Soybean-to-Soybean oil)	8	-
Getting access to equipment/tools for agriculture	31	100
Access to godown facility	14	-

## **Custom Hiring Centre (CHC)**

Under the agribusiness component, custom hiring centres (CHCs) are one of the major activities promoted under the PoCRA project. The objective is to contribute to climate co-benefit by focusing on pre-and post-harvest farm activities by encouraging the use of fuel-efficient (less energy) and technology-efficient (loss and

time-reducing) farm machinery and equipment. Various agriculture implements which are required from tillage till harvesting are provided on a rent basis. This includes tractor, plough, rotavator, trolley, threshing machine, BBF sowing machine, etc. Beneficiaries have found the facility extremely useful and nearly 75 percent of member farmers use it for agricultural purposes only. Farmers are easily able to move their farm produce by using a tractor with a trolley. Beneficiary farmers have shared that because of CHCs their farm-related works are done on time and at a cheaper rate with machines being available to everyone in the village. This has also saved their labour cost. Except for one FPC (i,e, Dattaprayag Group Farmer Producer Company Limited), the rest

Tentative rates at which CHCs lease out machines: Tractor: Rs. 500 per acre Trolley: Rs. 800 per day Thresher: Rs. 250 per quintal Rotavator: Rs. 1200 per acre Plough: Rs. 1300 per hour BBF sowing machine: Rs. 1000 per acre

allow the non-member farmers to use the machines by paying the rent.

The type of machines available in CHCs of the PoCRA-supported FPCs as reported by the respondents are as mentioned in Table 4.4.

Type of machine available in CHC	FPC Respondent N = 9	SHG Respondent N = 6
Tractor large more than 35 HP	8	1
Tractor small up to 35 hp	1	0
Harrow	3	4
Plough	9	1
Multicrop Thresher (30 hp and above)	5	1
Multicrop Thresher (Below 30 hp)	1	0
Power weeder	1	4
Cultivator -9 tyne	4	1
Cultivator-5 tyne	2	0
Power Tiller	1	0
Reaper	1	2

Table 4. 4 Types of Machines available in PoCRA-supported FPCs and SHGs

Type of machine available in CHC	FPC Respondent N = 9	SHG Respondent N = 6
Trailor ( above 1 brass)	1	0
Trailor ( below 1 brass)	0	6
Rotavator	9	2
Blower	0	0
Silage Baler	0	0
Chaff cutter	1	1
Ridger	2	6
Seed drill (BBF) - 9 tyne	4	0
Seed drill (BBF) - 4 tyne	3	0
Shredder (Cotton, Maize, etc.)	0	0
Combined Harvestor	0	0
Turmeric Harvestor	0	0
Mulching machine	0	0
V-pass	0	1
Bed maker	3	0
Land Leveller	1	0

## **Feedback from FPO Representatives**

An interview with the FPC director was arranged to get feedback on the implementation of the Agribusiness component of the project. A total of 16 FPCs were interviewed in the current CM round. The findings of the interviews are as follows.

Activities done by the FPC and Grant Disbursement: Out of the 16 interviewed FPOs, 11 of them were only the group of farmer which were not involved in any kind of Agribusiness activity before applying for the matching grant from PoCRA. The other five were involved in the activities of procurement, the aggregate of produce, bakery, and trading of food grains. Some FPCs have received grants for multiple activities. Out of these 16 interviewed FPCs, 9 were engaged in custom hiring centers and others. 4 FPCs received support for Godown, and 2 FPCs have received support for the Goat Breeding Center. One received the grant for Masala Unit, Daal Mill, and Cleaning Grading Support. The majority of the FPCs reported the project cost between Rs. 15-29 Lakhs. Most FPCs said that the profit is not shared among the members, but utilised for the expansion of the business. Financial assistance has also been forthcoming. Since these farm implements are now available to members at cheaper rates, farmers are saving up on rent, thereby increasing their economic output. This has made them profitable and improved their standard of living. The support received from project staff has been satisfactory.

**Interviewed FPC Profile:** Almost all of the interviewed FPOs were established between 2018 to 2020. The oldest FPC interviewed amongst the 16 FPCs was established in the year of 2008. All of the FPOs were registered with the ATMA around the same year of establishment.

**Members of the FPO:** The member size of the FPO ranged from 10 to 1500 members. The majority of the board directors reported that they had taken training for the business at some point after starting the activity. The membership fee varied for being a member of FPC amongst all the FPCs. The membership fee varied

from Rs. 500 to Rs. 1000. Out of the total members, it was observed that 10% of members belonged to Schedule Caste and 8 % belonged to ST. It was also observed that 90% of member farmers belonged to the Marginal and Small Farmer category. 10 % of the farmer were large farmers in the group.

**Participation and Decision Making:** On average, all members participate in group meetings conducted by FPCs. Everyone is given a chance to have a say in the decision-making process. Efforts are made to encourage the participation of women, the tribal population, and other marginalized groups like providing membership discounts, constituting smaller groups to provide guidance and encourage their participation, etc. Almost all the FPC representatives said that the decision made in the meetings and General meetings are based on the suggestions of the FPC members. As per the interview, it was observed that the attendance of members is about 60-70% for meetings. Many FPC representatives said that the members express their opinion during the decision-making process in the meetings. To increase the participation of vulnerable sections some FPCs said they give an additional discount to the farmers on implements and inputs.

**Financial Audit:** Out of the 16 interviewed FPCs, only 10 FPCs said that they have got some profit in the financial year. Despite a request for showing the financial audit statements, the data on turnover and profit was shared orally by FPC representatives. The highest profit was recorded to be Rs. 32,00,000 against the turnover of Rs. 9 Crore by Alok Sanjivani Farmer Producer Company, Murud, Latur. The second highest profit was recorded to be Rs. 20,00,000 against the turnover of Rs. 8 Crores by Agrotech Agro Producer Company, Khandapur, Latur. 4 FPCs said that they had a profit in the financial year 2020-2021.

**Record-keeping:** Records of registration, attendance, and financial transactions are maintained in most of the FPCs. Almost all FPCs said that they conduct annual audits. The book of records is generally maintained and owned by the secretory in most of the FPCs. In some cases, the chairman helps in maintaining the records. Some FPCs have hired Full-time workers to make entries of equipment hiring and other documentation.

**Training and Capacity Building of The FPC members:** The FPOs who received training said that on average 2-3 Directors received the training. Out of the 16 FPCs, 12 FPCs reported that they have taken training after getting the grant. The main subjects covered under the training were Financial Management, processing of seeds and Farm Produce. The main benefits perceived from the training were reported to be Increased knowledge of processing as well as an increase in business enhancement with an increase in Income. Some members also reported an increase in knowledge related to marketing. The imparting Agency and Venue for the training were reported to be Warehousing Corporation, VAMNICOM, and Agriculture University.

**Facilities for Member farmers at Concessional rates:** Many FPOs stated that they give special discounts on services to women members, which is generally an additional 5-10% less than the actual market rate, and some FPOs said that they give training to women for skill development and strengthening. In the case of custom hiring centers, all machinery and tools were found in good condition. The member of the CHC delivered services that are generally 5% less than the market rate.

**Fund Arrangement and Challenges Faced by the FPC**: The FPOs reported that they did not find any specific challenge in fund arrangement as the members have gathered the amount for establishing the business. Almost all the FPOs said that the initial fund for the establishment of the activity was raised by the members. Two FPOs said that they borrowed money from relatives as well as in one FPO took the assistance of a bank loan for raising the money. Many FPOs also expressed the challenge that they are not getting support from banks for the expansion of the business as banks are asking for properties as mortgages.

**Waste Management:** Waste management was not the issue in the case of CHC but in other FPOs. In the case of Godown, the waste is not generated yet as the Godown and Cleaning Grading Units are yet to come into operation after the Kharif Season.

**Support from PoCRA Staff:** Most of the FPCs said that the major help of AA was taken for knowing the activities related to matching grants for Agribusiness. The major help received was from the project staff as well as the Agriculture department for the preparation of the business proposals, and many FPOs also said that the Chartered Accountant also helps in the preparation of the business plan. Some also use it for paying off the debt of the FPC. The FPC directors expected the help of the Agriculture Department for getting the loans for expanding the current business activities.

## 4.3. Boost Pre-and-Post-harvest Activities through Project Support

PMU has conducted surveys of nearly 1451 FPCs in the project region in two phases i.e., 619 in the first phase in June 2018 and 832 in the second phase in January 2021. In the survey, the data on various aspects of FPC such as its registration, composition of the board of directors, the composition of membership, share capital, working capital, the status of agribusiness activities, business plan, etc. was collected. As of 30 September 2022, a total of 1000 FPCs are supported through PoCRA in the Marathwada region. It was suggested by PMU to assess the situation of PoCRA-supported FPCs which are covered in both the current Concurrent Monitoring round as well as PMU's survey held in 2021. Accordingly, we have identified three FPCs, one each in Beed, Latur, and Parbhani, and have presented a pre-post situation analysis of them as follows.

#### 1. Grishma Agro. Farmer Producer Company Ltd., Beed

The FPC did not conduct any agribusiness activity in 2019-20. The turnover of the company remains below 10 lakhs during that period. Grishma Agro has established a custom hiring center. Small and marginal farmers can take farm equipment from the center for rent. This facility provides an opportunity for the farmers in the vicinity to use tools and technology that is otherwise beyond their reach due to small farm size and high rental costs.



Grishma Agro has invested approx. Rs.20 lakhs on setting up the center. In FY 20-21 the turnover at the center was Rs. 6.33 lakhs and even registered a profit of Rs. 24491 in the subsequent year. The CHC can support more than 100 farmers (most of them nearly 80% are small and marginal farmers) in the vicinity of FPC.

A refer van is also operated by Grishma Agro, with an investment of Rs.15 lakhs. The average distance traveled by van is nearly 2500 km per month. The van runs an average of 12 km per liter of fuel. After paying a salary of Rs. 12,000/- to the driver per month, and paying the amount spent on maintenance and repairs, the refer van can generate a profit of Rs. 15,000 per month for Grishma Agro. The refer van provides services only to the members.

#### 2. Alok Sanjivani Farmers Agro Producer Company Limited, Latur

The FPC was already in the business of marketing farm produce in 2019-20, but could not report any turnover or profit. With support from PoCRA, the FPC established a godown. The godown helped FPC to establish a strong forward linkage with markets and created opportunities for price negotiations. The company registered a turnover of Rs. 10.55 lakhs in 2020-21 and Rs. 22 lakhs in the subsequent year. They earned a good profit of Rs. 1.34 lakh in 2021-22. Also, with the establishment of godown, the membership of the company increased from around 500 members to 800 members. Also, women (from less than 15% before PoCRA to 20% as of now) and SC/ST (from less than 15% before PoCRA to 34% as of now) membership improved significantly.

#### 3. Dattaprayag Agro Producer Company Ltd., Parbhani

The FPC was already running a godown in 2019-20 and registered a turnover below Rs. 10 lakhs. The company established a CHC centre with support from PoCRA. With a combination of Godown and CHC, FPC established a complete value chain with support to farmers in both pre-and post-harvest activities. This has resulted in an increase in turnover from below Rs. 10 lakhs to Rs. 26 lakhs in 2020-21 and further to Rs. 69 lakhs in 2021-22. The FPC registered a profit of around Rs, 22500/- and Rs. 25000/- in those years, respectively. With the establishment of CHC, the membership of female farmers increased from less than 15% to 31%. Also, membership of small and marginal farmers improved from less than 50% to 80%.

The key observations of Agribusiness Experts are summarized in the following case studies that follow.

## Case Study 1

## Aadesh Seed Agro Producers Co.

Adarsh Seed Agro Producers Co. is a farmer producer company (FPC), located in Sakhare Borgaon, Beed, which was established in the year 2020. It has two major lines of business: (a) seed processing, and (b) custom hiring center, where farmers hire equipment on rent.



#### i. Seed Processing

The seed processing business has shown good potential in the first year of operations, i.e., FY 2022-23. Procurement is done by member farmers at an average price of Rs. 60-65 per Kg. Thereafter, the seed is processed to separate the high-grade seed from the lower grades at a processing cost of Rs. 100 per quintal. Processing at this stage results in approximately 60% recovery of A and B-grade seed, which can be sold in the market. The remaining 40% contributes to the recovery of C and D grade, which is used for animal feed.

After the A and B-grade seed has been segregated, it is further cleaned and processed packing it in bags of 30 Kg, and selling it in the market. At this stage, certain additional costs related to labor, packing material, printing, and transportation are incurred.

The cost per quintal for Grade A and B seeds is tabulated below:

Cost Head	Cost (Rs.)
Labor	500 (per quintal)
Processing	1000-1500 (per quintal)
Packing material	40 (for each 30 Kg bag)
Printing (on the bag)	7 (for each 30 Kg bag)
Seed treatment (thiram)	70 (for 30 Kg)
Transportation	5 (for each 30 Kg bag)

The finished product costs approximately Rs.19.50 – Rs.20.00 per Kg. The average sale price is Rs.30.00 per Kg at which around 60% of grade A and B seeds are sold in the market. The major Soybean varieties sold by the FPC under the brand name "Adesh", are MAUS 612, MAUS 162, and KDS 726.

The remaining 40 percent product in the form of C and D-grade seeds is also processed and packed before selling it as animal feed. Out of this 40%, approximately 10 percent constitutes waste, and the remaining 30% is sold in a pack of 50 Kg bags at the sale price of Rs. 1000 per quintal.

In FY 22-23, Adarsh Seed Agro Producers Co. sold 10 metric tons of seed and animal feed. The target for FY 23-24 is 300 metric tons. It is noteworthy that May to July is a busy season dedicated to Soybean processing, followed by July to October season during which Jowar is processed. October to March is the slack season for the FPC.

#### ii. Custom Hiring Centres

The other line of business is the custom (equipment) hiring center. Farm equipment including tractors, trolleys, threshers, rotavators, etc. is available for rent for farmers at the centre. The PFC has invested Rs. 20 lakh in the center. Regarding operations, the major cost incurred by the FPC is on diesel (for tractor), which is Rs. 7,000 per month, and the driver is paid Rs. 10,000 per month. The farmers are charged the following rent depending on the equipment that they hire:

- Tractor and dynamo: Rs. 2000 per day
- Tractor and trolley: Rs. 1000 per day
- Tractor and thresher: Rs. 2000 per day
- Tractor and rotavator: Rs.1100 per acre

However, the business is not remunerative as the members expect and have to be offered a discount of 10 percent on the rentals. Similarly, a 20% discount is offered on processing charges. Moreover, the window for equipment hiring is very short say, four months in a year making it a not so lucrative line of business. The FPC has estimated that the profit from the custom hiring center during FY22-23 was Rs. 1 lakh.

However, the custom hiring center provides the crucial touchpoint and opportunities for interaction, leading to increased "stickiness". Therefore, despite it not being a high-profit activity, the FPC will continue with it.

#### *iii.* Cleaning and grading

Another FPO of cleaning and grading of grains was visited in Sakhare Borgaon village, Beed district. This FPO was established in March 2022. At present, the FPO is operating with Jowar, Rajma, Soybean, Chana, and Wheat from the local farmland. 100 farmers from the nearby area are members of the FPO. The 20 HP machines for cleaning and grading grains are operated with a tractor-based dynamometer. The FPO charges Rs. 80/quintal for cleaning of grains and Rs.100/quintal for grading to the member farmers. The rate includes Rs. 50/quintal profit to the FPO. The crop residue generated during the processing is sold at Rs. 2/Kg and used as fodder or poultry feed.

#### Case Study 2

## Adikant Seed Agro Producer Company Limited

Adikant Seed Agro Producer Company Limited produces cattle feed. It is a new business line operational for the last twelve months.

#### Cost-benefit analysis:

To produce one bag of 50 Kg cattle feed, the material required, and their cost is specified in the Table below.

Cost Item	Unit	300 bags/	600 bags/	900 bags/	1200
	Cost/	month	month	month	bags/
	bag				month
Inputs (fooder quality) for 50 Kg bag					
Maize (20 Kg @Rs.15/Kg)	300				
Rice broken (10 Kg @Rs.15/Kg)	150				
LHP (2 Kg @Rs.8/Kg)	16				
Molasses (7 kgs @Rs.6/Kg)	42				
Minerals (1 Kg @Rs.90/Kg)	90				
Soybean (4 Kg @Rs.25/Kg)	100				
Bajra (5 kgs @Rs.15/Kg)	75				
Nitrogen (1 Kg @Rs.6/Kg)	6				
Wage (Rs./bag)	30				
Packaging (Rs./bag)	20				
Logistics/transportation (Rs./bag)	15				
Sub-total (per bag of 50 kgs)	844	253200	506400	759600	1012800
Electricity (Rs./month)	10000	10000	10000	10000	10000
Rent (Rs./month)	2000	2000	2000	2000	2000

Admin Cost (10% of sub-total)	25320	50640	75960	101280
Total Cost	290520	569040	847560	1126080
Revenue (@Rs.1200/bag)	360000	720000	1080000	1440000
MinusTaxes (5%)	18000	36000	54000	72000
Net Revenue	342000	684000	1026000	1368000
Profit/Loss (per month)	51480	114960	178440	241920
Benefit Cost Ratio	1.18	1.20	1.21	1.21

Currently, the plant is producing 300 bags in a month with benefit to cost ratio of 1.18, while the capacity of the plant is more. Therefore, the FPC has set a target to produce 1000 bags per month during FY 23-24. The projection of benefit to cost ratio for production capacity from 300 bags/ month to 1200 bags/month is estimated and presented in the Table above. The FPC can achieve a higher benefit-to-cost ratio if it increases its production capacity to more than 1000 bags/month.

## Adikant Seeds Agro Producer Company, Udandwadgaon, Beed

With the help from Taluka officials, Shri Nandlal Chavan established a Farmer Producing Company (FPC). Initially, his FPC used to provide inputs, buy, and sell farmers' produce. However, six months ago his FPC also purchased Refrigerated Van and started carrying vegeTables and flowers to Pune. The Ref van capacity is 2 ton/trip, and the mileage with AC on is 8 km/litre. The driver's salary is Rs.10,000/- plus allowance. Introduction of Refrigerated Van has helped farmers in getting higher price for their produce. For instance, in local market, Shimla Mirch (Capsicum) is sold at Rs.25-28 per kg, whereas in Pune market it is sold at Rs.40-45 per kg.

He further informed that he has also established a dal and Masala mill which is yet to be operational. He is planning to sell the Adikant Masala in local market.



Refrigerated Van for flowers/ vegetables



Dal and Masala Mill

## Case Study 3

## Jain Bandhu Farmer Producer Company

Jain Bandhu Producer Company established a dal (pulses) mill in February 2022 with an investment of Rs.40 lakhs. The unit can process 3 metric tons of dal per day. The pulses processed in the unit are gram, tur, masoor, and moong. The company produces only the non-polished variety.

The cost of these pulses on average is Rs.700 per quintal. Rs.100 per quintal is charged for job work. A typical cycle for processing takes eight days to complete.

Day #	Activity
One	Cleaning
Тwo	Touching
Three	Oiling
Four	Husking
Five	Moistening
Six	Drying
Seven	80 percent dal is complete
Eight	20 percent dehulling, 100 percent complete

Of the 100 Kg dal, 25-30 Kg goes to waste and 70-75 Kg is recovered for sale after the processing is completed. Dal is sold in packs of 30 Kg. The cost of a bag is Rs. 5. Sale price of the processed dal is Rs. 100 per Kg. In FY 22-23, the company processed 10 metric tons of dal and made a profit of Rs. 2.5 lakhs. The company is currently not using the full capacity of 3 metric tons, but during FY 23-24, the plan is to use the full capacity and process 800 MT dal. In addition, the company is planning to install a cleaning and grading machine as well. Mid-January to mid-May is the busiest season. From June to December the company runs a vegetable delivery van for transportation of members' stocks on a no-profit no-loss basis.

## Case Study 4

## Mahzmeru Farmers Producer Company

Mahamery Farmer Producer Company established a Food processing plant in the year 2019 with an initial investment of 18 Lakhs excluding the cost of land. One of the directors of the company used his land for establishing the plant. The plant has the following machines: Washer and Peeler, Slicer, Blancher, Dehydrator, Fryer, Flavour coater (Seasoning), and Chips packing machine



The installed capacity of the plant is 400 Kg of Chips (Banana/potato) per day. The plant receives raw materials either from members or the open market depending upon availability. 100 Kg banana yields 20-22 Kg chips and 100 Kg potato yields 33 Kg Chips. The cost of one Kg chips of banana is Rs. 117 while in the case of potato, it is Rs 99. The sale price of banana chips is Rs 160 and Potato chips is Rs. 140. Packing and transportation costs add to Rs 12 per Kg. The company has established the brand Gokul for packaged products but a majority of the business is in bulk as wholesale. According to the audit statement of FY 2021-22, the company had a turnover of Rs. 5,70,000.

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

## 5.1. Village Climate Resilient Management Committee (VCRMC)

A total of 20 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 VCRMCs were formed as per the guidelines of the project and every VCRMC had 50% women participation. The participation of every community was found in the VCRMC as per the guidelines. The most common register available with the VCRMC was found to be the proceeding register which was maintained by AA and CA. Most of the VCRMCs were unaware of the documents to be maintained due to a lack of training on the functioning of the VCRMCs. It was observed that seven VCRMCs have received any training for the members. The training was related mainly to financial literacy, awareness creation as well as NRM activities, and agriculture development.

The committees hold meetings to raise awareness about the project through Gram Sabhas. The meeting dates are decided in the previous meeting of VCRMC. Almost all the VCRMCs stated that the meetings are held once a month, mainly for scrutiny and approvals of the applications. Some VCRMCs also said that the meetings are arranged as per the applications received as per the need of the project. Mostly, the key agenda of the meetings is the scrutiny of the applications received from the farmers. Four out of 20 VCRMCs have done any financial transactions after receiving the sum of Rs 25000/- from the SDAO. The four VCRMCs who received the fund have mainly spent on the remuneration of Krushi Tai as well as on the purchase of Tables and chairs in Gram Panchayats (GPs) under the project. All VCRMCs are aware and convinced of the current prioritization criteria.

## Capacities build through training

Seven of the 20 VCRMCs confirmed receiving the capacity building training received under the project. The training was mainly related to financial literacy as well as microplanning, awareness generation, and NRM/Agriculture. Most of the members when asked about their need for training, most common need for training was for the orientation and getting trained on the functioning as well as roles and responsibilities of the VCRMC. The committee members suggested the need for training for improvement in decision-making. None of the VCRMC reported about the training received on the Roles and responsibilities of VCRMC. It was also observed that many VCRMC members were not aware of the roles.

## Insights from Sarpanch and Farmers in Tupewadi

**Change in Cropping Pattern:** Sarpanch of Tupewadi informed that all 577 households have benefitted from POCRA interventions. He shared that the village has witnessed change in cropping pattern as earlier the farmers used to cultivate only Jowar, Bajra, Wheat and Cotton. However, with introduction of provision for Shadenets under POCRA, the farmers have started seed cultivation also for tomato, chilly and watermelon. Currently, they have tie-up with all the big companies like Syngenta, Bayer, East & West, etc.

**Positive Change in behaviour:** Some of the farmers shared that after being impressed by its success, the farmers who were not able to get subsidy, found an innovative way of constructing bamboo shadenet, where they use bamboo poles instead of metal poles. The cover sheet is also of lower quality, but it stays for a year. The cost of such shadenet comes around Rs.70,000-Rs.80,000/-

*Improvement in living standards:* Sarpanch shared that village has experienced enhancement in the living standard of people. This can be seen from the fact that almost 7-8 years ago hardly there was a motorbike in the village. Now, almost all households have bike/scooty, TV and pucca houses. Further, the village now also have around 20-25 four wheelers.



Team Leader-M&E, Sambodhi in discussion with Sarpanch and farmers of Tupewadi

## Mobilisation and Efforts for Making Village Climate Resilient

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. The plantation drive was the most common response from the member when asked about the efforts for making villages climate resilient.

#### Grievance Redressal

All VCRMCs mentioned they receive all complaints orally and try to resolve them based on their rapport with them/farmers. 12 Gram Panchayat (GP)s have installed the complaint box in the office and surrounding. It was observed that the complaints are generally related to delays in payment and pre-sanctions, which are solved orally.

## **Reasons for Delay in Approval of Individual Grant Applications**

Uploading of the incorrect documents of farmers was the main reason for the delay in the approval of the application as well as in some cases during the spot verification the farmers are not available at the site.

#### Awareness of the Environmental Safeguards

Awareness about the environmental safeguards was found to be limited to only not felling of trees as well as tree plantation drives in the village.

#### Awareness about the DPR and Water Budget

Most of the VCRMCs said that they are well aware of the VDP prepared during the Microplanning done in the village. VCRMCs were also aware of the Water Budget prepared during the microplanning.

#### Participation of SC and ST Communities in Project Activities

One of the major objectives of the project is the adequate representation and participation of vulnerable groups like SC and ST in all project activities. Some of the activities specifically targeted for SC and ST communities include –

- VCRMC representation of 2 progressive farmers of which one farmer shall be from SC/ST/VJNT/NT and the same as for female farmer i.e. one female farmer from SC/ST/VJNT/NT community
- Integrated farming system creating self-sustaining livelihood opportunities for the SC/ST communities covering activities like small ruminants, backyard poultry, sericulture, apiculture, inland fishery
- **FFS for technology dissemination –** Coverage of SC and ST farmers having less land holding
- **Protected cultivation (shade net, poly house, polytunnel)** coverage of SC and ST farmers and provision of matching grants, facilitating credit accessibility
- Micro-irrigation systems inclusion of SC and ST farmers
- **Custom hiring center –** equal opportunity accessibility

In the Marathwada region, the overall participation of SC and ST communities in project activities generated

mixed responses. In terms of VCRMC representation, all the project villages had the mandated number of representations from SC and ST communities including women farmers. Most of the time, men actively participated in the review of project progress, guidance to farmers regarding applications for matching grants, approval of the application, payment information, and liaison with the department for payments. However, the active participation of women members was reported to be low. They expressed that they are usually busy with household chores and other responsibilities and did not find it important to attend meetings. Even when they attended meetings, they did not voice their opinion or follow up on the application status.



# Co-benefits of PoCRA Interventions - Enhancing Livelihoods of Tribals and the Landless

The pastoral community of the Marathwada region is seminomadic with a strong traditional association with sheep and goat rearing. It provides a dependable source of income through the sale of wool, milk, manure, and meat. Households in the community are responsible for the full cycle of sheep breeding and the feed is from natural pasture. They use the entire grassland landscape and their mobility is dependent on rain, water sources, and the availability of fodder crops.

The pastoral community normally moved large distances depending on the rains, water sources, and fodder with their large herds of sheep/goats. They stayed in the central plateau only during monsoons. This being a semi-arid region, a vast

"We make a living by selling lamb and wool and earlier during summer months it was difficult to get good fodder from grazing lands. Now with POCRA project in our village, there is an increase in water availability and agricultural productivity and our sheep/goat get good fodder from farmers fields and we do not have to move out of the village in search of fodder." – Pastoral Community

tract of grazing land was available in the rainy season. After the rainy season (last phase of October), the pastoral communities slowly moved towards the Konkan area in search of green pasture lands. However, over a period of time, the mobility of the pastoral community decreased and in the study region, it was found that they were semi-nomadic and were more or less settled in the central plateau, with the younger generation children attending formal schools.

The indirect benefits received by the pastoral community due to POCRA intervention (which has resulted in improved water availability and agricultural productivity) have made it possible for the sheep to access fresh and nutritious fodder as grazing commons have declined. In addition to fodder, the pastoralists also received cash or grain in exchange for valuable manure. This has strengthened the reciprocal relationship between pastoralists and local farmers not only by providing food and livelihood security in a variable environment but also forging interdependence across caste-class lines, of shared respect and care.

During discussions, the pastoral community provided the following suggestions-

- Training in primary health care of sheep/ goat so that they can provide their services in the neighboring villages (non-POCRA villages) for the pastoral communities for a nominal fee.
- Veterinary support/health camps for their sheep/goat twice a year as part of the support for the 'landless'.
- Market support/buyback scheme from POCRA for wool and meat
- Training for wool processing



Sociology expert interaction with pastoral community

#### Digital Technology and Smart Phones as an Inclusion Tool

At a macro level, POCRA interventions of innovative ICT-based solutions have helped in improving the monitoring of the actual implementation of project activities, delivery of quality inputs, and identifying problems and constraints. A digital innovation lab has also been set up to develop and deploy a host of apps for project staff for effective implementation.

At the village level, the projects also attempt to reach out to maximum beneficiaries through means of

information technology and the project emphasizes the involvement of women in the project activities and has undertaken digital literacy to train women. Some of the important training conducted includes the use of the internet, social media, UPI-based transactions, and use of POCRA project applications and apps. Participation certificates have been given at the end of the successful completion of digital literacy training programs.

"I know I have to ensure active participation of women in all meetings and project activities, and the best way to provide advisory messages is through telephonic call, WhatsApp and SMS." – Krushi Tai

However, in the project villages of Aurangabad and Bheed districts, the use of digital technology and smartphones by women was found to be minimal. Although some of the women VCRMC members had smartphones, they were not used for the dissemination of information regarding meeting outcomes or applications and sanctions. It was further revealed that none of the women VCRMC members who owned mobile used to disseminate any project-related information. Mobile is most often used only as an entertainment tool by VCRMC members. However, they all agreed that men are actively participating in the Whatsapp group created exclusively for VCRMC members.

Krushi Tai, who is expected to work in close coordination with VCRMC members, agricultural assistants, cluster assistants, and the village community, often uses her own smartphone. However, their ownership did not have a major bearing on women's participation.

However, Krushi Tai reported that online training provided to them to describe the project activities and their roles and responsibilities was non-effective due to poor connectivity and frequent call drops.

Some of the common reasons and barriers identified for poor uptake and use of smartphones among women are:

- Lack of access and cost of the smartphones
- Lack of interest to understand and use apps, portals, and other digital initiatives
- Poor network connectivity in the villages
- Lack of information about different data plans
- Illiteracy difficulty in typing text messages
- Conservative cultural norms and various restrictions imposed by family members

Although mobiles give women the ability to enlarge their sphere of interaction through access to information and its effective utilization, they have not been able to enhance their capacity to access project benefits.

## Feedback from Krushi Tai (KT)

Five of the 13 interviewed Krishi Tais said that they have got some training on the project. The KTs who received the training said that the training lasted for 4 days at Taluka place. Five KTs have participated in the Microplanning of the project. However, no KT has been exposed to any field visit.

All Krushi Tais shared that they received support from their family in the form of travel and meeting arrangements.

Most of the KTs were found to be aware of social media and digital payment platforms and have utilised the same when needed. They were also found to be part of the administrative WhatsApp groups that facilitate coordination at the village, district, and sub-division levels.

KTs shared that they have been undertaking mobilisation activities through door-to-door meetings, sharing information about POCRA benefits in SHG meetings.

All Krushi Tais were aware that VCRMC is responsible for their monthly remuneration which is supposed to be paid quarterly. Four KTs were reported to have received their remuneration.

During interviews, it was observed that few KTs participated in the project's microplanning.

KTs shared that mostly, Gram Panchayat (GP) Meetings are used as a platform by farmers for raising any complaints.

None of the KT was found to be aware of beneficiary prioritization criteria or the inclusiveness system which is inbuilt in the DBT application of POCRA.

To increase female participation in the project, KTs are holding meetings with women, telling them about the plan, encouraging them, to adopt the CR technologies by making them aware of the benefits of the interventions under POCRA and how their fellow male farmers are utilising the services provided and how they have been benefited from them.

When asked, it was reported that none of the KT has either attended or organised any group meeting (SHG, VCRMC, FFS). Though Krushi Tai's said that they have smartphones, the phones are either used by their children for playing games or watching videos or taken away by their husbands.

It is observed that there is limited awareness among KTs on digital literacy programme i.e. the PMGDISHA-Pradhan Mantri Gramin Digital Sakshtra Abhiyan. There is a need for educating Krushi Tais on important components and initiatives of the project especially those which are related to women's empowerment.

## 5.2. Maharashtra Climate Innovation Centre

In July 2022, M/s Ernst and Young is onboarded for conducting a feasibility study to establish the climate innovation centre. 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 PoCRA. Currently, the preparation of the feasibility report is in progress.

## **5.3. Project Management**

## Feedback from Taluka Agriculture Officers (TAO)

The majority of the TAO reported that the BBF technology has helped the farmer in increasing production as well as safe drainage of excess water by protecting the roots of the crop from damage.

TAOs informed that the village-wise action plans are already prepared and have been uploaded on the portal for the promotion of CR technology.

It was observed that trained resource farmers have been appointed in the villages for the promotion of CR technologies.

Low availability of manpower in the department resulting in higher workload, and non-availability of computers, and printers are cited as possible reasons for the delay in pre-sanctions.

Difficulty being faced by TAOs in convincing farmers to take advantage of the Matching Grant being provided for FPO in the project.

TAOs further shared that the distance between the training centers and the village sometimes creates difficulty in attending the training. They suggested that the Capacity building programs must be handled at the Circle Agricultura Office, considering the workload of the SDAO office.

## Feedback from Project Specialists (PS)

3 Project Specialists (PSs) were interviewed in the FGD conducted at the District Office of the Agricultural Department. The feedback received from them is described below.

The project specialists shared that they are satisfied with the current status of the project implementation and the NRM works which are in progress. All the PSs were found to be aware of the environmental safeguards checklist specified in ESMF guidelines compiled as part of the project implementation through the village development plan. The knowledge of the checklist was found satisfactory as many project specialists mentioned the ban on the felling of trees during NRM works. It was also reported that the guidelines of ESMF are followed in the villages during the implementation of individual and community works.

All the PSs mentioned that they have clarity about the guidelines of the project. There is a demand for solar pumps and farm fencing to mitigate the menace due to wild animals. Also, to increase the participation of women in the project, it was observed that the FFS was conducted for women exclusively as well as
guidance was provided to women and vulnerable groups for the formation of small teams in the village. The activities related to updating the portal with VCRMC details were found to be conducted regularly by the PD HRD.

**Feedback from PS Human Resource:** The awareness regarding the responsibility for updating the data of VCRMC was observed in all the project specialists' HRD. The frequency of field visits of the PS HRD was found to be 3-10 days per month. The key task is to visit VCRMCs and support them. The PS HRD mentioned that they attend the VCRMC meetings regularly and the frequency of VCRMC meetings attended in the last 6 months was found to be 5-10 in some cases while the online VCRMC meetings were 20. In some districts also the online VCRMC meetings are arranged by the PS HRD. As per the PS HRD, the women are enrolled and trained in PMG-DISHA program through the PMG Disha coordinator with the help of CA in the guidance of PS HRD.

**Feedback from PS Agriculture:** The training related to NRM works was attended by all the PS Agriculture. However, they suggest revision in the training content by including training on the recharge shaft. The periodic refresher training related to NRM work was mostly demanded by all the PS Agriculture.

**Feedback from PS Agri-Business:** As per the PS AB, applications for Agribusiness activity are received in good amounts. The main challenge faced by PS AB as reported by them was found to be convincing a farmer to set up and purchase material for the proposed activity.

**Feedback from PS procurement:** All PS Procurement has informed that they have received training. There is a demand for refresher training by all PSs who have received prior training.

### **Project Satisfaction**

As Table 5.1 reflects, a high level of satisfaction was reported when asked about various activities undertaken under the PoCRA project. Apart from village micro-planning activity, in all other activities, the majority of the respondents were found to be satisfied. More than four-fifths of the total respondents were either somewhat satisfied or very much satisfied. Dissatisfaction (very unsatisfactory or somewhat unsatisfactory) was reported in one-tenth or less than one-tenth cases.

Concerns	Very unsatisfactory	Somewhat unsatisfactory	Neither satisfactory nor unsatisfactory	Somewhat satisfactory	Very Satisfactory
Village micro-plan rating (N = 393)	9	12	8	52	19
Process of accessing benefits (N =393)	9	9	6	54	22
Work of VCRMC (N = 393)	7	7	7	35	44
Support from Project staff (N = 393)	9	8	8	61	12
Knowledge of FFS facilitator (N = 393)	6	10	7	53	22
Work of Krushi Tai (N = 393)	7	8	7	28	40

#### Table 5. 1 Feedback on project satisfaction

### Feedback from Farmers in Project Villages

Feedback from the key project stakeholders including farmers (separate for farmers having landholding less than 2 Ha and for farmers having landholding more than 2 Ha and landless) was taken to assess the agricultural situation in the Marathwada region. Along with these qualitative interviews, field observation visits were also done by experts and research team members to assess the ground-level situation related to agriculture. The key crops that were reported to be cultivated in the Kharif season were Soybean, Cotton, Pigeon Pea, Black gram, Green gram, and Maize. The crops most reported to be cultivated in Rabi were Wheat, Jowar, and Chickpea. The key crops reported to be grown in Summer are Groundnut and Onion. The annual crops mostly cultivated were reported to be Sugarcane and Turmeric. Most of the villagers mentioned well as the main source of irrigation during the dry spell and cultivation of the Rabi crops

When asked about which cultivation season is perceived to be risky, the majority of the farmers perceive cultivation to be risky throughout the year due and water availability. Summer season is perceived to be risky due to the unavailability of water and lack of irrigation sources

Many farmers reported that the farming in rabbi is mainly done by rainfed agriculture, and they are facing problems particularly when the dry spell occurs. The irrigation is mainly done for the Rabbi and the Summer crops. Irrigation availability was reported to be low by all stakeholders, therefore most of the farmers are dependent on rainfall. Dug wells and bore wells were reported to be the most commonly available sources of irrigation

The most famous brand and trusted for the crops were reported to be Mahabeej by almost all the farmers, which was followed by MAHYCO, Rashi, and Ankur.

The most common pest was found to be bollworm, pink worm as well as armyworm in the villages. The crop-wise major diseases which were reported to affect their crops are a) Soybean- Pod borer, Stem Borer, Green worm, Semi looper, and armyworm b) Cotton- pink bollworm, Leaf reddening, Pod borer, Armyworm c) Pigeon Pea, Green Gram, and Black Gram- Aphids and Pod borer. The general practice adopted to avoid pests is the spraying of pesticides. Farmers mostly purchase pesticides based on the suggestions of agri-input dealers and, in a few cases, also based on suggestions of agriculture officers and Krishi Mitras

People perceived that BBF technology is most useful for increasing the production of the crop. Some people also responded that the Shade net technology has also been useful in increasing the income of farmers. Most of the project beneficiaries were satisfied with the work done by FFS as they think that the FFS has increased the knowledge of farmers to a great extent in terms of gaining knowledge about the CR technologies adoption. The percentage of people doing soil testing was found to be 20 to 50 %.

The use of chemical fertilisers was found to be on a large scale in the village. The mostly used fertilser was found to be Urea and DAP in the field. The application of fertiliser was reported to be more during the sowing phase. The commonly used fertilisers were known to be 102626, 1846 202013, and DAP

The main challenges faced by the farmer were found to be insufficient storage facilities for the storage of the produce as well as lack of transportation for taking the produce to the field as well as from the field to the market. There was also a problem in hiring farm labour, the farmer thinks that the labour rate is too high. The other challenges faced by farmers are the non-availability of loans from banks as the loan is not offered by the bank to the farmers when needed. As a solution, it was suggested to create common storage.

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

Indicator No. <sup>11</sup>	Indicator	Measurement technique and data source	Progress at CM Round VIII	
5	Number of farmersThe data on the number of farmers reached with assets or servicesfarmers reached with 		<ol> <li>Total number of registrations till 30<sup>th</sup> September 2022 was reported to be 6,13,568 (<i>Male</i> = 477612 and <i>Female</i> = 135956) Female Participation = 22%</li> <li>Total Number of farmers reached with Assets = 869118 (<i>Male</i> = 614572 and Female = 254546) Female participation = 29%</li> </ol>	
		1. The data on individual grant beneficiaries has been taken from DBT portal.	Total Disbursement = 336077	
		<ol> <li>The data of beneficiaries of FFS has been taken from FFS application.</li> </ol>	Total number of FFS participants to date are 254546 (28409 female farmers and 226137 male farmers)	
			Female participation = 11%	
			Total number of guest and host farmers are 249191 and 8355 respectively	
7	Area	The data of area with new or	Area provided with	
	provided with	Improved irrigation services and drainage services through	1. With water pumps only = 22279 Ha	
new/im d irrigat or drain service	new/improve	individual activities under the	2. With only pipes is = 18883 Ha	
	or drainage	project have been taken from DBT portal report. The data on	3. Sprinkler area =145468.6 Ha	
	services (in ha)	community-level new/improved	4. Drip area = 131293.8Ha	
	-,	from Project Specialists of the project districts.	5. Area under drip for Horticulture- 26030.51 Ha.	
		Total area under Irrigation	Total Drip area = 157324.31	
		Projects= IP (Irrigation Project)1*Area under irrigation project+ IP (Irrigation Project)2*Area under irrigation	(which includes 131293.8 Ha of individual drip + 26030.51 Ha of drip under horticulture plantation)	
		project+ IP (Irrigation Project) <sup>n</sup> *Area under irrigation project	Total Area = 343954.91 Ha	
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	28411.06 (1000 <i>m3</i> )	

<sup>&</sup>lt;sup>11</sup> as per PoCRA Results Framework

Indicator No. <sup>11</sup>	Indicator	Measurement technique and data source	Progress at CM Round VIII
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	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	A total of 1000 FPCs are supported through PoCRA in the Marathwada region until 30 <sup>th</sup> 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.
profits	profits	supported FPCs this indicator was to be calculated	Also, 15 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 implemente d / under implementati on	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 till 30<sup>th</sup> September 2022. This would help to understand the current implementation status of the project and draw insights from the same.

#### Registrations

The total number of registrations done for the activities under the project was 614669. The District of Aurangabad was leading in terms of registrations which accounted for 19% of total registrations for the activities followed by Jalna (18%). The district with the least registration was Hingoli with only 6.89% of total registrations. The total registrations done by the women for activities accounted for 22%. Aurangabad leads the other district where the percentage of activities registration by women is more (21%) which is followed by Jalna (20%). The smaller number of women registrations was found to be in the district of Hingoli with only 6% of the total applications registered in Marathwada being women. This has been detailed in Table 7.1.

Districts	Total Registration	Female registration	District-wise total registration percentage
Aurangabad	119970	28979	19.52
Jalana	112785	26915	18.35
Beed	77217	15140	12.56
Osmanabad	69392	13227	11.29
Parbhani	60862	13209	9.90
Nanded	67476	16769	10.98
Latur	64604	13537	10.51
Hingoli	42363	8229	6.89
Total	614669	136005	22.12

Table	7.1	District-wise	Registrations
-------	-----	---------------	---------------

#### Applications

The total number of applications done for the activities under the project till 30<sup>th</sup> September 2022 was 2024559. Jalna was the leading in terms of application which accounted for 24% of total applications for the activities followed by Aurangabad (22%). The district with the least applications was Hingoli with only 7 % of total applications. However, Latur had the highest percentage increase of application (3%) in the current monitoring round when compared to other Marathwada districts. The total number of applications done by women for activities accounted for 19%. This has been detailed in Table 7.2.

Table 7.2 District-wise Increase in Applications over 6 Months

Districts	No. of ap	District-wise percentage increase of applications over six months	
	CM-VII	CM-VIII	(%)
Jalna	476774	483373	1.4
Aurangabad	445277	454143	2.0
Beed	252125	257967	2.3
Osmanabad	194198	198482	2.2
Parbhani	182995	187765	2.6
Latur	153237	157839	3.0
Nanded	145722	148495	1.9
Hingoli	134606	136495	1.4
	1984934	2024559	2.0



Figure 7.1 District-wise Percentage Increase in Applications over 6 Months

#### **Activity Wise Applications**

It was observed that drip irrigation was the most applied technology among all the activities implemented under the project. The total applications for Drip irrigation account for 22.22% of the total applications. The second most popular activity was found to be Sprinkler irrigation (16.91%) followed by Horticulture (13.43%), and Pipes (6.91%). The least applied activity in individual activity was observed to be Planting material in Shade nets and Polyhouse was the least applied activity in the individual benefit list (0.39%). This has been detailed in Table 7.3.

Activity Group	Number of Applications	Percentage of Application
Drip Irrigation	411013	22.27
Sprinkler irrigation	312130	16.91
Horticulture and Plantation	247972	13.43
Pipes	128023	6.94
Farm Mechanisation	93201	5.05
Water Pumps	90180	4.89
Sericulture	84864	4.60
Saline and Sodic Soil	64257	3.48
Well	63427	3.44
Farm Pond (Individual)	61369	3.32
Seed Production	52211	2.83
Small Ruminants	52201	2.83
Shadenet	47748	2.59
Compost (Vermi/NADEP)	24797	1.34
FFS Host Farmer	19491	1.06
Back Yard Poultry	18426	1.00
Recharge of open wells	15513	0.84
Farm Pond Lining	13148	0.71
Apiculture	12730	0.69
Inland Fisheri	12252	0.66
Polyhouse/Poly Tunnel	8187	0.44

Table 7.3 Activity-wise Applications

Planting Material in Polyhouse/Shadenet	7175	0.39
Soil and Water Conservation Practices	3868	0.21
Others	1738	0.09
FPO	40	
Total	1845961	

Figure 7.2 Activity-wise Applications



### Progress in Agri-business Activities under POCRA

POCRA interventions have been able to bring change in farmers' behavior towards adapting CR technologies which have helped them in increasing their production as well as income. One can experience this fact, in terms of the number of proposals being put up by the farmers under various agri-business activities across the selected districts. Table 7.4 demonstrates the agri-business activity-wise number of proposals received and disbursed as of 2<sup>nd</sup> March 2023.

Type of Agri-Business Activity	No. of Proposals received	No. of Proposals Disbursed
СНС	3743	2216
Godown	1415	393
Other Business Activities	985	257
Post Harvest Activities	631	214

Table 7.4 Number of proposals received and disbursed under PoCRA

Source: MIS Data

A total of 6774 agri-business proposals have been received worth Rs. 132049/- lakhs, out of which 3080 projects have been disbursed.

### Agri-business Activity-wise Progress Update

#### 1. District-wise Progress in CHC

As per the MIS data, though Aurangabad received the highest number of applications under CHC intervention, the Nanded district was able to deliver the highest in terms of disbursement of proposals received. The figure below represents the % of CHC proposals disbursed district-wise.



It is evident from the figure that POCRA has been successful in creating demand for agri-business activities. However, the challenge lies in terms of speedy and timely disbursement of those proposals. Except for Nanded, the proposal disbursement rate lies below 45% for every district, indicating a need to develop a strategy to ensure faster disbursement of all the eligible proposals for improving the efficiency of the POCRA project.

#### 2. District-wise Progress in Godown

MIS data reveals that farmers have found the construction of warehouses to be the most appealing agribusiness activity, and accordingly, this activity has received a huge number of proposals across the selected districts.



Figure 7.4 District-wise Progress in Godown

Figure 7.4 reveals that more than 80% of the proposals for the construction of godown have been disbursed in 4 out of 8 Districts.

Source: MIS Data, Author's calculation

#### 3. Progress in Other Business Activities



Figure 7.5 Progress in Other Business Activities

Source: MIS Data, Author's calculations

It is evident from the figure that some districts are performing amazingly well in terms of disbursement of projects. However, in some districts the performance is just 55% or a little above, indicating the need to identify the factors responsible for such slower progress and thereby take corrective actions to increase the efficiency of the project and make it more sustainable.

#### 4. Group-wise Disbursement

Disbursement of proposals was found to be highest in the category of Farmers Group and SHGs from Aurangabad and FPCs from Jalana District.



#### Figure 7.5 District-wise Achievement in Farmers' Groups



#### Figure 7.6 District-wise Achievement in FPC





#### 5. Achievements in Post-harvest Activities

Figure 7.8 District-wise Progress in Post-harvest Activities

Progress in Post Harvest Activities (%)				
Aurangabad	76.85			
Beed	75.86			
Latur	70.00			
Nanded	66.67			
Jalna	64.71			
Osmanabad	64.29			
Hingoli	58.08			

More than 70% of the demand under Post Harvesting activities was met in Aurangabad, Beed, and Latur District. Followed by Nanded (67%), Jalna (65%), Osmanabad (64%), and Hingoli (58%).

# 8. Key Recommendations

#### Strengthening Institutional Capacity to Achieve Sustainability

Strengthening institutions and individuals through capacity-building activities is an important step towards achieving sustainability. Training sessions for VCRMCs especially the ones that are newly formed need to be conducted. This should be regularised by introducing and provisioning refresher training sessions. Also, the linkage of VCRMCs with block and district-level offices should be strengthened to improve their administrative capacity. FPCs and SHGs are another set of institutions that are supported by PoCRA and must be encouraged to participate in training related to agribusiness activities. The curriculum for all training should be dynamic to accommodate the changing needs of the project. Apart from strengthening institutions, the key project implementation staff should be provided refresher training from time to time.

#### Motivating and Empowering KTs

As female mobilisers at the village level, there is a need to motivate and educate Krushi Tais (KTs) on important components and initiatives of the project, especially those which are related to women empowerment. To keep them motivated in carrying out their roles and responsibilities efficiently, the delay in payments of remuneration should be addressed. They should also be given an appreciation letter for their outstanding work.

#### Building Capacities of Beneficiary Farmers

Technical project staff like ASs, AAs, and CAs (to some extent), and trained KTs should be involved in training farmers in the accurate use of CRATs, especially micro-irrigation systems. There is a need to focus more on exposure visits and social relationship-building across communities for demonstrating the effects of climate-resilient agriculture technologies. This will help in increasing the adaptation of such technologies in the farming community. The farmers need to be further trained in following the weather advisory, along with other advisories from different sources like market price information, etc. which can help them in better planning their cultivation activities.

#### Need for Introducing a Waste Disposal System

PoCRA has provided the farmers with shade nets, polyhouse, PVC pipes, etc. which has significantly increased the use of plastic materials. It is estimated that in a single village like Tapovan, 6-10 tons of plastic waste are generated every year. If we add the PVC pipes used in drip and sprinkler irrigation as well as in the motor pump, the quantity will increase further. A poly house film or shade net is expected to last for at least three years and drip laterals for nearly five years. Hence, a life cycle assessment (LCA) of plastics that are in use, including those which are used for lining farm ponds and mulching should be undertaken<sup>12</sup>. While adopting protected cultivation as a tool for climate resilience, it is recommended that a waste disposal mechanism should be developed such as monthly collection of plastic waste and sending it for recycling. There are small-scale industries involved in the collection, sorting, and re-use of plastics in Maharashtra. The PoCRA project can collaborate with them for the reuse of plastic waste generated through the project. A mechanism shall be developed for collecting small charges from the farmers who are using plastics for safe disposal which can be given as an incentive to the small industries involved in the collection and re-use of the plastics. The project staff also reported that they observe willingness amongst the farmers for adopting and using the waste plastic or torn shade net as shade / thatching material for vermicompost and NADEP unit for farm waste management in their respective villages which needs to be encouraged.

#### Awareness and Education on Safe Use of Pesticides

It is observed that farmers and farm workers do not use of protective cover during pesticide application. They did not cover their faces, not use hand gloves or indulge in proper hand washing during and after pesticide application. It is recommended that the use of pesticides should be pragmatic, and all activities concerning pesticides should be based on scientific judgement and not on commercial considerations. The PoCRA team should develop health education packages based on knowledge, aptitude, and practices and disseminate them

<sup>&</sup>lt;sup>12</sup> A recent report by FAO has done an assessment of agricultural plastics and their sustainability with a call for action. (FAO, 2021; https://www.fao.org/3/cb7856en/cb7856en.pdf)

within the farming community to minimise human exposure to pesticides. The use of biopesticides should also be encouraged over chemical pesticides.

Taking Note of the Positive Spillover Effect of PoCRA's Success: POCRA's success can be assessed from the fact that improvement in productivity from shade-net intervention has generated demand from the farmers in the non-project areas for this intervention. For instance, in Tapovan and Tupewari villages, some of the non-beneficiaries have installed shade-nets houses at their expense by using the local low-cost materials, resulting in the number of users of shade-net houses being much higher than that of the official record (to be nearly 15 percent). Accordingly, there is a need to devise a strategy to cater to the demand for expanding shade-net intervention in the non-project areas. Convergence or collaboration with other government programs could be the way forward.

# Annexure 1: List of Sample Project and Comparison Villages

District	Subdivision	Taluka	Village Code	Village	Project/ Comparison
Aurangabad	Sillod	Sillod	548650	Bhawan/ Warud Bk	Project
Aurangabad	Vaijapur	Gangapur	549292	Shekta	Project
Aurangabad	Sillod	Sillod	548634	Asadi	Project
Aurangabad	Aurangabad	Paithan	549523	Khadgaon	Project
Aurangabad	Vaijapur	Khuldabad	548950	Verul	Project
Jalna	Jalna	Jafferbad	547421	Dhondkheda	Project
Jalna	Jalna	Jafferbad	547519	Niwdunga	Project
Jalna	Partur	Partur	548064	Sirasgaon	Project
Jalna	Partur	Mantha	548209	Kendhali	Project
Parbhani	Parbhani	Parbhani	546712	Pingli Kothala	Project
Parbhani	Parbhani	Jintur	546568	Belura	Project
Bid	Bid	Ashti	558789	Kerul	Project
Bid	Bid	Ashti	558853	Hanumantgaon	Project
Hingoli	Hingoli	Basnath	546383	Bagdad	Project
Nanded	Kinwat	Kinwat	544284	Shaniwarpeth	Project
Nanded	Kinwat	Bhokar	544877	Nanda Patti Mhaisa	Project
Nanded	Nanded	Nanded	544701	Borgaon Telang	Project
Osmanabad	Osmanabad	Osmanabad	561490	Gaundgaon	Project
Osmanabad	Osmanabad	Tuljapur	561538	Kakramba	Project
Osmanabad	Osmanabad	Osmanabad	561404	Kond	Project
Osmanabad	Osmanabad	Osmanabad	561454	Bhanasgaon	Project
Latur	Latur	Latur	560169	Sikandarpur	Project
Latur	Latur	Nilanga	560740	Hanmantwadi	Project
Latur	Latur	Ausa	560712	Nandurga	Project
Latur	Latur	Ausa	560694	Ashiv (LODGE)	Project
Jalna	Jalna	Jalana	547614	Sevali	NRM - Project
Parbhani	Parbhani	Sailu	546475	Bhangapur	NRM - Project
Hingoli	Hingoli	Sengoan	545791	Mazod	NRM - Project
Beed	Bid	Ashti Beed	559661	Bhojewadi	NRM - Project
Osmanabad	Bhum	Washi	561273	Bavi	NRM - Project
Jalna	Partur	Ambad	547782	Nagonyachiwadi	NRM - Comparison
Parbhani	Parbhani	Sonpeth	546975	Karam	NRM - Comparison
Hingoli	Hingoli	Sengoan	545804	Kolsa	NRM - Comparison
Bid	Manjlegaon	Georai	559145	Khopati	NRM - Comparison
Osmanabad	Osmanabad	Lohara	561670	Bhosga	NRM - Comparison
Aurangabad	Aurangabad	Aurangabad	548814	Fattepur	Comparison
Aurangabad	Sillod	Soegoan	548463	Mohalai	Comparison
Aurangabad	Vaijapur	Vaijapur	549102	Vaijapur Rural 2	Comparison
Jalna	Partur	Partur	548017	Watur	Comparison
Bid	Ambejogai	Kaij	559805	Bhalgaon	Comparison
Nanded	Kinwat	Kinwat	544259	Navakheda	Comparison
Nanded	Deglur	Mukhed	545563	Tagyal	Comparison
Osmanabad	Osmanabad	Tuljapur	561505	Khuttewadi	Comparison
Latur	Latur	Ausa	560620	Almala	Comparison
Latur	Latur	Ausa	560689	Tavshi Tad	Comparison

# Annexure 2: List of Stakeholders Interviewed

### List of Agriculture Assistants interviewed

District	Subdivision	Taluka	Village Code	Village
Aurangabad	Sillod	Sillod	548650	Bhawan
Aurangabad	Vaijapur	Gangapur	549292	Shekta
Aurangabad	Sillod	Sillod	548634	Asadi
Aurangabad	Aurangabad	Paithan	549523	Khadgaon
Aurangabad	Vaijapur	Khuldabad	548950	Verul
Jalna	Jalna	Jafferbad	547421	Dhondkheda
Jalna	Jalna	Jalana	547614	Sevali
Jalna	Jalna	Jafferbad	547519	Niwdunga
Jalna	Partur	Partur	548064	Sirasgaon
Parbhani	Parbhani	Sailu	546475	Bhangapur
Parbhani	Parbhani	Parbhani	546712	Pingli Kothala
Hingoli	Hingoli	Basnath	546383	Bagdad
Nanded	Kinwat	Bhokar	544877	Nanda Patti Mhaisa
Nanded	Nanded	Nanded	544701	Borgaon Telang
Osmanabad	Osmanabad	Osmanabad	561490	Gaundgaon
Osmanabad	Osmanabad	Tuljapur	561538	Kakramba
Osmanabad	Bhum	Washi	561273	Bavi
Osmanabad	Osmanabad	Osmanabad	561404	Kond
Osmanabad	Osmanabad	Osmanabad	561454	Bhanasgaon
Latur	Latur	Nilanga	560740	Hanmantwadi
Latur	Latur	Ausa	560712	Nandurga
Latur	Latur	Ausa	560694	Ashiv

### List Cluster Assistants Interviewed

District	Subdivision	Taluka	Village Code	Village
Aurangabad	Sillod	Sillod	548650	Bhawan/ Warud BK
Aurangabad	Vaijapur	Gangapur	549292	Shekta
Aurangabad	Sillod	Sillod	548634	Asadi
Aurangabad	Aurangabad	Paithan	549523	Khadgaon
Aurangabad	Vaijapur	Khuldabad	548950	Verul
Jalna	Jalna	Jafferbad	547421	Dhondkheda
Jalna	Jalna	Jalana	547614	Sevali
Jalna	Jalna	Jafferbad	547519	Niwdunga
Jalna	Partur	Partur	548064	Sirasgaon
Parbhani	Parbhani	Sailu	546475	Bhangapur
Jalna	Partur	Mantha	548209	Kendhali
Parbhani	Parbhani	Parbhani	546712	Pingli kothala
Parbhani	Parbhani	Jintur	546568	Belura
Bid	Bid	Ashti	558853	Hanumantgaon
Hingoli	Hingoli	Sengoan	545791	Mazod
Hingoli	Hingoli	Basnath	546383	Bagdad
Beed	Bid	Ashti Beed	559661	Bhojewadi
Nanded	Kinwat	Bhokar	544877	Nanda Patti Mhaisa
Nanded	Nanded	Nanded	544701	Borgaon Telang

Osmanabad	Osmanabad	Osmanabad	561490	Gaundgaon
Osmanabad	Osmanabad	Tuljapur	561538	Kakramba
Osmanabad	Bhum	Washi	561273	Bavi
Osmanabad	Osmanabad	Osmanabad	561404	Kond
Osmanabad	Osmanabad	Osmanabad	561454	Bhanasgaon
Latur	Latur	Latur	560169	Sikandarpur
Latur	Latur	Nilanga	560740	Hanmantwadi
Latur	Latur	Ausa	560712	Nandurga
Latur	Latur	Ausa	560694	Ashiv

### List of Agricultural Supervisors Interviewed

District	Sub Division	Taluka	Village Code	Village
Aurangabad	Sillod	Sillod	548650	Bhawan/ Warud BK
Aurangabad	Vaijapur	Gangapur	549292	Shekta
Aurangabad	Aurangabad	Paithan	549523	Khadgaon
Aurangabad	Vaijapur	Khuldabad	548950	Verul
Jalna	Jalna	Bhokhardan	547421	Kosgaon
Jalna	Jalna	Jalana	547614	Sevali
Parbhani	Parbhani	Parbhani	546712	Pingli Kothala
Hingoli	Hingoli	Basnath	546383	Bagdad
Nanded	Kinwat	Bhokar	544877	Nanda Patti Mhaisa
Nanded	Nanded	Nanded	544701	Borgaon Telang
Osmanabad	Osmanabad	Osmanabad	561490	Gaundgaon
Osmanabad	Osmanabad	Osmanabad	561454	Bhanasgaon
Latur	Latur	Ausa	560694	Lodge

### List of Krishi Tai Interviewed

District	Subdivision	Taluka	Village Code	Village
Aurangabad	Vaijapur	Gangapur	549292	Shekta
Aurangabad	Aurangabad	Paithan	549523	Khadgaon
Jalna	Jalna	Jafferbad	547421	Dhondkheda
Bid	Bid	Ashti	558853	Hanumantgaon
Hingoli	Hingoli	Sengoan	545791	Mazod
Hingoli	Hingoli	Basnath	546383	Bagdad
Nanded	Kinwat	Kinwat	544284	Shaniwarpeth
Nanded	Kinwat	Bhokar	544877	Nanda Patti Mhaisa
Nanded	Nanded	Nanded	544701	Borgaon Telang
Osmanabad	Osmanabad	Osmanabad	561490	Gaundgaon
Osmanabad	Osmanabad	Osmanabad	561404	Kond
Latur	Latur	Latur	560169	Sikandarpur
Latur	Latur	Ausa	560694	Ashiv

#### List of FFS Facilitators Interviewed

District	Subdivision	Taluka	Village Code	Village
Aurangabad	Vaijapur	Gangapur	549292	Shekta
Aurangabad	Sillod	Sillod	548634	Asadi
Jalna	Jalna	Jafferbad	547421	Dhondkheda
Jalna	Jalna	Jafferbad	547519	Niwdunga
Jalna	Partur	Partur	548064	Sirasgaon
Bid	Bid	Ashti	558789	Kerul
Nanded	Kinwat	Kinwat	544284	Shaniwarpeth
Osmanabad	Osmanabad	Osmanabad	561454	Bhanasgaon
Latur	Latur	Latur	560169	Sikandarpur
Latur	Latur	Ausa	560712	Nandurga

#### List of FPC Representatives Interviewed

Name of FPC	Village
Adikant Agro FPC	Beed
Varad Vinayak FPC	Osmanabad
Deshmukh FPC	Nanded
Rayatecha Raja FPC	Hingoli
Alok Sanjeevani FPC	Latur
Appa Swamy FPC	Hingoli
Jadai Devi Agro FPC	Jalna
Dattprayag Gat	Parbhani
Bankatswami Agro FPC	Beed
Aaradhyapur FPC	Nanded
Akash Agro FPC	Aurangabad
Dhansanchay Agro FPC	Parbhani
Muktai Agrotech FPC	Jalna
Gangagiri FPC	Aurangabad
Malojiraje FPC	Aurangabad
Krantijyoti FPC	Beed

#### List Of TAO Interviewed

District	Subdivision	Taluka
Aurangabad	Aurangabad	Paithan
Jalna	Jalna	Jafferbad
Parbhani	Parbhani	Sailu
Bid	Bid	Ashti
Hingoli	Hingoli	Basnath
Nanded	Nanded	Nanded
Osmanabad	Osmanabad	Osmanabad
Osmanabad	Osmanabad	Osmanabad

### List of Project Specialists Interviewed

District
Aurangabad
Beed
Latur

# Annexure 3: Verification of Agribusiness Assets

SN	District	Village	FPC Name	Remark	Photo
1	Aurangabad	Panvi	Gangagiri farmer producer Company	Equipment was in good condition and presently in use. Date: 25/12/22	
				Time: 17:46	An 11 Star 17 Adv Dovrst 1, 4 3 Adv House Adm Walke Adm Unamed Rais Priva Bit Makendra (2) 17
				Lat: 19.78719	
				Long: 74.84765	
2	Beed	Udandwag hgaon	Adikant Agro Farmer producer Company	Seeds processing unit was newly installed and in operational condition.	
				Date: 24/12/22	The second s
				Time: 11:05	
				Lat: 18.95993	Sk nako nek
				Long: 75.74052	

3	Latur	Bokangoan	Jay Farm	Hanuman er Group	CHC shed was well maintained and operational Date: 19/12/22 Time: 13:24 Lat: 18.29924 Long: 76.71712	
					/6./1/12	Sent-Com Norse 2012 19 2002 12 22 13 20024 76 71 71 2 Unnamed Road, Maharashtra 41 3544

SN	District	Village	FPC Name	Remark	Photo
4	Nanded	Khairgaon	Aradhyapur Farmer Producer	Equipments were found in good condition and operational Date: 18/12/22 Time: 14:33 Lat: 19.21794 Long: 77.42768	
5	Latur	Murud Akola	Alok Sanjivani Farmer producer company	Godown was in good condition and operational Date: 17/12/22 Time: 11:20 Lat: 18.39574 Long: 76.40875	

SN	District	Village	FPC Name	Remark	Photo
6	Osmanabad	Singoli	Varad Vinayak Farmer Producer Company	Dal mill was in good condition and operational Date: 16/12/22 Time: 10:56 Lat: 18.23399 Long: 76.03724	
7	Osmanabad	Kawadewa adi	Ajinkya Agro Producer Company	Godown was in good operational condition Date: 14/12/22 Time: 12:39 Lat: 18.54638 Long: 75.78095	eren erendeterererererererererererererererererere
8	Parbhani	Rahati	Dhansanchay Agro Producer Company	CHC Equipments in good operational condition Date: 15/12/22 Time: 15:00 Lat: 19.29767 Long: 76.96082	

SN	District	Village	FPC Name	Remark	Photo
9	Jalna	Papal	Muktai Agrotech Producer Company	Equipment was available in the CHC shed and was in good operational condition Latitude and Longitude could not be captured due to network	
10	Auranagabad	Sillod	Akassh Farmer Producer Company	Grain processing was in good operational condition Latitude and Longitude could not be captured due to network	

# Annexure 4: Field Visit Notes of Team Leader and M&E Expert

#### 1. Objective of the Field Visit

The Team Leader and M&E expert visited Aurangabad, Jalna, and Beed districts as part of the CM-VIII round from 17<sup>th</sup> January 2023 to 19<sup>th</sup> January 2023. The purpose of the visit was manifold, and is explained below:

- Assessment of CHC
- Support to the logistic part of the value chain refer van
- Disposal of waste, plastic, pesticides bottles/tin, shade net, mulch plastic by Shadenet, Polyhouse, and other structures
- Change in the socio-economic status of PoCRA beneficiaries
- Coping with climate change or weather shocks like poor rainfall or heavy rainfall)
- Livelihood enhancement from project-supported SHG & FPCs, whether there is any change observed in the migration pattern which was during the pre-covid period)

#### 2. Key Observations from the Field

- 1. As VCRMCs are dissolved in many villages after the Gram Panchayat (GP) election, VCRMC representatives could not be met. The major observations from the field are listed below: The income generation activities which the farmers were doing earlier (like seed production) were multiplied manifold due to PoCRA.
- 2. There has been a significant change in the living standard of farmers since the PoCRA has been implemented.
- 3. Agri-entrepreneurs and FPCs though have started doing business, however, they need clarity on business planning and improving their businesses. They also need hand-holding support, otherwise, they may not survive in the long run, owing to competition from commercial ventures.
- 4. The farmers are witnessing the effect of climate change on their crop productivity and reported a 10%-15% reduction in crop productivity due to changes in the weather pattern.
- 5. There are no clear guidelines or directions for farmers on the safe disposal of plastic products and insecticides/pesticide bottles.
- 6. Farmers are not taking proper care and management during the application of insecticides/ pesticides which may have long-term irreversible effects on their health.

#### 3. Visit to FPC - Adikant Seeds Agro Producer Company, Udandwadgaon, Beed

With the help of Taluka officials, Shri Nandlal Chavan established a Farmer Producing Company (FPC). Initially, his FPC used to provide inputs, buy, and sell farmers' produce. However, six months ago his FPC also purchased Refrigerated Van and started carrying vegetables and flowers to Pune. The Refrigerated Van capacity is 2 ton/trip, and the mileage with AC on is 8 km/litre. The driver's salary is Rs.10,000/- plus allowance. The introduction of Refrigerated Vans has helped farmers in getting a higher price for their produce. For instance, he shared that while in the local market, Shimla Mirch (Capsicum) is sold at Rs.25-28/- per Kg, whereas, in the Pune market, it is sold at Rs.40-Rd.45/- per Kg if carried by Ref Van. The Ref van capacity is 2 ton/trip, and the mileage with AC on is 8 km/litre. Both ways travel to Pune is 280 km. He purchased a Refrigerated van for Rs.15.0 lakhs and the project provided a subsidy of Rs.9.0 lakh. The driver's salary is Rs.10,000/- plus allowance. He further informed that he has also established a dal and Masala mill which is yet to be operational. He is planning to sell the Adikant Masala in the local market.

#### 4. Visit to Onion Farmers in Pishor, Kannad Taluka, Aurangabad

Shri Sunil and other farmers have taken mulching and drip irrigation support from the POCRA project. He purchased mulching materials @Rs.1400/- per bundle (25 microns). Mr. Vijay has purchased a 30-micron mulching sheet @Rs.2000/- per roll. He shared that five rolls are sufficient for 1 acre. Presently, he is cultivating and marketing Onion seeds. He purchased the Onion bulbs @Rs.28,000/- for a 1-acre seed farm. He further spent Rs.10,000/- in fertiliser, Rs.15,000/- in biofertiliser, and another Rs.5000/- in micro-nutrients (boron, calcium, etc.). He has spent around Rs.30,000/- in drip irrigation. He further spends around Rs.10000/- in labour for sowing and harvesting.. He informed that Mulching has helped him in increasing his income as last year he was able to sell Onion seeds worth Rs.1.5 lakh, with an estimated profit of around Rs.70,000-Rs.80,000/-.

#### 5. Insights from Sarpanch and Farmers in Tupewadi

**Change in Cropping Pattern:** Shri Bhagwan Vishnu Kadam is Sarpanch of Tupewadi. He along with two farmers, namely Shri Ragunath Eknath More and Shri Bhaskar Uttam Thakre discussed the changes brought by PoCRA Intervention.

Shri Kadam informed that all 577 households have benefitted from POCRA interventions. There are five farmers' groups and one CHC in the village. He shared that the village has witnessed a change in cropping pattern as earlier the farmers used to cultivate only Jowar, Bajra, Wheat, and Cotton. However, with the introduction of provision for Shadenets under POCRA, the farmers have started seed cultivation also for tomato, chilly, and watermelon. Currently, they have tie-up with all the big companies like Syngenta, Bayer, East & West, etc.

**Positive behaviour change:** Shri Kadam shared that each shade net of 10 Guntha costs about Rs.4.7 lakhs, out of which 75% is a subsidy provided by the project. From each 10 Guntha they get 10-15 kgs per harvesting and roughly 1 quintal seed production per 10 Guntha land. They get a rate of Rs.8000/- per Kg for tomato seeds, and a similar process for chilly and watermelon. Some of the farmers shared that after being impressed by its success, the farmers who were not able to get the subsidy found an innovative way of constructing bamboo shade net, where they use bamboo poles instead of metal poles. The cover sheet is also of lower quality, but it stays for a year. The cost of such shade net comes to around Rs.70,000-Rs.80,000/-

*Impact of Climate Change:* On asking about the effect of climate change, the Sarpanch shared that due to climate change, the villagers have developed some skin allergies/ diseases. Also, as a result of climate change, disruptions in rainfall have increased and also the temperatures remain high than they used to be. Both these changes have resulted in a decline in crop productivity by around 10%-15%, as reported by farmers. The village has a CHC. The rate of hiring a tractor with a plough is Rs.2000/acre while a tractor with Rotavator is Rs.1500/- acre.

*Improvement in living standards:* On enquiring about the change in living standard, the Sarpanch shared that the village has experienced an enhancement in the living standard of people. This can be seen from the fact that almost 7-8 years ago hardly there was a motorbike in the village. Now, almost all households have bike/scooter, TV, and pucca houses. Further, the village now also has around 20-25 four-wheelers.

ltem	Before PoCRA	After PoCRA implementation
Tractor	10	35
2-Wheeler	50	500
Car/Jeep	0	20
Pick-up Van	0	5

Table 2: Change in Living Standards of Residents in Tupevadi Village

#### 6. Insights from Discussion with District Agriculture Officer, Beed on Benefits from PoCRA

Shri Babasaheb Jejurkar is the District Agriculture Officer of Beed. Discussion with him and his team on the unique feature of PoCRA, reveals that in PoCRA the farmers can get apply and get multiple benefits, like drip irrigation with horticulture, or a pond with a water pump. Whereas, in other government schemes the farmers can get only one benefit at a time. Another difference he shared is that the fund disbursal mechanism in PoCRA is comparatively faster than other government schemes. He further informed that minor irrigation, horticulture, and FPCs were in MIDH also, and sericulture is new activity in PoCRA. As such, there is no change in subsidy pattern, however, due to comparatively faster disbursal on time, PoCRA is popular among the farmers.

ltem	Subsidy in Other Govt Schemes (%)	Subsidy in PoCRA (%)
Shadenet for marginal and small farmers	75	75
Shadenet for medium farmers	65	65
Drip Irrigation for marginal and small farmers	80	80
Drip Irrigation for marginal and small farmers	75	75
Horticulture	100	100

Table 3: Subsidy pattern in PoCRA and other Government Schemes

#### 7. Need for Developing Waste Disposal Mechanism

PoCRA has provided the farmers with shade net, polyhouse, PVC pipes, etc. which have significantly increased the use of plastic materials. For example, in Tapovan villages, 197 shade nets, 5 polyhouse, and 15 farmers with PVC pipes have been provided to the farmers by the project. While interacting with the farmers, it was learned that in each shade net and polyhouse, 4-5 bundles of plastic mulch (30 kgs per bundle) are being used which are usually replaced after each crop, sometimes 2-3 times a year. Therefore, it is estimated that in a single village like Tapovan, 6-10 tons of plastic waste are generated each year. If we add the PVC pipes used in drip and sprinkler irrigation as well as in the motor pump, the quantity will increase further.

Unfortunately, there is no waste disposal mechanism found in the area. The farmers normally dispose of them in and around the village. Therefore, it is recommended that the PoCRA should develop and implement a strategy for the collection and safe disposal of plastic waste being generated through its interventions. According to PlastIndia Foundation<sup>1</sup>, the apex body of associations, organisations, and institutions connected with plastics and the plastic industry, 5.5 million metric tonnes (MMT) of plastic gets recycled yearly in India. This is about 60 percent of the total plastic waste that is generated in the country.

There are small-scale industries involved in the collection, sorting, and re-use of plastics in Maharashtra. The PoCRA project can develop collaboration with them for the reuse of plastic waste generated through the project. A mechanism shall be developed for collecting small charges from the farmers who are using plastics for safe disposal which can be given as an incentive to the small industries involved in the collection and re-use of the plastics. Normally, these industries collect, sort, and shred waste plastics. These shredded materials are melted and often extruded into the form of pellets which are then used to manufacture other products. These recycled plastics are also used in road construction.

#### 8. Keeping a Check on the Use of Pesticides in PoCRA Villages

Although pesticides are beneficial for crop production, extensive use of pesticides can possess serious consequences because of their persistent nature. Diverse pesticides directly or indirectly pollute the environment and cause serious health hazards for living being. In other words, if the credits of pesticides include increased food production, then their debts have resulted in serious health implications for humans and the environment.

Pesticides can contaminate soil, water, and vegetation. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds, fish, beneficial insects, and non-target plants. Pesticides can reach surface water through runoff from treated plants and soil.

During the field investigation, it is estimated that in each shade net, there is almost alternate day application of pesticides worth Rs.1000-Rs.1500. The pesticides are used aerial (through spray) as well in water (through drip irrigation). Pesticides are also being used indiscriminately in the open field in PoCRA where commercial crops (Cotton, vegetables, etc.) are being grown.

Though the PoCRA field team informed that they conducted orientation and training on the safe use of pesticides, these were not being followed. Almost in all the fields, the M & E agency found no use of protective cover during pesticide application. The workers did not cover their faces, not use hand gloves or proper handwash during and after pesticide application. Upon inquiry, they either faint ignorance of the harmful effect or tried to bypass the question by stating that they haven't come across any harmful effect. The high-risk groups exposed to pesticides include farmers and farm workers.

The M & E team is of the view that it is imperative to use pesticides to increase production and reduce crop loss due to insect pests and diseases, and it would be expedient to accept a reasonable degree of risk. However, the PoCRA approach to the use of pesticides should be pragmatic. All activities concerning pesticides should be based on scientific judgment and not on commercial considerations.

The PoCRA team should develop health education packages based on knowledge, aptitude, and practices and disseminate them within the farming community to minimize human exposure to pesticides. The use of biopesticides should also be encouraged over chemical pesticides.

# Annexure 5: Field Visit Notes of Agronomy Expert

#### 1. Introduction

After considering the soil type, available resources, climatic situations, and prevailing management issues in the selected districts, the following Climate Resilient (CR) Technologies were implemented (with different intensities) in the 6 selected villages::

- i. BBF technology (in the case of Soybean in deep and light soil)
- 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

#### 2. Scope of the Visit

For assessing the impact/constraints of any of the above CR technologies, the following points were discussed with the beneficiaries and collected the relevant information from them. While implementing the above-listed ten technologies in the field, the farmers faced various challenges against the climatic variables which influenced the crop performance and crop yield significantly. The Table below captures the insights from the discussions held with the beneficiaries.:

S.No	Scope	Insights from Beneficiaries
1	Adoption of CR technologies	The farmers have adopted various CR Technologies (described in detail )
2	Agronomic benefits gained by the farmers	The farmers have got benefits in terms of an increase in crop yield and net income. (described in detail)
3	Whether farmers experienced the impact	Yes, the impact of each CT technology is very much visible at the field level. (described in detail)
4	Whether yield increased because of the adoption of CR technologies	Yes, (described in detail )
5	Improved climate change adaptation and coping mechanism	Adopted the mechanism based on the scenarios which are location specific (details are given in each CR technology).
6	Positive behavioural changes in Agricultural Practices	It was observed that the beneficiaries have tended to take up advanced and well- established agricultural practices to increase overall income (details are given in each CR technology).
7	Resilience to absorb climate shock	Yes, they are well aware to go forward under adverse climatic environments, if severe crop damages take place while adopting new technologies. (Details are given in each CR technology).

Table 4: Insights from discussion with beneficiaries

#### 3. Insights from the Field Visit

**3.1 Demonstration of BBF Technology:** Due to the erratic distribution of rainfall with high intensity and long dry spell during crop growing period, the standing crops is being severely affected every year. However, the magnitude of crop damage occurs during high-intensity of rainfall in heavy black Cotton soils and long dry spell periods in light soil. Considering such severe weather changes phenomena particularly rainfall,

the BBF technology in Soybean was demonstrated in eight districts of the Marathwada region of Maharashtra in deep black Cotton soil, medium black Cotton, and shallow soils.

Sr	Name of District	Deep black soil	Medium deep black	Shallow black soil
no.	(Marathwada region)	(% of total geographical area)	soil (% of total geographical area)	(% of total geographical area)
1	Aurangabad	19.91	20.78	59.30
2	Beed	29.53	11.62	58.85
3	Hingoli*	36.34	7.95	55.7
4	Jalna	13.37	21.36	65.27
5	Latur	35.70	14.89	49.41
6	Nanded*	36.81	9.43	53.75
7	Osmanabad	23.14	10.72	66.14
8	Parbhani*	53.79	4.27	41.94

#### Table 5: The distribution of soils in eight districts

\*Visited those districts for data collection and assessment of the impact of CR Technology

Table 6: Rainfall pattern of Parbhani, Nanded, and Hingoli for the period from June 2022 to January 2023

Weekly rainfall (mm)				
Date	Hingoli	Nanded	Parbhani	
25.5.2022	1.8 (-87)	2.529)	0(-99)	
2.6.2022	0.6(-97)	0(-100)	0.8(-95)	
9.6.2022	23.8(-45)	32.8(-7)	60.1(61)	
16.6.2022	34.5(-39)	49.1(14)	46.6(21)	
23.6.2022	26.7(-40)	50.7(6)	78.1(101)	
30.6.2022	35.4(-24)	96.6(135)	40(5)	
7.7.2022	175.4(240)	321.9(501)	169.4(299)	
14.7.2022	108.4(127)	148.6(213)	74(82)	
21.7.2022	35.8(-36)	106.7(69)	39(-21)	
28.7.2022	24.0(-51)	24.2(-59	28.8(-40)	
4.8.2022	72.2(18)	90.2(53)	46.8(6)	
11.8.2022	9.4(-79)	18(-64)	8.2(-78)	
18.8.2022	1.4(-97)	1.3(-97)	1.9(-96)	
25.8.2022	1(-98)	6.1(-88)	4.7(-92)	
1.9.2022	40.4(-5)	21.5(-53)	48.9(11)	
8.9.2022	38.6(45)	123.8(249)	73.8(95)	
15.9.2022	32.5(-11)	33.2(-13)	18.5(-60)	

Weekly rainfall (mm)				
Date	Hingoli	Nanded	Parbhani	
22.9.2022	8.8(-73)	25(-26)	14.2(-58)	
29.9.2022	4.8(-82)	8.1(-71)	16.0(-47)	
6.10.2022	NA	NA	NA	
13.10.2022	25.2(89)	30.7(99)	68.6(301)	
20.10.2022	7.0(-26)	3.3(-79)	10.7(-5)	
27.10.2022	0(-100)	0(-100)	0(-100)	
3.11.2022	0(-100)	0(-100)	0(-100)	
10.11.2022	0(-100)	0(-100)	0(-100)	
17.11.2022	0(-100)	0(-100)	0(-100)	
24.11.2022	0(-100)	0(-100)	0(-100)	
30.11.2022	0(-100)	0(-100)	0(-100)	
7.12.2022	0(-100)	0(-100)	0(-100)	
15.12.2022	0(-100)	0(-100)	0(-100)	
22.12.2022	0(-100)	0(-100)	0.2(-85)	
29.12.2022	0(-100)	0.4(-73)	0(-100)	
11.1.2023	0(-100)	0(-100)	0(-100)	
18.1.2023	0(-100)	0(-100)	0(-100)	
25.1.2023	0(-100)	0(-100)	0(-100)	

Note: Figures in brackets are % deviation from normal rainfall

#### 3.2 Insights from Nanded District

**Sayal village:** In the presence of the Sarpanch, Gram Panchayat (GP), and the farmers of the village discussions were held about the PoCRA project CT technologies, its benefits, and constraints faced by the farmers. They explained that the benefits accrued through this project are highly effective. They suggested further expansion on a large scale basis so that the maximum number of farmers will get the benefit. The village houses a total of 563 small and marginal beneficiaries. The CR technologies implemented under PoCRA in this village include drip irrigation (31 beneficiaries), FFS/BBF/Zero tillage (3 beneficiaries), horticulture (5 beneficiaries), pipes (3 beneficiaries), water pump (2 beneficiaries), and sprinkler (45 beneficiaries). Still, a lot of small and marginal farmers are waiting to receive the benefits from the PoCRA project, though they have already submitted all relevant documents to the agriculture department.

The major Kharif season crops of this village are Soybean (400 ha), Cotton (105 ha), urad (18 ha), Kharif Jowar (48 ha), and Rabi crops are Gram (500ha), Wheat (70 ha), Rabi Jowar (40 ha) and Rabi ground nut (40 ha). Turmeric, Sugarcane, and Summer Soybean (seed production) are also covering substantial areas due

to the creation of irrigation resources through lift irrigation of the Godavari River and the development of a secondary reservoir, open well, and borewell.

#### 3.2.1 Saving Cultivation Cost through BBF Technology:

**Case Study 1 – Soybean Cultivation:** During Kharif 2022, the maximum number of farmers cultivated Soybean crops (Phule Sangam i.e. KDS 726) under the BBF method. To assess the impact of BBF technology on Soybean crop, discussions were held with Shri Harjee Jairam Dhumal, a farmer cultivating Soybean through BBF technology. He cultivate Soybean in medium to heavy soil on a raised bed with a crop geometry of 45 cmx15 cm with three continuous crop rows followed by a 60 cm furrow for draining excess rainfall. During the crop growing period, he observed no stagnation of excess rainfall in the plot as rainwater was removed through furrow, and optimum soil moisture was maintained throughout the crop growing period. Further, he adopted best management practices like intercultural operation, weeding, 99 fertiliser spraying, and harvested about 11 q/acre seed yield. Further, only 14 Kg /acre seed was used in this BBF technology as compared to flat-bed methods of sowing (30 Kg/acre) and harvested 6-7 q/acre under normal planting technique. It is thus concluded that implementation of the BBF method has given an additional seed yield of 4-5 q/acre. Adoption of this BBF technology saved 16 Kg of seed material costs as well as 99 fertiliser costs.

Some farmers have retained the raised bed system in Rabi Bengal gram and Summer Soybean and these crops are being irrigated through the sprinkler irrigation system. Adopting BBF in these Rabi and Summer crops has saved the cost of field preparation and the creation of a raised bed with a field bund maker. The cost of deep plowing and preparation of BBF through tractors comes to about Rs 3400 per acre (Rs 1400 for ploughing and Rs 2000 for making raise bed). So, the farmers are saving significant expenditure against the total cost of cultivation even for Rabi crops. The spraying of pesticides on the field crop is also very easy and economical.

In light soil, one of the farmers of the same village harvested only 3-4 quintal/acre Soybean seed yield due to very high weeds in the field as continuous rainfall during the vegetative stage hampered intercultural operation. However, the maximum number of farmers have harvested good yields in light to medium soil also.

**Case Study 2 – Cotton Cultivation:** Cotton is also one of the important crops of this village. The same farmer took Cotton crops in a crop geometry of 1.50 m x 075 m. He used Bt Cotton hybrid Super Cot and imposed a recommended package of practices i.e. 4 bags of DAP, 5 spraying with costly pesticides instead of low-cost pesticides like Neem Seedextract, yellow stickers, pheromone traps, etc. By using such costly inputs with best management practice, he could harvest only 6-7 quintal/acre seed Cotton yield because of receipt of high rainfall during Kharif 2022, which damaged crop growth and reduced seed Cotton yield. Had he adopted the raise and bed system (BBF), he would have harvested good seed Cotton yield. However, under the normal rainfall year of Kharif 2021, the same farmer had harvested 10-11 quintal/acre seed Cotton yield with 1-2 supplemental irrigation after recedes of monsoon rainfall. Accordingly, in high rainfall areas, sowing Cotton under the raised bed system in deep black Cotton soil (heavy soil) is recommended. 36.84% of the total geographical area is categorized as heavy soil where internal drainage is poor and standing crop is badly affected. In other seasonal Kharif crops, the BBF method is also recommended to bring more area of deep black Cotton soil under cultivation where drainage is very poor.

**3.2.2 Benefits of Adapting Mulching:** One of the farmers Shri Hanoji, Shankarao Jamge has used plastic mulching in watermelon in this Rabi-Summer season in 4 acres area. This is his first year of the demonstration on mulching. By adopting this technique, he may save a significant amount of irrigation water. If a drip system is implemented in combination with mulching then weed growth and evaporation loss are controlled and finally, more watermelon yield may be achieved during the ensuing Rabi-Summer season. For the implementation of mulching in crops, he has received in-depth knowledge on mulching through technical experts from the Agriculture department/ agricultural university and FFS. It is now suggested that the plastic mulch activities may be extended on a large scale basis for Rabi and Summer crops as the water requirement is very high.

**3.2.3 Benefits of Adapting Sprinkler Systems:** In this village, a large number of farmers have received sprinkler systems. They use this system in Kharif and Rabi seasons, saving significant amounts of irrigation water and increasing crop yield as compared to flood irrigation.

*Case Study 1 -* Visited the field of Shri Harjee Jairam Dhamal , who has received sprinkler sets (30 pipes and 8 riser) by paying Rs 17,500, though the total cost was Rs 28,000. The rest of the amount was paid through the PoCRA project. During the Kharif season, he had grown Soybean under the BBF method on 5 acres of land and harvested 10.4 quintal/acre seed yield and now, he has sown Summer ground nut under sprinkler irrigation in 54 guntha (1.35 acres). In another field (1.35 acre), the same farmer has taken an intercrop of

coriander in flatbed and cucumber and ridge gourd on raised bed system. In the flatbed, he is irrigating through the sprinkler and after the harvest of coriander after 45 days, he will maintain ridge gourd and cucumber in the whole field and use drip system and earn maximum profit from intercrop farming.

**Case Study 2 -** Another farmer Shri Govind Mahadev Dhumal has also received a sprinkler irrigation system. Last year he had grown Summer ground nut (variety Vardhan western) under surface irrigation method by making a border strip of 4 ft width and also using sprinkler irrigation method. He harvested 7 quintals/acre yield from the border strip irrigation method and 10 quintals/acre under the sprinkler irrigation system. The pod yield in the latter irrigation system was 42.9 % higher, however, irrigation data was not available but the use of a sprinkler system in any seasonal crop has improved crop yield and irrigation water substantially. The total cost of cultivation for Summer ground nut was Rs 2,000 per acre (Ploughing including land preparation Rs 4,000, labour Rs 3,000, spraying Rs 3,000, Picking Rs 5,000, Fertiliser Rs 5,000), and the gross return comes to Rs 38,500/acre in border irrigation and Rs 55,000 in case of Sprinkler irrigation. It is highly essential to take observations on irrigation requirements under both methods for computing water saving as water requirement in the Summer season is very high. He informed only on the number of irrigations applied (six irrigation) in the surface method, operated 16 hrs for irrigating a one-acre area under the sprinkler irrigation system

**3.2.4 Benefits of Adapting Drip Irrigation:** In 1.35 acres of land, the same farmer has taken Turmeric under the drip system. All drip components, he received in August 2022 and now irrigating the crop from October onwards at 15 days intervals. Up to February end, he may irrigate this crop 12 times, however, there is no proper data with regards to the amount of irrigation being applied. About 16 hrs are required to irrigate 1.35 acres of Turmeric crop having a crop geometry of 45 cm x20 cm. Post drip irrigation implementation, he is expecting a Turmeric yield of about 25 quintals/acre with an expected gross return of Rs 1.50 lakh/acre. Earlier he was harvesting only 15-18 quintal/acre Turmeric yield. All the developed CT technologies, implemented in these villages are highly useful and the beneficiaries have been effectively using them throughout the year, particularly in developed water resources areas. Further, they are modifying /changing their activities as per their demand, and location-specific problems, considering the changes in climatic variables of the villages. In these villages, providing pipes, drip, and sprinkler irrigation systems has boosted crop yield and increased additional cropped area under Rabi crops to the extent of 50- 60%.

#### 3.3 Insights from Limbgaon Village:

Limbgaon village was visited and discussions were held with the Sarpanch and other beneficiaries regarding crop production technologies being implemented through PoCRA intervention. Out of 556 farmers, about 160 marginal and small farmers have received benefits under PoCRA. The CR Technologies, which have been implemented in the village are - Drip (23 beneficiaries), Sprinkler sets (91 beneficiaries), Farm mechanization (2 beneficiaries), Farm Pond (2 beneficiaries), FFS/BBF/zero tillage (2 beneficiaries), seed production (13 beneficiaries), pipes (5 beneficiaries), sericulture (1 beneficiary), sprinkler (48 beneficiaries), water pump (7 beneficiaries). The major Kharif season crops are Soybean (814 ha), Arhar (45 ha), and Rabi season crops are Bengal gram (495 ha), and Wheat (209 ha). Besides these crops, farmers have taken Sugarcane and Turmeric as cash crops under the drip irrigation system. Through the PoCRA project about 100-acre horticultural fruit crops have been brought under the drip system. Since the fruit crops are in the early stages, the farmers are growing Soybean as an intercrop during the Kharif season and Wheat during the Rabi season and providing irrigation through sprinkler irrigation.

**3.3.1 Benefits accrued and challenges faced during the adoption of BBF technology:** The majority of the farmers had grown Soybean crops in medium to heavy soils during the Kharif season. One of the farmers Shri Prasant Kisanrao Kadam narrated that BBF technology is very much effective but due to heavy rainfall, the excess rainwater stagnated for a long period, and as a result, the crop yield got reduced considerably. The soil was medium type and drainage was also good. The crop geometry was 3 rows on a raised bed with row spacing of 45 cm and plant spacing of 15 cm followed by a 60 cm open furrow. This open furrow act as a drainage channel for removing excess rainwater. In the early stage, the crop suffered from excess /stagnated water, and growth was quite slow. Due to this, the farmer could harvest only 2 quintals/acre. In the same piece of land, the same farmer harvested 7.3 quintal/acre seed yield in the last Kharif season of 2021.

Another three farmers' fields were visited where the flatbed and BBF sowing were adopted during Kharif 2022. The crop geometry and soil type were similar to the first farmer. They harvested only 6-7 quintal/acre seed yield because of heavy rains as compared to 10-11 quintal/acre, harvested during Kharif 2021. Another farmer, Shri Gopal Bhaurao Kadam, explained to us that the Soybean crop was damaged when grown under a flatbed system. In the last year 2021, the Soybean yield was 8 q/acre. It is concluded that the BBF technology is very good but due to the very high amount of rainfall, the crop suffered from stagnated water. After the harvest of the Soybean crop, these farmers have sown Bengal gram variety JAKI 9218 and irrigated through sprinklers frequently. However, they are not measuring the irrigation water applied. This information has not been given

to the farmers in FFS, on how to calculate the amount of irrigation water to be applied during different crop growth stages. Three farmers have made individual farm ponds and this pond is acting as a secondary reservoir. They are filling this secondary reservoir with groundwater as the discharge rate is less than 2 l/sec. With such a low discharge rate, the sprinkler sets can not work hence constructed reservoir.

**Case Study 1 -** Sugarcane is a long-duration and water-intensive and nutrient-exhaustive crop. Shri Gopal Bhaurao Kadam had planted Sugarcane on 3.5 acres under a drip system from the PoCRA project. The crop row spacing was 1.20 meters and the lateral was placed on individual crop rows. From planting (January) to the onset of monsoon (June), farmers applied irrigation. From July onwards, he discontinued irrigation water due to the receipt of heavy rainfall. Waterlogged conditions in the field restricted the growth of Sugarcane crops and yield drastically declined to the extent of 30 tonne/acre this year as against 55-60 tonne/acre last year. This year, the maximum number of farmers have harvested very low Sugarcane yield as the heavy amount of rainfall during the Kharif season 2022 restricted the farmers to implement other components of crop technology (101 fertiliser application, earthing up, etc).

*Case Study 2 -* The same farmer has planted Mosambi (sweet lime) under a drip system on 2 acres of land. Since the horticultural fruit crop is in the seedling stage and the crop canopy is small, he had taken Soybean in Kharif 2022 and Bengal gram in the Rabi season as intercrop.

**3.3.2 Insights from Farm Pond:** Shri Sanjiv Rangnathrao Kadam is one of the beneficiaries of the PoCRA project and has received Rs 3.40 lakh from the project and constructed a farm pond with the dimension of 34mX34mX4.7 m. The total cost of the farm pond was Rs 5.50 lakh. The lining has been done to avoid seepage loss. During the Kharif season, rainwater is collected and stored for pre-sowing Rabi crops. Once all the collected rainwater is over, he is using two borewells for re-filling this pond and irrigating horticultural fruit crops (Mosambi), Rabi Wheat, and Bengal gram by pumping stored reservoir water with a 5 HP motor pump. He is re-filling this pond twice during the Rabi and Summer seasons and managing his crops effectively. But there is no proper irrigation scheduling of the amount of water used by the crops during the Rabi and Summer seasons. Since he is using pond water, it is highly essential to protect the open water of the pond from loss through evaporation by growing windbreak trees as seepage loss is being controlled with a polythene sheet at the bottom and surrounding area of the embankment.

**3.3.3 Insights from Seed Multiplication:** Discussed with one of the farmers Shri Vithalrao Kadam from Limbgaon, who had taken a seed multiplication program on Summer Soybean and Bengal gram variety Vikram (Rabi). Last year in December 2021, Soybean variety MAUS 612 was sown in a flatbed method in a crop geometry of 40 cm x 15 cm. It was sown by a bullock-drawn implement. After sowing, he irrigated twice with a sprinkler system, thereafter irrigated by flood method 8 times. He has not given any details about the irrigation water used by the crop from sowing to harvest (up to April). However, he narrated the duration of the pump operated by sprinkler (3-4 hours per irrigation cycle) and 6-7 hr per irrigation cycle during February, March, and April months. Accordingly, he was advised to collect the discharge rate of the 5 Hp/ 3 Hp pump for calculating irrigation water delivered to crops and also estimate ETcrops theoretically by using meteorological data. Concerning the benefits of growing Summer season Soybean crops, the gross return was Rs 32,000 (for 4 quintal/acre yield) as against a total expenditure of Rs 12,000/acre. During the Summer season, the crop yield is generally low due to very high temperatures during the flowering to pod development stages. Hence regression analysis of all weather data with crop yield is to be required to assess the intensity of weather parameters on the crop yield.

**Case Study 1** - Concerning the Bengal gram variety, Vikram Phule, the same farmer covered 4 acres of land for the multiplication program. He had sown Bengal gram at the end of November 2021 and harvested in March 2022. Before sowing he irrigated once and thereafter two irrigations in January and February 2022 were applied by flood method. However, no proper method of computing water requirements was done. He managed the crop by using all inputs but wilt disease caused a severe problem and harvested only 2.5 quintal /acre yield. The damage to the crop was due to flood irrigation and stagnation of more water in the field for a longer period, unlike sprinkler irrigation where the depth of each irrigation is very much low. Asper his view, the variety was not good and could not sustain flood irrigation and fusarium wilt. So, the choice of variety to be used for seed multiplication is highly essential for the overall benefit f the farmers.

#### 3.4 Insights from Chudava Village, Parbhani District:

Discussions were held with beneficiaries of Chudava village on 20<sup>th</sup> January 2023, in the presence of Gram Sarpanch, Agric Assistant, and Cluster Assistant, and detailed information about the PoCRA project activities was sought. In this village, about 113 beneficiaries have received benefits out of 724 small and marginal farmers. From the discussion, it was found that the non-beneficiaries are very much interested to receive

benefits but due to certain technical issues, their demand has not been finalised and is under process. The CR technologies implemented in this village are Drip irrigation (11), Farm Mechanization (6), farm pondindividual (6), horticulture (12), pipes (1), Sprinkler irrigation (89), and water pump (1). The net cropped area is about 1201 ha, the double-cropped area is 110 ha, the seasonal irrigated area is 402 ha and the annual irrigated area is 80 ha.

**3.4.1 Perceived benefits and challenges from BBF Technology:** BBF technology was implemented by a majority of the farmers, depending upon the soil types. In heavy and medium soil it was quite effective than the light type of soils where the productivity was low. A visit was made to the field where BBF was demonstrated.

**Case Study 1** – One of the lady farmers, Smt Sheela Tikaram Desai had taken Soybean crop variety KDS726 under BBF technology during Kharif 2022. The soil was medium-deep. The crop geometry was 45 cm x15 cm, followed by 60 cm furrow for draining excess water. In each raised bed, 3 lines of Soybean were sown by the dibbling method. After following all management practices, the farmer harvested 13 quintal/acre seed yield, however in normal planting (flatbed with border strip), she could harvest only 2.2 quintal/acre seed yield. As explained by her, the crop stand was good in both planting /sowing methods but the yellowish colour in leaves was seen during the vegetative to pod filling stage in the flatbed method of sowing. Therefore she could get a very low seed yield. Such symptoms were seen in waterlogged situations also.

**Case Study 2 -** Another farmer Shri Madhav Balaji Desai has obtained 9 quintals/acre Soybean seed under flatbed planting system. After the harvest of this crop, he again sown Soybean in the last week of November 2022 and he is expecting to get this Rabi Soybean variety KDS 726 to the tune of 11 quintals/acre. The farmer is using open well water with a solar-operated pump during the off supply of electricity. He has been cultivating Sugarcane, and Turmeric through a solar operating pump with a drip system and harvesting good crop yield. In the case of Sugarcane, which was planted recently on 4th January 2023, he will be using drip irrigation set up to June 2023, thereafter he will irrigate by flood irrigation during the dry spell period. This year during the Kharif season, he has not irrigated because of heavy rains. In Turmeric, the farmer is using a drip system from October to February and harvests a very high rhizome yield.

**3.4.2 Uptake of Farm Pond and Lift Irrigation:** During the Rabi and Summer seasons, water availability for irrigating Rabi and Summer crops is very much limited. To overcome the constraint of irrigation water Shri Devidas K Desai has constructed a farm pond with lining having a storage capacity of 10454.4 cubic meters of water (44x44x5.4 m). PoCRA provided Rs 4.75 lakh and the farmer invested Rs 1.5 lakh. Further, he has constructed open wells and borewells from his resources and covering his land and adjoining farmers' land. The total command area is 12 acres. From 2020 onwards, he is growing Sugarcane, Turmeric, Soybean, Wheat, and Bengal gram. In addition to these water resources, other farmers have laid underground pipelines of 5-inch diameters and 900 in number (18,000 ft length) and brought water from the Godavari river. He has installed a 20 Hp electric pump and stored water in a secondary reservoir and irrigated his field crops including horticultural fruit crops. This lift irrigation has created a good source of water in open-well as well as bore-well. It was not done through PoCRA but was done by a group of farmers. The total command area is 40 acres.

**3.4.3 Insight from Farmer's Group:** In this village, a group of farmers has been made to facilitate other farmers in farm mechanization. 15 members have purchased different farm implements viz. big tractor (55 Hp), small tractor (21 Hp), implement for earthing up in Sugarcane, combine thresher, rotavator, and cultivator. The total cost of these implements was Rs 19.90 lakh and PoCRA sanctioned and released Rs 11.86 lakh. They have constructed an implement shed also by spending Rs 2.75 lakh. They are providing farm machinery to the non -member and charging money as per the standards market rate, fixed by the group, however, they are giving to members of the group with minimum charge (25-30% less).

**3.4.4 Uptake of Sericulture:** About 40 sericulture units have been established through the PoCRA project, with the farmers on average producing silk cocoon 125 Kg/acre in one cycle.

**3.5 Insights from Alegaon Village:** Discussions were held with beneficiaries in the presence of Gram Sarpanch, Agriculture Assistant, and Cluster Assistant and details were sought regarding the PoCRA project activities. In this village, about 110 beneficiaries have received benefits out of 479 families (small and marginal farmers). Non-beneficiaries are very much interested to receive benefits but due to certain technical issues, their demand has not been finalised and is under process. The CR technologies implemented in this village are Drip irrigation (21), Farm Mechanisation(4), horticulture(24), pipes (1), Sprinkler irrigation (69), and water pump (2). The net cropped area is about 800 ha, and the double-cropped area is 600 ha but the irrigated area is very low i.e. 30 ha under seasonal crops and 25 ha under annual crops. Considering the benefits of this project, particularly the creation of water resources, it is highly essential to expand more area under irrigation

with a pressurized system and provide benefits to the large group of marginal/ needy farmers. The major field crops, being grown by the farmers are Soybean during Kharif and Bengal gram and Wheat during the Rabi season and Sugarcane as an annual crop. Horticultural fruit crops are also available to the farmers and the drip system has been fixed in the field for irrigation.

**3.5.1 Use of BBF Technology:** BBF technology has been implemented since Kharif 2022 on a large scale to avoid any crop damage due to irregular distribution of rainfall. A large number of farmers (more than 100) had taken Soybean during Kharif 2022. One of the farmers, Shri Datta Sambhajee Sawarate shared his views about BBF technology. He was found to be very much aware of BBF and informed that Soybean was grown by him under BBF in-row spacing of 45 cm x 15 cm with 2 crop lines on raised bed and 60 cm was furrow. He used only 11 Kg of seeds per acre as compared to the flatbed method in which about 30 Kg /acre of seed is used by the drilling method. The soil was the medium type where drainage was satisfactory, unlike heavy soils where drainage is poor. From medium soil, he harvested 8 quintal/acre seed yield as against 5-6 quintal/acre under normal sowing where the farmer used 30 Kg seed /acre area. In normal sowing, under flatbed method the crop growth was stunted.

3.5.2 Uptake of Inter-Cropping Method: Last year (2021-2022) Sugarcane was planted at a row spacing of 1.2 m under drip irrigation and harvested in November 2022. Thereafter Bengal gram has been taken as an intercrop with a seed rate of 30 Kg /acre. This crop is being irrigated through a sprinkler which has been given through the PoCRA project. Some farmers have prepared rain pipes by making micro holes on 40 mm PVC pipe and irrigating Bengal gram after sowing. Due to small droplets of water like fog, the flower shading is not taking place, unlike sprinklers where water droplets are causing flower drop when irrigation is given during the flowering stage. By adopting such irrigation practices, last year one of the farmers harvested a 7-8 guintal/acre seed yield. Like Bengal gram, the farmers have also taken one row of Wheat crop in between two rows of Sugarcane. They harvested Sugarcane in November 2022 and retained the ration crop for the second year 2023. The Sugarcane yield of the main crop was 40 tonne/acre (very low due to heavy rains) and Wheat yield is expected to be 6-7 guintals/acre. In this intercropping system, the farmers are adopting sprinkler irrigation, but they are not maintaining details on irrigation water applied in both crops(Wheat and Bengal gram) separately. Adoption of the intercropping system is highly economical. Both land and energy resource efficiency are increasing due to the adoption of such practices. In the case of ratoon Sugarcane, the farmers are also using sprinkler irrigation up to February and surface irrigation later on. In one acre of a Sugarcane field, they are operating the pump for 8 hrs per day and continue for three days to irrigate a one-acre area with a 5 Hp electric pump. It is possible only when a regular electric supply is available. But in the case of drip irrigation, the farmers are operating the pump for 8 hrs and covering a one-acre area.

**3.5.3 Composting of Sugarcane Trash**: About 4-4.8 tonne/acre of leaf trash is produced from the Sugarcane crop. The leaf trash is decomposable in the field itself. It contains 28.6 organic carbon, 0.35-0.42 % nitrogen, 0.04 to 0.15 % phosphorus, and 0.50-0.42 % potassium<sup>13</sup>. Generally, the farmers burn dried leaves in the field itself and create pollution in the environment, which is not advisable. One of the farmers Shri Laxman Nagorao Ghatod has made good efforts to use Sugarcane trash particularly dried leaf as manure in the field itself. After the harvest of a 2 ha area of Sugarcane crop in Dec.2022, he spread all the dried leaves in the field and used a rotavator for mixing dried leaves in the field. After proper mixing, he applied decomposer S-9, urea, and SSP and pulverized with a rotavator, and irrigated with sprinkler irrigation as he has kept Sugarcane crop. In this way adding Sugarcane leaves adds nutrients to the soil, and improves physical and chemical properties also.

**3.5.4 Insights from the Gur-making Group(Krishi Dhan):** About 15 members have formed a Gur-making group named Krishi Dhan. Out of 20 members, 6 members have purchased all necessary implements/materials for making gur from Sugarcane by contributing Rs 20.00 lakh. Due to the large areas of Sugarcane crops and the demand of the consumer in other states as well, they have started this remunerative enterprise at the village level only. The Sugarcane factory is also located in those areas but due to a shortage of labor, involving additional costs for transporting to sugar industries, they have done a good job for themselves and non-members of this group. This Krishi Dhan group is charging Rs 1800/ per quintal for crushing Sugarcane and Rs 400/per quintal for making Gur from Sugarcane juice. They are selling gur @ Rs 3500 per quintal in the local market and @Rs 2800 per quintal to other states. In this case, the purchaser is

<sup>&</sup>lt;sup>13</sup> Sugarcane trash composting (https://agritech.tnau.ac.in/org\_farm/orgfarm\_sugar.html)

directly lifting the required quantity from the spot. The production capacity of Gur is 2 tonne/day, though the potential capacity of Gur production is 5 tonne/day. It is operated for a 3.5 -4 month period starting from the Dussehra festival to March-April months. This group is also interested to enter into another enterprise like a small grain processing unit by taking a loan from Pradhan Mantri Small and Medium Scale Industries Fund. They are hoping to start shortly.

#### 3.6 Insights from Tutk Pimpri Village, Hingoli District:

Discussions were held with farmers (beneficiaries and non-beneficiaries) regarding the status of PoCRA project activities. This village is very small having a total geographical area of 258.95 ha and a net cropped area of 251.9 ha. The seasonal irrigated area is 160 ha and the annual irrigated area is 56 ha. Out of 161 farm families, 131 farm families have received benefits from the PoCRA project and the rest of them are waiting to get the required benefits. The major Kharif crop is Soybean, Turmeric, tur, and Rabi crops Bengal gram, Wheat, Rabi Jowar, and safflower. In this village, location-specific CR technologies are being adopted by the farmers, including drip (6 farmers), sprinkler (40 farmers), seed production (20 farmers), Go-down (under process), Shed-net (2 farmers), horticulture (2 farmers). Other benefits like pipes and electric motor supply, which were granted, have been stopped. Now they urging the govt to restart this facility as these components in the agriculture sector are equally important.

3.6.1 Uptake of BBF Technology in Soybean: All farmers have adopted this technology in Soybean and have received benefits in terms of an increase in crop yield, saving of seed material cost, fertiliser, plant protection cost, and crop escape from the waterlogged conditions. One of the farmers who had grown Soybean under BBF technology during Kharif 2022, revealed that on the raised bed he maintained 3 crop rows with a spacing of 45 cm and plant spacing of 15 cm. He used sowing equipment (dibbler). The cost of the dibbler is Rs 7,000 and it can cover a one-acre area within a one-hour duration, however manually, it takes more time. During the crop growth period, all packages of practices were followed. The seed yield was 12 quintals/acre in medium to heavy soil. In medium soil, the total seed yield was 8 guintals/acre. In light soil, the farmers have recorded 5-6 g/acre seed yield. The cost of production in the BBF system was recorded to the extent of Rs 2,500 for ploughing, Rs. 1,500 for BBF preparation, Rs 400 for sowing by dibbling machine, Rs 1,500 for fertiliser (1 bag DAP), spraying Rs 2,000, weeding Rs 1,000, harvesting Rs 4,000, threshing, cleaning and winnowing Rs 3,000. From these farm activities, the total production cost comes to Rs 15,900. However, the gross return comes to Rs 60,000 (12 quintals x Rs5,000 per quintal), and the net return achieved by the farmer is Rs 43,000. In the case of the Flatbed method, the crop yield comes to 7-8 quintals/acre. If it is grown in light -medium soil the total production in the flatbed method comes to 4-5 quintal/acre and slightly less net return they get in the traditional flatbed system.

**3.6.2** Adoption of Inter-cropping Practices: During the Kharif season, Cotton +Soybean, and Cotton +red gram are important intercropping systems. The farmers of this village harvest about 4 quintals of Cotton and 5-7 quintals of Soybean per acre and 4-5 quintals of Cotton + 2 quintals of red gram per acre. The yield of these crops under the intercropping system is quite low. If an irrigation facility is created and a drip system is installed in the Cotton crop, the farmer may harvest seed Cotton yield to the extent of 11-12 quintals/acre. This year, the crop was badly damaged due to heavy rains as these were grown under a flatbed system where inadequate drainage in the field restricted intercultural operation and other crop management activities. One of the farmers, Shri Suresh Khandobarao Pole harvested only 4 quintals of Soybean and 1 quintal of red gram from one-acre land from heavy soil where drainage was very poor and the recently sown Bengal gram is also not good due to more moisture available in the field.

**3.6.3** Insights from Village regarding Horticulture: Shri Dhanabarao Pandobararao Pole has procured a Solar pump of 3 Hp by paying Rs 16,500 against the total cost of Rs 3.20 lakh from Kusum Solar Project of Govt of Maharashtra. He has installed an open well and irrigated Rabi crop (2.37 acre), guava (0.75 acre), and mango (0.75 acre). Mango and Guava seedling coupled with a drip system was given to the farmers through the PoCRA project. All the benefits were given in the year 2020-21. He is applying irrigation to Mango and Guava in a rotation of two days on and 10 days off till May every year. However, the amount of water delivered to these two crops is not measured properly.

**3.6.4 Increase in profits under Seed Multiplication Program:** Shri Dhanabarao Pandobararao Pole has been taking seed multiplication program of Soybean and Bengal gram since 2020-21 and providing good quality goods to Maharashtra State Seed Corporation/ NAFED and earning 25 % more income as compared to MSP of govt. of India. During the year 20221-22, he had grown the Bengal gram variety Phule Vikrant on 2 acres and harvested 16 quintals of good quality seed. The yield was low due to heavy rains in the Rabi season. He handed over all produce to NAFED @ Rs 5,230 per quintal as against the market Rs 4,700 per quintal and earned an extra amount of Rs 530 per quintal (total profit was Rs 530x16 quintal =Rs 8,480). Further, he extended the seed multiplication of Soybean variety KDS726 and Amba during Kharif 2022 in 3 acres of land

and obtained 31 quintal seeds, and handed them over to FPO @ Rs 5,100 per quintal with an extra profit of Rs 800 per quintal as the MSP rate for the year 2022-23 was Rs 4300 per quintal. The expenditure incurred for seed production was Rs 20,000 per acre.

**3.6.5** *Profit earned under ShadeNet Intervention:* Shri Ramesh Sambhajirao Pole received financial help from the PoCRA project in the year 2021, dated 15 January 2021, and constructed the shade net unit (40 m X 52 m size). The total cost of the shade net unit is Rs 15.00 lakh. He has received Rs 8,74,139 from PoCRA as a subsidy and the remaining amount he has spent to complete this setup. Last year provided seedlings of vegetable crops viz. Chilli, brinjal, tomato, capsicum, and cabbage and received a net income of Rs 2.00 lakh. 105his year 2022-23, he has been growing seedlings in staggered sowing and selling to needy farmers. To date, he has sold seedlings of different vegetable crops to the tune of about 8.00 lakh and the total expenditure for producing seedlings was approximately 40 % of the gross return. So he has earned a net profit of Rs 4.80 lakh.

**3.6.6 Status update from FPO**: Construction of Go-down is under process and FPO will take up all activities related to the organisation for the benefit of farmers immediately.

#### 3.7 Insights from the Yelgaon Solanke Village:

Yelgaon Solanke village was visited to monitor the activities being implemented by the farmers. The total geographical area of this village is 891 ha and the cultivated area is 842 ha. The marginal and small farmers are 487 in number but only 123 farmers have received benefits from the PoCRA project. This year, the total rainfall received was 1476.5 mm which was quite high as to normal rainfall. The field crops are, Soybean, Turmeric, gram, and Wheat.

**3.7.1 Uptake of Farm Implements:** Of the farmers, Dr. Namdeorao S. Solanke has made a farmers group of 15 members and purchased farm implements from the PoCRA project and also constructed an implement shed, godown for keeping the farm produce. The farmer group has cultivated an area of 45 acres. They are providing these farm implements to other farmers and charging a very minimum rate. The implements purchased by this group include tractor, trolley, BBF-making machine, rotavator, bed maker, cultivator, combine (thresher, harvester), and chaff cutter. Out of a total expenditure of Rs 23.50 lakh, the group has received a subsidy of Rs 13.50, and the rest of the amount has been spent by the group.

The godown has been constructed with the proposed total cost of Rs 20.00 lakh and the group has received a subsidy of Rs 11.99 lakh from the PoCRA project. The farmers of this village stored 16 tonnes of Soybean produce in 2021 as per the warehouse rate and paid to the farmers' group. Such a basic facility of go-down at the farm level can provide relief to the farmers when the market rate is very low. Other field crops and horticultural fruit crops are also covered through a pressurised system, however, the details are not available.

## **Annexure 6: Field Visit Notes of Agri-engineering Expert**

#### Introduction

A visit was made to Sires village and Sirafpur village in Gangapur Tahsil in Aurangabad on 17<sup>th</sup> January 2023 to assess the impact of Mini Watershed Planning and Water Budgeting as part of the POCRA Project. Discussions were held with cluster assistants and the farmer community. The interventions implemented as part of the POCRA project in these villages are - i. Compartment bunding and, ii. Creation of pumped pressurized Drip irrigation system. Open wells are the main source of irrigation in this village.

#### **Key Observations**

The following observations emerged from the discussions held:

- Analysis of the NRM Work including compartment bunding work which started in 2019 and was completed by 2022 revealed that in Sires Gaon, the planned ("Manjur") command area accounts for 350.00 ha and the work executed area is around 118.00 ha (33.71% of planned). Further, in Sarif Gaon, the planned ("Manjur") command area is around 98.00 ha with the work executed area being 48.27 ha ( 49.26 % of planned). The major reason behind the low percentage of area covered, as reported by the executing agency, is the non-availability of land due to the unwillingness of landowners to give their part of the land for the construction of compartment bunding in the area. It was also observed that the already constructed compartment bunding is well-maintained and utilised in the project area.
- Open wells were the only source of irrigation in the project area before POCRA Intervention. Discussions
  with cluster assistants and farmers reveal that the introduction of a deep pressurized irrigation system has
  considerably benefitted farmers. POCRA intervention has resulted in:
  - Better surface drainage results in the elimination of the problem of surface water logging in their cropped fields, thereby improving the quality of their yield.
  - A substantial rise in the groundwater Table ensures year-round availability of irrigation water in the wells and thereby enabling farmers to undertake Rabi as well Kharif season crops in the project area.
  - Change in cropping pattern Before the POCRA intervention, farmers were cultivating single Kharif crops such as Bajra. However, post-intervention, farmers are cultivating Cotton and Maize in Kharif Season; Onion, Wheat, and Maize in the Rabi season, and are cultivating Sugarcane on an annual basis.

# Annexure 7: Field Visit Notes of Hydrology Expert

# Data & Information Collected During the Field Visit to Villages of Nanded & Parbhani Districts (19 to 21 January 2023)

#### Case 1

Date of visit	19 January 2023
Name of the village	Sayal
Taluka	Nanded
District	Nanded
Name of the farmer	Harji Jayram Dhumal
Total land of the farmer/ family	2ha
Source(s) of water	Dug well
Pump set type, HP and Company	Submersible centrifugal, VARUN
Dimensions of the well/ storage volume	On average 96 cubic meters in 8 hours
Сгор	Groundnut (Summer)
Irrigation method	Sprinkler
Area covered	0.55 ha
Month of purchase/ installation	2020
Lateral and sprinkler spacing	6 m 6 m
Sprinkler set details	8 sprinkler head, 30 HDPE pipes of 75 mm dia;
	Farmer has purchased 4 additional sprinkler heads
	(total 12 sprinklers)
Area covered in one sprinkler setting	Entire 0.55 ha is irrigated in 3 sets of 8 hours each
Duration of one setting	8 hours
Approx. water depth / per irrigation	96/5466X1000 =18 mm

#### Case 2

Date of visit	19 January 2023
Name of the village	Sayal
Taluka	Nanded
District	Nanded
Name of the farmer	Harji Jayram Dhumal
Total land of the farmer	2 ha
Source(s) of water	Dug well
Сгор	Turmeric
Duration of the crop	9 months
Irrigation method	Drip method (Inline)
Area covered	0.55 ha
Month of purchase/ installation	August 2022
Cost of the set/ subsidy received	Subsidy received: 65,000/-
Drip lateral diameter/ dripper discharge	20 mm
Drip lateral to lateral spacing	4.5 ft
Dripper type and spacing on lateral	4 LPH inline and 1,5 ft
No of irrigations	12
June to August	No irrigation is required as there is adequate rainfall
	during these months
September to January	At about 12 to 15 days interval

#### Case 3

Date of visit	19 January 2023
Name of the village	Limbgaon
Taluka	Nanded
District	Nanded
Name of the farmer	Prataprao Vishwas Kadam

Total land of the farmer	8.5 acres 9 divided among three brothers)
Gat no	338
Source(s) of water	Dug well
Pump set type , HP and Company	
Crop	Sweet orange (Mosambi)
Sowing/ planting date	2020
Duration of the crop	Perennial
Irrigation method	Drip
Area covered	1.6 ha
Month of purchase/ installation	2021
Company name	Jain Irrigation
Cost of the set/ subsidy received	Rs.89,115 (for orchard + drip), 80% in the 1 <sup>st</sup> year,
	10 5 in 2 <sup>nd</sup> and 3 <sup>rd</sup> year each
Dripper type and spacing on lateral	14 LPH, 2 drippers per tree
	(Presently there is only one lateral, one parallel
	lateral will be laid in coming years, however, there is
	no provision of subsidy)
No of irrigations	As and when required

#### Case 4

Date of visit	19 January 2023
Name of the village	Limbgaon
Taluka	Nanded
District	Nanded
Name of the farmer	Gopal Babanrao Kadam
Total land of the farmer/ family	21 ha
Gat no	281
Source(s) of water	Dug well
Pump set type , HP and Company	5 HP
Сгор	Sweet orange (Mosambi)
Sowing/ planting date	2022
Duration of the crop	perennial
Irrigation method	Drip method (Inline)
Area covered	2.0 ha
Drip lateral diameter	16 mm
Drip lateral to lateral spacing	3m
Dripper type and spacing on lateral	45 cm
No of irrigations	3
June to August	No irrigation as rainfall is adequate
Sept to October	2 to 3 irrigations as required
November to May	Daily 8 hours

### Case 5

Date of visit	20 January 2023
Name of the village	Alegaon
Taluka	Purna
District	Parbhani
Name of the farmer	Manoj Marotrao Chourate
Total land of the farmer/ family	6 ha (2 ha each among three brothers)
Gat no	224 & 228
Source(s) of water	Dug well
Pump set type, HP and Company	5 HP (Aquatic make)
Сгор	Gram
Sowing/ planting date	NA
Irrigation method	Sprinkler
Area covered	2 ha
Cost of the set/ subsidy received	Rs.28,000; (Rs: 17,500 subsidy received)
Lateral and sprinkler spacing	12 mX 12m
Sprinkler set details	8 sprinklers, 30 HDPE pipes of 2.5-inch dia
---------------------------------------	--
No of irrigations	3
1 <sup>st</sup> irrigation	4 hours per setting
2 <sup>nd</sup> irrigation	6 hrs/ setting
3 <sup>rd</sup> irrigation	6 hrs/ setting
Area covered in one sprinkler setting	0.20 ha in 8 hours
Duration of one setting	4 to 8 hours (depending upon the crop need)
Water depth /volume applied	Well diameter is 30 ft and drawdown was about 6 ft
	in 8 hours.

# Case 6

Date of visit	21 January 2023
Name of the village	Mendhala 9Bk)
Taluka	Aardhapur
District	Nanded
Name of the farmer	Datta Tulshiram Bharkad
Total land of the farmer/ family	16 acres
Source(s) of water	Dug well
Pump set type , HP and Company	7.5 HP (Company: MASCOT)
Crop	Gram
Duration of the crop	Rabi season
Irrigation method	Sprinkler
Area covered	2 acres
Company name	PARAS
Sprinkler set details	8 nozzles, 30 pipes of 75 dia
Sprinkler lateral to lateral spacing	6 m X 6m
Sprinkler spacing on lateral	6 m
No of irrigations	3
	1 <sup>st</sup> – after 2 days of sowing
	2 <sup>nd</sup> – 25 days after sowing
	3 <sup>rd</sup> – 50 days after sowing
Area covered in one sprinkler setting	0.2 ha

# Case 7

Date of visit	21 January 2023
Name of the village	Ganpur
Taluka	Aardhapur
District	Nanded
Name of the farmer	Parmeshwar Rohidas Bandale
Total land of the farmer/ family	2ha
Source(s) of water	Dug well
Pump set type, HP and Company	5 Hp ( CRI company, open well submersible)
Dimensions of the well/ storage volume	20 ft diameter and total depth of 60 ft.
Сгор	Gram
Sowing/ planting date	June 2022
Duration of the crop	Rabi season
Irrigation method	PorTable sprinkler
Area covered	2 ha
Month of purchase/ installation	2021
Company name	Jain Irrigation
Subsidy received	Rs.17,000/-
Details of the set	1 se comprising 8 sprinkler heads & 30 HDPE pipes).
	The farmer has purchased additional three sprinklers
	from the company dealer.
Later and sprinkler spacing	12m X 12m
Duration of one setting	8 hours
Area irrigated in one setting of 8 hours	0.2 ha

Water depth/volume applied in one setting of 8	125 cubic meters
hours	

# Case 8

Date of visit	21 January 2023			
Name of the village	Ganpur			
Taluka	Aardhapur			
District	Nanded			
Name of the farmer	Balaji Digambar Bandale			
Total land of the farmer/ family	7.28 ha			
Gat no	70			
Source(s) of water	Dug well			
Pump set type, HP and Company	7.5 Hp ( company:MASCOT)			
Crop	Turmeric			
Sowing/ planting date	June 2022			
Duration of the crop	9 months			
Irrigation method	Drip (inline system)			
Area covered	2 acres			
Company name	KASTA			
Drip set details	Inline drip system			
Dripper discharge	4 LPH			
Drip lateral to lateral spacing	3.5 ft			
Dripper spacing on lateral	1,5 ft			
June to September	<ul> <li>1<sup>st</sup> irrigation is given by surface method for land preparation</li> </ul>			
October to February	<ul> <li>No irrigation during rainy season. However, fertigation and chemigation is done through drip system;</li> <li>8 days interval between two irrigations;</li> <li>About 3 irrigations are given per month i. e. about 15 irrigations are given in five months</li> </ul>			
No of irrigations				
Time required to cover 4 acres	16 hours (8 hours for 2 days)			
Duration of one setting	8 hours			

# Case 9

Date of visit	21 January 2023
Name of the village	Mendhala 9Bk)
Taluka	Aardhapur
District	Nanded
Name of the farmer	Vitthal Tulshiram Bharkad
Total land of the farmer	2 acres
Gat no	16
Source(s) of water	Dug well
Pump set type, HP and Company	7.5 HP (Company MASCOT)
Сгор	Turmeric
Sowing/ planting date	1 July 2022
Irrigation method	Drip
Area covered	2 acres
Month of purchase/ installation	31 July 2022
Company name	PARAS
Drip lateral to lateral spacing	4.5 ft
Dripper spacing on lateral	1.5 ft

# **Annexure 8: Field Visit Notes of Agri Economy Expert**

# 1. Background

During mid-January 2023, based on the performance of various project activities, three villages *viz*. Tapvan and Tupewadi in Jalana district and Pishor in Aurangabad were selected for field investigations. The objective is to assess the resilience built within the community specifically for, (a) Adoption of CR technologies, (b) Improved skillsets of farmers due to the use of CR technology, (c) Improved climate change adaptation and coping mechanism, (d) Positive behavioral change in agricultural practices, (e) Resilience to absorb sudden climate shock, (f) Resilience to market price fluctuations, (g) Development of youth entrepreneurship, and (h) Achievement of sustainability in terms of livelihood enhancement, employment generation, reduction in migration, etc. The participatory approach such as group discussion, and interaction with the project implementation staff at the field level and senior management staff was followed to collect the information.

# 2. Implementation of Project Activities

Under the provisions of PoCRA, a set of 13 activities including drip irrigation, safety nets, Saline and Sodic lands, pipes, etc. were implemented across the selected villages with a view of extending benefits to the target groups. The total number of beneficiaries covered across the three villages are 399, 702, and 2600 in Tapovan, Tupewari, and Pishor village respectively. It is important to note that the status of the implementation of activities varies across the three villages, which is reflected in the demand for activities by farmers and local resources. For instance, as per the field assessment, it was found that while drip irrigation occupies the leading position; in Tapovan and Tupewari villages, shade-net intervention was occupying the prime position.

In Tapovan and Tupewari villages, the beneficiaries of shade-net houses were in substantial proportions. Keeping in view the viability of the project activity, the demonstration effect can be noted. The non-beneficiaries have also installed shade-nets houses at their own expense by using local low-cost materials. Hence, the number of users of shade-net house was much higher than that of the official record. It can be nearly 15 percent.

	Tapovan		Tupewari		Pishor		Overall	
Activities Implemented	Numbers	Distri- bution	Numbers	Distri- bution	Numbers	Distri bution	Numbers	Distri- bution
Apiculture	0	0.00	0	0.00	106	7.07	106	4.08
Backyard Poultry	0	0.00	0	0.00	1	0.07	1	0.04
Compost (Vermicompost / NADEP / Organic input production unit)	1	0.25	1	0.14	0	0.00	2	0.08
Drip Irrigation	53	13.28	226	32.19	889	59.31	1168	44.92
Farm Mechanization	41	10.28	5	0.71	0	0.00	46	1.77
Farm Pond Individual	0	0.00	42	5.98	1	0.07	43	1.65
Farm Pond Lining	0	0.00	5	0.71	0	0.00	5	0.19
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	0	0.00	0	0.00	1	0.07	1	0.04
Horticulture Plantation / Agroforestry	21	5.26	59	8.40	10	0.67	90	3.46
Inland Fisheries	17	4.26	14	1.99	0	0.00	31	1.19
Pipes	15	3.76	11	1.57	202	13.48	228	8.77

# Table 7: Status of Implementation of Different Project Activities

	Tapovan		Tupewari		Pishor		Overall	
Activities Implemented	Numbers	Distri- bution	Numbers	Distri- bution	Numbers	Distri bution	Numbers	Distri- bution
Planting material in Polyhouse / Shadenet house	3	0.75	0	0.00	29	1.93	32	1.23
Polyhouse/ Poly tunnels	5	1.25	0	0.00	0	0.00	5	0.19
Recharge of open dug wells	0	0.00	0	0.00	0	0.00	0	0.00
Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	2	0.50	2	0.28	118	7.87	122	4.69
Seed Production	0	0.00	0	0.00	0	0.00	0	0.00
Sericulture	0	0.00	0	0.00	22	1.47	22	0.85
Shade-net House	197	49.37	243	34.62	42	2.80	482	18.54
Small ruminants	0	0.00	0.00	0.00	0	0.00	0	0.00
Soil and Water Conservation Practices	0	0.00	0.00	0.00	0	0.00	0	0.00
Sprinkler Irrigation	18	4.51	81	11.54	6	0.40	105	4.04
Water Pumps	25	6.27	11	1.57	72	4.80	108	4.15
Wells	1	0.25	2	0.28	0	0.00	3	0.20
Total	399	100.00	702	100.00	1499	100.00	2600	100.00

Source: Village-level data from mahapocra website

#### 3. Impact of Adaptation of Climate Resilient Technologies and Agricultural Practices

In the present section, an attempt has been made to understand the impact provided climate-resilient technologies on agricultural practices including changes in terms of change in the cropping patterns and crop productivity in the selected villages of the Jalana and Aurangabad districts of the Marathwada region.

#### 3.1 Changes in Cropping Pattern

Table 9 below compares the pre and post-intervention changes in cropping patterns as well as changes in cultivated areas of a particular crop during both Kharif and Rabi seasons, based on the interactions with beneficiaries.

Table 8: 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, moong, Maize,	Kharif: Cotton (-75%), moong (-	Chillies, Tomatoes, Capsicum,					
Soyabeen, Tur, and so on.	33%, Maize (-50%),	Cucumber, Turmeric, and other					
Rabi: Wheat, Gram, Rabi juari	Soyabeen (0), Tur (-20%), and	cash crops including horticulture					
	Bajra (-25%).	(grasp, citrus pomegranate,					
	Rabi: Wheat (-50%), Gram (-	vegetables) and floriculture					
	50%), Rabi juari/ bajra (-25),						

Source: Discussion with beneficiaries in Tapovan and Tupewari and Pishor villages

Note: change in the area under cultivation is indicated in parenthesis

From the Table, it can be inferred that though there has been no change in the cropping pattern pre-and postintervention during both Kharif and Rabi seasons, the farmers have experienced a decline in the cultivation area under various crops. Discussions with farmers have revealed that the substantial decline in the area under Cotton is attributed to its high cultivation cost, making it an enviable crop for farmers.

Post-intervention various new crops such as chilies, tomatoes, capsicum, cucumber, Turmeric, and other cash crops including horticulture (grasp, citrus pomegranate, vegetables) and floriculture have gained popularity amongst the farmers. It has emerged during the interaction with the beneficiaries in the selected villages that about two-fifth of the total cropped area was allocated to the new crops by the farmers.

### 3.2. Crop Productivity

Crop productivity is one of the major indicators of development in the farm economy. The field assessment has revealed that adaptation of climate resilient technologies, and implementation of provided farm input increased accessibility and availability of water for irrigation has resulted in a substantial increase in productivity of major crops such as Wheat, Gram, and Rabi Jowar grown by farmers in the project villages. Interestingly, farmers, in the project villages, have witnessed an increase in Cotton productivity by around 67%, despite a decline in the area under cultivation. Table 10 showcases the pre-and post-intervention change in crop productivity levels across various crops in the project villages.

Crops	Before the project	After the Project	Proportionate (Percent) Change
Cotton	11.25	18.75	66.67
Moong	7.5	10	33.33
Juar	11.2	18.5	65.17
Soyabeen	10	13.75	37.5
Groundnut	7.5	10	33.33
Tur	15	20	33.33
Wheat	11.25	21.25	88.89
Gram	10	17.5	75.00

Table 9: Changes in Crop Productivity (Qtls/Ha.)

Source: discussion with beneficiaries in Tapovan and Tupewari villages

#### 3.3. 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 used for vegetables and floriculture cultivation, and (iii) inter-cropping practice.

**3.3.1 Use of Traditional Practices in Cultivation of Traditional Crops:** It is noted from the fact that cost and returns in the case of traditional crops were not much different with certain exceptions as in the case of Bajra as a fodder crop. The farmers were growing these crops keeping in view the requirement of food and fodder for humans and animals. It can be noted from the fact that the cost structure in the case of Wheat, tur, Cotton, and Soybean varies between Rs. 20,000 to about Rs. 22,000 except for fodder crops. A similar pattern can be noticed in the case of revenue earned from the crops. The net return earned by farmers was Rs. 34,000 in the case of Wheat, Rs. 14,000 for Wheat, about Rs. 20,000 for tur and Cotton, and Rs. 22,000 for oil seed crops such as Soybean.

**3.3.2 Use of Shade Net Intervention:** The provision of shade net is one of the most important intervention activities under PoCRA. During the field visit, it is noted that shade net is one of the important project activities. The farmers have shown keen interest to be associated with this intervention. The farmers from the non-project area showed a keen interest in this intervention and were demanding to expand the project area. It is the demonstration effect of the PoCRA that can be seen in the field. Shade Net activity helps maintain the required sunlight, moisture, and air for the proper growth of the plants. In the project area, the farmers use it for the cultivation of cash crops such as vegetables and floriculture. Being a capital-intensive activity, it is highly subsidized i.e. more than 75 percent. It is noted from the fact that the farmers were growing cash crops such as vegetables and floriculture. The vegetable crops include capsicum, cucumber, muskmelon, and floriculture especially marigold.

The analysis shows that the total average cost incurred in the cultivation of capsicum was about Rs. 2.68 lakh per hectare while the average revenue was worked out as approximately Rs. 6.56 lakhs per hectare. Hence, per hectare, average net returns were around Rs. 3.88 lakhs. In the case of marigold cultivation, per hectare average cost was about Rs. 1. 18 lakh and total revenue was Rs. 3 lakh and farmers were getting annual average net returns of about Rs. 1.82 lakh. In the case of overall cultivation, the average annual net returns were Rs. 5.70 lakhs which are substantial as compared to other farm practices followed by the farmers (Table 11). Further, analysis shows that in the cultivation of commercial crops during the year, the human labour component constituted a major share of one-fourth of the total cost followed by seed and crop nutrients such as FYM and chemical fertiliser. The analysis reveals that the use of chemical fertiliser and plant protection

material varies across the crops but it is noticeable in the case of certain crops. It was found that the farmers were applying FYM once during the crop year. It was noted during the discussion with groups of farmers across the selected villages.

	Major Crops						
Particulars	Wheat	Tur	Bajra	Cotton	Soybean	Vegetables	Floriculture
Labour Cost (in Rs.)							
Machine (in Rs.)	3500	3600	1500	1500	1100	16000	10667
Animal (in Rs.)	0	1500	0	2000	2000	4667	4267
Human (in Rs.)	2500	3000	200	6000	5000	53333	40000
Material Cost (in Rs.)							
Seed (in Rs.)	2000	300	400	1500	4500	38000	20000
Fertiliser (in Rs.)	400	3600	500	4400	2800	33333	4000
FYM (in Rs.)	1200	0	0	0	1500	40000	0
Pesticide (in Rs.) Insecticides	2000	3000	0	2000	1700	23333	2000
Irrigation (in Rs.)	1667	1500	300	500	500	8000	2667
Harvesting (in Rs.)	2000	1500	1500	0	1800	12667	9333
Packing Material (in Rs.)	1500	700	450	300	300	20000	12000
Transportation Cost(in Rs.)	1600	560	800	800	900	16000	9333
Marketing Cost(in Rs.)	1500	750	150	1500	250	2500	3500
Total Cost (in Rs.)	19867	20010	5800	20500	22350	267833	117767
Total Revenue	34000	39900	10800	40000	42000	656000	300000
Net Returns	14133	19890	5000	19500	25550	388167	182233
Input-Output ratio	58:42	50:50	54:46	51:49	53:47	41:59	39:61

Table 10: Cost of production of Major Crops (in Rs./ Ha)

Source: Field Observation

The analysis shows that the cultivation of other commercial crops during the year yields substantial net returns as compared to that of traditional crops. In the cultivation of these crops such as vegetables and floriculture, the project interventions in terms of net-shed infrastructure have played an important role in developing the agricultural economy in the project area. In the cost of cultivation, the human labour component constituted the major proportion of chemical inputs including fertiliser and pesticides in the total cost of production. The substantial and irrational use of chemical inputs can be a challenge for climate-resilient agriculture. It may be because of the lack of awareness among the beneficiaries towards rational input use<sup>14</sup>. Because of the shade net activity of PoCRA, the farmers were able to cultivate high-value crops and get substantial benefits.

Further, it can be noted from the fact that there is no systematic input-output ratio among the different crops. Keeping in view the viability of shad net intervention, the farmers were demanding more support for this activity. They also expressed that the provision of shade net activity should be more comfortable so that the left-out farmers can be benefited. It can be stated that knowledgeable and progressive farmers who have the management capacity were found to be benefited considerably from this intervention<sup>15</sup>. The farmers reported that because of the pandemic, they have to face certain problems, especially relating labour and marketing.

**3.3.3.** *Inter-Cropping Practice*: 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. During the field visit, it was noted that the farmers were following the inter-cropping practices on the limited size of land.

<sup>&</sup>lt;sup>14</sup> 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.

<sup>&</sup>lt;sup>15</sup> It is observed during the interaction with the groups of farmers in the project villages. Only those farmers were getting benefits those have enrich in broader understanding about the modern agriculture operation.

The inter-cropping practices were not new but age-old. The farmers were following to minimize the environmental risks. Today, these practices are scientifically followed by the farmers. As per the farmers' priorities, institutional and technical, they were following inter-cropping practices. Under these practices, the farmers were following the combinations of Soyabeen+ Tuhar, Cotton+Soyabeen, Maize+Cotton+Moong, and so on (Table 12).

The analysis shows that in the case of Onion crop cultivation as well as seed cultivation, the farmers were getting a quantum of benefits as compared to other crops. Certainly, it is because of the PoCRA's support in terms of micro-irrigation including drip and sprinklers as well as water tanks that ensure irrigation facilities. Similarly, in the case of other combinations of crops, the extent of benefits was considerable<sup>16</sup>. Next to Onion cultivation, the benefits of Chilly seed production were also considerable. It is important to mention here that separate estimation of the cost of production was complex and therefore, it is ignored in the present context (Table 5). The adoption of cultivation practices such as keeping appropriate gaps in rows among different crops keeping in mind the varieties of the crop as well as sowing and maturity timings. The innovative ideas and practices that followed efficiently were the outcome of the Farmer Field School (FFS). Hence, the performance of institutional intervention can also be noticed considerably.

Particulars	Soyabeen	Cotton+	Maize+	Traditional	Zero	Onion	Chili
	+ Tunar	Soyabeen	moong	Practices	Tillage		seed
Labor Cost (in Rs.)							
Machine	1600	3125	2571	6250	2250	15000	4500
Animal	1067	1500	2143	3250	880	1500	1875
Human	1600	14286	22143	16200	8745	17500	62500
Material Cost (in Rs.)							
Seed	1227	1313	1750	2625	3500	25000	6250
Fertiliser	2800	1813	1250	3625	2500	11250	20000
FYM	1333	0	1500	500	750	7500	5000
Pesticide/ Insecticides	2667	1875	3750	2850	2480	3000	45000
Irrigation	6667	2500	4000	1250	1475	12500	10000
Harvesting	2480	2800	3211	2670	3500	9865	5600
Other	1867	2750	3750	860	990	750	6250
Total Cost (in Rs.)	23308	31962	46068	40080	27070	103865	161375
Total Revenue	81000	95625	94286	72800	84000	280000	312500
Net Return	57692	63663	48218	32720	56930	176135	151125
Input-Output ratio	29:71	33:67	49:51	55:45	32:68	37:63	52:48

Table 11: Cost of Cultivation of Selected Crop Combination in the Project Villages

Source: Field Observation

The zero-tillage technology has also played a crucial role in bringing down the cost of crop cultivation and resource conservation. It is observed that the farmers were showing interest in zero tillage technology. Initially, the farmers were reluctant in following this technique due to certain considerations like the appearance of the field at the initial stage. But as the zero tillage crops grow and mature effectively, they generated the interest of the farmers because of both quality and productivity crops grown under zero tillage crops. The available technological options not only help in increasing crop production but also contributed considerably to bringing the production cost and resource conservation, increasing crop productivity, cropping intensity, and improvement in soil health<sup>17</sup>.

<sup>&</sup>lt;sup>16</sup> See for similar findings, Harikrishna, Yeragorla Venkata et. al. (2019) "Agro-Economic Impact of Climate Resilient Practices on Farmers in Anantapur District of Andhra Pradesh" Indian Journal of Extension Education Vol. 55, No. 4. Jasna, V. K (2014) "Socio Economic Impact of Climate Resilient Technologies" *International Journal of Agriculture and Food Science Technology*, Vol.5, No. 3, pp. 185-190

<sup>&</sup>lt;sup>17</sup> This experience shared by the groups of farmers during the discussion. The similar experience also shared by the project staff deployed at the village level.

Keeping in view the foregoing discussion, It can be concluded that the farmers were 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. Hence, the ultimate objective of the project is missing. Farmers' priorities were to enhance profitability from the limited land resources<sup>18</sup>. To deal with such strategies of the framing communities, there is a need to strengthen the capacity building program so that project intervention can be made climate resilient.

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

Farmers' skills include problem-solving, interpersonal, farm management, and organisational skills. One can use these skills to use in a variety of ways, from communicating with farmhands to tending crops, repairing machinery, and so on. Skill development of the rural youth scheme of Govt. of India coupled with project initiatives such as exposure visits, social relationships among the farming communities across the villages and representatives of agriculture departments and allied departments as well as project staff deployed in the project villages has contributed well in building skills of the farmers. For instance, in project villages, the implementation and promotion of technological devices such as mobile computers, and modern farm implements have led to improvement in farmers' skills in dealing with emerging issues in farm activities<sup>19</sup>. The use of technology has also enabled farmers in the scientific application of various operations at the farm. Many farmers reported that computers, internet facilities, mobiles, etc. have helped them not only in accessing the market and other farming-related information and marketing their farm products but also helped them in learning about new farm operations and attaining training in repairing farm machinery. Further, various training and capacity-building programs at MANAGE, Hyderabad, and other local organisations like KVKs have contributed to substantially improving farmers' skills in making agriculture more economically viable. During the discussion, many farmers highlighted the need for a technology that can help them in getting information regarding disaster warnings and weather forecasting easily at the local level. The images below illustrate some of the use of electronic technology and farm implements in Tapovan village. Mobile technology is playing an important role in enhancing the skill of not only the farmers but also of farm laborers in terms of better monitoring and controlling crop irrigation systems.



The pictures reveal the use of electronic technology and farm implements in Tapovan village

<sup>&</sup>lt;sup>18</sup> This experience was shared by the project implementing staff. Some of the farmers also reported that same.

<sup>&</sup>lt;sup>19</sup> It is emerged during the interaction with a group of progressive farmers in Tapovan village and Tupewari villages in Jalna District.

# 5. Positive Behavioral Change in Agricultural Practices

It has emerged from the discussions with the group of farmers in the selected villages<sup>20</sup> that certain activities of the project such as drip and sprinkler irrigation have yielded desirable results in terms of a rise in quantum farm income from the limited size of land. It was also observed that the availability of extension services in a sustainable manner has helped in maintaining the interest of the farmers in farm operations which lead to a further increase in their farm income. The inputs provided by the experts from KVK have also helped farmers in reaping the benefits of the intervention. Suggestions have been received to focus on continuing interactions with the farming community as well as the beneficiaries to create confidence and promote positive behaviour amongst the targeted stakeholders<sup>21</sup> towards the project activities.

It was observed that not only technologies, but institutional arrangements have also contributed considerably to bringing out positive behavioral change in farm practices. For instance, in some of the villages, the emergence of informal financial institutions has enabled and encouraged poor farmers to avail resources to adopt climate-resilient technologies. Similarly, the sericulture activities, launched in the project villages of Aurangabad district, were observed to have resulted in scaling up of the activities to a larger extent.

Accordingly, it has been suggested to have a confluence of target groups, other stakeholders, and institutions such as market forces in the long run to ensure the sustainability of the impact. Further, there is a need to focus more on exposure visits and social relationship-building across communities for demonstrating the effects of climate-resilient agriculture technologies. This will help in increasing the adaptation of such technologies in the farming community.

#### 6. Resilience to Absorb Sudden Climate Shocks

Resilience is the ability to cope with adverse shocks and stresses and to adapt and learn to live with changes and uncertainty. The review of the literature notes that it is the 'ability to resist, recover from, or adapt to the effects of a shock or a change'. Resilience is a long-term approach, not only focused on the ability to bounce back but also on integrating adaptation and transformation while changing<sup>22</sup>.

Field Investigation has revealed "Shade-Net Intervention" as one of the assured result-oriented interventions in the targeted geographies. The success of this intervention can be assessed from the fact that improvement in productivity from shade-net intervention has motivated the farmers in the non-project areas to also adopted the shade-net technology by using local material. Resultantly, the demand for expanding the shade-net intervention in the non-project areas has been registered.

The images below showcase the shade-net technology being used by farmers from both project and non-project areas.



<sup>&</sup>lt;sup>20</sup> These farmers were belonged to joint family and availing facilities provided under PoCRA. Theses farmers were eligible for the project activities after the division of land holding among the other members of family while resources were in pool that were required for efficient function.

<sup>&</sup>lt;sup>21</sup> These view points were expressed by the representatives of project implementing agency.

<sup>&</sup>lt;sup>22</sup> ACF International (2013) Enhancing Resilience to Shocks and Stresses, Briefing Paper

https://www.preventionweb.net/

The provision of assured irrigation facilities and adaptation of climate-resilient technologies has not only increased the irrigated area for the farmers but has also increased the area under crop cultivation<sup>23</sup>.

Furthermore, the implementation of project interventions in the selected villages of Jalan and Aurangabad districts of Maharashtra has not only resulted in achieving the intended results in terms of increased yields, enhanced skills, etc. but has also played an important role in ensuring resource conservation as well as resource generation locally. One can observe this statement to hold from the fact that before project interventions, these areas were considered drought-prone areas resulting in various socio-economic challenges related to food security and livelihood. However, post-project intervention implementations, these areas have become relatively more resilient in terms of being more environmental as well as livelihood shock-free areas.

The project intervention has also helped in considerably improving the economic condition as well as living styles of rural poor households and thereby resulting in an increased regional contribution to the State's economy.

#### 7. Resilience to Market Price Fluctuations

The agriculture sector is usually subject to large price shocks, resulting in spatial-temporal differentiation in regional agricultural-economic resilience. In this context, an attempt has been made to understand the price fluctuation against the declared prices of various crops across the seasons and try to visualize the coping mechanism to deal with the situation under PoCRA interventions in the project areas.

To understand the market price fluctuation, only selected crops were considered for in-depth verifications. It was observed that the market institutions were inefficient and failed to yield the expected benefits to the farmers. The farmers were not satisfied with the market price offered to them. The farmers reported that due to a lack of an efficient marketing system, they are compelled to sale out the produce at the price offered in the local/informal and nearby markets.

Table 13 below captures the difference between MSP and the price received by the farmers for selected crops.

Сгор	Minimum Support Price (MSP)	Price Received	Gaps	Proportionat e Difference
Bajra	2250	1450	800	35.56
Maize	1870	1500	370	19.79
Tur	6000	4800	1200	20.00
Juar	2970	1800	1170	39.39
Soyabeen	3950	2600	1350	31.65
Wheat	2015	1350	665	33.00
Gram	5230	4000	1230	23.52

#### Table 12: Gaps between MSP and Price received for Marketed Produce

Source: CACP Reports and FGDs with the farmers

A wide variation can be observed between the minimum support price and the price received by the farmers of the selected crops. The gap ranges from 40% in Juar to 20% in Tur. These gaps in prices also vary across the marketed farm produce. Market inefficiency is cited as the reason behind the existence of such gaps in prices. The discussion with farmers reveals that sometimes the prices offered do not cover even the harvesting as well as transportation costs of a crop, making farming an economically inviable option for them. For instance, farmers reported that during the high production season, they often end up disposing of the produce, say potato, at Rs.2/3 per Kg. Such incidences cause distress among the farming community.

<sup>&</sup>lt;sup>23</sup> The expansion in area under crop cultivation has been notices in Pishor village in Aurangabad ditrict, where farmers cleared the unwanted vegetation and brought under crop cultivation.

Further, no provision of MSP for various commercial crops such as fruits, vegetables, and spices, makes the situation much worse for farmers as they end up exposed to the vulnerabilities of market forces which are responsible for determining the prices of these commodities. Thereby, creating more distress among the farmers.

However, POCRA interventions including provisions of assured irrigation through efficient methods like drip and sprinkler and shade-net technology have come as a blessing for farmers, especially small and marginalized farmers. This is because these interventions have helped these farmers in shifting away from the commercial cropping system. Further, the farmers using shade-net technology coupled with sound irrigation systems have considerably benefitted in terms of receiving rational market prices for their produce.

# 8. Development of Youth Entrepreneurship

Agri-based entrepreneurship has substantial potential of creating new employment opportunities for rural youth. It can help halt the migration of rural youth from villages to urban centers and helps in improving the living conditions of the farmers by providing an alternative source of livelihood. To make successful marketoriented farming, the farmers are required to be equipped with good farm management and entrepreneurial skills.

Experience from selected villages shows that the implementation of PoCRA activities has resulted in substantial changes in the rural economy and holds potential for further development. It is found that several youths were involved in various agriculturally based businesses such as transportation, farm inputs business, and farm implements-based supply and repair centers. It has emerged from the discussion with farmers, that there exists huge potential not only for agri-based businesses such as farm implements supply businesses but also for the development of value chain businesses such as food processing units. This will help in resolving the problem of emerging unemployment in the geography by providing substantial employment opportunities to youth<sup>24</sup>. Opportunity also prevails for mobilizing ICT and social media to promote and aware youth of careers in the agriculture sector<sup>25</sup>.

There is a high need for Government to hold discussions regarding the introduction of MSP provision for commercial crops. To promote entrepreneurship in agriculture, financial assistance may be provided for starting a farm/non-farm business in the Agriculture sector.

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

Sustainability is a crucial issue in PoCRA intervention. Certain activities such as the provision of assured irrigation with water-saving technologies, and the installation of shade nets, and water tanks by both community and individuals have played an important role in resource conservation and regeneration in the project villages. Interestingly, the farmers were following climate-resilient technologies in crop cultivation. It is also noted that the farming communities were more concerned with the economic viability of crop cultivation rather than the optimality of resource use. Certainly, it needs certain technological options and institutional reforms like strengthening capacity-building programs which can help to ensure the sustainability of the impact created.

*i. Generation of Employment Opportunities*: PoCRA has been successful in generating substantial employment opportunities for both male and female categories within and outside the selected villages. It is important to note that there is a growing demand for human labor in crop production, especially in the case of horticulture and floriculture. The growing demand for labor is, generally, met from outside the village, thereby creating ample employment opportunities for the outside workforce. In the project villages, there was a considerable proportion of landless households such as about one-fifth in Pishor village while it constituted about one-ten and more in Tapovan and Tupewari villages. It emerged during the discussion with a group of farmers that most of the landless farmers were availing employment opportunities within the villages<sup>26</sup>. Hence, it can be inferred from the fact that PoCRA

<sup>&</sup>lt;sup>24</sup> Based on the discussion with group of farmers and representatives of various stakeholders across the selected villages and out-side the villages.

<sup>&</sup>lt;sup>25</sup> https://ap.fftc.org.tw

<sup>&</sup>lt;sup>26</sup> It is emerged during the discussion with groups of farmers in the respective villages that workforce with landless households were getting the employment opportunities with the project villages. It is evidenced from the fact that in Tapovan and Tupewari villages no landless household goes out-side the villages for the search of wage employment.

activities played an important role in employment generation not only for the farmers but also for the resource-poor/landless households.

- *ii. Migration:* PoCRA interventions have worked positively in solving the migration issues of the project villages. The interventions have been able to create ample employment opportunities through increased demand for labor for accomplishing farm activities across different seasons, thereby eliminating the out-migration of labor from the project villages. Because of the growing demand for labour in farm operations especially in the case of seed production in-migration has increased considerably. In these villages every day, about 125 to 150 farmer workers both males and females come to the villages where intensive project activities have taken place. While in the peak period of farm activities, the in-migration of farm workers increases to around 250-275<sup>27</sup>. within and outside the project villages within and outside villages.
- iii. Discrimination in Wage-employment: Past trends in the project villages show that there was a considerable difference ranging from one-fourth to one-third, in wage rates of male and female farm labor<sup>28</sup>. However, as mentioned previously, POCRA interventions have resulted in an excess demand for farm labor. For instance, in the villages of Tapovan and Tubewari in Jalna district, substantial demand for farm labor was witnessed in seed production and floriculture during the peak season creating an excess demand situation. Presently, the wage range for both males and females was equal i.e. Rs 450 per day. Given the limited supply of farm labour at a particular point in time, this has resulted in reducing the discrimination in wage employment. Hence, one can infer that POCRA interventions have also been able to reduce/eliminate wage differences across gender in the project villages.
- *iv.* Status of Health and Nutrition: During the limited period of project interventions i.e. three and half years, the project has brought considerable and satisfactory outcomes as per the beneficiaries' perceptions. There is a considerable impact on the health and nutrition status of the village population as a whole in the villages as well as that of adjacent villages. The consumption pattern of households has changed from ordinary to more nutritious food in the form of green vegetables and fresh fruits. It improved the health status of the villagers<sup>29</sup>. It is also noted the fact that rural households realised inner happiness among them. Their lifestyle has improved considerably because of the substantial increase in household income<sup>30</sup>. After the project interventions, they remained busy with farm-related activities throughout the days and crop seasons. It can be inferred from the fact that sometimes, social considerations hampered the process of development. But, economic wellness resolved the social issues.

#### 10. Economic Analysis

The results of the economic analysis include the values of project benefit, project cost, and the IRRs as depicted in Table 6.

Overall project, analysis shows that benefits from investments across the different components are aggregated. Project costs include the costs of all project activities implemented in the villages as well as operational and maintenance costs that are expected after the completion of the project and during the full lifetime life of 20 years.

Further, the analysis shows that the project was found economically viable with an EIRR of 24 percent. EIRR will be affected in the case of changes in the cost and benefit streams by a 20 percent increase and decrease respectively. Keeping in view the remaining time for the completion of the project, the financial resources that are supposed to be spent in the time ahead can affect the estimates. The analysis shows that EIRR will be considerably higher at 24 percent. It shows that the completion of certain uncompleted activities of the project will certainly bring the desired results as compared to the expected benefits. Similarly, a sensitivity test for an overall will be 16 percent in case of a decrease in the level of benefits and an increase in cost during the time

<sup>&</sup>lt;sup>27</sup> It is reported by the group of farmers especially progressive farmers in Tapovan and Tupewari villages.

<sup>&</sup>lt;sup>28</sup> There were considerable changes have been taken place in these villages, For details see the Concurrent Monitoring Reports- Round VI & VII.

<sup>&</sup>lt;sup>29</sup> It realized by the village communities during the interaction with them. There is no formal data on this aspect but realized by the households in the all the selected villages.

<sup>&</sup>lt;sup>30</sup> For the same findings, please see the previous Concurrent and monitoring Reports and Mid-Term evaluations Report.

ahead. Thus, the project is expected to have a robust economic performance as evidenced by the high EIRR and the relatively large changes in the performance of various activities of the project.

The analysis also shows that the project intervention has achieved the proposed goals in certain respects. Keeping in view, the available unused resources and efficiencies gained till now, it worked out that the project will be able to enhance the production of Wheat seed by two-thirds. It will be possible on the ground of certain efficiencies performance. In the next more than two years, the project will be viable It will also be viable in case of changes in benefits.

Particulars	At Present
Costs	
Investment costs in three selected villages	
Total Cost of all Implemented Activities	475
Estimated Annual O&M Cost	24
Benefits	
Annual Incremental Returns	130
Incremental Net Benefits Total/year	106
Incremental Net Benefits Total per ha/year	83783
Returns	
ENPV (Base)	114
EIRR (Base) %	24
Sensitivity Analysis	
ENPV (Base) 20%	19
EIRR (Base)	4

Table. 6 Summary of Economic Analysis (Rs. in Lakh)

It has emerged from the fact that there is a substantial development in area, production, and productivity of various crops to a larger extent that has boosted the rural economy. Since the launching of the project, it was noticeable that the efficiency level of project interventions has improved considerably in various aspects of the project such as resource conservation and regeneration in the framework of climate resiliency and sustainable livelihoods in the Marathwada region of Maharashtra.

# Annexure 9: Field Visit Notes of Environment & GIS Expert

#### Introduction

A field visit was conducted in various villages of Beed and Jalna districts on the 5th and 6th of January 2023. Project Director, FPOs, Village Agriculture Assistants, and farmers interacted with and interviewed during the visit.

#### Insights from the field visit

During the visit, a meeting with Mr. Subhas Salve, Project Director, in the Beed district was scheduled. He described the PoCRA project's progress and the benefits that farmers received from the PoCRA. Field visits were conducted in Nalwandi Villages of Beed District on the 5th of January. Under the PoCRA project, fourteen farm ponds were constructed. A couple of farm ponds were visited in these villages; these structures were built under the PoCRA project and were completed in 2019. Taking advantage of this structure for the past three years.

Before the construction of the farm pond, there was a water shortage and traditional crop framing was done such as Soybean, Cotton, etc. They shifted horticulture crops after constructing the structure. He has begun to cultivate Mosambi, Sweet Lemon, Guava, and Lemon trees. He will have harvesTable fruits this year. The

farmer owns 2 acres of cropland for horticulture. He is currently attempting to intercrop Chana and Haldi. Because of the improved water availability due to Farm Pond, he was able to irrigate plants all year long. The farm pond's building has boosted water accessibility as well. The farm pond also supports fish aquaculture. In June 2022, the farmer received a Sericulture sanction through the PoCRA program. He cultivates mulberries on two acres. He is growing Mulberry leaves using farm pond water.



Farm pond, Horticulture cropping, Mulberry farming, and Sericulture in Nalwandi village, Beed District

# Case Study 1 - Capsicum crop in the Beed district's Samnapur Village Beneficiary Shade net.

Samapur village visited and interacted beneficiary farmer The farmer is growing Capsicum in a shade net built on 0.5 acres of land. Following losses in his traditional Cotton farming, the farmer has shifted to shade net farming. He is irrigating with drip irrigation and drawing water from a farm pond that was built in 2019. He has been using farm pond water for the past three years. Water is available all year. The farmer did not farm the Summer crops before building the farm pond. But now He farms all year and grows vegetables as well. During the visit, it was observed that the farm pond fencing and sign board were missing. According to the farmer's perception, rainfall has increased in the last three years, and he experienced a water availability problem in 2018. Since then, no incidents of less water availability have occurred.



15 tones of capsicum were produced in the shade net during the previous season. With the use of a farm pond and a shade net, farmer income is increased in comparison to traditional crops.

A grain separation and grading unit was visited in the Beed district's Sakhare Borgaon village. The PoCRA scheme led to the establishment of this FPO in March 2022. The FPO is now running on Jowar, Rajma,

Soybean, Chana, and Wheat from the nearby farmland. The FPO has 100 farmers from the neighborhood as members. In comparison to prior Cotton growing, the beneficiary is currently making good money.



Grain separation and grading FPO at Sakhare Borgaon village, Beed district.

On January 6th, 2023, the villages of Kolkawadi and Sivli in the Jalna district visited and interacted with farmers. At Kolwadi village, three farm ponds were built as part of the PoCRA program. Under the scheme, three community-dug wells have been sanctioned although preparation has not yet begun. Construction of these three farm ponds was finished in 2019 and they have been utilising the benefits for the last four years.



# **Case Study 2 - Farm Pond and Cotton Farming**

Four farm ponds were planned as part of the village development plan, and three of them are now built and operational. The names and information boards for some farm ponds were missing. Farmers stated during the interaction that the farm ponds were extremely beneficial to them. They worked in agriculture for the entire year. In a few farm ponds, the protective fencing has been damaged. This structure is useful during the Summer and other non-rainy seasons. As a result of this structure, water level, and percolation have increased. Four to five farmers benefit from these farm ponds. The farmer farms Cotton on 15 acres of land. The farmer grows Soybeans during the Rabi season. Crop yield and revenue have both increased because of these farm ponds. They provide water from the farm pond when other farmers require it. Because of the availability of farm pond water, they were planning to switch to vegetable cropping. Under the PoCRA program, one beneficiary farmer in Sevali village established a farm pond (15m X25m X 15m), shade net, and Onion storage he also has a dug well with a solar-powered water pump. The shade net is irrigated with water from the farm pond. In the farm pond, the farmer practices pisciculture. There is no shortage of water on the farm.

# Annexure 10: Field Visit Notes of Sociology Expert

The following project villages in Aurangabad and Beed district were visited:

- Asegoan
- Shindhi
- Hoal

A case study on the pastoral community in the Marathwada region is done to highlight the co-benefits of PCORA interventions which aims to enhance the livelihoods of tribal and landless. It is observed that the community desires to become a direct beneficiary of the program and flagged a few inclusive suggestions such as - training in primary health care of sheep/goat so that they can provide their services in the neighboring villages (non-POCRA villages) for the pastoral communities for a nominal fee, veterinary support/health camps for their sheep/goat twice a year as part of the support for the 'landless', grazing land – earmark common land for pastoral communities during the rainy season, market support/buyback scheme from POCRA for wool and meat, and training for wool processing. The indirect benefit received by the pastoral community due to POCRA intervention (which has resulted in improved water availability and agricultural productivity) has made it possible for the sheep to access fresh and nutritious fodder as grazing commons have declined. In addition to fodder, the pastoralists also received cash or grain in exchange for valuable manure. This has strengthened the reciprocal relationship between pastoralists and local farmers not only by providing food and livelihood security in a variable environment but also forging interdependence across caste-class lines, of shared respect and care.

# Participation of SC and ST communities in Project Activities

One of the major objectives of the project is the adequate representation and participation of vulnerable groups like SC and ST in all project activities. Some of the activities specifically targeted for SC and ST communities include –

- VCRMC representation (Progressive farmer (male) 2, progressive farmer (female) 1)
- Cluster level plan Asses special needs of SC/ST farmers
- Integrated farming system creating self-sustaining livelihood opportunities for the SC/SC communities covering activities like small ruminants, backyard poultry, sericulture, apiculture, inland fishery
- FFS for technology dissemination Coverage of SC and ST farmers having less land holding
- Protected cultivation (shade net, poly house, polytunnel) coverage of SC and ST farmers and provision of matching grants, facilitating credit accessibility
- Micro-irrigation systems inclusion of SC and ST farmers
- Custom hiring center equal opportunity accessibility

In the Marathwada region, the overall participation of SC and ST communities in project activities generated mixed responses. In terms of VCRMC representation, all the project villages had the mandated number of representations from SC and ST communities including women farmers. Most of the time, men actively participated in the review of project progress, guidance to farmers regarding applications for matching grants, approval of the application, payment information, and liaison with the department for payments. However, the active participation of women members was reported to be low. They expressed that they are usually busy with household chores and other responsibilities and did not find it important to attend meetings. Even when they attended meetings, they did not voice their opinion or follow up on the application status.

During the planning processes, most often special needs of SC and ST communities were assessed and attempts were made to integrate them into the implementation processes. The major benefit availed by progressive SC and ST farmers was support for micro-irrigation systems (drip/sprinkler) for horticulture plantations. They did not face any hurdles in pre-sanction or fund disbursement. Farmers also reported an increase in their farm yields due to micro-irrigation. Nonetheless, many SC and ST farmers could not utilise this opportunity due to a couple of external and internal factors. Some farmers expressed that some of them have already got sprinkler sets as part of another Tribal welfare scheme where a 100% grant was provided. So, they expected POCRA also to give 100% subsidy and provide micro-irrigation to all the remaining tribal/ST households in the village. They are also of the opinion that any government schemes which do not offer at least 80% of subsidy for ST/SC/tribal communities are not even worth considering. Another concern raised is that framers can get reimbursement only after the completion of the activity and submission of bills. However, they are constrained by a lack of resources (cash in hand) to invest upfront in micro-irrigation systems since they would already be constrained due to other expenses like land preparation, buying of saplings, and labour costs among others. They are not able to mobilise institutional credit for an upfront payment and they are not

keen to take any credit from local money lenders. Further, most of the farmers did not have any savings/cash in hand to avail this benefit.

Participation of SC and ST farmers in FFS was not found to be promising, although the agricultural assistant and FFS coordinator had motivated them to avail of this benefit. The key challenge in availing of FFS benefits was a lack of awareness and motivation. Some farmers who attended a few demonstrations mentioned that they did not find the session useful and also found the technology difficult to understand. SC and ST farmers expressed a desire to avail benefits of polyhouse and shade net but stated that it required a much higher amount of investment and it becomes difficult for them to take it up at the individual level. The Agriculture Assistant (AA)also said that the response to polyhouse and shade nets in villages dominated by tribal populations has been poor. In the Marathwada region, the SC and ST farmers hold about 10% of all the operational farm holdings and the common demand from landless is support for allied activities such as poultry, goat rearing, and dairy. These activities were stopped abruptly in January 2020. In the absence of specific livelihood programs, the landless often migrated to other villages/cities as daily wage laborers for nearly 6 months a year in search of productive employment.

# Annexure 11: Factsheets of 16 FPCs

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
Location	Beed	Osmanabad	Nanded	Hingoli	Latur	Hingoli
Year of establishment	Jul-20	Sep-20	Feb-20	Feb-20	Sep-20	Jan-20
List of key activities before PoCRA	Agricultural work	Processing of Soybeans & gram	Traditional farming	No activity	No activity	No activity
Source of information about PoCRA	Son (B.Sc Agri), Agriculture assistant	Social Media	Skill India program	Agricultural assistant, Friend	Seminar by District Officer	Agricultural Assistant
PoCRA supported activities	CHC, Spice unit, Refer-van	Pulse mill	СНС	CHC, Goat Breeding	Godown	Goat Breeding
Cost of PoCRA- supported activities	Received: Rs. 9 lakhs	Received: Rs. 11 lakhs	Received: 11.5 Iakhs Owned: 20 Iakhs	Received: Rs. 11.5 lakhs	Received: Rs. 24 lakhs	Received Rs. 11.75 lakhs
Source of funding	Own investment and bank loan	Own investment and bank loan	Raised funds from all the members; remaining amount from the bank	Own investment	Own Investment and Bank loan	Own funding; partnership of members;

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
Current status activity	Project established; took almost a year to establish;	Currently ongoing	Project is ongoing; took about 11 months to set up the initiative	Project established	Project established and in progress.	Smooth progress, with 70 goats in shed; took 9-10 months to set the project;
Participation and decision making						
Average attendance in group meetings	60 - 65%	All members	All members	7-8 members	20-22 members	8 - 9 members
Participation of members	All Members engage	Some members speak	Every member speaks	Every member engage	All members participate	Every member engage
Efforts for participation of women, vulnerable and tribal community farmers	Try to employ masala and fair wages	Invited and encouraged to speak	Tell women to increase participation	Ask them to join	Offer them one bag of fertiliser free after 30 bags	Ask them to join
Book-keeping and records						
Types of records maintained	Attendance, stock, and cash register	Stock register	Stock register	Attendance, stock, and cash register	Attendance, stock, and cash register	Cash register
Records maintained by	Member	Director	Member	Chairman	Assistant	Chairman

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
Training/ Capacity building of members.						
Number of trained members	15-20 members	30-40 members	20 member	7 - 8 members	2 members	10 members
Place of training	Villages	Aurangabad	Pune	Aurangabad and Pune	Pune	From PoCRA
Topics of training	Machine operations, packaging	Business plan, Seed & material, waste management	Business plan, tools, & financial management	Machinery rental and agriculture	Training at Vakhar corporation like storing, cleaning & stocking of goods	Goat breeding & rearing
Impact due to training	Marketing and profits increased	Benefit to all members	Time savings due to use of implements	Timely agricultural work helped in increasing income and production	Ease of Work	Training was good, but no profits from goat rearing due to disease
Further training requirements	None	Market linkage training so that Dal Kendras can run more smoothly	Training in using new technologies	None	None	New technologies like shade net, polyhouse, etc.

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
List of environmental safeguards followed	No felling of trees, waste management bins, and wash basins installed	Toilets and hand washing facilities for wet and dry waste etc	Planted teak trees on the side of agriculture; managed wet and dry waste	Planted trees, constructed toilets, and followed environmental protection	Constructed toilets, provided hand washing facilities, managed wet and dry waste	No environmental damage during project construction; Build sheds on barren land
Site Specifications of FPC/FPO from environmental perspective	Built in an environmentally safe place	Built in an environmentally safe place	Built in a safe place away from the forest reserve	Constructed far away from wildlife conservation area, far from industrial zone too, no sewerage, etc., at site	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	Not equipped with fire safety standards; aware of water management work	Not equipped	Not equipped with fire safety standards but aware of water management work

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
Benefits due to PoCRA	Employment to 50 to 60 people, provided business to the farmers along with agriculture, through CHC, Work is done on time, agricultural implements are available at a low cost	Got dal mill unit which benefits all members	Climate-friendly technology helped in facing challenges of climate, machine helped finish all the farm work on time, BBF sowing increased our production	Migration in village has reduced as farmers are looking at agriculture from a different perspective, increase in income and production	Project has increased storage proximity for farmers, guaranteed price of Gram as government procurement center has benefited the organisation, Eg. Rs. 10 lakh rupees from Soybeans; Plan to start 5000 bags of seed processing which will generate profit of 15 to 20 lakh rupees.	Not much benefit as despite much care 30-35 goats die every year due to natural disease
Challenges faced	Market linkage challenges initially	Bank linkage and market link, difficulties in getting loan from the bank	Accumulation of capital	None	Documentation takes a lot of time and money	No challenges in setting up the project, but controlling the disease in goats was a big challenge
Feedback on FPO portal	None	Willing to provide all facilities from seed to purchase of goods	Portal is good and accessible	Portal is good	Good portal, farmers get bean bags on subsidy	Very good

FPC Details	1	2	3	4	5	6
Name	Adikant Agro FPC	Varad Vinayak FPC	Deshmukh FPC	Rayatecha Raja FPC	Alok Sanjeevani FPC	Appa Swamy FPC
Feedback on project staff	Good cooperation from project staff like Agriculture Assistant, SDO	Received proper guidance from project staff	Project staff are prompt & all employees have helped us	Agricultural assistants and other staff cooperated and timely sharing of information	Very good cooperation, but only document takes time	Active Project staff
Suggestions for PoCRA	None	Grants for construction of godowns should be increased; Additional space for the MIDC quota	Provide sprayers and harvesters, training on new technology	Maximum number of new villages should be included in this scheme	Instructions (terms of the project) should be relaxed to some extent	Include new villages

FPC Details	7	8	9	10	11	12
Name	Jadai Devi Agro FPC	Dattprayag Gat	Bankatswami Agro FPC	Aaradhyapur FPC	Akash Agro FPC	Dhansanchay Agro FPC
Location	Jalna	Parbhani	Beed	Nanded	Aurangabad	Parbhani
Year of establishment	Aug-21	Aug-20	Oct-19	Feb-19	Jul-10	Aug-20
List of key activities before PoCRA	Recently established	Buying grain through NAFED	No activity	No activity	Onion & seed production	No activity
Source of information about PoCRA	Agricultural assistant, Friend	Self Initiative, Internet	Agricultural department	ATMA Office, Helped by ATMA staff and Taluka officer	Village Announcements, Agriculture Assistant (AA)and Taluka Agriculture Officer and Cluster Assistant	Agriculture Assistant
PoCRA supported activities	СНС	Godown	Cattle feed, Grain processing	СНС	Grain processing unit	СНС
Cost of PoCRA- supported activities	Received: Rs. 11.97 lakhs	Received: Rs. 9 lakhs	Received: Rs. 8 lakhs	Received: Rs. 11.37 lakhs	Received: Rs 23 lakhs	Received: Rs. 9 lakhs
Source of funding	Partnering with all members for Rs. 1.25 lakh each	Collection from all members	Own investment	Members sourced funds	Bank loan and promoter contribution	All members sourced own funds
Current status activity	Project established; took 3-4 months to set up	Installed and working	Project established; took 6 months for the setup;	Project established; took 6 months for the setup;	Project established; took 4-5 months to set up	Project establised; took 3 months to set up
Participation and decision making						

FPC Details	7	8	9	10	11	12
Name	Jadai Devi Agro FPC	Dattprayag Gat	Bankatswami Agro FPC	Aaradhyapur FPC	Akash Agro FPC	Dhansanchay Agro FPC
Average attendence in group meetings	10 members	50%	60-70 members	All Members	15	25 -30%
Participation of members	Every member engages	All members engage	Each Member engage	Every member engages	All members engage	Each member shares their opinion
Efforts for participation of women, vulnerable and tribal community farmers	Use subsidy as a medium to promote people to take the scheme	Implements provided at lower cost	To encourage, buy Soybean from them and give them good price	Implements are provided at a lower cost	Awareness about PoCRA and associated benefits	Inform them about new schemes and trying to improve their lives.
Book-keeping and records						
Types of records maintained	Machine lease register	Attendance, stock, and cash register	Attendance, stock, and cash register	Attendance, stock, and cash register	Stock register	Attendance, stock, and cash register
Records maintained by	Secretary	Chairman	Chairman	CA Kadam	Chairman & Member	Manager
Training/ Capacity building of members.						
Number of trained members	No training	No training	10-20 members	No training	15 members	5 members
Place of training	NA	NA	Aurangabad	NA	Aurangabad	Venomicon, Pune

FPC Details	7	8	9	10	11	12
Name	Jadai Devi Agro FPC	Dattprayag Gat	Bankatswami Agro FPC	Aaradhyapur FPC	Akash Agro FPC	Dhansanchay Agro FPC
Topics of training	NA	NA	FPC operations	NA	Wheat & seed processing, business plan making, financial management	Training on how to create a market link and business plan and how to grow the business
Impact due to training.	NA	NA	Helped in reducing mistakes and maintain statement of account	NA	Training increased production and now farmers getting higher prices for processing the good	More informed about business operations, how to market a crop, and selling price dynamics
Further training requirements	Trained in wood oil	Need training for industrial processing unit	None	Training in market, business plan, how to pack and grade	Training in market link, pricing, waste management	How to improve marketing and packaging
List of environmental safeguards followed	Have toilet arrangement, garbage management, no trees are felled, unit away from the drainage channel, and is above the flood line, away from all wildlife protected areas.	No trees were felled during project construction	Availability of toilet facility and handwash, solid and liquid waste management, pollution management	Don't know	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

FPC Details	7	8	9	10	11	12
Name	Jadai Devi Agro FPC	Dattprayag Gat	Bankatswami Agro FPC	Aaradhyapur FPC	Akash Agro FPC	Dhansanchay Agro FPC
Site specifications of FPC/FPO from environmental perspective	Away from the drainage channel and above the flood line, away from all wildlife protected areas	Built in an environmentally safe place	Built in an environmentally safe place	Built in an environmentally safe place	Built in environmentally safe place, drainage channels, wildlife sanctuaries, above the flood line, and far from industrial zones	Built in an environmentally safe place
Fire safety standards and water management strategies	Not equipped with fire safety standards but aware of water management work	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
PoCRA	Agricultural implements made the work easier	earlier went in outsourcing of the tools; also got 60 percent subsidy under the project.	Access to venicles for transportation; Farmers got wages	tilling and harvest and implements used at lower than market rate	production has increased, income has increased, due to value-added processing;	work done quickly and money saved & income of the farmers increased; helped use implements at a lower rate than market rate

FPC Details	7	8	9	10	11	12
Name	Jadai Devi Agro FPC	Dattprayag Gat	Bankatswami Agro FPC	Aaradhyapur FPC	Akash Agro FPC	Dhansanchay Agro FPC
Challenges faced	No problems but need more training, so that the farmers can increase the production	Bank linkage was not received, project staff and officers were busy with their work	Market linkage and management of funds	Organising funds required for the project	Information about digital marketing and training on waste management	Issues with bank linkage and long process for loan approvals
Feedback on FPO portal	Easy to use	No information	Not Aware	Not Aware	Good	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 project officer, SDO, and other staff	Agriculture trainers from TAO, AA, CA	Help by Krishi Assistant and Sub Divisional Officer, along with staff members
Suggestions for PoCRA	Include new villages	Files of the farmers should be routed as soon as possible, and project file should not be delayed	None	Project staff should help in raising capital	Solar system should be introduced; value addition due to cleaning and grading; select new villages; provide bank loans	Approve the project and loan at the earliest

FPC Details	13	14	15	16
Name	Muktai Agrotech FPC	Gangagiri FPC	Malojiraje FPC	Krantijyoti FPC
Location	Jalna	Aurangabad	Aurangabad	Beed
Year of establishment	Dec-20	Nov-20	Sep-19	Jul-13
List of key activities before PoCRA	Dal mill	Farm work	No activity	MSP Centre
Source of information about PoCRA	Agricultural Assistant	Gram Panchayat (GP), Rozgar Sevak, Village sarpanch and Agricultural assistant	Agriculture Department Officer and got guidance from Swarup FPC	Agricultural Assistant
PoCRA supported activities	СНС	СНС	Sillage unit	СНС
Cost of PoCRA- supported activities	Received: 11.92 lakhs	Received: Rs. 6.95 lakhs	Received 60% grant	Received: Rs. 20 lakhs
Source of funding	Own investment	Members sourced funds	Raised funds from all the members; remaining amount Rs. 50 lakhs from the bank	Members sourced funds
Current status activity	Initiative's current status is unsure;	Project established, took 6 months for the setup;	Project established, took 3-4 months for the setup;	Project established, took 5-6 months for the setup;
Participation and decision making				

FPC Details	13	14	15	16
Name	Muktai Agrotech FPC	Gangagiri FPC	Malojiraje FPC	Krantijyoti FPC
Average attendence in group meetings	11 members	All members	All members	All members
Participation of members	All members	All members engage	Yes, actively participate in every meeting held after every three months	We make decisions unanimously
Efforts for the participation of women, vulnerable and tribal community farmers	Encourage by discussion	Given implements on lease	Encouraged to increase their participation	Help to get the benefits from the bank.
Book-keeping and records				
Types of records maintained	Farmers register, machine lease register	Attendance, stock, and cash register	Attendance, stock, and cash register	Machine lease and cash register
Records maintained by	Director	Chairman	Member	Member
Training/ Capacity building of members.				
Number of trained members	11 members	No training	Few members	Few members
Place of training	PoCRA	NA	Gujrat	Don't know

FPC Details	13	14	15	16
Name	Muktai Agrotech FPC	Gangagiri FPC	Malojiraje FPC	Krantijyoti FPC
Topics of training	Help farmers increase their income using modern technology	NA	Fund and guidance to start a business of silage making	Training of market linkage
Impact due to training.	Information about modern technology; income increased; production increased and the financial condition of the farmers improved	NA	Don't know	Don't know
Further training requirements	Using climate resilient modern technology, shade net, polyhouse, food processing	Need training on BBF technology	None	Bank linkage
List of environmental safeguards followed	CHC has been constructed on vacant land and no trees have been cut, toilets have been constructed	Don't know	No trees were cut and made vermicompost from garbage	Built the project by taking care of the environment

FPC Details	13	14	15	16
Name	Muktai Agrotech FPC	Gangagiri FPC	Malojiraje FPC	Krantijyoti FPC
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. safe from things	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	Not equipped with fire safety standards but 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	Farming implements help get work done on time and increased profits	Machines helped in saving time and money	Generated employment	Machines helped in saving time and money

FPC Details	13	14	15	16
Name	Muktai Agrotech FPC	Gangagiri FPC	Malojiraje FPC	Krantijyoti FPC
Challenges faced	None	Issues during market linkage and capital	No challenges faced	Problem during fund collection
Feedback on FPO portal	Good	No information	Good	Good
Feedback on project staff	Staff cooperation was good	Help from the project staff, like Agriculture Assistant, Block Development Officer, SDAO	Officers gave guidance from time to time while filling the form, but we faced network issue	Good process
Suggestions for PoCRA	Include new villages; provide subsidies with bank loans	None	Support for the milk processing	None



# Head Office

C - 126, Sector 2, Noida - 201301, Uttar Pradesh +91 120 4056400-99, +91 120 4127069



Head Office Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi – 110 003 +91-11-24682100