Concurrent Monitoring – Round V Report

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

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

Submitted by

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Abbreviations

AA	Agriculture Assistant
BBF	Broad Bed Furrow
CA	Cluster Assistant
COVID-19	Corona Virus Disease 2019
CBP	Capacity Building Program
CFP	Community farm pond
CRAT	Climate Resilient Agriculture Technology
DBT	Direct Benefit Transfer
DSAO	District Superintending Agriculture officer
FFS	Farmer Field School
FPO	Farmers Producers Organisation
FPC	Farmers Producers Company
GF	Guest Farmer
HF	Host Farmer
IDI	In-Depth Interview
M&E	Monitoring and evaluation
MIS	Management Information System
NRM	Natural Resource Management
PDO	Project Development Objective
PoCRA	Project on Climate Resilient Agriculture
PS	Project Specialist
SDAO	Sub-Division Agriculture Officer
SHG	Self Help Groups
TAO	Taluka Agriculture Officer
VCRMC	Village Climate Resilient Agriculture Management Committee

Executive Summary

Introduction

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

Sambodhi, in partnership with TERI, is conducting M&E of PoCRA in all eight districts of Marathwada region. As part of the monitoring and evaluation of the project, one of the key components is to conduct concurrent monitoring of the project, which is being conducted bi-annually for six years. Concurrent monitoring aims at finding out what are the bottlenecks in the implementation of each project component and suggesting solutions for the same. It also aims to get beneficiary feedback on the key processes of the different project components. Further, concurrent monitoring also aims to assess the progress of the project on key results frame indicators, which are measurable through concurrent monitoring rounds. The first concurrent monitoring was conducted from the start of the project till 31st March 2019. With a plan to conduct a total 12 rounds of concurrent monitoring in every six months, the current round, i.e., the fifth round of concurrent monitoring, has considered the period from 1st October 2020 to 31st March 2021.

Methodology

Like previous rounds of concurrent monitoring, the current concurrent monitoring-V (CM-V) focused on the concurrent process and progress monitoring whichincludes different components such as: Individual matching grants accessed using Direct Beneficiary Transfer (DBT) application, farmer field school for demonstration of climate-resilient and sustainable farming practices, construction of community assets which are aimed to benefit the farming community of the area including natural resource management works and community farm pond, farmer producer organizations and self-help groups for strengthening post-harvest and value chain strengthening agri-business activities. Feedback on the functioning of Village Climate Resilience Management Committee (VCRMC), Krishi Tai, satisfaction in project planning, micro-planning, support from project staff, support received and expected by the FPOs/FPCs etc., was also analyzed in the project and control villages. The project MIS data for the period was also analyzed to understand the progress of the project activities during this period. The study area is comprised of eight districts of Marathwada region of Maharashtra viz. Aurangabad, Beed, Nanded, Hingoli, Latur, Osmanabad, Parbhani and Jalna.

A mixed-methods approach has been adopted for all the concurrent monitoring surveys of PoCRA conducted till yet. CM-V of PoCRA project followed the same methodology which was used in the previous rounds of concurrent monitoring. As part of this, we have interviewed beneficiaries of different PoCRA components from the project area and from comparison areas (where beneficiaries of similar interventions were interviewed). A quantitative survey tool for the beneficiaries and qualitative interview schedules for the other key project stakeholders were finalized in discussion with PoCRA PMU team. Concurrent monitoring round V survey was conducted in 30 project and 15 comparison villages. The purpose of the quantitative survey was to get the feedback of project beneficiaries on activities of PoCRA and also to get feedback of beneficiaries of similar interventions in comparison villages. A sample of 675 beneficiary respondents were targeted to cover under the quantitative survey, however with slight overachievement, a total 773 samples have been covered with 515 respondents in project and 258 respondents in comparison areas. As per the methodology of CM-V, it was ensured that project to comparison respondent ratio remains 2:1.

Also, as part of the qualitative component, 30 FGDs with VCRMC members, 8 FGDs with Project Specialists; and key-informant interviews of 9 SDAOs, 10 Taluka Agriculture Officer, 10 Agriculture Supervisors, 28 Cluster Assistants, 28 Agriculture Assistants, 6 DSAOs, 10 FFS Facilitators, 10 FFS Coordinators, 15 Krishi Tais and 10

FPC/FPO members were conducted. These interviews were administered to get their feedback on project implementation, understand the key challenges in project implementation and suggest appropriate solutions along with other relevant areas of interest. In addition to quantitative survey and qualitative interviews, expert field visits were also conducted.

Summary of Key Findings in Concurrent Monitoring Round V

Cultivation Practices

The average land under Kharif in project areas is 5.3 acres which is more than comparison areas (4.6 acres). Similarly, under rabi crops, an average area under cultivation is 4 acres in project areas which is more than comparison (3.5 acres) areas.

It is observed that access to irrigation facilities has improved in project clusters in the current round (94%) as compared to the CM IV round (91%). The most common Kharif crops cultivated in both project and comparison clusters included Soybean, Cotton, and Pigeon pea. The most common rabi crops cultivated in both project and comparison clusters included chickpea, sorghum, and wheat. **V**egetables like Onion and Tomato are mostly grown in summer. Banana, Papaya, Guava, Sweet Lime, Lemon, and Orange are common crops sown annually.

It was observed that nearly 64% of respondents in the project and 60% of respondents in comparison clusters faced crop damage. The primary reason for crop damage in both project and comparison clusters is excessive rain, with around half of the respondents reporting it. Delayed onset of monsoons was also reported by one-fifth of the respondents, while the dry spell was reported by slightly more than one-tenth of the respondents in both project and comparison clusters. Nearly 12% of respondents in comparison clusters, as compared to 7% of respondents in project clusters, also face crop damage due to pest and disease attacks.

One of the key objectives of the project is to promote the use of certified varieties of climate resilient seeds, and in this aspect, positive improvements have been observed in CM-V in both project and comparison areas. The overall percentage of land under certified seed varieties of pigeon pea, chickpea, and soybean has also significantly improved in project areas in the current round (76%) as compared to that observed in project areas in CM round IV (66%) and CM round II (44%). However, there is also improvement of adoption of certified seeds in comparison areas as 79% of respondents found to have adopted it during CM-V.

Awareness about PoCRA

For project-related information, project staff, especially Agriculture Assistants, Cluster Assistants, FFS facilitators, Project specialists, Krishi Tai etc., are key informants for project beneficiaries. Like previous rounds, nearly all respondents were aware of PoCRA project, especially about matching grants for the individual assets (i.e., pumps/pipes/drip/sprinkler/farm pond), and four-fifth were aware of construction of farm pond with inlet & outlet and grass cultivation on burms & inlet channel.

Nearly half of the respondents were not aware of high return activities like shade-net, polyhouse and polytunnels, and around one-third of the respondents were not aware of matching grant to set up sericulture, apiculture, inland fisheries, backyard poultry unit and goatery. Also, awareness on community benefits such as matching grant support to FPC/FPO/SHG for construction of Godown/ small warehouse, custom hiring centre, ripening chamber, and primary processing units for fruits and vegetables, demonstration of climate-resilient agriculture practices, including BBF, green manuring, contour cultivation, etc. through farmer field schools and training/exposure visits to develop the capacity of farmers on climate-resilient agriculture technologies were observed to be relatively low with less than ten percent of the respondents were about it. More awareness should be created for these activities for which the awareness level is less.

Regarding the awareness of the steps that are involved in accessing the individual benefits as part of the PoCRA project, respondents were found to be aware of initial steps such as registration on DBT portal (84%), which has experienced an increase by 7% in comparison to CM-IV. The other individual benefits found were application for matching grant on the DBT portal (65%), verification of application by cluster assistant (56%), and approval by VCRMC committee (49%). More than 30% of respondents were aware of approval of the application by SDAO, and more than 25% were aware of the transfer of matching grants to beneficiaries.

When asked about their general awareness about the project through various mediums, 82% of respondents in project clusters used facebook page/ youtube channels of PoCRA, 68% respondents were aware of project display boards, and 57% of them were aware of the VCRMC board. Nearly 16% of respondents were aware of board presenting water balance activity of the village. Also, 18% of respondents were aware of project through participation in exposure visits and training under PoCRA.

Adoption and training of CRAT and agrometeorological advisory

Nearly 93% of respondents in project clusters showed a willingness to adopt the climate-resilient agricultural technologies (CRATs). Similarly, 82% of respondents in comparison showed their willingness for the same.

It is observed that 57% of respondents in project clusters as compared to 27% of respondents in comparison clusters, showed interest in following the agrometeorological advisory regularly.

Nearly 61% of respondents in comparison clusters did not have soil health cards as compared to 42% of respondents in the project. It is observed that more respondents in project clusters (46%) as compared to those in comparison (30%) treated the soil using soil health card information. Around half of the respondents from comparison clusters (52%) and 36% in project clusters do not find the information on soil health cards useful. About 13% of respondents from both types of clusters say that they do not have the technical knowledge to use the soil health information.

Responding to the question if they would like to get a mobile app for agriculture and allied activity-related information or advisory services, the majority of respondents both in project (91%) and comparison (84%) clusters responded positively. Majority of respondents across all districts and social categories seek advisory in the mobile app on key aspects such as climate resilient technology, weather, soil nutrient, NRM, fertilizer (chemical and bio), certified seeds, pesticides (chemical and bio), crops (food/cash/plantation), irrigation and crop pest/ disease. However, attention should also be given to those advisories on which the respondents recorded low demand. Generating awareness among project beneficiaries about crop residue disposal, organic farming, horticulture, market for agriculture produce, agri-business, poultry/ goatry/ fishery, and environment safeguards must be prioritized.

Almost all the beneficiaries covered in the project clusters have received at least one training. However, large-scale variation was observed in the proportion of farmers receiving different types of training. More percentage of respondents were found to be trained in the project through FFS and other sources. Also, there is higher adoption of CRATs after receiving training in the project compared to comparison clusters. Although there is variation by training types, more percentage of small farmers did not attend the training in comparison to the overall percentage of non-attendance and percentage of non-attendance under the category of large farmers. It warrants more focus to cover small farmers under different training programs.

Individual project benefits

Out of 80% of respondents in project clusters, nearly 58% had applied or received individual benefits, 41% had participated in farmer field school, and 1% had accessed both the benefits. Around 65% of respondents in comparison clusters had applied or received individual benefits. It was observed that the highest demand under the project was for sprinklers (44%) followed by drip (21%), pipes (14%), and pumps (10%).

Individual matching grants: Regarding the status of the application for individual benefits in project clusters, nearly 60% of respondents had received the matching grant on their bank account. It was observed that the

transfer of matching grants in current round V has improved by 4% as compared to that observed during the CM IV round. All beneficiaries were found to be aware of their application status, which is a positive trend.

During qualitative interviews with other key stakeholders, almost all stakeholders (AA, CA, AS, TAO) provided positive feedback on the DBT application. It is efficient in saving the time of applicants and also helps in achieving better transparency. However, some applicants also face difficulty in uploading documents and photographs in the villages where the mobile network signal is not good. Some of the project staff also suggested having an option to cancel an application at cluster/ taluka level and to revise the application, if needed. No cases of duplication of DBT applications were reported.

Drip irrigation system: 24 beneficiaries who have set up a drip irrigation system using a project grant participated in the survey. On average, each of the beneficiaries reported availing drip irrigation has 4 acres of land irrigated by drip irrigation which has increased from 3.37 acres from CM IV round. Most of the farmers used drip irrigation to irrigate cotton (46%), Soyabean (33%), Pigeon Pea (25%), Chickpea (25%), Black gram (21%), and Wheat (21%).

Sprinkler irrigation system: A total of 51 beneficiaries who had accessed the sprinkler irrigation system under the project were surveyed. The area irrigated using sprinkler irrigation was around 5 acres per household. Common crops that are irrigated using sprinkler irrigation include soybean (66%), chickpea (69%), sorghum (33%), wheat (31%), cotton (26%), and pigeon pea (27%).

Pipes and pumps: 21 beneficiaries of pipe and 18 beneficiaries of pump who have received the benefit from PoCRA were surveyed, respectively. The average per sample household size of land irrigated by pipe was 6 acres, while it was 4.2 acres per sample household for pump. Majority of the farmers (71% of beneficiaries of pipes and 56% of beneficiaries of pumps) used pipes and pumps to transport water from well to pond, followed by lifting of water from river/canal and transport water from pond to field (29% of beneficiaries of pipes and 17% of beneficiaries of pumps).

Shadenet: Out of the five shade-net beneficiaries who were surveyed, four beneficiaries had received training on how to do cultivation in shade net. Four shade-net beneficiaries were primarily growing vegetables in their shade-net, and one had developed a nursery.

Horticulture plantation: All the nine project beneficiaries of the horticulture plantation were found to have received training. The main crops grown by beneficiary were custard apple (56%), Guava (33%), sweet lime (33%), mango (22%), pomegranate (22%), lime (11%), and orange (11%).

Individual farm pond, seed production activity, and sericulture activities were observed in only one case under each type in CM-V. This may further be promoted under PoCRA.

BBF technology: Out of 70 respondents using BBF technology, 87% of respondents found it to be useful in excessive rain last year. The respondents noted that it helped in drainage of excessive water and helped in root development by avoiding water stagnation. Of the total FFS participants, including host and guest farmers 72 % found that the technologies learned through farmer field school demonstration sessions have been very helpful in reducing the impact of climate vulnerability (less rainfall, high temperature). Nearly 93% of the FFS participants, including host and guest farmers, are willing to continue using the technologies.

Status of individual benefits and suggestions: Of the total 135 beneficiaries of individual activities interviewed, around 90% of beneficiaries have constructed assets at the site. The reason cited by the remaining 10% of the respondents are mainly pertaining to the financial issues and have applied in DBT but did not receive benefit etc. Almost all beneficiaries (99%) had a good experience with the application process. 63% of project and 65% comparison beneficiaries incurred additional costs during the application stage. Costs mostly included Documentation, transportation costs, and loss of wages.

More than four-fifth in each type of beneficiaries of four individual types of irrigation benefits (drip, sprinkler, pipes, and pumps) reported an increase in income and increase of agricultural production as the major benefits of adopting these. Increase in income was reported more among the beneficiaries of drip and sprinkler irrigation than beneficiaries of pipes and pumps. Other major benefits reported are: increased availability of water,

increase in the area of cultivation in both Kharif and Rabi season, change in cropping season, and availability of water in dry spells.

Farmer Field Schools (FFS)

A total of 131 farmers who participated in FFS to learn new technologies were surveyed from project villages which include 31 host farmers and 100 guest farmers. It was observed that nearly 82% of respondents had attended all sessions conducted by the FFS facilitator. Nearly 28% of FFS participants were interested in learning new technologies, 21% participated with the aim to increase their agriculture production and income, and 20% of farmers wanted to learn the techniques to reduce the cost of production.

Of all the climate-resilient technologies demonstrated in FFS, the highest adoption was for technologies including preparation of pesticides formulation and spraying (75%), spraying techniques with safety measures (75%), seed treatment with bio-fertilizers (68%), irrigation by drip/ sprinkler (66%), foliar application of 2% Urea (64%), application of a basal dose of fertilizers (64%), crop residue management (63%), drainage of excessive water (62%) and foliar application of 2% DAP (62%).

Community Works – NRM and Community Farm Ponds

Most of the respondents in both project and comparison clusters shared that planning for the development of community assets is done according to the water balances (73% in project and 81% in control). It is observed that the status of social audit was much better in project villages (75%) as compared to comparison villages (43%). Also, it was observed that benefits accrued from NRM works in project villages were higher than in comparison villages. As compared to respondents in comparison villages, more respondents in project villages have experienced an increase in the availability of water for protective irrigation (27% in the project; 22% in control), increase in yield/ production (23% in the project; 21% in control), change on cropping pattern (18% in project and 10% in control), and availability of water during dry spells (11% in project and 10% in control).

Of the total 34 project beneficiaries of CFP, 76 % shared that they have received the matching grant on their bank account, 18% have registered on DBT portal, and 6% have applied for matching grant through DBT portal. A total of 173 acres of land is irrigated using water from these 26 CFPs in project area. The main source of water for these CFPs is open dug well (60%) followed by borewell (17%). Other sources of water are river, canal, and lake. Almost in all the CFPs, water is filled using motor pump and pipes. 94% of CFP beneficiaries did not face any issues in accessing the benefit from PoCRA.

PoCRA supported FPOs and SHGs

In current round, a total of 19 Farmer Producer Companies (FPCs) were covered, and feedback from a total of 82 FPC respondents (24 FPC directors and 58 members) was taken. Nearly 48% of all 82 FPC respondents, including director and members have received training. Of the total 19 FPCs, one-fourth of them undertook aggregation of produce and best practices in agriculture, one-fifth of them provided agriculture inputs like seeds and fertilizers, and one-fifth of them provided access to market for produce, and two of them provided value added services to farmers.

A total of 11 SHGs were covered and feedback from a total of 41 SHG respondents (10 SHG presidents and 31 members) was taken as part of CM V round. All the surveyed 11 SHGs have received the financial support from PoCRA. Three SHGs shared that they faced difficulty in getting presanction and getting bank loan while accessing the benefit through PoCRA.

Access to other government schemes

Pradhan Mantri Fasal Bima Yojna (75% in project and 71% in comparison) followed by KIsan Samman Yojana (44% in project and 22% in comparison) was the most popular among all Government schemes. The awareness

and accessibility among the farmers to other Government schemes should be increased for better percolation of benefits.

Satisfaction on other project parameters

65% of respondents in project clusters were aware of the village level micro-planning (as part of PoCRA project) that was conducted in their village to decide what watershed management activities should be done in their village. 75 % of them had participated in the development of your village's micro-plans developed as part of PoCRA project. 70% of respondents in the project village found the water budgeting application used in the micro-planning process useful, 25% of respondents found it very useful, and while rest did not find it useful. 72% of respondents in project villages feel that VCRMC represents all sections of the society, 25% say not representing, and the rest 3% did not have a say.

Equity and gender sensitive efforts taken by the project

There have been many gender and equity-sensitive steps taken while implementing PoCRA project to make it more gender-inclusive. During qualitative interviews with VCRMC, it was found that the majority of VCRMC members were females. As per MIS data, a total of 884 Krushi Tai's were appointed as of 31st March 2021 in the Marathwada region who are working on the PoCRA project. As per MIS data, 4221 female farmers have attended the FFS for Rabi crops in the Marathwada region. The number of FFS arranged exclusively for women were 143. Around one-fourth of FPC farmers were women farmers out of total members in 16 interviews with FPCs. However, in our quantitative primary survey samples, less than one-tenth samples were women farmers. This may not be the actual proportion of women farmers as during the survey of beneficiaries, many times head of households or name of the owner of the land who generally is male is recorded. This reflects the benefits of PoCRA should reach more women farmers, although there have been efforts into providing benefits.

Again, analysis based on social category reflects that preference to applicants from Scheduled castes (SC), Scheduled tribes (ST) is provided. Also, around three-fourths of our samples were from small and marginal farmers, which is almost in line with the actual proportion in the areas. Although sampling methodology is not designed to give a statistical estimation as it is designed from the point of view of concurrent monitoring with a focus on coverage of different types of beneficiaries to monitor process and progress, it may give a broad indication of scope to provide more emphasis on disadvantaged community.

Key Challenges and Actions

Along with process and progress monitoring, one of the key objectives of concurrent monitoring is to identify the current challenges faced in the project implementation and solicit stakeholder suggestions to address the same.

As the World and Marathwada region still is going through the COVID situation, it has also impacted on PoCRA project activities. As the data collection of CM-V was undertaken after improvement of the COVID situation in August 2021, the impact was limited, and the impact was mostly found on conducting physical training and exposure visits of farmers. The training and capacity-building activities should continue and be further expedited.

There is significant increase in use of certified varieties of climate-resilient seeds in CM-V in comparison to CM-IV as more than three fourth of the respondents have adopted the technology. With unseasonal rainfall and drought related challenges in Marathwada, it is necessary that use of certified varieties of seeds should be promoted more and expanded further.

Crop damage is an important issue faced by around three-fifth of farmers in both project and comparison clusters. The major reason is excessive rain occurred this year as was reported by half of the sample respondents. Delayed monsoon was reported by one-fifth of the respondents, while the dry spell was reported by slightly more than one-tenth of respondents. Therefore, from drought management focused activities, the focus should be on enhancing agriculture resilience to manage excess/ unseasonal rain and drought.

Although there is good adoption of different irrigation practices under individual benefits of PoCRA, however Individual farm pond, seed production activity, and sericulture activities were observed in only one case under

each type in CM-V. This may further be promoted under PoCRA. Due to uncertainty in the availability of electricity in rural areas, there is demand for solar pumps by the farmers, which may be considered.

Landless people currently have limited options for availing benefits under PoCRA project. That is why animal husbandry activities like goat rearing should be included. Some activities like pipes, motor, open dug well, community farm pond, goat rearing have been reported to be closed though they are still in demand: There is a need to reassess these guidelines. If feasible, the decision for resuming can be decentralized based on groundwater levels and other critical factors.

Majority of FFS coordinators reported the quality of the session to be good. Overall awareness of FFS and adoption of technologies has improved especially in preparing formulations and use of BBF technology. Poor rapport and mobilizing skills, non-corporation of FFS facilitators due to unpaid dues, and time management during the Kharif season as farmer is busy are some of the common challenges faced. The issue of low attendance in FFS sessions has been amplified because of COVID-19. As a solution, more efforts are required by the project staff and VCRMC members to motivate farmers to attend FFS sessions regularly while ensuring COVID related safety protocols are followed. Also, incentives should be provided to FFS participants in the form of refreshments and agri-inputs at subsidized costs (if feasible).

Women participation in FFS needs to be improved through generating awareness among women farmers and their household members. Variable timings of men andwomen FFS sessions can enable more women to attend. It was also observed efforts have been put to increase women's participation in training since eight facilitators reported conducting the FFS exclusively for women. Special efforts should be given to increase the participation of farmers from SC, ST, and OBC categories.

Some cases were reported where farmers were not well-versed in how to use the asset. It is necessary that requisite training and awareness sessions should be organised for those who purchase the assets with the project's support.

Natural Resource Management (NRM) works have not been initiated in majority of the project villages: The work under NRM has been impacted because of lack of functional VCRMC committee or lack of capacity of newly formed VCRMC and lack of people's participation. The capacity of VCRMC must be enhanced. Farmers are, in many instances are not willing to share their land, especially in the compartment bunding activity. Sometimes, people with different intentions come together for the execution of community work, so they need to be guided to avoid problems later during resource distribution. Awareness needs to be created in farmers about the benefits of NRM assets- both at the community and individual level. FFS sessions can be used as a platform to spread awareness on the benefits of NRM structures.

Due to increased responsibility of presanction and spot verification, the need for laptop and printer is utmost necessary at Taluka level along with the computer operator which may be considered. Also, the majority of Krushi Tai's who were interviewed were working for the first time. Though many of them were able to tell about the objectives of the project, one-third of them were unaware of it. They should be trained more so that they can take up their responsibilities as mandated under PoCRA. It is also suggested that one must ensure that the honorarium of Host farmers and Krushi Tai's should be paid on time to keep them motivated. Impetus also needs to be given on capacity building of Krushi Tais so that able they are able to discharge their duties effectively.

The key challenge of availing bank loans by FPOs was still observed amongst PoCRA supported FPOs. As a solution, it is suggested that technical support (from expert agencies) should be provided to the applicant FPOs so that they can develop bankable business proposals and have the required documentation to make their proposals acceptable to the banks. Lack of availability of working capital to run their operations is another key challenge reported by the FPOs. As a solution, it is suggested that FPO representatives should be provided training (with PoCRA's support) to manage FPO operations. The project should provide technical support to the applicant FPOs in shortlisting and implementing value addition and processing activities.

Activities and benefits under PoCRA have certainly helped the beneficiary farmers in the Marathwada region by improving their access to water for irrigation, improving their climate resilience, and further increasing their income. Addressing the challenges as mentioned above can further enable the project to achieve its intended objectives.

1. About the Study

1.1. Project Background

Agriculture is vulnerable to climate change. Climate change's negative impacts are already being felt, in the form of increasing temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. On farms, climate change is reducing crop yields, the nutritional quality of major cereals, and lowering livestock productivity[1]. The recent report of Asian Development Outlook, 2021 published by Asian Development Bank in September 2021 highlighted the importance of transformation of agriculture in the developmental process, and agriculture is exposed to risks from a changing climate and from farm practices that are not environmentally sustainable[2].

More than half of the population of Maharashtra is dependent on agriculture for livelihood. 22.6 million hectares of land of Maharashtra under cultivation (gross cropped area) [3]. About 84% of the total area under agriculture in the state is rainfed and is dependent only on the monsoon[4]. 49% of the landholdings in the State falls in the marginal category, with less than one hectare of land. Smaller land holdings and heavy dependence on monsoon for irrigation make agriculture vulnerable to climate change impacts. In addition to climate vulnerabilities, farmers face high production and market risks. High production costs, low productivity and water scarcities at the production end, and unreliable price of produce due to limited market reach are common challenges faced by farmers across the state. [5]

In response to the above-mentioned challenges, the Government of Maharashtra, in partnership with the World Bank, conceptualized the Project on Climate Resilient Agriculture (PoCRA) for 5,142 villages in 15 districts of Maharashtra[6]. The Project Development Objective (PDO) of PoCRA is to enhance climate-resilience and profitability of smallholder farming systems in selected districts of Maharashtra[7]. 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[8].

The project is built around a comprehensive, multi-sector 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, c) Farm Productivity & Crop Diversification. The need for intervention across these three areas in the region is evident from the agro-climatic attributes of the area. The project aims to contribute to drought-proofing and management of lands in states' most drought and salinity/sodicity-affected villages.

The project has been implemented in 15 districts in Maharashtra, which include eight districts of the Marathwada region (Aurangabad, Nanded, Latur, Parbhani, Jalna, Beed, Hingoli, Osmanabad), six 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[9]. Figure 1 highlights the villages where the project is being implemented. This

[1] https://www.worldbank.org/en/topic/climate-smart-agriculture
[2] Asian development outlook, 2021, Asian Development Bank, September 2021
[3] Source: PoCRA Project Implementation Plan (PIP) document
[4] Source: ibid
[5] Source: PoCRA Project Appraisal document
[6] Source: ibid
[7] Source: PoCRA Project Appraisal document
[8] Project implementation status report as on 31st March, 2021, Maharashtra PoCRA
[9] Source: PoCRA- Sambodhi Terms of Reference

project will be implemented six years from 2018-2024[10]. Out of the 15 districts where PoCRA is implemented, the current assignment is conducted in eight districts of the Marathwada region, covering 347 mini watershed clusters. The project is being implemented in a phased manner reaching out to 70 clusters in year I, 175 clusters in year II, and 102 clusters in year III.

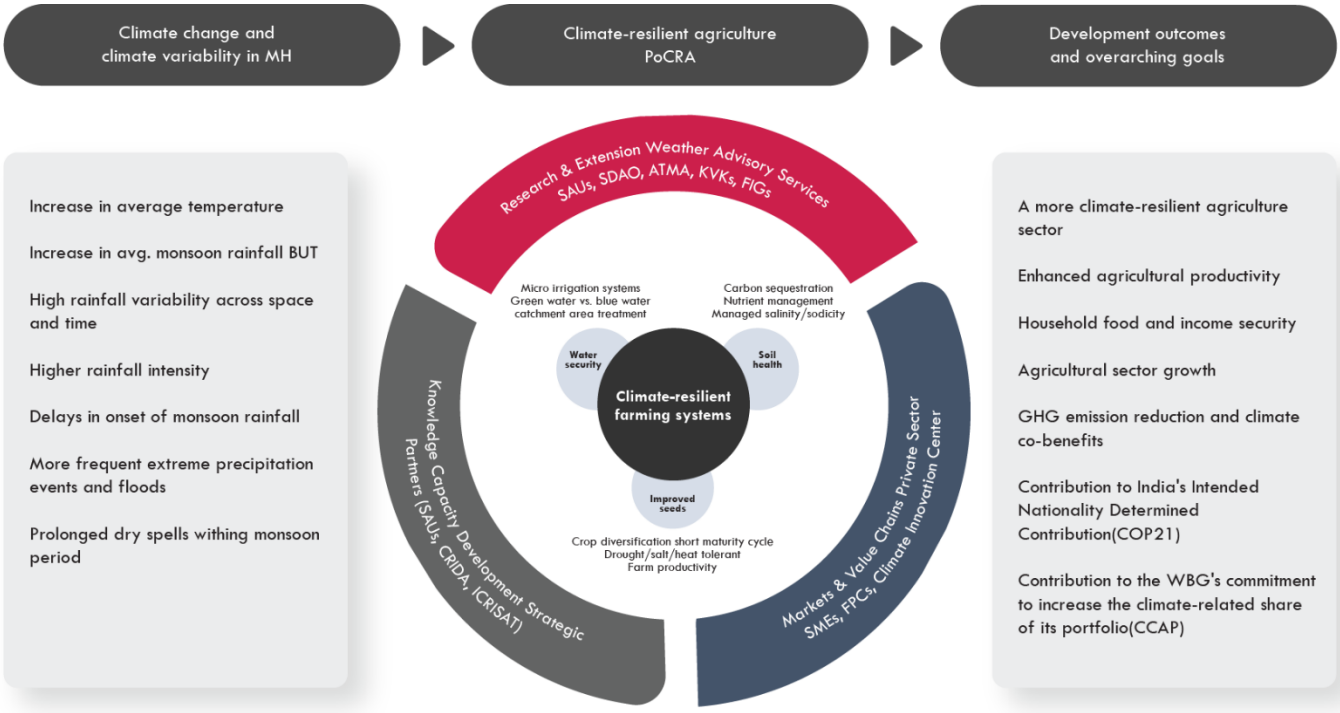

Figure 1: PoCRA strategic overview, thematic linkages and expected achievements

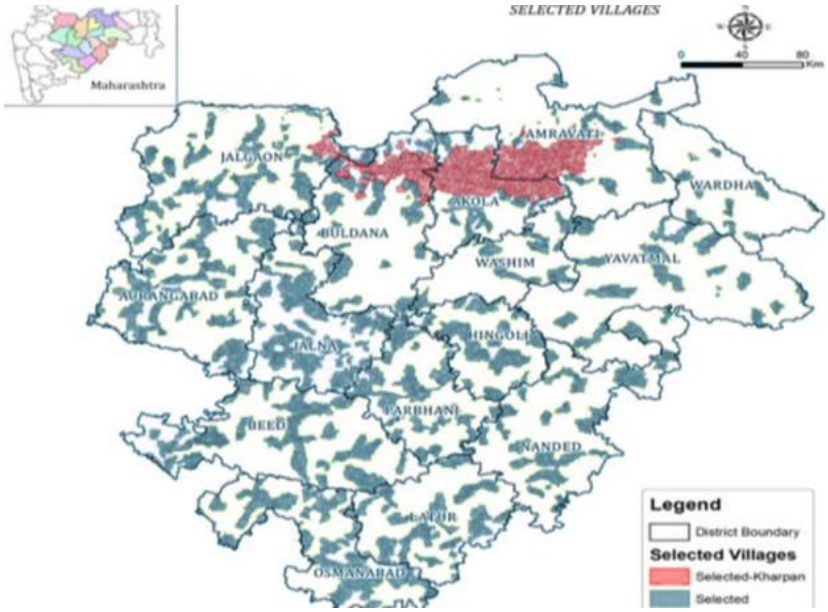

Figure 2: Nanaji Deshmukh Krishi Sanjivani Prakalp (PoCRA) project area and villages

[10] Source: ibid

1.2. Overview of the Study Area

About 40% of the Maharashtra State falls under Drought Prone Area, with less than 750 mm of the annual average rainfall[11]. 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[12]. 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 depleting 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 in the drought. The anticipated impact of climatic change as well as climate variability presumably led to increased pressure on already scarce water resources.

Starting in 2014, the Jalyukt Shivar Abhiyaan[13], 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 deepening and widening of streams, construction of cement and earthen stop dams, work on nullahs and digging of farm ponds. A total of 158,089 water management works were to be carried out under this project, of which 51,660 have been completed till April 2018. This demonstrates that there is a need for more 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 that most of the farmers in the project region are small and marginal[14], their adaptive capacity is very limited; hence economically viable and culturally acceptable adaptation techniques need to be developed and implemented. The Government of Maharashtra has realized the implications of building climate resilience in the agricultural sector and has developed a drought-proofing and climate-resilient strategy as a long-term and sustainable measure to address the likely impacts of climate change. With 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.

2. Objectives of Concurrent Monitoring of PoCRA

Along with evaluating the impact of PoCRA, the other key objective of the assignment is to conduct concurrent progress 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 are the key components of the intervention that 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 during the project implementation.
- To validate the veracity of the MIS data by validating the information in the MIS progress reports.

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

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

[13] Government of Maharashtra had launched a water conservation scheme named Jalyukt 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".

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

3. Overarching Monitoring Framework

The framework in figure 3 below presents the overarching approach that has been adopted for the concurrent monitoring of PoCRA:

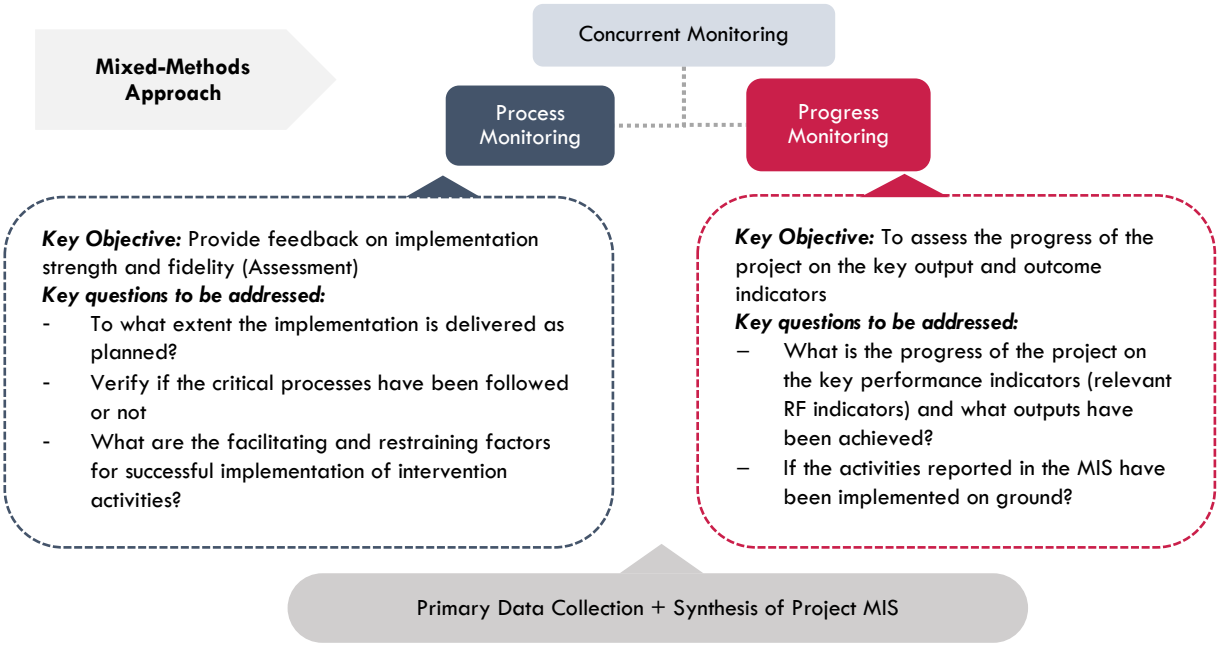

Figure 3: Overarching methodology

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 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 would need to be monitored should be listed. A detailed discussion with the PMU team, relevant stakeholders, and a secondary literature review of relevant documents was done to understand these key processes. Also, during the listing of processes, Sambodhi studied that 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.

4. Methodology

The methodological approach for conducting concurrent monitoring has the following steps illustrated in figure 4.

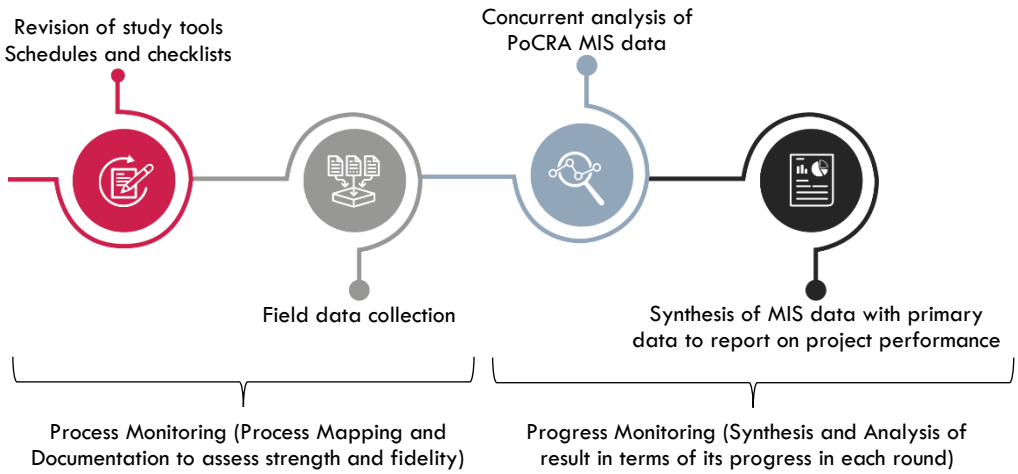

Figure 4: Concurrent monitoring methodology steps

Step 1: 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 V. The revised tools were 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 anticipated in the CM V round. The study tools were finalized post incorporation of comments/ suggestions from PMU as well as key experts.

Step 2: Primary data collection from field

The primary data havebeen collected based on revised study tools which are categorized as shown in table 1 below.

Table 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, respondent's 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 various levels, including individuals, community (village and cluster) as well as district level, key informant interviews have been conducted with key stakeholders (viz. Agriculture Assistant, Agriculture Supervisor, Cluster Assistant, DSAO, SDAO, TAO, FFS Coordinator & Facilitator, Krishi Tai, and FPC representatives) involved in the implementation of the project to get their feedback on project implementation and further improvement of the program.
Focus Group discussion schedule	Focus group discussions have been done with Village Climate Resilience Management Committee (VCRMC) members and Project specialists of districts to investigate the current status of implementation of the project and get feedback on project implementation and further improvement of the program.

In addition to the structured surveys, interviews, and focus group discussions with key stakeholders, field visits by experts are also conducted as part of concurrent monitoring. The objective of the expert field visit is to provide insights pertaining to 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.

Step 3: Concurrent analysis of PoCRA MIS data

For monitoring the progress of the project, the MIS data of activities and outputs have been analyzed to see if the project implementation is progressing according to the plan. The project performance is assessed on the key performance indicators, including the results framework indicators, which need to be assessed on a semi-annual or annual basis. A consultative approach is adopted to resolve queries related to indicators on which data is required from the PMU MIS team and other relevant stakeholders. Project activities and geography-wise analysis has been done to identify the strengths and weaknesses in the project implementation.

Step 4: Synthesis of MIS data with primary data to report on project performance

The MIS data on the project progress, the primary data on the quality and feedback of implementation (from stakeholder interviews and beneficiary interviews) is synthesized to report on the status of implementation of the project for the period of 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.

4.1. Sampling Methodology

The sampling size and methodology adopted for the current concurrent monitoring round have been explained in this section. The sampling methodology remains the same as which was adopted during the previous rounds of concurrent monitoring. Using the proposed sampling method in line with the ToR, concurrent monitoring has been 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 the period of six years. Twelve concurrent monitoring rounds would be conducted over six years, i.e., two in a year. Given the phased approach to implementation, the project will be implemented in 70 clusters in the year I, 175 clusters in year II, and 102 clusters in year III. The sampling strategy for concurrent monitoring is proposed likewise. The number of clusters to be visited in each district in each round has been selected proportionately. The distribution of the beneficiary samples across districts and monitoring rounds is presented in table 2 below. Accordingly, a total of 30 project clusters and 15 comparison clusters have been covered in Concurrent monitoring Round V. The list of sampled clusters and villages has been provided in Annexure A.

Table 2: Sample distribution

Sl. No	Districts	Round wise clusters to be covered												Total
		1	2	**3**	4	**5**	6	7	8	9	10	11	12	
1	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 Project clusters		20	27	30	30	**30**	30	30	30	30	30	30	30	347
Total Comparison clusters		10	14	15	15	**15**	15	15	15	15	15	15	15	174
Total Project sample		300	405	450	450	**450**	450	450	450	450	450	450	450	5205
Total comparison sample		150	210	225	225	**225**	225	225	225	225	225	225	225	2610
Total beneficiary sample per round		450	615	675	675	**675**	675	675	675	675	675	675	675	7815

The steps in sampling methodology that have been adopted for concurrent monitoring round V have been detailed below:

Selection of Project Clusters

30 clusters were sampled for concurrent monitoring round V in project areas. These 30 clusters were sampled proportionately from the eight project districts, as presented above in the beneficiary sample distribution table 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 (and excluding the clusters which have already been covered in the previous CM Rounds). Following this approach, 30 clusters for concurrent monitoring round V were selected. Note 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 cluster and villages

15 comparison clusters are selected for concurrent monitoring round V. The non-PoCRA watershed clusters are selected after matching them with PoCRA clusters based on climate vulnerability index score. It is ensured that a district-wise 2:1 proportion 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 2:1 ratio in project and comparison clusters per district.

Step 2: The comparison clusters in each district which had 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 a total 30 non-PoCRA clusters are identified for the selection of comparison group for the concurrent monitoring.

Step 4: Finally, 15 non-PoCRA clusters are randomly selected from these 30 clusters while ensuring that the district-wise proportion of comparison clusters are maintained.

Selection of Beneficiaries

Based on specifications in in the ToR, 15 beneficiaries were targeted to be surveyed from each sampled cluster/village. Out of these, nine beneficiaries of individual interventions (e.g., those benefitting from drip, sprinkler irrigation systems, pumps and pipes, individual farm ponds, etc.) were sampled. Out of these nine beneficiaries,

a) two beneficiaries were applicants of Direct Benefit Transfer (DBT) who have at least received pre-sanction,
b) three beneficiaries who have received DBT disbursement,
c) one beneficiary was chosen from the list of host farmers from farmer field school and
d) three beneficiaries (one female and two males) were chosen from the list of guest farmers who had participated in the farmer field schools.

These five DBT beneficiaries and four Farmer Field Schools (FFS) beneficiaries were randomly chosen from the list of beneficiaries in the sampled village. In the comparison villages, a list of beneficiaries (receiving benefits like that of PoCRA beneficiaries) was identified with the help of the local agriculture assistant or Krishi mitra or with the help of gram panchayat officials. Further, the beneficiaries for the survey are chosen randomly from this list. Table 3 summarizes the summary of 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 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, project supported 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 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 interview, qualitative interviews have been conducted with the key project stakeholders to get their feedback on the current situation project implementation. The details of the qualitative interviews planned to be conducted are detailed in Table 4 below.

Table 3: Planned quantitative samples

Activity Category	Activity	Sample per Village	Total Sample (Project)	Total Sample (Comparison)	Remarks
Individual Beneficiaries		**9**	**270**	**135**	**405**
	DBT Matching Grant beneficiaries				
	Pre sanction received and following stages	2	60	30	
	Beneficiaries receiving disbursement	3	90	45	
	FFS beneficiaries				
	Host Farmer (HF)	1	30	15	2 male, 1 female (wherever available) GF were sampled
	Guest Farmer (GF)	3	90	45	
		6	**180**	**90**	**270**
Community Beneficiaries	Beneficiaries of NRM activities		50	25	NRM works in 5 villages, 10 sampled beneficiaries per village.
	Community farm pond (CFP) beneficiaries		18	9	Sampled villages having CFPs work tried to be assessed.
	FPC members		80	40	5 members (1 board director + 4 general members) each from 16 sampled FPCs. Parbhani district doesn't have any project supported FPC. So, additional 3 FPCs were covered in Jalna and Latur.
	SHG members		32	16	4 (At least one president/secretary) members each from 8 SHGs (one in each district)
Target Sample		**15**	**450**	**225**	**675**

Table 4: Planned qualitative samples

Target Respondent	Sample	Enquiry Technique	Remarks
VCRMC Representatives	One discussion with VCRMC representatives per cluster (in project clusters), up to 30	– Focus Group Discussion with VCRMC Representatives	Investigation on all project activities implemented in their village (capacity building, implementation, challenges, and suggestions for course correction)
Agriculture Assistant (AA)	IDI with Agriculture assistants of all sampled villages (in project clusters), up to 30	– IDI with AA	Investigation on all project activities implemented at village level (implementation, challenges, and suggestions for course correction)
Cluster Assistant	IDI with Cluster assistants of all sampled villages (in project clusters), up to 30	– IDI with CA	Investigation on all project activities implemented at village level (implementation, challenges, and suggestions for course correction)

Target Respondent	Sample	Enquiry Technique	Remarks
Krishi Tai	IDI with Krishi Tai's of randomly selected sampled villages (in project clusters), up to 15	– IDI with Krishi Tai	Feedback on project-related activities implemented by Krishi Tai
FFS Facilitator	IDI with FFS facilitators of randomly selected sampled villages (in project clusters), up to 10	– IDI with FFS Facilitator	Investigation on implementation of FFS at village level (implementation, challenges, and suggestions for course correction)
FFS Coordinator	IDI with FFS Coordinators of randomly selected sampled villages (in project clusters), up to 10	– IDI with FFS Coordinator	Investigation on implementation of FFS in their district (implementation, challenges, and suggestions for course correction)
Agriculture Supervisor	IDI with Agriculture Supervisors of randomly selected sampled villages (in project clusters), up to 10	– IDI with Agriculture Supervisor	Investigation on project activities part of the scope of the Agriculture Supervisor (implementation, challenges, and suggestions for course correction)
Taluka Agriculture Officer (TAO)	IDI with Taluka Agriculture Officers of randomly selected sampled villages (in project clusters), up to 10	– IDI with TAO	Investigation on project activities part of the scope of the TAO (implementation, challenges, and suggestions for course correction)
FPC/FPO Representatives	Two FPC/FPO representative interviews per district, up to 16	– IDI with FPC/FPO Representatives	Investigation on support from PoCRA (support received, process bottlenecks, and suggestions for course correction)
SDAO	IDI with SDAO's of sub-divisions sampled for concurrent monitoring, up to 10	– IDI with SDAO	Investigation on all project activities implemented in their district (implementation, challenges, and suggestions for course correction).
District Superintending Agriculture Officer/ Project Director, Agriculture Technology Management Agency (DSAO/PD ATMA)	IDI with DSAO and PD ATMA in all eight project districts	– IDI with DSAO/PD ATMA	Investigation on all project activities implemented in their district (implementation, challenges, and suggestions for course correction)
Project Specialists (PS Agriculture, PS Agribusiness, PS HRD) PoCRA in districts	Discussion with Project Specialist in all eight project districts	– Discussion with Project Specialists (with PSs implementing PoCRA at district level)	Investigation on all project activities implemented in their district (implementation, challenges, and suggestions for course correction)

5. Sample Covered for Process Monitoring

5.1 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 515 respondents in the project and 258 respondents in comparison villages were covered. Of the 515 respondents covered in the project area, 314 respondents were for individual interventions and 201 for community interventions. Further, of 515 respondents from project clusters, 115 were from phase I villages, 174 from phase II, 104 from phase III, and the rest from other villages where the project supported FPCs and SHGs

were found. In the comparison area, of the 258 respondents, 167 beneficiaries were from individual benefits and 91 beneficiaries were from community benefits. Of the total 773 respondents, 14 belonged to villages under the PESA act. In the current concurrent monitoring round, no FFS host or guest farmers were found in sampled comparison clusters. Also, only one community farm pond beneficiary was found in sampled comparison clusters. Hence, the sample was covered under the NRM community works category.

Table 5: District-wise quantitative sample coverage in project and comparison villages

District	Project	Comparison
Aurangabad	69	35
Beed	50	39
Hingoli	52	40
Jalna	88	51
Latur	73	15
Nanded	54	16
Osmanabad	77	35
Parbhani	52	27
Total	**515**	**258**

Table 6: Category wise quantitative sample coverage in project and comparison villages

District	Project	Comparison	Total
Individual	**314**	**167**	**481**
DBT (pre-sanction approval not received)	80	12	92
DBT (pre sanction approval received)	103	155	258
FFS- Host Farmer	35	-	35
FFS- Guest Farmer	96	-	96
Community	**201**	**91**	**292**
NRM Community works	44	90	134
Community Farm Pond	34	1	35
FPC Member	82	-	82
SHG Member	41	-	41
Total	**515**	**258**	**773**

5.2 Qualitative Data

For collecting the qualitative data, key project stakeholders from the sampled project clusters were interviewed. Table 7 presents the samples of various categries which wwere covered under CM-V. The sample shortfall in a few cases was due to the unavailability of the stakeholders for the survey especially due to their health reasons.

Table 7: Qualitative respondents

S.No.	Research Tool	Samples Covered
1	FGD with VCRMC Members	30
2	IDI with AA	29*
3	IDI with CA	28**
4	IDI with FPO representatives	10
5	IDI with TAO	10
6	IDI with AS	10
7	IDI with SDAO	9***
8	FGDs with PS	8

S.No.	Research Tool	Samples Covered
9	IDI with DSAO/PD ATMA	6****
10	IDI with FFS Facilitator	10
11	IDI with FFS Coordinator	10
12	IDI with Krushi Tai	15
*AA of Nagzarwadi and ** CA of Lingsa could not be interviewed due to their health issue. Terkheda and Sonarwadi villages has same CA. ***SDAO Beed could not be interviewed due to his eye operation. ****DSAO post are vacant in Osmanabad and Hingoli (SDAOs are in-charge)		

Expert Field Visits

As mentioned earlier, expert field visits were conducted to get insights on project implementation. Except for the hydrology expert, all key experts have conducted the field visit. The research team from Sambodhi also conducted the field observations during the survey. Unfortunately, the hydrology expert was not able to travel to the field, given his health condition and safety risks (in line with government and health ministry recommendations due to the spread of COVID-19 pandemic) as he is more than 55 years in age and he has also co-morbidities.

6. Findings

6.1. Respondent's socio-economic profile

As beneficiaries were selected, providing representation to different categories of beneficiaries as per sampling design, the proportion of different socio-economic categories mentioned in this section does not fully reflect the representation of the actual population of the area. Also, information about caste types, educational status, and status of ration cards are based on responses of respondents, and no detailed physical verification has been conducted. However, it provides an indication of current coverage of PoCRA benefits covering different socio-economic groups, and it would help in deciding required steps to make the program more equity oriented ensuring benefits reaching all strata of the population, including women farmers and farmers from other backward castes, scheduled castes, scheduled tribes, nomadic tribes and the farmers who are illiterates or do not have formal education.

Gender: Nearly 91% of respondents in both project and comparison clusters were male beneficiaries. Around 83% of total interviews were given by beneficiaries themselves.

Social category: Majority of respondents belonged to the general/ open category. The distribution of respondents based on social category is as follows:

Table 8: Social category of respondents

Social Category	Project (%)	Comparison (%)
	N=515	N=258
General/ Open	82	72
Scheduled Caste (SC)	5	5
Scheduled Tribe (ST)	4	3
Other backward class (OBC)	3	10
Nomadic Tribe (NT)	6	10

Education: As can be seen from the following table, the educational attainment of respondents in project villages was slightly better than in comparison villages. Slightly more than one-tenth of respondents both in project and comparison villages were found to have not attended any school.

Table 9: Educational background of respondents

Education	Project (%)	Comparison (%)
	N=515	N=258
No schooling	11	13
Primary school (upto class 5th)	14	25
Middle school (upto class 8th)	8	15
Secondary school (upto class 10th)	23	21
Senior secondary school (upto class 12th)	22	16
Diploma but not graduate	5	1
Graduate	14	8
Post-graduate	3	1
Total	100	100

Poverty status: Both in project and comparison clusters, around 63% of respondents belonged to APL, 35% belonged to BPL, and rest 2% were not aware of their poverty level category.

Marital Status: 91% of respondents in the project and 97% in comparison clusters were married. Approximately 8% of the respondents in project villages and 3% in comparison villages were unmarried. The sample also included three widows in the project and onein the comparison cluster.

Household size and family type: On average, the total number of members in a household in both project and comparison clusters were six. 98% of respondents in both project and comparison clusters stayed in a joint family.

Source of income: Farming/agriculture is the primary source of income for nearly all respondents in both project as well as comparison clusters. Apart from agriculture, the other sources of income for sample households were livestock, unskilled wage labor, and micro-enterprises, but in none of these activities, the proportion of respondents was more than 10 percent. This implies dependence of sample households on a single source of income which is agriculture. .

Table 10: Source of income of respondents

Source of Income	Project (%)	Comparison (%)
	Valid N=515 (Multi response)	Valid N=258 (Multi response)
Farming/Agriculture	100	99
Livestock (goats, poultry, piggery, fishery & dairy)	9.1	5.4
Unskilled wage labor (agricultural labor, MGNREGA, labor, construction etc.)	4.5	6.2
Micro-enterprises (kirana shops, dhabas, mobile shops, ferry shops etc)	4.3	2.3
Skilled worker (tailoring, masonry, electrician, plumbing, carpentry, etc.)	1.6	1.9
Salaried worker (teachers, anganwadi teacher etc.)	1.2	1.2
Contractual or task-based work	0.4	0
NTFP Collection	0.2	0
Others	0	0.8

Annual income: The average annual income for respondent households in project and comparison clusters is Rs. 188520 and Rs. 147628 respectively.

Table 11: Average annual income of respondents

Cluster	N	Mean Income (INR)	Std. Dev	95% CI	
Project	515	188520	426088	151720	225320
Comparison	258	147628	261667	115699	179557

Membership in community organizations: 44% of respondents in project clusters and 24% of respondents in comparison clusters reported that at least one member of their households was part of self-help groups (SHG). Further, at least one member from nearly 23% of respondent's households in project clusters had membership in Farmer Producer Company (FPC). Whereas in the case of comparison clusters, only one respondent's household had a member as was part of FPC. At least one member, from nearly 7% of respondent's households in project clusters, was part of VCRMC. Except for seven respondent households in the project and one in respondent households in comparison cluster, none of the respondents or members of household of theirs was part of district/block level marketing committee, or agriculture produce marketing committee. This reflects farmers in project clusters had better participation in community organizations than comparison clusters. However, it is observed that still 40% of respondent households in the project and 76% in the comparison cluster had no member participating in community organization. This implies that there is adequate scope to facilitate and motivate farmers to participate in community organizations.

6.2. Land ownership and cultivation practices

Land ownership: All respondent's households in the project and almost all the respondent's households (except one) in comparison clusters owned agricultural land. Women in 38% of respondent's households in project clusters owned agriculture land, while in comparison clusters, the proportion for the same was 22%. The average agriculture landholding in the project cluster is 5.5 acres, and that in comparison cluster is 4.7 acres. Of the average agriculture land holding in both types of clusters, nearly all are cultivable. 16 respondent households in project clusters have leased in on land with an average size of 6.3 acres of agriculture land, while in comparison clusters 8 respondent households have on an average leased-in land size of 4.4 acres. As can be seen from the table below, the majority of respondent households in the project (71%) and comparison (77%) belonged to small and marginal farmers (those who owned less than 2 Ha of land).

Table 12: Category of farmers covered in the household survey

Category of farmers	Project (%)	Comparison (%)
	N = 515	N = 258
Small & Marginal (less than 2 Ha)	71	77
Medium (between 2 to 5 Ha)	24	19
Large (more than 5 Ha)	5	4

Cultivation: In the project cluster, in Kharif season, nearly 98% of the total respondents cultivated their land with an average of 5.3 acres per household. Similarly, 84% of total respondents cultivated Rabi crops (on average of 4 acres per household), and only 7% respondents cultivated Summer crop (on an average of 3.5 acres per household) in last 12 months. The same is true for comparison clusters. Around 97% of respondents cultivated Kharif crop (on an average of 4.6 acres per household), 77% of respondents cultivated rabi crop (on an average of 3.5 acres per household), and only 10% cultivated summer crop (on average of 4.6 acres).

Irrigation: Nearly 94% (increased by 4% compared to CM IV round) of respondents in project clusters had irrigation source, while in comparison 91% had the irrigation facility. 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 are open dug well, borewell, earthen/check dam, canal/river, and farm pond. Both in project and comparison clusters, open dug well and borewell was found to be a major source of irrigation, as the following table reflects. However, open dug well is more prominent in project clusters (75%) than comparison clusters (56%) and also nearlyone-fifth respondent in comparison areas reported earthen/ check dam as a major source of irrigation which was found to be less in project clusters (3%).

Table 12: Source of irrigation

Source of irrigation	Project (%)	Comparison (%)
	Valid N = 482 (Multi response)	Valid N = 234 (Multi response)
Open dug well	75	56
Borewell	31	23
Farm pond	11	8
Canal/river	6	8
Earthen/ check dam	3	18
Other source	1	0
Total (%)	100	100

Average area under different cropping seasons: In project clusters, on an average 4.8 acres of land with Kharif crop, 3.9 acres of land with rabi crop, and 3.5 acres of land with summer crop was under irrigation in the past 12 months. Similarly, in comparison clusters, on an average 4.5 acres of land with Kharif crop, 3.3 acres of land with rabi crop, and 3.4 acres of land with summer crop was under irrigation in the past 12 months. Around 14% of respondents in project clusters and 11% respondents in comparison had their land (on average of 8 and 6.3 acres respectively) under orchards plantation.

Crops Grown in Various Seasons:
Kharif Season: The most common Kharif crops cultivated in both project and comparison clusters included Cotton, Pigeon pea, and Soybean. Some of the other Kharif crops cultivated are Black gram, Green gram, Maize, Sugarcane, Turmeric, Ginger, 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.

Crop damage: Crop damage is an important issue faced by farmers in both project and comparison clusters. It was observed that nearly 64% of respondents in the project and 60% of respondents in comparison clusters faced crop damage. The crop-wise distribution of the crop damage response is presented in the table below.

Table 13: Crops grown and damage faced by respondents in various seasons

Season wise crops	Percentage respondents growing crops		Percentage respondents facing crop damage	
	Project (%)	**Comparison (%)**	**Project (%)**	**Comparison (%)**
	Valid N = 515 (Multi response)	Valid N = 257 (Multi response)	Valid N=330 (Multi response)	Valid N=154 (Multi response)
KHARIF				
Soyabean	70.3	63.4	65.5	55.8
Cotton	46.2	51.4	31.2	30.5
Pigeon pea	28.5	29.2	12.7	10.4
Sugarcane	13.0	13.2	1.5	-
Black gram	10.1	9.7	6.4	9.7
Green gram	10.1	4.7	2.7	2.0
Maize	8.2	9.3	4.6	3.3
Turmeric	6.0	7.8	0.3	2.6
Millet	2.1	4.7	-	2.0
Ginger	1.8	0.8	0.9	-
RABI				
Chickpea	56.3	47.9	12.4	11.7
Sorghum	28.0	30.0	8.2	5.2

Season wise crops	Percentage respondents growing crops		Percentage respondents facing crop damage	
Wheat	33.0	21.8	5.2	0.7
SUMMER				
Onion	6.4	9.3	1.5	-
Tomato	1.4	1.2	0.3	-
ANNUAL				
Mango	3.5	0.4	0.3	
Guava	2.3	1.2	0.3	0.7
Sweet Lime	2.3	5.8	0.6	-
Chilli	1.6	0.4	0.3	0.7
Lemon	1.2	0.4	-	-
Groundnut	1.2	0.4	-	-
Watermelon	1.0	0.4	-	-
Potato	1.0	-	-	-
Capsicum	0.8	-	0.3	-
Cucumber	0.6	-	-	-
Papaya	0.4	-	0.3	-
Cabbage	0.4	-	-	-
Cauliflower	0.4	-	-	-
Banana	0.2	2.3	-	1.3
Orange	0.2	0.4	-	0.7
Pomegranate	0.2	2.0	0.3	-
Apple Ber	0.2	-	-	-
Flat Bean (Saim)	0.2	-	-	-
Lathyrus	0.2	-	-	-
Ridge Gourd	0.2	-	-	-
Others	2.9	2.0	0.6	-

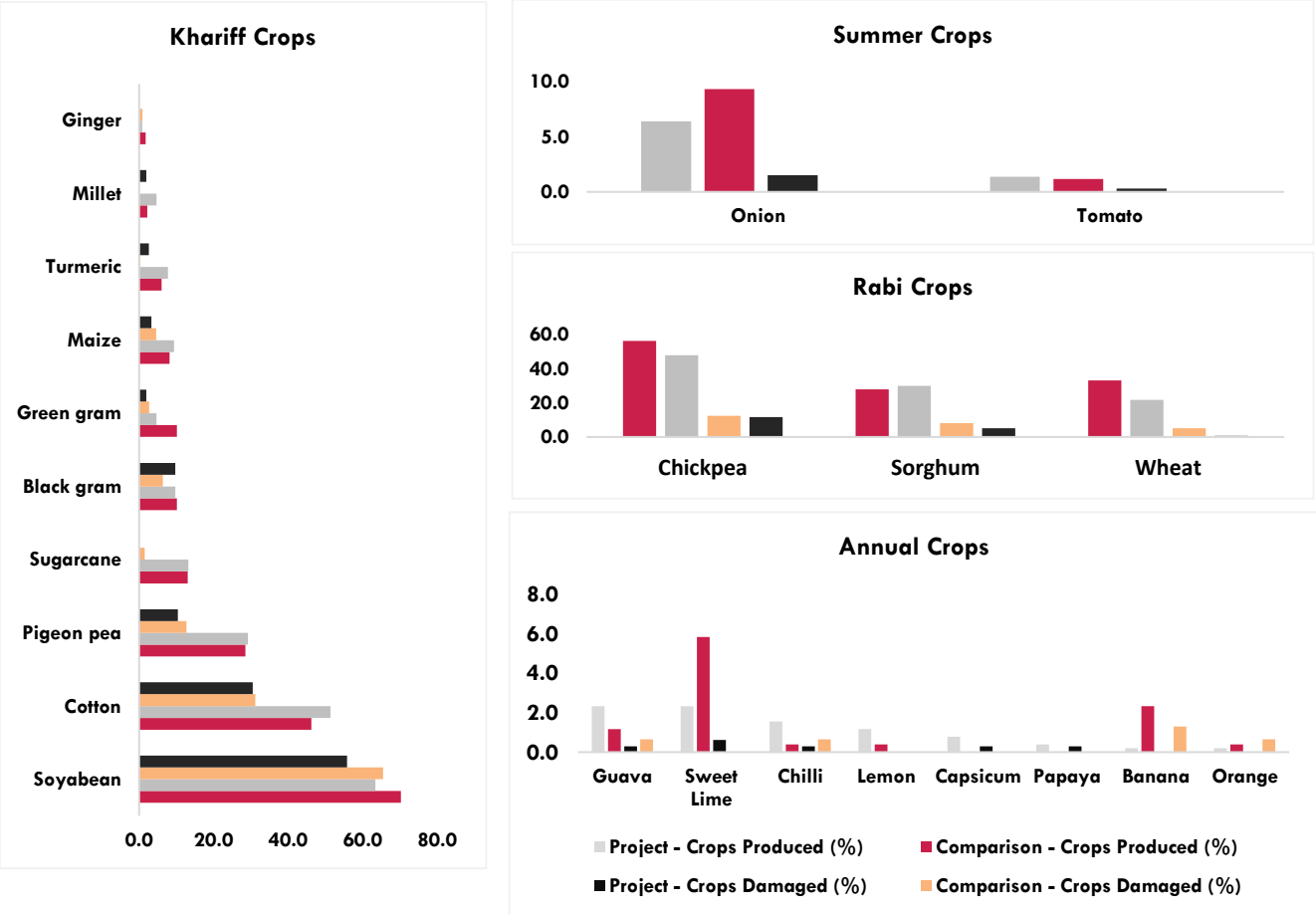

Figure 5: Crops grown and damage faced by respondents in various seasons

The primary reason for crop damage in both project and comparison clusters is excessive rain, delayed onset of monsoons, and dry spell. Nearly 12% of respondents in comparison clusters as compared to 7% in project clusters, also facde crop damage due to pest and disease attacks. The lesser percentage of respondents facing pest attack in the project region can be attributed to the effect of project initiatives which promotes the adoption of integrated pest management techniques among the farmers. The distribution of respondents specifying reasons for crop damage in project and comparison clusters are as follows:

Table 14: Reasons for crop damage

Reasons for crop damage	Project (%)	Comparison (%)
	N=330	N=154
Excessive rain	56.7	46
Delayed onset of monsoon	19.1	22.7
Dry spell	13.3	11.7
Pest and disease attack	6.7	11.7
No germination of seed due to faulty seeds	3.0	3.3
Hailstorm	0.6	4.6
Other reasons	0.6	--

Most of the damage in Kharif crops in both clusters is experienced during the flowering stage. Most of the respondents also shared that damage also occurs in Kharif crops at the sowing and pod development stage.

Table 15: Stage of Kharif crop damage

Stage of damage for Kharif crop	Project (%)	Comparison (%)
	N=330	N=154
At and after the sowing stage	25.5	29.2
At flowering stage	40.9	31.8
At pod development stage	20.6	28.6
Harvesting stage	13.0	10.4

Land under certified seeds

One of the key objectives of the project is to promote use of certified varieties of climate resilient seeds. To check on 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 area under certified seeds was relatively higher in comparison villages as compared to project villages.

The area under cultivation using climate resilient certified seed varieties for soybean was 85% in both project and comparison areas. The land under certified seeds for pigeon pea was higher in comparison area (69%) as compared to project areas (54%). Same was the case for chickpea, wherein it was observed that the comparison sample had a higher percentage of the land (76%) under certified seeds as compared to the project (72%). The overall percent of land under certified seeds for these three crops is 76% in the project area and 79% in the comparison area. However, when compared to CM IV round, the percentage of land under certified seeds for these three crops is found to be higher in the current round. It is observed that there is 22% and 4% appreciation in the percentage of land under certified seeds in the project area for soybean and chickpea, respectively. For pigeon pea percentage of land under certified seeds has decreased by 14%. However, the overall appreciation in the percentage of land under certified seeds in the project area considering three crops together is 10% more when compared to CM IV round (66%).

Table 16: Land under climate seed varieties for specified crops in the study area

Crop	Land under production (acres)		Land under climate resilient seed varieties (acres)*		% Land under climate resilient seed varieties	
	Project	Comparison	Project	Comparison	Project	Comparison
Soybean	1140 (N = 362)	414 (N = 163)	965 (N = 308)	352 (N = 139)	85	85
Pigeon pea	276 (N = 147)	127 (N = 75)	148 (N = 85)	87 (N = 58)	54	69
Chickpea	824 (N = 290)	294 (N = 123)	593 (N = 197)	224 (N = 100)	72	76
Overall	2240	835	1706	663	76	79

(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 V and CM IV rounds. In each case, the corresponding two-tailed p-value was found to be greater than alpha = 0.05, implying that the mean differences were not significantly different from the null hypothesis, i.e., Ha = 0. Hence, the resulting means for each crop in the CM V round are statistically significant when compared to those estimated using CM IV dataset at 95% confidence level.)*

Willingness to adopt climate resilient technologies promoted under project: Nearly 93% of respondents in project clusters showed a willingness to adopt the CRATs. Similarly, 82% of respondents in comparison showed their willingness for the same.

Follow of agrometeorological advisory: It is observed that 57% of respondents in project clusters as compared to 27% in comparison clusters, showed interest in following the agrometeorological advisory regularly.

Treating soil using soil health card information: Nearly 61% of respondents in comparison clusters did not have soil health cards as compared to 42% of respondents in the project. It was observed that more respondents in project clusters (46%) as compared to those in comparison (30%) treated the soil using soil health card information. Around half of the respondents from comparison clusters (52%) and 36% in project clusters did not find the information on soil health cards useful. About 13% of respondents from both clusters reported that they did not have the technical knowledge to use the soil health information.

Response on the mobile app: Responding to the question if they would like to get a mobile app for agriculture and allied activity related information or advisory services, the majority of respondents both in the project (91%) and comparison (84%) clusters responded positively. Majority of respondents across all districts and social categories seek advisory in the mobile app on key aspects such as climate resilient technology, weather, soil nutrient, NRM, fertilizer (chemical and bio), certified seeds, pesticides (chemical and bio), crops (food/cash/plantation), irrigation and crop pest/ disease. However, attention should also be given to those advisories on which the respondents recorded low demand. Generating awareness among project beneficiaries about crop residue disposal, organic farming, horticulture, market for agriculture produce, agri-business, poultry/ goatry/ fishery, and environment safeguards must be prioritized.

The distribution of responses on various advisory features on a mobile app for both clusters are listed below.

Table 17: Response on advisory features on a mobile app

Advisory feature on a mobile app	Project (%) (Multi response)	Comparison (%) (Multi response)
Climate resilient technology	73.2	82.1
Weather	62.7	75.1
Soil nutrient	40.0	43.2
Natural resource management	36.5	24.9
Fertilizer (chemical and bio)	35.5	34.6
Certified seeds	35.2	31.1
Pesticides (chemical and bio)	29.7	27.2
Crop (Food/ Cash/ Plantation)	29.3	21.4
Irrigation	28.4	30.0
Crop pest/ disease	15.3	8.2

Advisory feature on a mobile app	Project (%) (Multi response)	Comparison (%) (Multi response)
Crop residue disposal	8.4	6.6
Organic farming	4.7	2.0
Horticulture	1.6	1.2
Markets for agri produce	0.8	0.0
Agri-business	0.6	1.2
Poultry/ Goatry/ Fishery	0.2	0.4
Environment safeguards	0.2	0.4
Total %	100	100
Valid N	515	257

6.3. Awareness of project activities

One of the key objectives of concurrent monitoring is to gauge the level of awareness of the beneficiaries of the different benefits under PoCRA and other schemes, sources of information, and if they received and adopted any of the agricultural technologies being promoted.

Source of information about PoCRA: The respondents were asked about the source of information through which they came to know about PoCRA in project areas and about other projects with similar benefits in the comparison area. The most important source of information in project clusters was Gram Panchayat Members (28%), project staff (25%) - which includes Agriculture Assistant, Cluster Assistant, FFS Facilitator, Project Specialist, Krushi Tai, etc.; and VCRMC members (9%). While in the case of comparison villages, information was mostly gained from Gram Panchayat members (28%), through friends and relatives (17%), and through project staff (13%). Other sources include village microplanning activity, advertisements on radio/television, hoardings, and project display boards.

Awareness in project clusters of different benefits: it was observed that 97% (with an increase of 1% since CM IV and 12% since CM II rounds) respondents in project clusters were aware of matching grants for irrigation systems like drip and sprinkler, etc. used for protected cultivation. Nearly 79% of respondents (with an increase of 2% since CM IV and 20% since CM II) were aware of support received for construction of farm pond with inlet and outlet, and 57% (same as CM IV) respondents knew about matching grants received for doing protected cultivation by the construction of shade net, polyhouse, and polytunnel. As compared to individual benefits, it was observed that there was little awareness about NRM works conducted under the project. Also, respondents were less aware of the matching grant support to FPCs and SHGs to start an agribusiness activity.

Table 18: Awareness of project benefits in project clusters

Project benefits	Project (%)
Matching grant for the purchase of water pumps/pipes/drip irrigation systems or sprinklers	97.2
Construction of farm pond with inlet & outlet and grass cultivation on burms & inlet channel	79.4
Matching grant for construction of shade net house, poly house, and polytunnels	56.5
Plantation of fruit trees on the boundaries of farmlands/ Horticulture Plantation Mango, Custard Apple, Citrus, etc.	35.4
Matching grant to set up Sericulture/Apiculture/Inland fisheries/backyard poultry unit/goatery	32.1
Matching grant for developing Seed Processing and Seed Testing Infrastructure	20.9
Financial support for repair of existing water harvesting structure and desilting of such structures.	12.2
Production of foundation and certified seed of climate resilient varieties	12.0
Recharge of open dug wells	8.7
Drainage line treatment using Gully plug, Loose boulder structures, Earthen nala bund, Cement nala bund	3.6
Matching grant support to FPC/FPO/SHG for construction of Godown/ small warehouse, custom hiring centre, ripening chamber and primary processing units for fruits and vegetables	3.3
Catchment area treatment using Continuous Contour Trenches (CCT)	2.8

Project benefits	Project (%)
Construction of farm pond with lining	2.3
Matching grant for developing Vermi Compost unit, NADEP	1.8
Construction of Subsurface drainage wherever the land slope permits good drainage	1.0
Demonstration of Climate Resilient Agriculture Practices, including BBF, green manuring, contour cultivation, etc. through demonstration through farmer field schools	1.0
Training/Exposure visits to develop capacity of farmers on climate resilient agriculture technologies	1.0
Do not Know	0.3
Total	100

Valid N = 393 (Multi response)

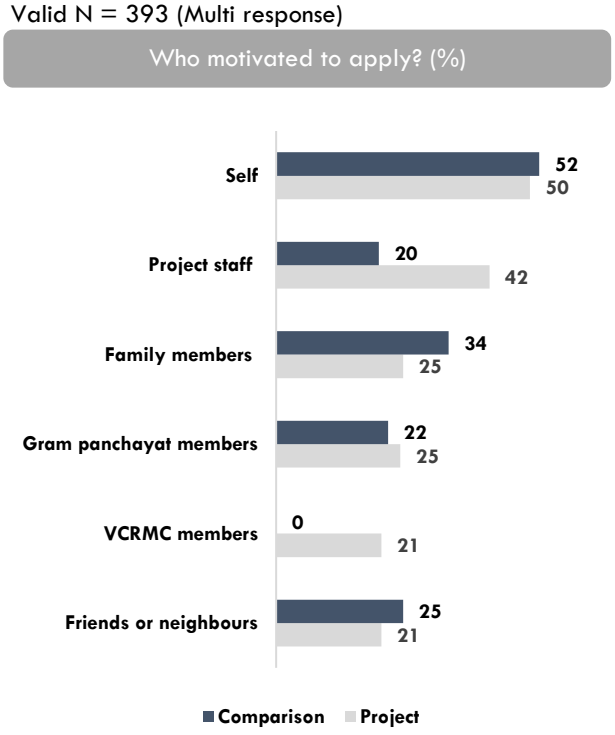

Figure 6: Motivation to apply

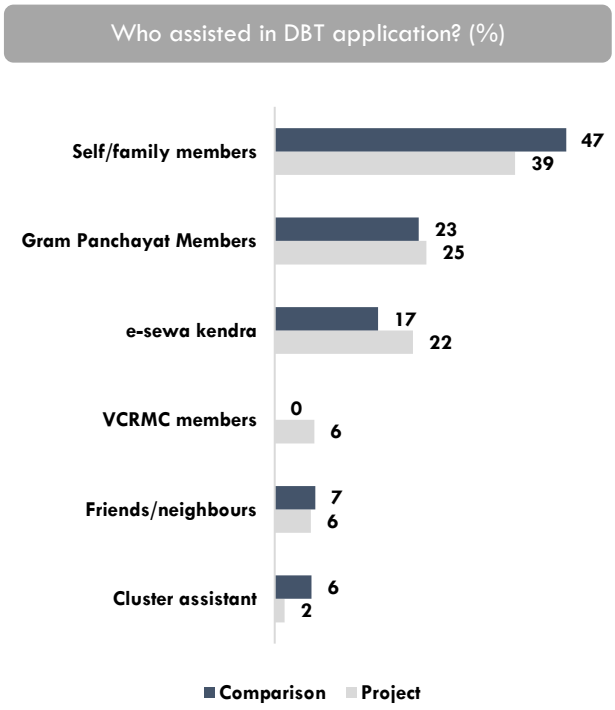

Figure 7: Assistance in DBT application

Project staff, VCRMC committee were observed to play a more proactive role in motivating farmers in project villages as compared to comparison villages. Most of the beneficiaries have received application support from family members, Gram Panchayat members, and e-Sewa Kendras. The application support process has formalized with time, and the majority of beneficiaries have started applying for benefits on their own. Improvement in percentage of beneficiaries in applying was observed because they find the PoCRA interventions have helped to increase water availability for agriculture (89% in project and 85% in comparison villages, agriculture production, and ultimately their income (91% in project and 74% in comparison).

6.4 Training and adoption of CRATs

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

Table 19: Training and adoption of climate resilient technologies

Technology	Training received						Adoption in past one year					
	Through PoCRA supported FFS		Through other sources		No		Started practicing after training		Already practicing before training		No	
	P	C	P	C	P	C	P	C	P	C	P	C
Contour cultivation	33.4	0.0	20.6	38.5	46.0	61.5	15.2	0.4	58.6	72.0	26.2	27.6
Cultivation by BBF method	33.2	0.0	15.2	33.1	51.7	66.9	12.8	1.6	40.0	54.9	47.2	43.6
Intercropping	38.8	0.0	22.9	31.9	38.3	68.1	12.8	0.8	71.8	68.9	15.3	30.4
Use of improved seed	41.4	0.0	21.6	38.9	37.1	61.1	20.6	2.3	66.6	85.2	12.8	12.5
Seed treatment	40.6	0.0	21.9	35.0	37.5	65.0	25.8	2.3	51.3	65.4	22.9	32.3
INM	35.9	0.0	17.5	33.9	46.6	66.2	20.2	2.7	46.8	59.5	33.0	37.7
IPM	35.9	0.0	16.3	31.9	47.8	68.1	19.0	2.3	52.6	62.3	28.4	35.4
Furrow opening	26.0	0.0	13.2	22.2	60.8	77.8	13.0	1.2	28.2	39.7	58.8	59.1
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	40.2	0.0	24.1	37.7	35.7	62.3	15.3	3.5	71.8	82.9	12.8	13.6
Protective irrigation through farm pond	31.5	0.0	13.8	24.1	54.8	75.9	10.7	2.3	31.5	49.0	57.9	48.6
Conservation tillage	32.2	0.0	20.2	26.1	47.6	73.9	16.7	1.6	49.1	59.1	34.2	39.3
Incorporation of biomass	34.0	0.0	19.2	26.1	46.8	73.9	19.8	2.3	59.6	73.2	20.6	24.5
Mulching	25.8	0.0	12.4	14.4	61.8	85.6	11.7	1.2	25.1	23.0	63.3	75.9
Cultivation of citrus crops on broad ridges	24.7	0.0	8.4	17.5	67.0	82.5	9.1	2.0	16.1	23.7	74.8	74.3
Canopy management in fruit Crops	24.1	0.0	6.2	16.3	69.7	83.7	9.9	2.7	13.8	18.7	76.3	78.6
Shade net	16.7	0.0	3.7	6.2	79.6	93.8	3.5	1.2	94.0	1.6	94.0	97.3
Polyhouse	14.0	0.0	2.5	5.5	83.5	94.6	2.1	0.8	1.8	1.2	96.1	98.1
Poly tunnel	12.6	0.0	3.3	2.7	84.1	97.3	1.8	0.4	1.4	0.4	96.9	99.2
Land preparation	30.3	0.0	20.8	22.2	48.9	77.8	7.2	0.8	86.8	93.4	6.0	5.8
Use of machinery	35.2	0.0	23.7	31.5	41.2	68.5	83.9	4.7	83.9	85.6	5.4	9.7
Rainwater Harvesting	28.0	0.0	16.1	20.6	20.6	79.4	7.2	1.2	57.1	71.6	35.7	27.2
Small ruminants	15.0	0.0	5.2	5.0	79.8	95.0	2.1	0.0	6.2	4.7	91.7	95.4
Backyard poultry	9.3	0.0	2.1	2.7	88.5	97.3	1.8	0.4	1.6	2.3	96.7	97.3
Sericulture	9.7	0.0	1.2	1.6	89.1	98.5	1.8	0.0	0.6	1.2	97.7	98.8
Apiculture	6.8	0.0	1.2	1.6	92.0	98.5	1.0	0.4	0.6	1.2	98.5	98.5
Inland fisheries	10.5	0.0	2.3	4.7	87.2	95.4	2.9	0.8	1.0	0.4	96.1	98.8

For Project (P) N=515 and Comparison (C) N=258

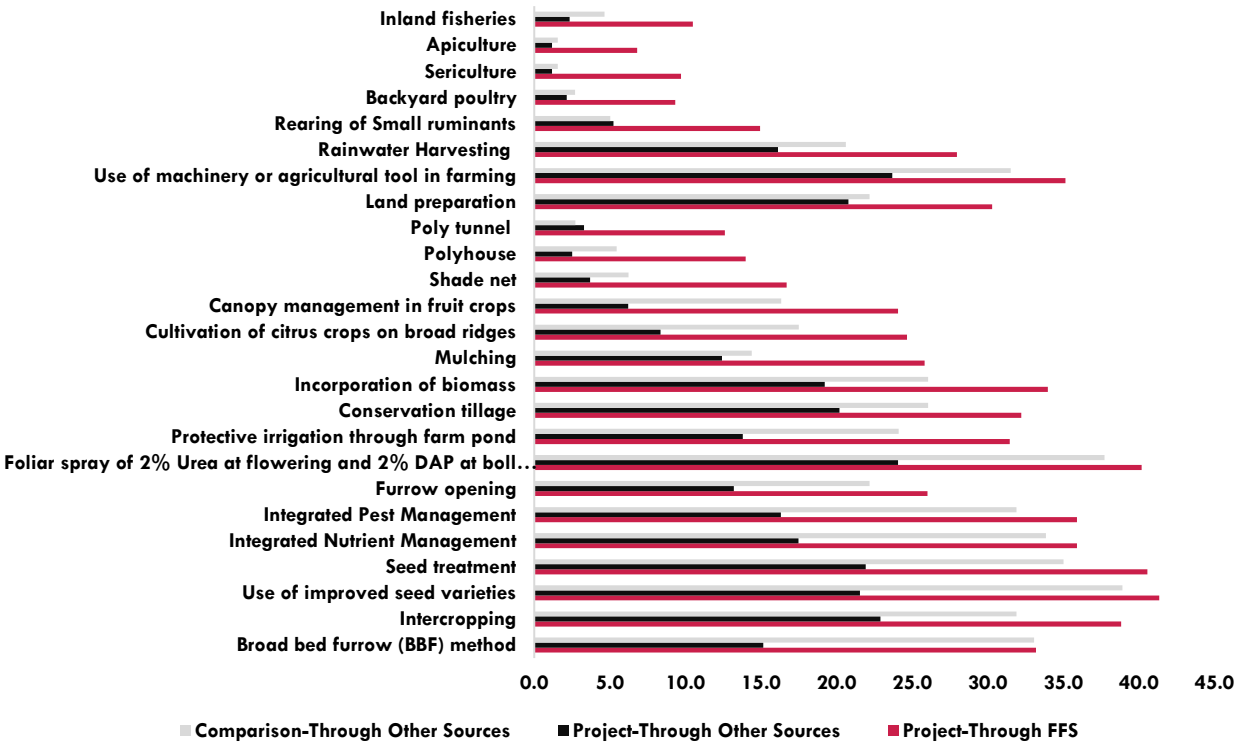

Figure 8: Training received on climate resilient technologies

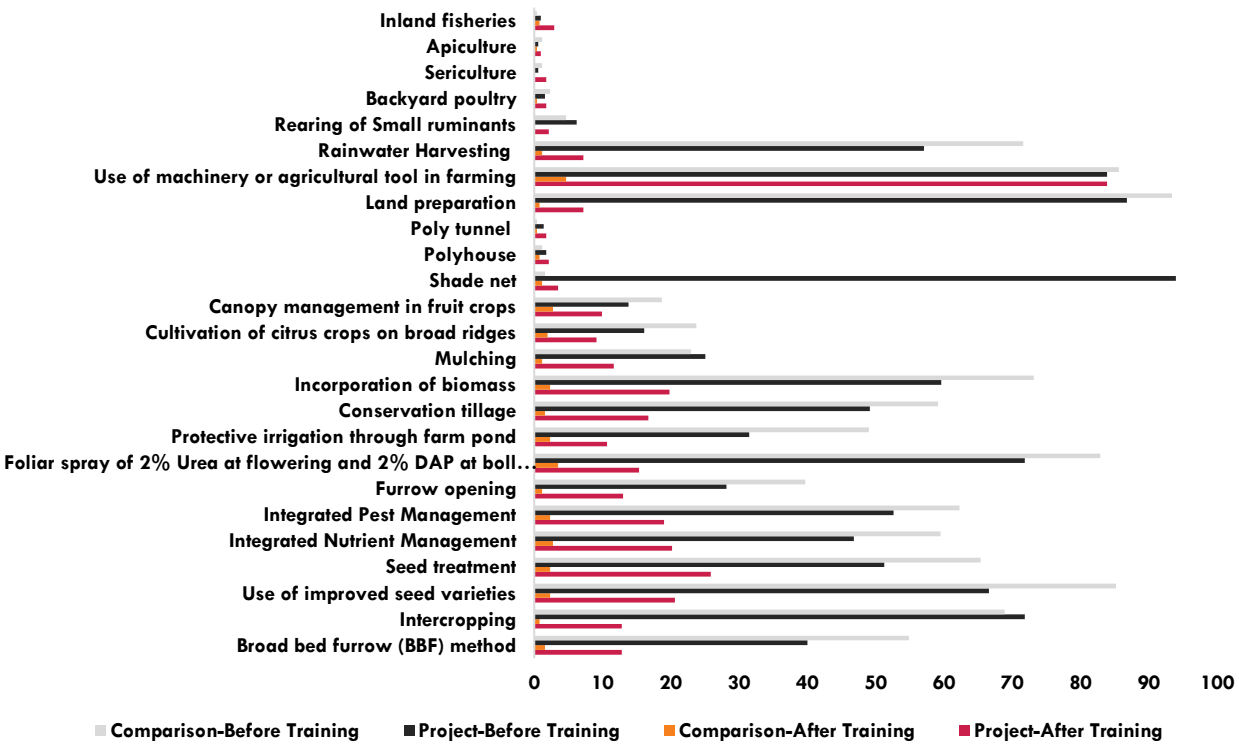

Figure 9: Adoption of climate resilient technologies in past one year

As can be seen from illustrations in figures 8 and 9, more percentage of respondents were found to be trained in the project through FFS and other sources. Also, there was higher adoption of CRATs after receiving training in the project as compared to comparison clusters.

Almost all the beneficiaries covered in the project clusters have received at least one training. However, large scale variation was observed in the proportion of farmers receiving different types of training as mentioned in table 19a and 19b.

While analysing the distribution of beneficiaries in project clusters by caste categories who did not receive training of CRATs, it was found that the proportion follows almost the same proportion as per actual coverage of samples by caste categories. It means under each training category, those who did not attend, around four-fifth were from general categories. With little variation, total beneficiaries in each training type by other social categories who did not receive training were around 7% from Nomadic tribes, 5% from SC, 5% from ST category, and 3% from other backward classes. Similarly, with small variation, total beneficiaries in each training type by farmers with different landholding sizes who did not receive training were slightly more than half in cases of medium farmers, slightly more than one-fourth in cases of large farmers, and around one fifth were small farmers.

Within each social category, it has been tried to analyse the proportion of farmers receiving different types of training as depicted in the below table. Although there is variation by training types, more percentage of STs did not attend the training in comparison to the overall percentage of non-attendance and percentage of non-attendance under other caste categories.

Table 19a: Percentage of project beneficiaries who received different trainings (% within each social category)

Types of training	% of beneficiaries did not receive the training (all categories)	General (%)	Nomadic Tribes (%)	OBC (%)	SC (%)	ST (%)
Contour cultivation	46	46	48	31	38	70
Cultivation by BBF method	52	51	58	50	46	65
Intercropping	38	37	42	31	31	70
Use of improved seed	37	37	36	31	31	60
Seed treatment	37	37	39	31	31	60
INM	47	45	42	56	50	65
IPM	48	47	45	63	50	60
Furrow opening	61	60	58	63	54	80
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	36	35	42	31	19	60
Protective irrigation through farm pond	55	54	55	63	50	80
Conservation tillage	48	45	67	50	38	70
Incorporation of biomass	47	46	48	44	42	60
Mulching	62	60	79	56	46	90
Cultivation of citrus crops on broad ridges	67	67	67	69	58	85
Canopy management in fruit Crops	70	70	79	63	54	80
Shade net	80	79	76	94	77	95
Polyhouse	83	83	79	88	88	95
Poly tunnel	84	83	82	88	88	100
Land preparation	49	48	58	44	54	60
Use of machinery	41	42	36	31	31	55
Rainwater Harvesting	56	55	52	44	69	70
Small ruminants	80	79	70	100	88	95
Backyard poultry	89	87	88	100	100	95
Sericulture	89	89	85	100	88	100
Apiculture	92	91	97	100	96	100
Inland fisheries	87	85	94	100	88	100

Total samples (N)=General-420, Nomadic tribe=33, OBC=16, Scheduled caste=26, Scheduled tribe=20

Within each category of farmers by landholding size, it has been tried to analyse the proportion of farmers receiving different types of training as depicted in the below table. Although there is variation by training types, more percentage of small farmers did not attend the training in comparison to the overall percentage of non-attendance and percentage of non-attendance under the category of large farmers. It warrants more focus to cover small farmers under different training programmes.

Table 19b: Percentage of project beneficiaries received different trainings (% within beneficiaries by landholding size)

Types of training	% of beneficiaries did not receive the training (all categories)	Large farmers (%)	Medium (%)	Small (%)
Contour cultivation	46	39	46	59
Cultivation by BBF method	52	47	52	57
Intercropping	38	32	39	46
Use of improved seed	37	28	38	48
Seed treatment	37	30	39	45
INM	47	43	47	53
IPM	48	43	49	52
Furrow opening	61	57	63	61
Foliar spray of 2% Urea at flowering & 2% DAP at boll dev.	36	32	37	38
Protective irrigation through farm pond	55	53	54	60
Conservation tillage	48	42	47	58
Incorporation of biomass	47	41	47	54
Mulching	62	61	61	65
Cultivation of citrus crops on broad ridges	67	59	70	72
Canopy management in fruit Crops	70	62	72	76
Shade net	80	76	81	83
Polyhouse	83	81	85	84
Poly tunnel	84	82	85	86
Land preparation	49	45	50	53
Use of machinery	41	35	43	45
Rainwater Harvesting	56	52	56	61
Small ruminants	80	80	79	83
Backyard poultry	89	88	89	89
Sericulture	89	88	89	92
Apiculture	92	92	92	92
Inland fisheries	87	87	87	89

Total samples (N)= Large farmers: 152, Medium farmers: 268, Small farmers: 95

6.5. Awareness of the process of accessing benefits

Regarding the awareness of the steps that are involved in accessing the individual level benefits as part of the PoCRA project, respondents were found to be aware of initial steps such as registration on the DBT portal (84%), which has experienced an increase by 7% in comparison to CM-IV. The other individual benefits found were: application for matching grant on the DBT portal (65%), verification of application by cluster assistant (56%), and approval by VCRMC committee (49%). More than 30% of respondents were aware of approval of the application by SDAO, and more than 25% were aware of the transfer of matching grants to beneficiaries. The higher percentage of the beneficiaries receiving matching grants could also be a factor for higher awareness about steps and processes involved in accessing the benefits.

Table 20: Awareness of steps in accessing individual benefits

Steps for accessing individual benefits	Project (%) Valid N=393 (Multi response)
Registration on DBT portal	83.5
Application for matching grant on the DBT portal	65.1
Verification of application by Cluster Assistant	56.0
Approval by VCRMC committee	49.4
Spot verification by Agri Assistant	42.5
Approval of application by SDAO and provision of pre sanction	34.1
Implementation of work by beneficiary	33.3
Demand by beneficiary for matching grant on submission of bills of expenditure	27.7
Post Asset Construction scrutiny by the Agriculture Assistant	18.8
Post Asset Construction scrutiny and approval by the SDAO	19.9
Transfer of matching grant to the beneficiary bank account	27.7
Not aware	0.5
Total %	100

Except for 8% of respondents in the project clusters, the rest were aware of the category of people which is provided priority in accessing individual grant benefits through PoCRA project.

Table 21: Awareness of beneficiary priority

Social category	Project (%) N = 393 (Multi response)
Schedule Caste potential beneficiaries	53.7
Schedule Tribe potential beneficiaries	56.2
Widows	20.9
Small and Marginal Farmers	71.5
Disabled Person	16.8
Landless Men and Women	34.4
Women	15.8
Others (Specify)	1.3
Do not Know	8.1
Total %	100
Valid N (multiple responses)	393

6.6. Project benefits

6.6.1 Individual

Out of 80% of respondents in project clusters, nearly 58% had applied or received individual benefits, 41% had participated in farmer field school, and 1% had accessed both the benefits. Around 65% of respondents in comparison clusters had applied or received individual benefits. Activity-wise distribution of the access to individual benefit in both project and comparison clusters are detailed below. It is observed that the highest demand under the project was for sprinklers (44%), followed by drip (21%), pipes (14%), and pumps (10%).

Table 22: Status of individual benefits received

Individual Benefit	Project (%)	Comparison (%)
Drip irrigation	21.4	28.1
Sprinkler irrigation	43.9	19.2
Pipes (HDPE/PVC)	13.9	9.6
Water pumps	10.2	9.6
NADEP Compost Unit	-	0.6
Vermicompost unit	-	
Construction of Individual Farm Pond/farm pond lining	1.6	10.2
Polyhouse (Open vent)	-	-
Poly tunnels	-	-
Shade net house	2.7	1.2
Planting material in Polytunnels and Polyhouse	-	-
Production of foundation & certified seeds of climate resilient varieties	0.5	-
Plantation of Horticulture Crops	8.6	8.4
Plantation of agroforestry	-	0.6
Recharge of open dug wells	0.5	2.4
Construction of open dug well	1.1	9.6
Apiculture	-	-
Backyard poultry	0.5	-
Small ruminants	-	1.2
Inland fisheries	-	-
Sericulture	1.1	-
Others (specify)	1.6	4.2
None	-	1.2
Total	100	100
Valid N (Multiple response)	187	167

Regarding the status of application for individual benefits in project clusters, nearly 60% of respondents had received the matching grant on their bank account. It was observed that the transfer of matching grants in current round V has improved by 4% as compared to that observed during the CM IV round. All beneficiaries were found to be aware of their application status, which is a positive trend.

Table 23: Status of application

Status of application	Project (%)
Application for matching grant through DBT mobile application	15.5
Verification of application by Cluster Assistant	4.3
Approval by VCRMC committee	9.6
Spot verification by Agriculture Assistant	2.7
Approval and pre-sanction by SDAO	1.1
Work under implementation & document submission by beneficiary	0.5
Post work approval by SDAO	6.4
Transfer of matching grant to the beneficiary bank account	59.9
Total %	100
Valid N	187

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.

6.6.1.1 Drip irrigation system

24 beneficiaries who have set up a drip irrigation system using project grant participated in the survey. 22 beneficiaries of them (92%) used their irrigation set only when required. One beneficiary was found to be using the set regularly, while the other one used the set seasonally. The area irrigated using drip irrigation lied between 1 to 12 acres. On average, each of the beneficiaries reported availing drip irrigation has 4 acres of land irrigated by drip irrigation which has increased from 3.37 acres from CM IV round. The frequency of irrigation lied between1 to 3 times. Most of the farmers used drip irrigation to irrigate cotton (46%), Soyabean (33%), Pigeon Pea (25%), Chickpea (25%), Black gram (21%), and Wheat (21%). Other crops include sorghum, sugarcane, green gram, sweet lime, maize, tomato, turmeric, and watermelon. None of these farmers has availed the benefit of horticulture plantation under the project or use their drips irrigation system for horticulture plantation activity.

Six beneficiaries (3 small and 1 medium farmer from the general category, 1 small farmer from nomadic tribe, and 1 small farmer from OBC category) out of 24 beneficiaries reported that they faced difficulty in accessing the benefit. Mostly the difficulty was faced in obtaining the micro-irrigation quotation/plan from the dealer (66%), providing proof of permanent water supply (33%), and providing agreement/consent in case of the common source of water supply (33%). All these project beneficiaries acknowledged benefitting from using drip irrigation.

6.6.1.2 Sprinkler irrigation system

A total of 51 beneficiaries who had accessed the sprinkler irrigation system under the project were surveyed. Except for two, all of them used sprinkler sets only on the requirement. The area irrigated using sprinkler irrigation lay between 1 to 22 acres, and on average, it is around 5 acres per household undertaking sprinkler irrigation. Common crops that are irrigated using sprinkler irrigation include soybean (66%), chickpea (69%), sorghum (33%), wheat (31%), cotton (26%), pigeon pea (27%). Other crops include green gram, black gram, groundnut, maize, millet, onion, and sweet lime. Like drip irrigation beneficiaries, four (1 small, 2 medium, and 1 large farmer from the general category) reported difficulties in obtaining micro-irrigation plan from the dealer while accessing the project benefits.

6.6.1.3 Pipes

21 beneficiaries who have received the benefit of pipes from PoCRA were surveyed. Most of them (14 of 21 beneficiaries) were found to be using as per the requirement. Six beneficiaries were found to be using it regularly, and one beneficiary was using it seasonally. The size of land irrigated by pipes ranges from 1.5 to

30 acres with an average size of 6 acres as compared to 3.97 acres observed in CM IV round. Six beneficiaries (all small farmers belonging to the general category) reported difficulties in providing proof that they have not taken benefit for pipe procurement on the same plot from any other scheme (3 beneficiaries), providing proof of permanent water supply (2 beneficiaries), and providing agreement/consent if there is a common source of water supply (2 beneficiaries).

6.6.1.4 Water pumps

Of the 18 beneficiaries who have accessed water pumps as a project benefit and were surveyed, 17 of them used water pumps only on the requirement. The range of land size irrigated using water pumps goes from 1 to 24 acres with an average 4.19 acres in each respondent's household as compared to 3.71 acres observed during the CM IV round. Of the 18 beneficiaries interviewed, 15 beneficiaries used the water pump with a power rating of 5HP, while the remaining three used pumps of 3HP power. Half of the beneficiaries did not know the diameter of the pipes they used. Three (17%) respondents used pipes of diameter 0.5 inch, four (22%) used pipes of 1-inch diameter, and two (11%) used pipes of 1.5-inch diameter.

It is observed that on average, the pump is operated for 5.5 hours per day during the Kharif season and 6.5 hours during the rabi season. Like beneficiaries of pipes, three respondents (all small farmers belonging to the general category) reported difficulties in proving that they have not taken benefit for pipe procurement on the same plot from any other scheme (1), providing proof of permanent water supply (1) and providing agreement/consent if there is a common source of water supply (1).

Table 24: Purpose of Pipes and Pumps

Purpose	Pipes Respondent (%)	Pumps Respondent (%)
Draw ground water	-	11.1
Lifting of water from river/canal	28.6	16.7
Transport water from well to pond	71.4	55.6
Transport water from pond to field	4.8	22.2
Other (Please specify)	4.8	16.7
Total %	100	100
Valid N	21	18

Table 25: Irrigation System used with Pipes and Pumps

Irrigation system	Pipes Respondent (%)	Pumps Respondent (%)
	Valid N=21	Valid N=18
Drip	42.9	50.0
Flood irrigation	33.3	22.2
Sprinkler irrigation	38.1	0.0
Furrow irrigation	14.3	11.1
Other (Please specify)	4.8	16.7

More than four-fifth of each type of beneficiaries of four individual types of irrigation benefits (drip, sprinkler, pipes, and pumps) reported an increase of income and increase of agricultural production as the major benefits of adopting these. As the following table reflects an increase in income was reported more among the 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 season, change in cropping season, and availability of water in dry spells.

The benefit accrued from the above four individual benefits are listed below:

Table 26: Benefits from Drip, Sprinkler, Pipes, and Pumps

Benefits	Drip	Sprinkler	Pipes	Pumps
Increase in income	96	98	86	89
Increase in production	92	92	86	94
Increased availability in water for protected irrigation	46	55	43	39

Benefits	Drip	Sprinkler	Pipes	Pumps
Change in cropping pattern	25	16	33	22
Availability of water during dry spells	25	20	29	22
Efficient use of water	13	12	38	17
Increase in quality of agriculture produce	33	24		
Increase in area of cultivation during Kharif Season	38	29	38	17
Increase in area of cultivation during Rabi Season	38	37	38	6
Increased water availability for rabi season	8	10	-	-
Timely availability of water for irrigation	-	-	24	17
Total %	100	100	100	100
Valid N	24	51	21	18

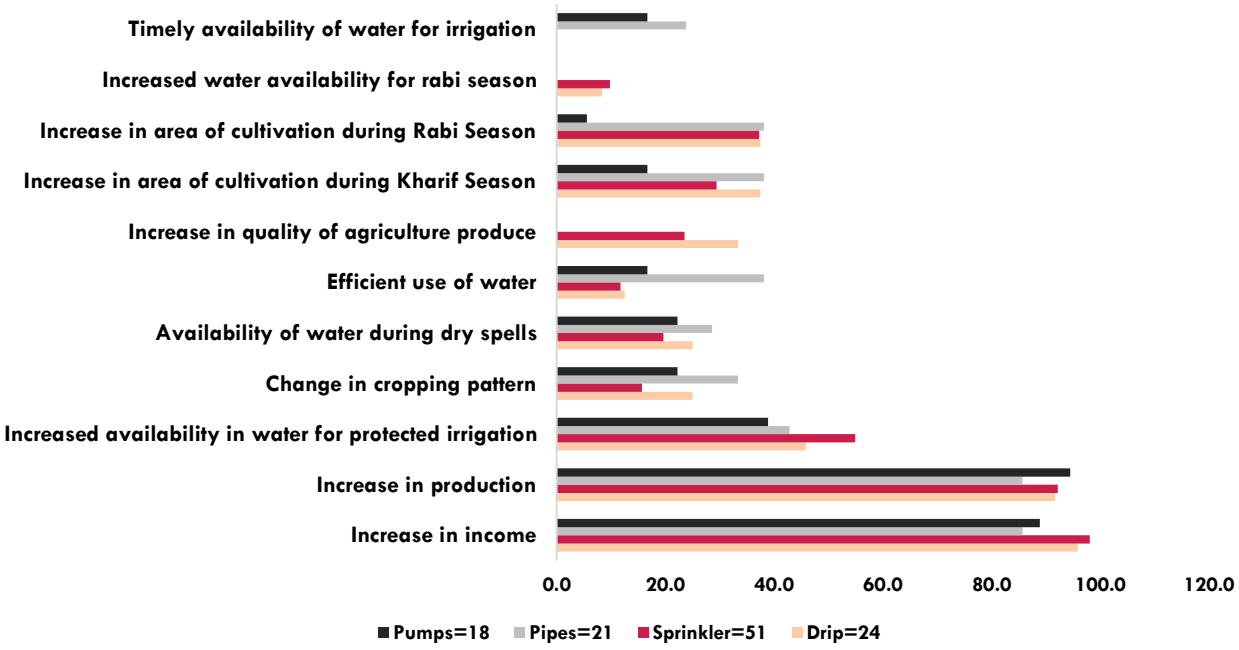

Figure 10: Benefits from Drip, Sprinkler, Pipes, and Pumps

6.6.1.5 Individual farm pond

One beneficiary with the benefit of an individual farm pond was interviewed. The size of farm pond is 180 ft (length) X 160 ft (width) X 30 ft (height). The farm pond has no inlet and outlet but has grass cultivation on its bund, ensuring its stability. According to the respondent, once the farm pond is filled the water, it lasts for 120 days. With support from PoCRA, the farm pond was lined later, which increased the availability of water to nearly 180 days. The respondent uses the water as per the requirement. Currently, the beneficiary is using the farm pond for inland fishery activity. A total amount of Rs 30000 was invested last year in fish production activities using this technology. However, the production has not started yet. The beneficiary 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, pigeon pea, and wheat and increased availability of water for irrigation.

6.6.1.6 Shadenet

Out of the five shade-net beneficiaries who were surveyed, four beneficiaries have received training on how to do cultivation in shade net. Four shade-net beneficiaries are primarily growing vegetables in their shade-net, and one has developed a nursery. Three of them get the technical guidance on how to cultivate to achieve

better productivity taking the help of an agriculture assistant. Two of them were not using the shade net, two beneficiaries were using it regularly, and one had reported that he used it seasonally. Three beneficiaries who were using it had invested around Rs 5 to 6 lakhs last year. Two beneficiaries find it difficult to find skilled labours for production related activities. All three are able to sell their produce easily directly via haat or retail mode and in nearest town or district market. One beneficiary had reported having earned Rs. 3 lakhs last year. Rest two beneficiaries were yet to witness their first production cycle. On asking about their plan to dispose shade net after it is damaged, one beneficiary plans to burn, and rest two beneficiaries were not sure about their plans. All five beneficiaries did not face any difficulty in accessing the benefit from PoCRA. All of them anticipate benefits of an increase in income, production, able to produce high-value crop, and an increase in employment opportunities for locals.

6.6.1.7 Seed production activity

One beneficiary taking benefit of seed production activity under the project was interviewed. The respondent produced Soyabean -158 variety under this activity through procuring the seeds from Mahabeej. The beneficiary was found to have received training for the activity from Krishi Vigyan Kendra and had tied up with national seeds corporation for selling the seeds he produces. According to the beneficiary interviewed, the 'Soyabean 158' was climate resilient variety, and he has been producing the same for past two years on four acres of land. While the beneficiary did not face any difficulty in accessing the benefit and he anticipates benefits such as an increase in income, increased availability to climate resilient seeds, and support in strengthening of seed-producing activity.

6.6.1.7 Horticulture plantation

All the nine project beneficiaries of the horticulture plantation were found to have received training. The source of training was the farmer producer company (4 beneficiaries), department of agriculture (one beneficiary), agriculture university (two beneficiaries), and Krishi vigyan kendra (two beneficiaries). The main crops grown by beneficiary were custard apple (56%), Guava (33%), sweet lime (33%), Mango (22%), pomegranate (22%), lime (11%), and orange (11%). The activity was practiced on one acre of land by four beneficiaries, on three acres by another three, and the rest two beneficiaries practiced on seven acres and 12 acres of land, respectively. Seven out of nine beneficiaries sourced their saplings from government nursery and the rest two from agriculture university. Seven out of nine respondents have installed drip irrigation for efficient use of water, while the rest two respodents did not find the technology useful. However, none of the beneficiaries has started the production from horticulture yet. Three beneficiaries faced difficulty in the purchase of plants from Government approved nurseries. Since the production has not started, no respondents have experienced any benefit yet. However, two respondents have noted that the water requirement under the activity is high.

6.6.1.8 Sericulture

One beneficiary taking benefit of sericulture activity was interviewed. The respondent did not face any difficulty in accessing the benefit under PoCRA and anticipated the benefit of an increase in income. However, the beneficiary has currently stopped practicing the activity, citing that he did not find it profitable.

6.6.1.9 Status of individual benefits and suggestions

Of the total 135 beneficiaries of individual activities interviewed, around 90% of beneficiaries have constructed assets at the site. The reason cited by the remaining 10% of the respondents are mainly pertaining to the financial issues and have applied in DBT but did not receive benefit etc. Almost all beneficiaries (99%) had a good experience with the application process.

Cost Incurred on the application process:

- 63% of project and 65% comparison beneficiaries incurred additional costs during the application stage.
- Costs mostly included Documentation, Transportation costs, and loss of wages.

While asking for suggestions on the application process, around one-fourth were found to be satisfied. Around one third suggested that matching grants should be increased, and another nearly one third

provided feedback that the Process of applying and getting benefits can be simplified. One-tenth of respondents reported that support is required in filling the application through the DBT application portal.

Table 27: Feedback on application processes

Suggestions on application processes	Project (%)
	N = 187
I am satisfied with the current process	24
Support required in filling application through DBT application portal	10
Process of applying and getting benefits can be simplified	30
Matching grant should be increased	34
Documentation process in the application should be simplified	2

During CM-V, the sample did not cover beneficiary accessing benefit of NADEP, vermi compost, polyhouse, poly tunnel, planting material for polyhouse and polytunnel, agroforestry plantation, recharge of open dug well, construction of open dug well, apiculture, backyard poultry, small ruminants, and inland fisheries.

Feedback from Qualitative Enquiry:

During the qualitative survey, the participants also suggested including other activities under the individual benefit list, which are mentioned below:

1. **Pipes and Pumps**: Though previously most popular amongst the farmers, the access to benefit is presently put on hold under PoCRA program. Many AA and CA demanded this activity to be started again.
2. **Goat rearing:** AAs and other district staff expressed the need for inclusion of this activity for the landless people since currently, they do not have an option for availing any other benefits from PoCRA project.
3. **Machines** that help in the **mechanization of agriculture activities** are available in the lottery system and also have very low coverage. AAs find it difficult to implement this activity. There is a need to increase the coverage for this activity.
4. **New well construction:** AAs and SDAOs have suggested increasing the coverage for construction of new wells.
5. **Fencing for farms:** Farmers, particularly in Hingoli, Nanded and Parbhani, demanded for the inclusion of fencing activity to prevent crop damage and loss due to the menace of animals from forest areas.
6. **Solar pumps:** Due to uncertainty in the availability of electricity in rural areas, there was demand for solar pumps by the farmers.
7. **Individual farm pond**: It was suggested by one SDAO that the individual farm ponds should be allowed to be constructed with the size permitted for the construction of community farm ponds.
8. **Community works**: There was also a suggestion for starting the community farm pond activity from SDAOs and DSAOs. It was also suggested to include onion storage activity in the community works.

Most and least popular activities

1. Maximum applications were received for micro-irrigation (Drip, Sprinklers/Farm Pond) and horticulture plantations.
2. **Reasons:** These benefits help in getting better irrigation to land. The farmers can cultivate more crops in different cycles because of better irrigation facilities, and it helps in saving their crops during drought.

3. No activity was reported to be least popular. But the well recharge activity, as well as vermicompost, were found to be difficult to implement since the cost norms under the project for these activities were found to be less than the actual implementation cost.

4. Apiculture and sericulture activities received mixed responses. These activities are not in the core subject of the Agri Department as shared by one of the SDAO.

Reasons for application rejection/delay in approval/work not initiated after receiving pre-sanction:

1. **Rejection:** Documentation issues, incomplete/incorrect application form, farmers availed the same benefit from other schemes, non-eligibility for a benefit were the primary reasons for rejection of the application.

2. **Delay in approval/Pre-sanction:** Delay in approval/ verification from CA/AA is due to high workload (majorly because of vacant posts) and lack of adequate IT infrastructure at Taluka level.

3. **Reasons for not applying:** Insufficient funds for initial investment and requirement of getting land records (7/12 document) updated from Talathi records with signature are the main reasons for not applying.

4. **Work not initiated:** Insufficient funds, other priority expenses, and seasonal aberrations causing a delay in construction are the reasons shared by farmers for not initiating the work.

5. **Measures by VCRMC for work initiation:** Motivate and guide farmers to apply and complete the work

Feedback on DBT Application

1. Almost all stakeholders (AA, CA, AS, TAO) provided positive feedback on the DBT application.

2. It is efficient in saving the time of applicants and also helps in achieving better transparency.

3. However, some applicants also face difficulty in uploading documents and photographs in the villages where the mobile network signal is not good. Some of the project staff also suggested having an option to cancel an application at cluster/ taluka level and to revise the application, if needed.

Feedback on project guidelines

1. Most officials/stakeholders had clarity on the project guidelines.

2. One SDAO has shared that there is no clarity in the guidelines for accessing the benefit of inland fishery activity in case the farmer already has an individual farm pond from MTS ("Magel Tyala Shetale") scheme.

3. One DSAO has shared that in cultivable area calculation, currently, only bed size is considered for making an estimate... It was suggested that the inspection area must also be considered in the estimate.

Feedback on activities for which more cases of duplication were received

1. No cases of duplication of DBT applications were reported.

Feedback on Implementation

1. Some cases were reported where farmers were not well-versed in how to use the asset. It is necessary that requisite training and awareness sessions should be organised for those who purchase the assets with the project's support.

Individual Activities- Specific Challenges and Suggested solutions

1. <u>Some activities like pipes, motor, open dug well, community farm pond, goat rearing have reported being closed though they are still in demand</u>: There is a need to reassess these guidelines. If feasible, decision for resuming can be decentralized based on groundwater levels and other critical factors.

2. Application by farmers on the same land multiple times, which accounts for more than his owned land: Changes in the guideline of DBT to be made so that the benefit for the same activity must not be given on the same land.

3. Difficulty in carrying out daily field visits due to no provision of contingency amount in PoCRA at Subdivisional Level: Feedback was given that contingency funds may be allocated at the sub-divisional level to carry out the maintenance of vehicles as well as to bear payment to drivers. Provision should be made for contingency amounts like that available under Jalyukt Shivar and IWMP.

4. Difficulties faced by TAO and Agri Supervisors due to non-availability of laptops and printers: Due to increased responsibility of presanction and spot verification, the need for laptop and printer is utmost necessary at Taluka level along with the computer operator.

5. High workload reported by project staff remains a continuous challenge: On average, under PoCRA project, one AA has the responsibility of 5 villages (range 2-12), and CAs have 10 villages (range 6 - 15).

6. Low demand for the well recharge Vermicompost and the NADEP activity: Activity of well recharge needs more awareness as farmers think that the silt may damage their wells. Estimates for activities of well recharge and vermicompost may be increased as suggested by SDAOs.

7. Low demand for the E class farm pond in the project area since the area is encroached by the villagers and the ownership or maintenance post-construction is challenging: Awareness and follow-up meetings with the GP members can help resolve the challenges farmers face. Feedback was given that some amount should be given to VCRMC for post-construction maintenance activities.

6.6.2. Farmer Field Schools

Farmer Field School (FFS) is an important component being implemented under PoCRA. 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. This section presents the findings on FFS in the current concurrent monitoring round survey from the PoCRA villages. No beneficiaries from comparison villages have reported undergoing FFS or similar training sessions.

Review of success of FFS based on feedback from surveyed beneficiaries:

A total of 131 farmers were surveyed from project villages which include 31 host farmers and 100 guest farmers. Nearly 36% of guest farmers participated in 2018, 26% in 2019, and the rest 40% in 2020. Looking at the cropping season-wise distribution, 84% of the guest farmers participated during Kharif and the rest 16% during Rabi.

Table 28: Crop wise host farmer demonstration and guest farmer participation

Crop	Host farmer demonstration (%)	Guest farmer participation (%)
Cotton	19	34
Maize	2	2
Soybean	19	36
Turmeric	0	1
Rabbi Jowar	7	0
Chick Pea	21	12
Onion	2	1
Cotton + Green Gram	12	5
Cotton + Black Gram	0	3
Cotton + Pigeon Pea	5	0
Soybean + Pigeon Pea	7	2
Bajara + Pigeon Pea	0	0
Others(specify)	5	4
Total %	100	100
Total N	N = 31	N = 100

Among the 31 host farmers, 20 farmers (65%) were motivated by agriculture assistants, 8 farmers (26%) were motivated by FFS facilitators, two farmers (6%) were motivated by VCRMC, and one was motivated by agriculture department staff. Regarding honorarium, though only 11 (36%) of them have received it, the percentage of those who have received it has increased by 19% since the last round. The honorarium for 3% of host farmers is in the process, while 61% of host farmers shared that they have not received it. And rest have reported not receiving it yet. 27 (87%) host farmers find that difference in the quality/cultivation of produce from demo and control plot. All the 27 host farmers see higher yield, 23 hosts observe less pest attack, 16 farmers noted more climate resilience to weather, and 12 farmers reported less tillage.

The distribution of reasons cited by both host and guest farmers for participating in the FFS were as follows:

Table 29: Reason for FFS participation

Reasons for participation	FFS participants (%)
	Valid N = 131 (Multiple reason)
Was interested to learn new technologies related to agriculture	94
To increase production and income	70
To reduce cost of production	67
To learn how to apply fertilizers and pesticides more effectively	51
To utilize water more effectively	29
To save their crop from climate variation (high temperature /low rainfall/very high intensity rainfall etc)	26
No specific reason, was suggested by my friends/family	2
Due to extra income provided for participating in FFS as host farmer	-
Others	-

On asking if they have attended all technology sessions conducted under PoCRA FFS, 82% (increased by 12 % since CM IV round) of FFS farmers responded positively. Rest 18% FFS farmers could attend on an average 3 to 4 FFS sessions and cited the following reasons for not being able to attend all sessions. Most common reason for not attending FFS was the priority of other personal work.

Table 30: Reasons for not attending all sessions

Reason for not attending all sessions	FFS participants (%)
	N = 23
Did not find the sessions useful	-
Had to skip the session due to personal work	70
Had to skip the session due to work in own field	17
Was not aware about the session's timings	4
Found the new technology difficult to understand	9
Others (Specify)	-
Total %	100

It was observed that the time of the next FFS session was informed to nearly 55% through SMS or WhatsApp message, 33% were informed by FFS facilitator during FFS session and the rest 12% were informed in person by other project staff such as cluster assistant, agriculture assistant, and Krishi tai. Nearly 75% of the participant find the timing of the FFS session convenient. 46% of all the sample guest farmers have reported that their queries were satisfactorily answered by FFS host farmers. 24% of all FFS participants, including host and guest farmers, have requested training on topics apart from what is covered under FFS. Some of the key topics on which they expect training are orchard plantation, goatry, certified seeds, and the marketing of agri produce. 95% (125 of 131) of all FFS participants including host and guest farmers think that they have benefitted from attending the FFS session which is an increase of 3% in comparison to CM-IV. The benefits from FFS have been summarized in the below table:

Table 31: Benefits from participation in FFS

Benefits from participation in FFS	FFS participant (%)
Awareness about good agriculture practices	90
Better awareness of use of inputs (fertilizers, seeds etc.)	69
Improvement in Soil health	56

Benefits from participation in FFS	FFS participant (%)
Soil moisture was conserve around the crop roots	-
Less diseases in crops	28
Better water management for agriculture	34
Increase in crop production or yield	27
Saving in seed input cost	39
Saving in fertilizer input cost	19
Overall reduction in cost of production	11
Others(specify)	1
Total (%)	100
Valid N (Multi response)	125

Rest 5% of FFS participants reported they were not benefiting from FFS sessions since they feel that the training on technology demonstrated was not useful. 70% of the FFS participant, including both host and guest farmers reported having faced climate vulnerability.

Table 32: Training and adoption of technologies demonstrated in FFS (N = 131)

Technology demonstrated in FFS	Whether received training on technology through FFS?		Whether adopted technology after participating in FFS session		
	Yes	No	Yes, after participating in PoCRA FFS	Yes, but before participating in PoCRA FFS	No
Preparation of pesticide formulations & spraying	87.0	13.0	74.8	11.5	13.7
Foliar application of 2% DAP	93.1	6.9	61.8	33.6	4.6
Spraying techniques with safety measures	93.9	6.1	74.8	16.8	8.4
Seed treatment with bio-fertilizers	91.6	8.4	67.9	15.3	16.8
Bird perches (10/acre)	44.3	55.7	29.8	2.3	67.9
Irrigation by Drip/Sprinkler	90.8	9.2	65.7	9.9	24.4
Integrated weed management	67.2	32.8	49.6	6.9	43.5
Crop residue management	89.3	10.7	62.6	22.1	15.3
Foliar Spray of micronutrients	73.3	26.7	51.2	14.5	34.4
Seed treatment with fungicides	74.8	25.2	51.2	9.2	39.7
Installation of pheromone traps (4-5/ha)	42.0	58.0	29.8	3.8	66.4
Sticky traps (10/acre)	46.6	53.4	37.4	3.8	58.8
Nipping of apical bud	64.1	35.9	38.9	16.0	45.0
Application of basal dose of fertilizers	81.7	18.3	64.1	15.3	20.6
Thinning & Gap filling	70.2	29.8	38.2	28.2	33.6
Preparation and application of Dashaparni extract	52.7	47.3	34.4	6.1	59.5
Preparation of Broad Bed Furrow	66.4	33.6	43.5	5.3	51.2
Foliar application of Potassium Nitrate	55.7	44.3	34.4	21.4	44.3
Preparation of neem based formulations	53.4	46.6	41.2	9.9	48.9
Sowing of border crops/Trap crops	42.0	58.0	29.8	4.6	65.7
Foliar application of 2% Urea	87.8	12.2	64.1	29.0	6.9
Application of Soil amendments	61.8	38.2	42.8	13.7	43.5
Draining of excess water	74.1	26.0	61.8	13.7	24.4
Identification & removal of affected rosette flowers	64.1	35.9	38.2	23.7	38.2
Intercultural operation	82.4	17.6	51.2	36.6	12.2
Opening of alternate furrow / dead furrow	35.1	64.9	13.0	12.2	74.8

Technology demonstrated in FFS	Whether received training on technology through FFS?		Whether adopted technology after participating in FFS session		
	Yes	No	Yes, after participating in PoCRA FFS	Yes, but before participating in PoCRA FFS	No
Sowing on Broad Bed Furrow (with Planter)	46.6	53.4	26.0	8.4	65.7
Sowing across the slope	61.1	38.9	42.0	15.3	42.8
Sowing of refugee in cotton	26.7	73.3	17.6	7.6	74.8
Use Trichocards / Crysopa (4000 eggs/acre)	13.7	86.3	11.5	3.1	85.5
Use of climate resilient varieties	68.7	31.3	49.6	16.8	33.6
Intercropping	89.3	10.7	54.2	34.4	11.5
Zero- tillage	71.0	29.0	51.2	21.4	27.5
Use of green manure	62.6	37.4	47.3	11.5	41.2
Soil amendments	51.9	48.1	31.3	14.5	54.2
Protective cultivation	70.2	29.8	52.7	15.3	32.1

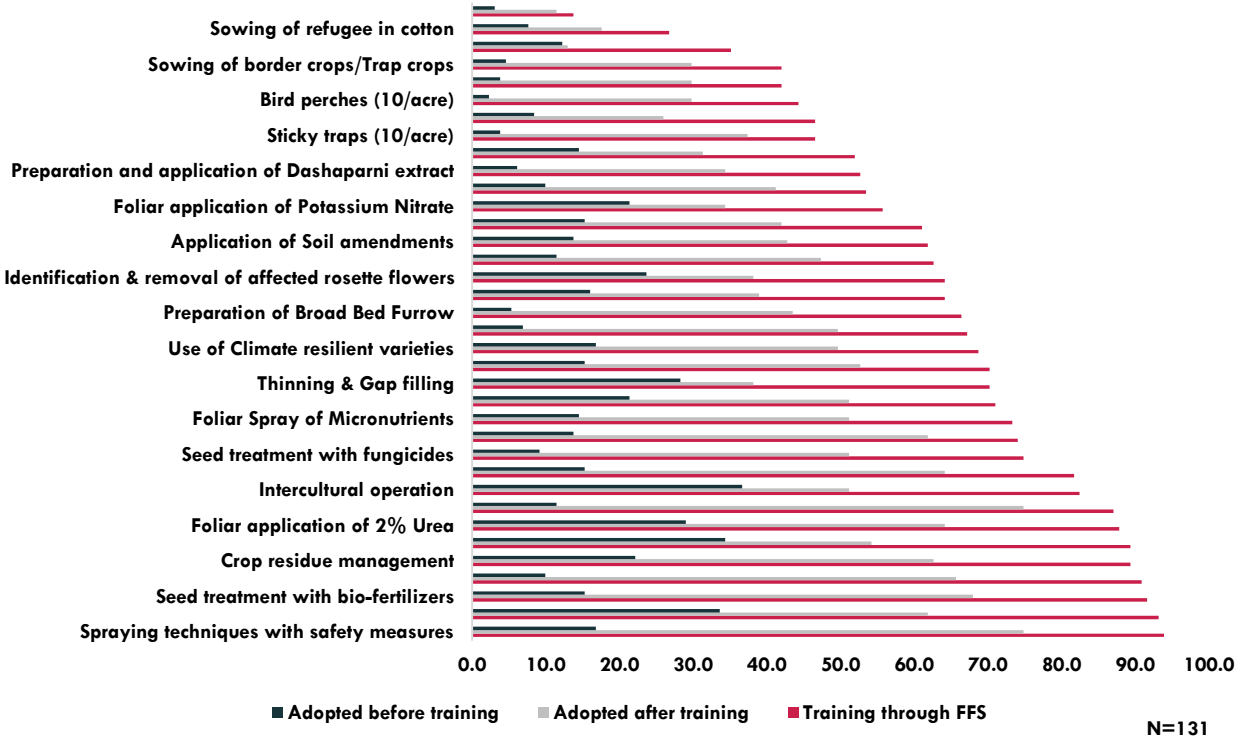

Figure 11: Training and adoption of technologies demonstrated in FFS

Feedback on BBF Technology: Out of 70 respondents using BBF technology, 87% of respondents found it to be useful during excessive rain last year. The respondents noted that it helped in the drainage of excess water and helped in root development by avoiding water stagnation.

Of the total FFS participants, including host and guest farmers 72 % found that the technologies learned through farmer field school demonstration sessions have been very helpful in reducing the impact of climate vulnerability (less rainfall, high temperature). Rest 28% found the technologies promoted helpful to some extent. All the participants reported that the information provided by the FFS facilitator was useful. Nearly 93% of the FFS participants, including host and guest farmers, are willing to continue using the technologies. Rest, 7% of respondents, reported that they do not find the technologies useful. The technologies are expensive and difficult to apply in fields. The crop-wise FFS participants are listed in the table below. More than 90% of FFS participants feel that they have reduced the number of pesticides sprays and hence saved on pesticides cost.

Table 33: Crop wise FFS participants response on pesticides

Crops	FFS participants (%) (N = 131)	Reduced number of sprays and hence cost on pesticides (%)
Soyabean	92	96
Chickpea	84	94
Cotton	69	97
Sorghum	42	90
Pigeon pea	41	90
Black gram	18	83
Green gram	18	100

The distribution of the percentage of FFS respondents, including both host and guest farmers, on the location of selling their agricultural produce is as follows:

Table 34: Place of selling agricultural produce

Place of selling agriculture produce	FFS respondents (%) Valid N = 131 (Mutiple response)
Directly through Haat or via retail mode	66
Local dealers in village	8
To other traders outside the village	11
In the nearest town or district market	17
Through Farmer Producer Companies	1
Nearest APMC market	8
Government Procurement Agencies (NAFED / SFAC etc)	-
Directly to processer	-
Directly collected from home	5

The mean distance the FFS respondents travel for selling their produce is around 25 km. When asked about the form in which they sell their agricultural produce, 92% always sell it separately, 2% always prefer aggregation with others, and the rest 7% sometimes prefer to sell separately and sometimes through aggregation. 66% of respondents reported that they store their crops after harvest and 74 % of respondents reported that they have adequate space to store their crops.

Feedback from Qualitative Enquiry:

Feedback on Quality and Effectiveness of FFS Sessions

1. The majority FFS coordinators reported the quality of the session to be good, overall awareness of FFS and adoption of technologies has improved especially in preparing formulations and use of BBF Technology.
2. **Effective strategies:** Demo-based teaching with charts, using learning videos on YouTube and co-finding solutions, using simple local language, interactive sessions with feedback and listening to farmer queries, facilitators reaching before time for the sessions are some of the effective strategies.
3. **Common challenges:** Poor rapport and mobilizing skills, non-corporation of FFS facilitators due to unpaid dues, and time management during the Kharif season as the farmer is busy are some of the common challenges faced.

Feedback on Skills of FFS Facilitators

- Coordinators reported that they themselves check and observe the facilitators and guide them in case of a problem. Trainers are accordingly supported by training in KVKs, webinars, or through WhatsApp.
- **Mixed response on facilitator skills.** Many coordinators reported lack of understanding of technical aspects of agriculture and mobilization skills.

- **Steps to improve facilitator skills:** Training through retired officials of the agricultural department would help in improving the skills of facilitators
- **Common indicators to review FFS Facilitator's work by Coordinators:** Their punctuality in FFS sessions, accuracy in the observation's noted, the ability to share information, mobilizing the farmer to participate, and the adoption of the technology

Feedback on FFS Application

- Most of the facilitators have not faced any issues with the FFS App.
- Some FFS Facilitators also shared that entering information in the App during the FFS session becomes a little problematic. Because of the constant use of the phone during the FFS session, sometimes farmers think that the facilitator is not sincere in conducting the FFS and using the phone in the middle of the session.
- Networks issues and thus problems in using presentations from the App were also cited by a few FFS facilitators.

Participation of Women Farmers in FFS

- Women usually had no spare time because they were already busy with their domestic work. Also, it is observed that some of the FFS demonstration plots are at a long distance from the village, which makes it difficult for women farmers to attend the sessions.
- Eight Facilitators reported conducting the FFS exclusive for women.
- Also, some women prefer to come with her husband. However, every time this is not possible, causing less attendance.
- Some facilitators reported that the women do not come forward for the photographs therefore, the attendance is not reflected in the FFS.
- There is a need to sensitize men so that they support women to participate in the FFS Sessions.
- Attempts were made to improve the participation of women with the help of Krishi Tai and the SHG members in the village.

Reducing Production Cost of farmers

- The proven methods for reducing production costs, such as organic methods of farming, including pest management, fertilizers use, and soil management methods, are demonstrated to farmers.
- Some other technologies such as the use of compost manure and neem extract use along with seed treatment, are also demonstrated to farmers.

FFS Monitoring

- Almost all coordinators reported having a regular meeting, twice a month, with SDAO and FFS Facilitator to review the work and keep track of progress.
- The usual days are 1st and 3rd Saturday, except in some cases where it is shifted to Thursday/Friday.
- All coordinators shared that they do not face any problems while organizing these meetings.

FFS - Challenges and their solutions

- **<u>Relatively low attendance of farmers regularly in FFS, especially women farmers.</u>**
    - More focus needs to be given to mobilizie farmers to attend FFS sessions. All project stakeholders, including VCRMC members, CA, and AA, should have a more proactive role. Suitable incentives should be provided to framers to attend FFS sessions. This could include a

small kit with a cap, pen along with tea arrangements, and Agriculture inputs (possible to be given).

  - Variable timings of men-women FFS sessions can enable more women to attend FFS sessions.

- **Quality of FFS Sessions need to be improved, instead of targeting higher number of FFS**
  - More crop related sessions in each FFS can be added. This would help the farmers to understand and take measures at different stages of crop growth.

- **Problem of quality of guidance by farmers from FFS Facilitator is persistent**
  - The retired staff of the Agri department/ current staff may be involved with some extra payment to increase the effectiveness and quality of sessions

- **Challenge in filling FFS application while administering the session**
  - The information to be entered in the FFS session should be reviewed. FFS facilitators should be allocated separate time after the session and should be encouraged to fill in the information (whatever possible) after the session.

6.6.3 Community Benefits

6.6.3.1 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 is 44 respondents in project villages and 90 respondents in comparison villages. However, to maintain the project to comparison sample ratio of 2:1, we randomly sampled 22 samples from the comparison set and analyzed them. All the assets constructed in project villages were found on the site. Nearly all the assets in project and comparison villages were already constructed.

The distribution of community/ NRM works beneficiaries interviewed in project and comparison clusters are as follows:

Table 35: Community NRM works done

Community/ NRM works	Project (%)	Comparison (%)
	N = 44	N = 22
Agro forestry	-	-
Continuous Contour trenches	2	-
Deep Continuous Contour trenches (CCT)	9	-
Construction of Loose bolder Structures	2	-
Construction of Earthen Nala Bunds	34	64
Construction of Cement Nala Bunds	25	18
Gabian Structure	5	-
Desilting of old water storage structure	9	9
Compartment /graded bunding	14	9
Common land (e- class) community farm pond	-	-

When asked whether the planning for the development of community assets is done according to the water balance, nearly three fourth of the respondents said yes (73% in both project and control), around one-fourth of them responded no (23% in project and 27% in comparison) and few (5%) from project clusters were not aware of the development planning.

75% of the respondents in project villages and 46% in the comparison villages shared that social audit has been done in their village. The distribution of rating of the quality of constructed assets reported by the respondents in both project and comparison clusters is depicted in below table, which shows satisfaction on the quality of assets was slightly better in project areas than comparison areas.

Table 36: Feedback on the quality of assets

Feedback on quality of assets	Project (%)	Comparison (%)
	N = 44	N = 22
Very unsatisfactory	2	-
Somewhat unsatisfactory	11	32
Neither satisfactory, nor satisfactory	-	-
Somewhat satisfactory	41	32
Very Satisfactory	46	36
Total %	100	100

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:

Table 37: Benefits from NRM works

Benefits accrued from NRM works	Project (%)	Comparison (%)
	Valid N = 44	Valid N = 22
Increased availability in water for protective irrigation	80	86
Increase in yield/ production	68	68
Change in cropping pattern	55	41
Availability of water during dry spells	34	23
Increase in area of cultivation during Kharif Season	23	50
Increase in area of cultivation during Rabi Season	27	68
Increase in income	11	18
Have not benefitted till now but may benefit in future	-	-
Do not think will benefit from this NRM work	2	-
Total	100	100

When asked if they have experienced an increase in groundwater level near their farm after construction of these NRM assets, 89% (39 of 44 respondents) in project clusters and 64% (14 of 22 respondents) in comparison clusters responded positively. Rest in both project and comparison are hopeful that it may increase in future. When the respondents in the project clusters were asked about their willingness to be involved or are involved in the maintenance of these asset post construction, 73% (32 of 44 respondents) responded positively. They would like to contribute to the maintenance activity of NRM works in the following ways:

Table 38: Maintenance of NRM works

Maintenance of NRM works	Project (%)
	N=32
Willing to be part of the structure maintenance committee	22
Willing to pay for maintenance of structure	56
Willing to provide labour support from self or family for maintenance of the structure	22

6.6.3.2 Community Farm Pond (CFP)

Similar to the feedback on NRM assets, feedback was taken from beneficiaries of community farm ponds. The beneficiary sample for community farm ponds includes 34 beneficiaries from the project area and one from the comparison area. In project villages, it is observed that generally, 2 to 10 members come together to apply for CFPs. In the case of comparison villages, 10 farmers have collectively built one farm pond. In 98% of the project cases, the asset was found on site. 83% of the project respondents shared that their farm pond does not have an inlet-outlet. And 83% of the project respondents have a lining their farm pond. Since only one CFP beneficiary from the comparison clusters was found and interviewed, we would focus on the feedback from beneficiaries interviewed in project clusters only.

Status of application: 76% (26 of 34 respondents) shared that they have received the matching grant on their bank account, 18% (6 of 34) have registered on the DBT portal, and 6% (2 of 34) have applied for matching grant through DBT portal.

Motivation for applying and application process: Following are the source of motivation and support for the application process for the beneficiaries in project clusters.

Table 39: Source of motivation and support for the application process

Source/ Support	Motivation for application (%)	Application process (%)
	Valid N =34	N = 34
Self	27	38
Family members of the household	29	-
VCRMC members	27	29
Friends or neighbours	9	
Project staff (including cluster assistant, agriculture assistant, FFS facilitator)	59	9
Gram panchayat members	9	21
E-Sewa kendra	-	3

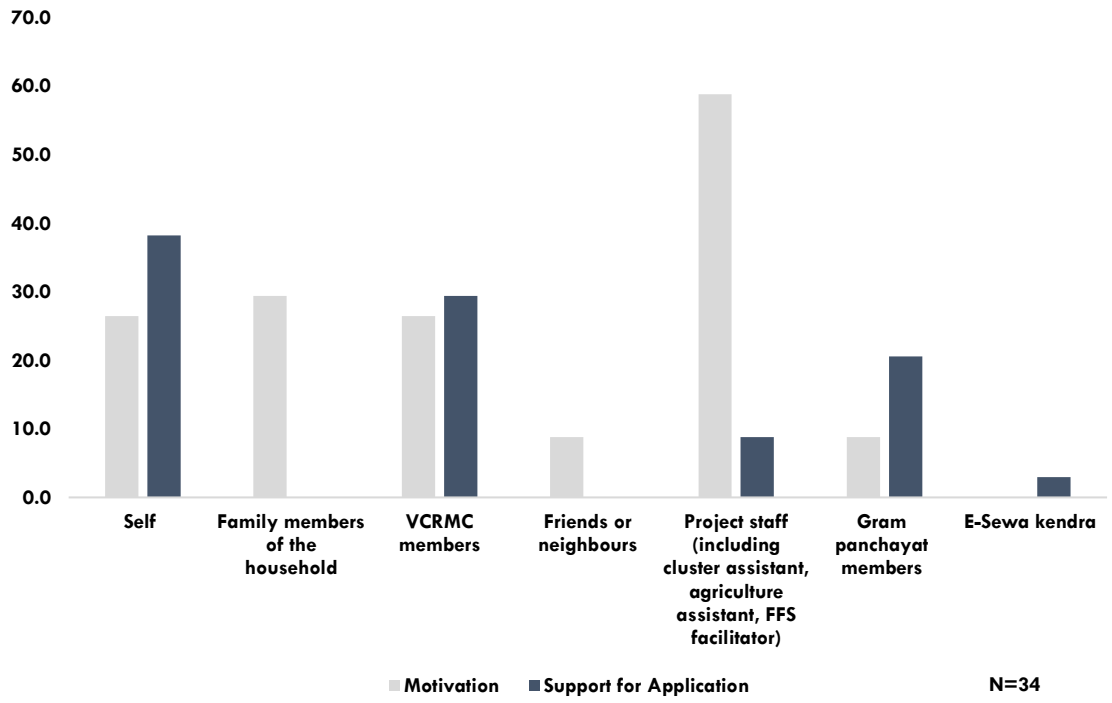

Figure 12: Source of motivation and support for application process

Source of funds: Of the 34 CFP beneficiary respondents, 26 shared that their application status has been approved and pre-sanctioned by SDAO. The various sources of funds for these 26 CFP beneficiary respondents in project clusters were found to be as follows:

Table 38: Source of fund

Source of fund	Project (%)
	Valid N = 26
Used own funds	96
Took loan from friends/extended family members/neighbours	12
Took loan from money lender	8
Took loan from bank/micro finance companies	4
Took loan from SHG	-

Dimensions of CFP and water availability: The length, width, and height of CFP in the project cluster ranged from 34 ft to 250 ft, 8 to 120 ft, and 18 to 40 ft. The average duration for which water lasts in the CFP once filled is 115 days.

CFP features and benefits: All the CFP beneficiary uses the asset as per the requirement. Of the 26 CFPs, farm pond display boards are available at 20 sites. 73% (19 of 26) beneficiaries shared that their CFPs do not have an inlet/ outlet, and 76% (26 of 34) do not have grass cultivation on their farm pond bunds. All CFPs have a lining on them. A total of 173 acres of land is irrigated using water from these 26 CFPs in the project area. The main source of water for these CFPs is an open dug well (60%) followed by borewell (17%). Other sources of water are river, canal, and lake. Almost in all the CFPs, water is filled using a motor pump and pipes. 94% of CFP beneficiaries did not face any issues in accessing the benefit from PoCRA.

Table 39: Benefits from CFPs

Benefits accrued from CFPs	Project (%)
	N = 34
Increase in income	97
Increase in production	85
Increased availability in water for protective irrigation	85
Change in cropping pattern	29
Availability of water during dry spells	29
Increase in area of cultivation during Kharif Season	24
Increase in area of cultivation during Rabi Season	32
Increased water availability for Rabi season	6
Started inland fisheries activity	3
Do not think will benefit	-
Others(specify)	-

Feedback from Qualitative Enquiry on Community Activities

Status of community works & Challenges in Implementation of NRM Works

- NRM works have not been started yet in the majority of the villages: The work of micro-planning is ongoing in Phase II and phase III villages
- Lack of functional VCRMC committee and thus limited planning on community work, lack of people's participation: Wherever functional, VCRMC lacked the capacity of developing DPRs and taking for the NRM work in the village.
- Due to Kharif and Rabi seasons, it is difficult to implement the activity due to standing crops.

Limited acceptance/ contribution amongst farmers

- Farmers are generally unwilling to share their land, especially in the compartment bunding activity.
- Sometimes, people with different intentions come together for the execution of community work, so they need to be guided to avoid problems later during resource distribution.

Guidelines of NRM work

- Some SDAOs suggested that the project can be further improved through building capacities and understanding of NRM guidelines of the project staff and VCRMC members so they can implement it smoothly, especially in the case of community farm ponds on E class land.

Community Activities- Specific Challenges and Solutions

- **Scope for implementation of community NRM works on large scale:**
    - Ensuring the presence of functional VCRMCs
    - Need to expedite implementation of community works in Phase 1 villages.
    - Workshop with key stakeholders should be conducted to identify the key impediments and practical solutions, and realistic times should be set for their implementation.

- Micro planning and community works should be planned on a priority basis for second and third phase villages.

- **Limited understanding of VCRMC committees and project staff of their role in the planning of community work in the village**
  - Capacity building of VCRMCs and project staff required on guidelines and processes and roles related to implementing community activities. Also, in planning and developing Detailed Project Reports (DPRs) for NRM benefits the training must be arranged for staff.
  - **Individuals are not inclined to sharing personal water resource or land with others in community initiatives**
  - The project may require investments into behavior change for understanding the benefits of community work so that farmers do not feel they are at a loss in case of contributing to a community asset.

- **Lack of awareness amongst farmers about the benefits of NRM structures** (NRM structures causes soil erosion is a common myth)
  - Awareness needs to be created in farmers about the benefits of NRM assets- both at the community and individual level.
  - FFS sessions can be used as a platform to spread awareness on the benefits of NRM structures.

- **Cases are reported of disputes within CFP applicants regarding the distribution of water from ponds and logistical arrangements of distributing water in the case of Community Farm Pond**
  - VCRMCs, AAs, and CAs should help to ensure that the beneficiaries who apply for Community farm ponds have a prior understanding and plan of distribution of water resources amongst them in different seasons.

6.6.4 Project Supported FPC Beneficiaries

One of the key components of PoCRA is to strengthen the existing farmer producer organizations or companies 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 FPCs that have applied to receive support or have received support through PoCRA were sampled from each district, and feedback of 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 (Except the Parbhani district – since currently, there is no FPC supported in Parbhani district by PoCRA). A total of 19 FPCs were covered, and feedback from a total of 82 FPC respondents (24 FPC directors and 58 members) was taken as part of the CM V round. The year of establishment of FPCs is as follows: 2013 (1), 2015(1), 2016(2), 2018(4), 2019(7), and 2020(4). 96.34% of respondents shared that their FPC has both male and female members, and 98% of respondents agreed that their FPC is operational. During the survey, 78% of 58 members shared that they always participate in general body meetings of their FPCs, 14% sometimes attend it, and the rest 9%, rarely attend the meeting. Nearly the same proportion of members participate in the decision-making process of their FPCs. Around 57% of 58 members reported that they get priority for accessing storage facility of their FPC, for 28 % of them the priority is not applicable, and the rest 16% shared that they do not get priority access. Nearly 48% of all 82 FPC respondents, including directors and members, have received training on especially custom hiring centres, farm mechanization, seed production, and crop management. A relatively higher percentage of respondents reported receiving training on best agricultural practices during the current round (48% in CM V as compared to 36% in CMIV and 17% in CMII). The activities which the surveyed FPCs undertake are as follows:

Table 40: Activities undertaken in FPCs

Activities undertaken in FPCs	FPC respondent (%)
	Valid N = 80
Aggregation of produce	65
Providing agricultural inputs like seeds, fertilizers	44
Providing access to market for produce	41
Value addition of agriculture produce like sorting, grading etc.	24
Provide training to farmers on best agricultural practices	51
Others (specify)	1

Some of the key agribusiness activities in which the surveyed FPCs are involved are custom hiring centres, oil extraction units, and guide farmers. Facilities/ services which members of sampled FPCs receive are as follows:

Table 41: Facilities/ Services provided by FPCs

Facilities/ Services provided by FPCs	Respondent (%)
	Valid N = 80
Marketing support in selling my agriculture produce	44
Purchasing seeds through FPC	41
Purchasing chemicals fertilizers through FPC	30
Grading and sorting of my agriculture produce with support of FPC	28
Converting my agriculture produce to value added products (E.g Converting into soybean-to-soybean oil)	15
Getting access to equipment/tools for agriculture	75
Access to godown facility	11
None	1
Others (specify)	1

72% of the total FPC respondents have sold their agriculture produce through their respective FPCs. Following crops are sold through the FPCs:

Table 42: Crops sold through FPCs

Crop	Respondent (%)
	Valid N = 80
Black gram	4
Chickpea	24
Cotton	35
Ginger	5
Green gram	5
Maize	4
Millet	1
Onion	1
Pigeon pea	15
Sorghum	9
Soybean	63
Sugarcane	1
Sweet Lime	1
Tomato	1
Turmeric	2
Wheat	13

The most common crops sold through FPCs are Soybean, Chickpea, and Cotton.

98% of all respondents were aware of business plans prepared by their company for financial support to be received from PoCRA. All the surveyed 19 FPCs have received financial support from PoCRA. 11 % of FPC respondents shared that they faced difficulty in accessing the benefit through PoCRA, which are mentioned in the below table:

Table 43: Difficulty faced in accessing benefit through PoCRA

Difficulty faced	Respondent (%)
	Valid N= 80
Difficulty in receiving guidance in accessing project benefits	37
Difficulty in preparation of business plan	23
Difficulty in arranging the required documents for application	18
Difficulty in getting pre-sanction for the application	9
Difficulty in getting bank loan	45
Others (specify)	17

Stakeholder Feedback on FPO Support under PoCRA

Challenges faced by FPOs

- Lack of working capital/finance for their activities. In the words of FPO Director - "*We face the challenge of getting bank loans. Also, banks ask for NA property as a mortgage.*"
- Limited storage facility and inexperience in marketing their produce.
- Some FPOs also mentioned that the quality of agricultural produce they receive from farmers is sometimes not of good quality, and they struggle to sell it further. Also, the FPO faces problems as some villages are very big and machinery received is very less compared to the population.
- There was Limited understanding of the marketing of produce.

Experience with application process and review

- Majority are satisfied with the support received for the grant application.
- Most of them acknowledged support from Agriculture Assistant, Cluster Assistant, Taluka Agriculture Officer in filling their application. Few were also supported by NABARD.
- Some were found to be receiving support for capacity building, machinery procurement, market linkage from PoCRA.

Strategy for arranging the balance funds

- With respect to current finance sources, most FPOs arrange funds through member contributions. Few avail from banks and other sources.
- Respondents reported that the requirements set by the banks were stringent and often unattainable, and hence they could not get access to the loans. The documentation requirements and initial banking costs were reported to be the biggest hurdles faced.

Suggestions/Support expected from PoCRA

- Support required for accessing bank loans. Support in developing bankable proposals /convincing banks to provide loans
- Technical support to help in building warehouses, cold storage and godowns infrastructure.
- Technical support for value chain and market linkage development.
- The experts, based on their field visits, highlighted that there is value in developing clusters of crop/fruits and support FPOs in setting up aggregation and value addition. This would be helpful in expanding horticulture activities under the project.

6.6.5 Project 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 of their members was taken to understand the current activities taken by the by 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 11 SHGs were covered, and feedback from a total of 41 SHG respondents (10 SHG presidents and 31 members) was taken as part of the CM V round. The year of establishment of SHGs is as follows: 2012 (1), 2014(2), 2018(2), 2019(3), 2020(2), and 2021(1). 88% of respondents shared that their SHG has both male and female members.

Nearly 73% of all 41 SHG respondents, including president and members, have received training on especially custom hiring centres, farm mechanization, seed production, and crop management. Also, 45% of the respondents have also received training on business establishment through the agriculture department. 83% (34 of 41) of respondents shared that they save regularly on a monthly basis, while the rest reported that they are not currently saving regularly. The average monthly saving is Rs. 699. 41% of respondents noted that their SHGs are involved in income generation agribusiness activities such as custom hiring centres. Facilities/ services which members of sampled FPCs receive are as follows:

Table 44: Facilities/ Services provided by SHGs

Facilities/ Services provided by SHGs	Respondent (%)
	N = 41
Marketing support in selling my agriculture produce	17
Purchasing seeds through SHG	12
Purchasing chemicals fertilizers through SHG	20
Grading and sorting of my agriculture produce with support of SHG	2
Converting my agriculture produce to value added products (e.g. Converting into soybean-to-soybean oil)	-
Getting access to equipment/tools for agriculture	90
Access to godown facility	
None	2
Others (specify)	-

All the surveyed 11 SHGs have received financial support from PoCRA. 7% of SHG respondents shared that they faced difficulty in getting a presanction and getting a bank loan while accessing the benefit through PoCRA.

FPOs and SHGs: Specific Challenges and Solutions

- **Majority of FPOs are still facing difficulty in availing of bank loans.**
    - Technical support should be provided to the FPOs to develop a bankable business plan
    - Facilitation support through bank partnerships under the project would be helpful.
    - **Lack of working capital for their activities is a key challenge faced by most FPOs.**
    - Facilitation support should be provided to FPOs to develop a sound business plan and for getting loans from the bank
    - Representatives of FPOs should be provided professional training and exposure visits to support to run their FPO effectively
    - Support should be FPOs to enhance the farmer membership base and the membership fee from the members
    - Delay in approvals/technical sanction due to limited understanding of procurement and Agribusiness PSs/ PS Procurement in civil work estimation and following its technical language. The training is required for the same to the project specialists
    - Test reports for some tools are required which do not qualify the criteria for procurement

6.6.6 Support to FPCs/ SHGs for undertaking Agribusiness

24 FPC directors and 10 SHG presidents have reported that their groups were involved in agribusiness activities. The year of receiving the PoCRA grants is as follow:

Table 45: Year of grant for agribusiness

Year of grant	FPC (N=24) (%)	SHG (N=10) (%)
2018-2019	21	-
2019-2020	50	70
2020-2021	29	30
Total %	100	100

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

Table 46: Agribusiness activity-wise support from PoCRA

Agribusiness activity	FPC Respondent (%)	SHG Respondent (%)
	Valid N = 80	Valid N = 40
Custom Hiring Centre	88	100
Godown	21	5
Seed processing unit	14	5
Fruit Processing	3	-
Vegetable processing	-	-
Pulse mill	1	-
Oil extraction Unit	6	-
Grain Processing (Cleaning & Grading unit)	9	-
Cattle feed Processing Unit	-	3
Marketing of Agricultural Produce	1	3
Silk unit	-	-
Flour mill	6	-
Total %	100	100

Finance for agribusiness activities: The status of funding for agribusiness activities as reported by the directors of projects supported FPCs, and the presidents of project supported SHGs is detailed below.

Table 47: Status of funding for undertaking agribusiness activities

Finance head	FPC Range of Amount (Approx.)	SHG Range of Amount (Approx.)
	N = 24	N = 10
Total value of AB project	Rs. 90000 to Rs. 60 lakhs	Rs. 1.5 lakhs to Rs. 20 lakhs
Bank loan	Rs 10 lakhs to 50 lakhs	None
Self-capital	Rs. 86000 to 20 lakhs	Rs. 20000 to 15.35 lakhs
PoCRA grant	Rs. 9 lakhs to 45 lakhs	Rs. 7.23 lakhs to 20 lakhs

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

6.6.6.1 Custom Hiring Centre (CHC)

The type of machines available in CHCs of the PoCRA supported FPCs and SHGs as reported by the respondents are as follows:

Table 48: Type of machines available in PoCRA supported FPCs and SHGs

Type of machine available in CHC	FPC Respondent (%)	SHG Respondent (%)
	Valid N = 70	Valid N = 40
Tractor large more than 35 HP	49	58
Tractor small up to 35 hp	19	18
Harrow	1	-
Plough	3	10
Multicrop Thresher (30 hp and above)	9	5
Multicrop Thresher (Below 30 hp)	3	-
ower weeder	-	-
Cultivator -9 tyne	1	-
Reaper	3	-
Trailor (above 1 brass)	1	-
Trailor (below 1 brass)	-	-
Rotavator	1	5
Ridger	-	3
Seed drill (BBF) – 9 tyne	-	3
Seed drill (BBF) – 4 tyne	1	-
Others	9	-

All the respondents of FPCs and SHGs shared that the members were provided machines from CHC at lower rates. The various features of CHC services are as follows:

Table 49: Features of CHCs of PoCRA supported FPCs and SHGs

Features of CHCs	FPC Respondents (%)	SHG Respondents (%)
Area under CHC service		
	Valid N = 21	Valid N = 10
Within 50 hectares	19	20
50 to 100 hectares	52	30
More than 100 hectares	29	40
Service not provided	-	10
Farmers Serviced		
0 to 50	24	10
51 to 100	43	60
101 to 150	-	30
151 and above	33	-
People trained for operating equipment		
0 Men	5	10
1 to 5 Men	91	80
6 and above Men	5	10
0 women	-	-
1 to 5 women	-	-
6 and above women	-	-
Perceived Benefits		
	N = 70 (Multiple Response)	N = 40 (Multiple Response)
Machines available at discounted rates	94	95
Reduction in cost of cultivation	50	65
Solution to labour issues	41	50
Increase in rural employment	19	10
Difficulty faced by farmers in accessing CHC		
Hiring Rates very high	31	33
Machines not made available to all	47	40
Cannot operate the machines	9	10
Skilled labour not available	11	18
Very high demand leads to shortage of availability	41	58
Cost of maintenance very high	10	5
Some machines are non-operational	-	3
Others	17	3

According to the respondents, though all villagers were aware of the CHC facility, not all of them were able to access the same. 12% of FPC respondents and 18% of SHG respondents shared that they were not able to access the facility. The display board for CHC was found to be available in all the villages. According to respondents, all equipments were in good operational condition.

6.6.6.2 Godown (Warehouse)

4 FPC directors and 1 SHG president have reported the presence of godown under PoCRA support. The details of the various features of the godown are as follows:

Table 50: Features of Godown (Warehouse) of PoCRA supported FPCs and SHGs

Features of Godown/ Warehouse	FPC Respondents	SHG Respondents
	N =4	N =1
Total Capacity in MT		
50	1	-
200	2	-
250		1
500	1	-
Capacity utilized in MT		
10	1	-
100	1	-
200	1	-
250	-	1
300	1	-
Purpose of godown		
Seed processing and storage	2	-
Grain processing and Storage	2	1
Multiple Use	-	-
Crops stored		
Soybean	4	1
Tur	1	-
Gram	2	1
Wheat	1	1
Paddy	1	-
Moong	1	-
Udid	1	-
Maize	1	1
Bajra	1	-
Jowar	1	-
Turmeric	1	-
Spices	-	-
Cotton	-	-
Other (Please specify)	-	-
Farmer benefitted		
0 to 50	2	1
51 to 100	2	-
101 to 150	-	-
151 and above	-	-
Do not Know	-	-
Rate for storage (INR/kg)		
10	1	-
30	1	-
50	1	1
100	1	-
Discount for members		
	N = 22	N = 4
10% lower rate	17	4
10-20% lower rate	3	-
More than 20% lower rate	-	-
No lower rates are offered	-	-
Do not know	2	-

Features of Godown/ Warehouse	FPC Respondents	SHG Respondents
	N =4	N =1
Perceived benefits of warehouse		
Storage available at discounted rates	11	2
Post-Harvest Losses are reduced	7	1
Better price to the produce	4	-
Perceived difficulties in accessing warehouse		
Hiring Rates very high	5	2
Storage not made available to all members	5	-
Shortage of storage capacity	5	-
Others	7	2

According to the respondents, all villagers were aware of the warehouse facility, and all of them were able to access the same. The display board for the warehouse was available in all the villages. According to respondents, all warehouses were in good operational condition. However, 3 out of 4 FPCs and one SHG with a warehouse did not have insurance.

6.6.6.3 Commodity processing units

3 FPC director and 1 SHG president have reported the presence of a commodity processing unit under PoCRA support. The details of the various features of the commodity processing unit are as follows:

Table 51: Features of commodity processing units of PoCRA supported FPCs and SHGs

Features of commodity processing unit	FPC Respondents (%)	SHG Respondents (%)
	N = 3	N =1
Total Capacity in Quintal		
10	1	-
120	1	1
200	1	-
Capacity utilized in Quintal per day		
9	1	-
50	1	-
120	1	-
250	-	1
Crops processed		
Soybean	1	
Gram	1	1
Cotton	1	
Farmer benefitted		
0 to 10	1	-
11 to 30	1	1
31 to 50	1	-
	Valid N = 12	Valid N = 1
Perceived benefits of commodity processing unit		
Increase in rural employment	2	1
Increased shelf life of product	-	-
Will get access to market to sell their produce	3	1
Will get better price for their produce	-	1
Increase in income from selling value added products	2	-
Do not think will benefit	-	-
Will get access to market to sell their produce	-	-
Will get better price for their produce	5	-
Others (Please specify)	-	-
Perceived difficulties in accessing commodity processing unit		
Supply raw material	1	-
Participation from members	-	-
Electricity unavailability	2	1

Features of commodity processing unit	FPC Respondents (%)	SHG Respondents (%)
Transportation	3	-
Skilled labour for machinery	-	-
Marketing challenges	1	-
Other features	5	-

According to the respondents, all villagers were aware of the commodity facility, and all of them were able to access the same. The display board for the commodity processing unit is available in all the villages. According to respondents, all commodity processing units were in good operational condition. However, none of the 3 FPCs and one SHG had insurance for their commodity processing unit.

6.7. Democratic governance

65% (75 of 115) of respondents in project clusters were aware of the village level micro-planning (as part of PoCRA project) that was conducted in their village to decide what watershed management activities should be done in their village. 75 % (56 of 75) of them had participated in the development of your village's micro-plans developed as part of PoCRA project. 70% (39 of 56) of the respondents in the project village found the water budgeting application used in the micro-planning process useful, 25% (14 of 56) of the respondents found it very useful, and while rest did not find it useful. 72% (83 of 115) respondents in project villages feel that VCRMC represents all sections of the society, 25% (29 of 115) say not representing, and the rest 3% (3 of 115) did not have a say.

6.8. Access to other government schemes

The distribution of access to other government schemes in both project and comparison clusters is presented below. Major schemes from which beneficiaries from both project and comparison are particularly related to agriculture credit and insurance. Pradhan Mantri Fasal Bima Yojna (75% in project and 71% in comparison) followed by Kisan Samman Yojana (44% in project and 22% in comparison) was the most popular among all Government schemes. The awareness and accessibility among the farmers to other Government schemes should be increased for better percolation of benefits.

Table 52: Access to other government schemes in project and comparison

Access to other government schemes	Project (%)	Comparison (%)
	N = 515	N = 258
Solar Water Pump Scheme	7	13
Pradhan Mantri Fasal Bima Yojna	75	71
Jalayukt Shivar Abhiyaan	10	9
Minimum support price (MSP) for the crops	1	
MGNREGA	26	25
Dr. Babasaheb Ambedkar Krushi Swavalamban Yojna(for SC households)	1	0
Birsa Munda Krushi Kranti Yojna (for tribal households)	1	0
Adarshgaon Yojana	1	
Kitchen Garden Scheme	1	1
Pradhan Mantri Kisan SAMPADA Yojana	14	15
Watershed development program (Integrated Watershed Management Program)	1	3
Soil Health Card Scheme	0	0
National Mission for Sustainable Agriculture (NMSA)	-	0
Neem Coated Urea (NCU)	-	-
Pradhan Mantri Krishi Sinchai Yojana (PMKSY)	7	13
Paramparagat Krishi Vikas Yojana (PKVY)	0	-
Rainfed Area Development Programme (RADP)	-	-
Livestock insurance Scheme	0	0
National Horticulture Mission	1	2
National food security mission	2	1
Klsan Samman Yojana	44	22

Gramin Bhandaran Yojna	0	-
Others (Specify)	0	1
None	14	18

6.9. Project knowledge

When asked about their general awareness about the project through various mediums, 82% of respondents in project clusters used Facebook page/ youtube channels of PoCRA, 68% respondents were aware of project display boards, and 57% of them were aware of the VCRMC board. Nearly 16% of respondents were aware of the board presenting the water balance activity of the village. Also, 18% of respondents were aware of the project through participation in exposure visits and training under PoCRA.

Table 53: Knowledge of project

Knowledge on project	Project (%)
	N = 393
Use of Facebook/youtube	82
Participation in an exposure visit	18
Attended training from PoCRA	18
Board detailing activities under the project	27
Board presenting the water balance activity details of your village	16
Project information board	68
VCRMC Board	57

6.10. Project satisfaction

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

Table 54: Feedback on project satisfaction

Concerns	Very unsatisfactory	Somewhat unsatisfactory	Neither satisfactory or unsatisfactory	Somewhat satisfactory	Very Satisfactory
Village micro-plan rating (N = 393)	3	10	1	39	46
Process of accessing benefits (N =515)	2	5	3	34	56
Work of VCRMC (N = 393)	2	9	3	20	65
Support from Project staff (N = 515)	3	6	2	37	52
Knowledge of FFS facilitator (N = 314)	1	6	5	35	52
Work of Krishi Tai (N = 393)	1	7	4	17	71

6.11. Feedback from Qualitative Enquiry

6.11.1 VCRMC

VCRMC meetings were found to be conducted mostly once in a month. The main topics of discussion in the meeting were approval to the application of the farmers etc., and in some cases, there was also a meeting conducted for the formation of VCRMC committee as the newly elected body was formed in many villages. The key documents maintained by VCRMC were meeting and proceeding book followed by documents related to individual applications. Most of the VCRMCs had received initial training. Only one VCRMC in sampled villages has received funds in last six months. In one village, the fund could not be allotted due to the absence of a bank account in the bank. One VCRMC which received the fund utilized it for the purchase of cupboard, stationery, and other expenses.

- **Frequency of meetings:** Most of the meeting dates were decided in the last meeting of VCRMC. Meetings were mostly held once a month, mainly for scrutiny and approvals to the applications
- **Documentation:** Proceedings of the meeting were mostly maintained by AA/CA in most VCRMCs. Many VCRMCs were newly formed and with no awareness, and it was independently maintained by the AA.
- **Complaints:** Almost all VCRMC mentioned they resolved any complaint verbally, and they did not use the register.
- **Financial transactions**: 27 out of 30 VCRMCs have not done any financial transactions themselves. Common reasons cited: no funds were received by the committee and that all financial transactions were suspended due to lockdown & pandemic, and the new VCRMC's were in the process of opening New Bank accounts.
- **Prioritization criteria:** 26 out of 30 respondents were satisfied with the current prioritization criteria. The remaining four respondents expressed their dissatisfaction citing the reason that OBC farmers ,and landless were not included in the priority.
- **Capacity building training sessions attended**: Only a few VCRMCs (7) had undergone an initial training that introduced them to different components of PoCRA and the role of VCRMC, however, few have not undergone any training sessions under the project. The participation count varied from 1 to 10 members.
- **Participation of Women:** Most women respondents positively responded to their involvement and participation in the decision-making process and work of VCRMC.
    - On further probing, responses were not detailed, and women could not share their experiences themselves. Thus it reflects a gap in their understanding and participation .
    - Many women members were not able to attend the training sessions. Reason included – The VCRMC was new, and lack of rapport needed to be built with AA and Agriculture Department.
- **Suggestion to improve VCRMC quality and decision making:** Training on project by project staff to the new committee, follow up training for members who couldn't attend (especially women) must be arranged
- **Reasons for delay in approval to Individual grant Application:**
    - The delay happens mainly due to uploading of wrong documents was the main reason mentioned by most of the VCRMC.
    - Some cited reasons for AA not coming to villages due to COVID.
- **Efforts for making village climate resilient:** Many VCRMCs suggested that they have taken plantation drive for the villages, 1 VCRMC said that they had planned nala deepening activity and one said that they are using the BBF method.

- **Motivating farmers receiving presanctions but not starting work:** Supported through awareness, guidance, connecting them with financial stakeholders or facilitate linkage with shops for asset purchase on credit/based on faith; referring them for capacity building sessions.
- **Awareness about the Environmental Safeguards:** Awareness about the environmental safeguard was mostly limited to only not felling of trees and plantation of trees drives in the village.

6.11.2 Project Specialists

Most of the project specialists shared that the climate resilient activities carried out under the project are best for combating climate vulnerabilities. It was suggested that some of the activities under PoCRA which were stopped now should be reinitiated since those were very popular among the farmers. During microplanning, women participated in Mashaal Pheri as well as during the Gram Sabha. No exposure visits were conducted during the period of current CM round period, probably due to COVID conditions.

The activities and mechanism of updating the portal with VCRMC details were found to be conducted regularly. The main responsibility for updating the data of VCRMC was with the CA and and the CA was provided handholding support by the PS HRD. The frequency of visits of the PS HRD was found to be 4-5 days per month for the field visit, and the main reason was for the field visit was found to be to support VCRMC in the project area. It was observed that the knowledge sharing with different stakeholders was done through sharing of PPT as well as effective communication through online meetings. The training was attended by all the PS Agriculture related to NRM works, but many PS said that they need a revision training for this activity as well as also we need an updated training on Protective Cultivation as well as Horticulture. The understanding of ESMF checklist was found to be limited up to the Forest area as well and not felling of trees during the NRM work. One PS suggestedconstruction of flood line for the FPC godowns

> "It is experienced that the project staff who are concerned with monitoring of Krishi Tai's evaluation and performance assessment do not take our instructions seriously. Also, there is conflict between permanent staff and contractual staff which sometimes leads to delay of work" – Project Specialist
>
> "We have to depend upon the field visits of other colleagues so that there will be arrangement of vehicle for gong to long distance villages" – Project Specialist

The need for the training was expressed by all the Procurement experts as they have received the initial training on procurement and need the revision training on a regular basis at the interval of 2 months for at least 2 days.

6.11.3 Agriculture Assistants

It is observed that the activity of micro-irrigation was having the highest demand among the farmers, especially the drip and sprinkler, as farmers are confident that the irrigation sets would help in saving water and the water would be used efficiently, resulting in the high yield of the crop. Followed by the irrigation sets, pumps, pipes, and the demand for horticulture are most popular amongst the farmers. The problems faced while working as non -executive member is majorly in constituting the committee in respect to the non-availability of representatives belonging to that category and the selection of Krishi Tai. Also, in case of group gram panchayat it is difficult to mobilize people from the different villages for selection as representatives.

The other problem faced are motivating women for onboarding in the committee. It was reported that Krishi Tai's work was regularly monitored, and proper guidance was given to regularize the work. It is found that communication through SHG for creating awareness is the effective strategy to increase the participation of women and marginalized sections i.e., SC/ST/small farmers/widows. Also, Krishi Tai is engaged in motivating women for participation in PoCRA activities. The main reason for the delay in spot verification as well as approval was mentioned as the workload reported by three AAs. Others shared that they managed to avoid delays in the approval of works. All AAs feel that the guidelines are very clear and need no change, however, one AA suggested that the field staff must also be included and consulted before finalizing the guidelines. The suggestion to new activities to be added in the project were the fencing for the protection of crops from wild animals as well as resuming the activities which were closed recently.

Among those, the activities of community farm ponds and pumps were insisted by the AA, followed by well and farm mechanization. For landless, the activity of goat rearing was suggested to restart by most of the AA's. Some AA' s reported problems in the implementation of PoCRA, such as lack of farmer's interest due to upfront investment and farmers lacking knowledge for the process of implementation such as documentation and guidelines. It was also found that the demand for drainage line treatment work is most usual among the NRM works in which preference is given for Cement Nala Bunds (CNBs) as well as the deepening and desilting of nala for better water storage and percolation of groundwater. The other works demanded by farmers are Continuous Contour Trenches (CCTs) and compartment bunding. The perception of AA when asked about the most useful NRM activity was found to be compartment bunding, and CNBs followed by the agroforestry plantation activity. The major changes observed in last three years were found to be an increase in yield as awareness among the farmers related to the use of climate resilient technologies has improved. The support demanded by AA's was mainly related to training as well as resuming the activities which are stopped under PoCRA.

6.11.4 Agriculture Supervisor

According to agriculture supervisors, the drip and sprinkler were the most useful technologies given under the project, followed by the community farm pond. There was no problem in understanding the guideline, and all guidelines are clearly mentioned. Most of the agriculture supervisors suggested that the NADEP and the vermicompost were the best ecofriendly practices followed in the villages. The best integrated pest management (IPM) technique suggested by most of agriculture supervisors wasthe use of pheromone traps and sticky traps for controlling the bollworm. Major challenges faced during the implementation were internet connectivity as well as over expenses on the data connection needed for day-to-day work. Also, the slow internet connectivity was also the major issue during the field operations.

Cause of delay in approval and registering completion of work

"The main reason for the delay in approval for works is the incorrect documentation by the farmer as well as no Aadhaar linked to their bank accounts. Also, some farmers do not mark the assets with paint, therefore it is difficult to register the activity as complete and it gets shown as incomplete causing the delay."

- Agriculture supervisor

6.11.5 Cluster Assistant

The most demanded activity was found to be the irrigation assets such as drip and sprinkler as farmers are confident that it helps in water savings. The delay in approval is also due to workload as well as incomplete application by the farmer. CA reported that the farmers in the villages who are ready to take the NADEP and compost are mostly those who have livestock availability. On asked about the communication with KT, the CA reported they communicate with her every time whenever they visit the village. CA's awareness regarding environmental safeguards was limited to avoiding tree felling during the construction of NRM works.

6.11.6 FFS Facilitator

The key roles and responsibilities reported by FFS Facilitators involved mobilizing farmers for FFS, giving farmers information about the latest technology and to share the session plans and details before the session. Some facilitators also shared that it was their responsibility to organize FFS, including the selection of host farmers and the experiment plot. 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 of the bottles in the ground.

The FFS exclusively for the women was conducted in 9 villages of the interviewed sample. The main challenges found in arranging the women's FFS was found that those women give priority to the domestic works rather than FFS as well as in some cases, women also prefer to come in couple with husband. The main interest of women and contribution after FFS in farming was found to be the production of Neem Ark and pesticide formulations. Seed treatment and Neem extract formulation were the most demonstrated technologies in the FFS sessions. As per the perception of the FFS facilitator, the farmers are aware of the global warming phenomenon and have

experienced it at some point in last 5 years. There was variation in the use of organic farming as in the range from for the use of organic fertiliser was found in between 10-80 % in the villages. The awareness regarding the use of banned pesticides was found to be satisfactory in the villages, as reported by the facilitator.

6.11.7 FFS Coordinator

The main work of the coordinator is to monitor the work done by the FFS facilitators as well as observe and handholding the facilitators for improving their skills and teaching methods. The timetable for the FFS is decided based on the stage of the crop as well as, in some cases, according to the situation and availability of the women farmers in the village. The method adopted for improving the skills of the facilitator is by enhancing their knowledge during the meetings conducted on every first and third Saturday of the month. The efforts made by the FFS coordinator to promote improved agriculture practices were mainly in motivating farmers for the use of climate resilient seeds along with the BBF technologies especially for the cultivation of Soybean. Most FFS coordinators reported the less attendance of women as compared to men is generally because of their involvement in domestic work.

As per the qualitative findings, the most used technology adopted by farmers after the FFS session was IPM, in which formulation of Nimboli Ark was mostly used by farmers who adopted BBF technology. The monitoring method adopted by the coordinators for evaluation of work is to review the observations communicated by the facilitator in the FFS sessions on every first and third Saturday of the month at the SDAO office. Coordinators reported that they themselves check and observe the facilitators and guide them in case of a problem. Some reported that during their monthly meeting, discussion on the skills of the facilitator is done, and accordingly, training is arranged for the facilitators with the support of Krishi Vigyan Kendra or agriculture coordinators. Other than a meeting, they are trained through webinars and WhatsApp and are given demonstrations on the field.

6.11.8 Krishi Tai

Almost all the Krushi Tai's who were interviewed were working for the first time. Though many of them were able to tell about the objectives of the project, one-third of them were unaware of it. The project objectives mentioned by the Krushi Tai's were increasing farmers' income, building climate resilience in farming, support in SHG formation, water management, and irrigation improvement. The major motivation for Krushi Tai to work under the project comes through encouragement from gram panchayat and other officials. Few were self-motivated and wanted to help farmers. Some of them were keen to learn advanced farming techniques and thus took the responsibility of Krushi Tai. Most of the Krushi Tais see their role in mobilizing farmers, disseminating information regarding the project, and guiding farmers regarding the project and farm-related activities. Only 9 of the interviewed Krushitai's were aware that the project has initiated digital Saksharta program (PMGDISHA-Pradhan Mantri Gramin Digital Saksharta Abhiyan) for all women stakeholders of the project. Out of 9 KT aware of this program, only six have enrolled in this program. The main challenges faced by the KT were reported as the conflict of timing for domestic work and project-related responsibilities. Also, all KT said that they received help from family members, which was limited to pick up and drop at farmer site as well as meeting venue. One KT mentioned that they face challenge in attending the meeting when the village is in a group panchayat, and a lot of traveling is involved. 6 Krushitai interviewed knew about the beneficiary priority criteria in the DBT app.

Training Received by Krushi Tai

- Most of the Krushi Tais (9 out of 15 Krushi Tais) acknowledged that they had not undergone any training under the project. However, few have received training periodically.
- Some respondents had also gone to exposure visits under the project.

Past Experience and Motivation Factors

- **Experience:** Almost all the Krushi Tai's (14 out of 15 interviewed) were working for the first time in any project.
- **Motivation factor:** Encouragement from Gram Panchayat and other officials. Few were self-motivated to learn new Agri technologies and wanted to help farmers.

- **Support from family:** All Krushi Tais received support from their family. Assistance was in the form of travel and help in arranging meetings.

Awareness on Project

- **On Project:** 13 out of 15 KTs were not aware of specific project objectives. The project objectives mentioned by them were increasing farmers' income, building climate resilience in farming, support in SHG formation, giving benefits to marginal farmers
- **On their role in project:** Most (14 out of 15 KTs) of them see their role in mobilizing farmers, disseminating information regarding the project, and guiding farmers regarding the project and farm-related activities. Only 3 KTs acknowledged they participated in PoCRA Micro-Planning.
- **On performance evaluation criteria**: Most of them (06 out of 15) were not aware of the specific indicators on which their work is reviewed. Reported evaluation criteria included: number of FFS organized(most common response)

Operational Aspects

- **Mobilization activities undertaken by KTs:** Through informal conversation, door-to-door meetings to share information about PoCRA and the potential benefits from the project. Majority have organized or participated in meetings.
- **Challenges faced:** Majority did not report any challenge. One Krushi Tai expressed concern over the work overlap for domestic work and personal work
- **Payments of Honorarium of KTs:** 3 out of 15 Krushi Tais have received their first remuneration as Krushi Tai. Only 13out of 15 Krushi Tais were aware that VCRMC is responsible for their monthly remuneration that is supposed to be paid quarterly.

6.11.9 Taluka Agriculture Officer

There was mix response when asked about the reason for low demand of well recharge activity. It was shared that farmers think that their well may be silted by the silt coming along with the water, and many of the wells do not have a protective casing. Hence, farmers fear that any construction done will lead to the collapse of the edges of the well. Also, the reason for the low demand of the eclass farm ponds was less land availability under the gram panchayat as well as the issue of maintenance post its construction. The challenges faced by the TAO were mentioned as the low availability of the manpower in the department resulting in the workload. Also, non-availability of the computer and printer at the Taluka level is also creating the problem for giving pre-sanctions and the pendency of work has increased. One TAO demanded that the rejection of the application must be done by the AA at the field level if site is not suitable for taking the benefit.

> "The rocky terrain in some areas has resulted in the low demand of the well recharge activity. The major problems we face is the shortage of manpower and the vacant posts at the Agricultural Supervisor level. Also, the main problem in project implementation is the incorrect information furnished by the famers in the application which results in delay of the work. Apart from this, we face lot of problem at taluka level as we do not have adequate IT infrastructure i.e., computers or laptops for carrying out our day-to-day official work."

6.11.10 Sub Divisional Agriculture Officer

a. Strategies adopted to increase the participation of women in the POCRA project:

The strategies adopted for increasing women participation was found to be the women FFS arrangement and the motivation of women with the help of village-level staff.

b. Clarity in Guideline of PoCRA and course correction in guidelines:

The guidelines were clear as per the SDAO, but some guidelines such as Farmers cannot avail the benefit of fishery activity if his farm pond is individual but taken from other parallel schemes of agriculture department were found confusing to the SDAO's.

"Some farmers are applying for the same activities on the same land such as Horticulture with Drip though he has taken the benefit of drip on the same area previously" – SDAO

c. Low demand for E class farm pond and well recharge activity:

Many SDAO's said that the demand for e-class was less due to the encroachment of sites by villagers and the non-availability of suitable sites in the villages. The gram panchayats must take the initiative for the demand of e-class farm ponds if this activity to be taken forward. The main reason regarding low intake of well recharge was observed to be the higher side cost of this activity as well as unawareness of this activity and fear of accumulation of silt in the well along with incoming water.

"Village sarpanch and members sometimes force us to carry out the e-class farm pond and are expecting that we resolve the issue of encroachment and free the land. This can lead to conflict"- SDAO

d. Addition of activities

SADO's found the current activities insufficient as many of them wished to restart the activities which are closed for now. Others said that explicit activity for organic farming should be included.

e. Challenges in implementation of activities:

The main challenge faced by the project is the shortage of staff for the implementation of activities. Also, the upfront investment by the farmer is also a major challenge to the farmer. In some cases, the farmer submit application for support for multiple activities which exceed his land area.

f. The need for training and feedback on capacity building component:

The SDAO's said that the activities like Apiculture and Sericulture, there is need of training from the experts related to field and line departments such as Forest department and Silk board.

Farmers cannot avail the benefit of fishery activity if their farm pond is individual and they have taken from other parallel schemes of the agriculture department. Also, it is observed that farmers are applying for the drip along with the horticulture even though they have already taken drip on that area previously. The gram panchayats must take the initiative for the demand of E class farm ponds if this activity tobe taken forward. The need for training on shade net as well as polyhouse should be given to the farmers.

6.11.11 DSAO

The DSAO expressed the need of increasing the staff for mitigating the grievances from the farmers regarding the delay in the pre sanction and the spot verification activity. The participation of women can be ensured in the project by at least keeping 50 % of FFS for women in the villages. The appointment of the KT has also been helpful for increasing the participation of women. All DSAO shared that the guidelines were clear and no problem has occurred for this activity. But in the case of Shadenet the grant is given according to the size of bed so the remaining space is not considered in the grant and farmer faces loss in this. Many DSAO's said that fencing activity, if given in the community can be helpful and must be added to project. The main challenges mentioned were the fewer CA in the project as well as farmers purchasing the assets before receiving pre-sanction to the activity.

"The training related to behavioral change is necessary for the staff"- DSAO

"The farm mechanization activity is good, but the compulsion of BBF machine in this activity is not necessary"- DSAO

6.11.12 FPO: Out of the 16 interviewed FPO's 15 of them were registered in the time span of 2018 and later, indicating that there was awareness about the project activity of grant for Agribusiness activity. The member size of FPO ranged from 1000 to 10 members among the sample size. The male members contributed to 73 % of the total members in the FPO. Many FPO's reported that they were engaged in the procurement and selling of cereals before starting the agribusiness activity. Majority of the board directors reported that they had taken training for the business at some point after starting the activity. The profit of the interviewed FPC ranged from 30000 INR to 5000000 INR for the FY 2020-2021. Many FPO's 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 FPO's said that they give training to women for skill development and strengthening. Majority of the interviewed FPO's were engaged in the Custom Hiring center business, and one FPO was engaged in the animal feed production as well as go down. In the case of custom hiring centers all machinery and tools were found in good condition. The member of the CHC and animal feed are delivered the services which are generally 5 % less than the market rate. The FPO's reported that they did not find any specific challenge in fund arrangement as the members have gathered the amount for establishing the business. Many FPO's also expressed the challenge that they are not getting the support from banks for expansion of the business as banks are asking for the NA properties as Mortgages. The major help received was from the project staff as well the Agri department for the preparation of the business proposals, and many FPO's also said that the Chartered Accountant also helps in the preparation of the business plan. The waste was managed by making the biogas as well as compost by many of the FPO's. Most FPC's said that the profit is not shared among the members and utilized for the expansion of the business as well some use it for paying off the debt of the FPC. The FPC directors expected the help for the Agri department for market linkages as well as help in getting the loans for expanding the current business activities.

6.11.13 Feedback on other key aspects

Gender Sensitive Efforts Taken by the Project

There have been many gender sensitive steps taken while implementing PoCRA project to make it more gender inclusive as mentioned below:

- During qualitative interviews with VCRMC it was found that majority of VCRMC members were females i.e., in almost all VCRMCs covered, each VCRMC has 7 female members out of a total of 13 members.
- As per MIS data, a total 884 Krushi Tai's were appointed as of 31st March 2021 who are working on the PoCRA project in the Marathwada region.
- As per MIS data, 4221 female farmers have attended the FFS for Rabi crops in the Marathwada region. The number of FFS arranged exclusively for women were 143.
- Around one-fourth of FPC farmers were women farmers out of total members in 16 interviews with FPCs.

Capacity building initiatives by PMU

- CB Programmes held- About PoCRA, and its components, water balancing, and latest climate resilient technologies were held. Most trainings were held online due to COVID restrictions.
- 13% of the survey respondents had undergone training through PoCRA. These were mostly FFS or sessions on particular technologies like intercropping, pest management, soybean sowing, amongst others.
- Training sessions on new CR technologies for FFS staff is critical.
- Refresher training required on VCRMCs set-up and functioning, along with assistance and training in developing DPR reports for NRM activities under PoCRA are required.

Feedback on DBT-based approach

- Majority stakeholders reported PoCRA to be more effective and transparent as compared to similar government programs.
- **Reasons :**
    - It adopts a comprehensive approach, not piecemeal approach.
    - It is demand-based and on target based.

It has higher matching grants, hence it is beneficial for farmers.**Agro-met Services**

- Almost all respondent stakeholders had positive feedback.
- It is helpful in farming, pest management, planning further in farming.
- Information reaches farmers using WhatsApp groups, text messages. In some cases, social media, print out of the advisory, through Krushi Tai, written on the Gram Panchayat Board are also used.
- One facilitator reported that the information through agro-met services is usually not accurate. E.g., rainfall pattern often do not match with the predictions from the advisory.

Awareness of Environmental Safeguards

- Most of the respondent stakeholders acknowledged being aware of and following environmental safeguards.
- They ensure community works do not disturb environmental resources, avoid cutting of trees, plant more trees/orchards, promote organic farming, prevent soil erosion.

6.12 Case studies

6.12.1 Farmer producer company with agribusiness grant

The farmer producer company "Malojiraje Farmer Producer Company" of Sultanpur village in Khultabad taluka of Aurangabad district which was established by farmers in Sept 2018. The group has nearly 100 members with around 40 female and five board of directors. Before getting support from PoCRA, the FPC was engaged in collection of milk, and distribution of milk. Majority of the farmers are the producer of corn in the region. The group was also engaged in the procurement of grains and marketing them in Aurangabad.

Challenges faced by the FPO
The FPC had initially faced the challenge of not being able to mobilize enough members and raise funds through their members. The milk distribution business has shown some profit initially, due to which the farmers thought that the share capital must be raised for starting the new business. The members collected the share capital of 1000 Rs each, and the board of directors collected. The loan was still a huge amount as the project needed to have a bank loan of at least 75%. This was sorted out by mortgaging one of the Directors NA properties against the loan. This was a long process of around four months. The current challenges faced by the NGO are the adverse climate this year and the need for operational costs for carrying out the operations.

Support from PoCRA
After knowing about the opportunity to get support from PoCRA, the FPC applied for a matching grant for establishing a silage unit as the area has scarcity of green fodder after the Kharif season, and there was need of nutritious diet to the cattle in the area. The business plan was also approved for a cost of 92 lakh. The application was made by the company to the District Project Implementation Unit of PoCRA in Aurangabad. Within 6 months, the project was approved by PoCRA, and the matching grant was also disbursed after all the scrutiny y by the officials are per the guidelines of the PoCRA.

"The process of application for the Silage Unit was very easy and the Grant approval process was also very fast due to the cooperation of staff"- Mr. Chavan, Board of Director

The grant was received by PoCRA in July 2020. The purchase of Tractor, Baler machine, Harvester, and Stabiliser were purchased by the company soon after the grant was received. The procurement process was assisted by the staff of Specialist for Agribusiness and Procurement.

Market and Distribution

The produce of silage, also known as bail, is distributed all over Maharashtra and is packed in 90 Kg's bale. The average rate of selling was found to be 5 Rs per Kg, and the production cost was observed as 4 Rs per Kg. The members of the Company receive the Silage at the discounted rate, which is 5 to 10 % less than the actual price. The overall turnover for the year 2020-21 was told as 80 lakhs and reported the profit of 9 lakhs rupees. The overall turnover for the year 2019-20 was told as 50 lakhs and reported the profit of 3 lakhs rupees.

Benefits realized after Silage Unit establishment

The perceived benefits seen after the Silage unit include the increase in Milk production for the cattle of the members who are using it as well as the option for the green fodder is available now throughout the year to the farmers. Also, the farmers initially were not able to get the proper rate for the Maize crop in the area, but after construction of this unit, the farmers have started Harvesting the crop one month earlier for providing the raw material to the unit, and they also got the time in advance for the next Rabi Cultivation preparations. Also, the farmers are getting a good rate from the raw material they are supplying to the unit.

Future and profit-sharing

The directors said that the plant was running in full capacity at the time of visit, and they did not haveplan of expansion of the company. It was decided unanimously by the Members and the Board of directors that the profit will not be shared for the coming 2-3 years and it will be used solely for repayment of loans as well paying off the loans from the banks as well as infrastructure development of the company

6.12.2 Institutional support being provided by PoCRA is helping farmers in practicing sericulture

In Taki Sagar village of Aurangabad, there is a farmer who had undertaken sericulture activity even before the commencement of PoCRA. It was reported that he had started sericulture activities more than six years ago. He got training and enhanced his understanding from his friend circle. Recently he was also associated with PoCRA and got assistance and scaled up sericulture activities. Similarly, other farmers were also associated with sericulture in the villages.

He reported that the sustainability of sericulture is dictated by the natural resource base and management skill of the entrepreneurs. Generally, it is noted that when the shortage of feed in terms of mulberry leaves takes place, sericulture farming is affected badly. To deal with such adverse situation, the institutional support as PoCRA is providing and management skills of the farmers play an important role in sustaining the enterprise.

Under PoCRA, the farmer has received the infrastructure and financial support that helped the farmers in sustaining the enterprise on the one hand, and they followed the rotational feed production practices on the other hand. The rotational production of mulberry leaves is also dictated by the availability of irrigation water resource.

In the present village, there are about 15 farmers following sericulture practices and following the rotational feed production practices. It was also reported that some farmers also left it due to limited knowledge and resources constraints. To make the enterprise viable, the institutional support and technical knowledge among the farmers are essential to what PoCRA is providing now.

The farmers also reported that there need to improve the marketing facilities so that the farmers may market their produce locally. Presently, the market facilities are available the distance of 125- 150 km away from the village.

6.12.3 Inter-cropping system and use of zero-tillage technology helped in getting better income from agriculture

In a village namely Raelgaon, a Guest Farmer, Mr. Tulsi Ram Dawade, who has two plots of parcel of land holding as 0.80 hectare each. He has followed inter-cropping system with two combinations, first, cotton and Soybean and second Maize, cotton, and Moong. The farmers have not only followed the inter-cropping practices but also adopted the zero-tillage option for crop cultivation. He reported that these combinations have multi-dimensional implications in farm production.

Intercropping farm practices helps in minimizing the risk of climate variability that affects seed germination, plant growth, minimizing the cost of production, and resource conversation include water saving, soil health,

The farmer also followed the zero-tillage technology in the farm operation. The farmer reported that zero tillage technology has certain problems in the initial stage. During sowing and till the plants grow till the specific height, the field looks ugly. But after some days of sowing, the field looks beautiful. Certainly, it also cost less as compared to prevailing practices. These technological options have played an important role in enhancing

crop productivity ranging from one-fifth to one-third. The farmer also reported that these techniques are followed by other counters at a faster rate.

The farmer reported that the marketing of farm produce is one of the major problems. There is absence of regulated market where farmers can sale out the farm product at reasonable price.

Further, reported that he received lower price than the minimum support price. In case of marketing practices, the local traders were dominating the scenario. They purchase the farm produce in the respective villages at lower rate and sold it out at higher prices and get the substantial profit.

6.12.4 Shade net, intercropping system and technical training to farmers helped farmer in increase of income of farmers

In the visited areas in Malisagaj of Vaizapur block and some other villages in Phulambri, Vaizapur and Kannad of Aurangabad district, the farmers are receiving very high return through Shadenet system since the farmers are growing three high value crops in one year under semi-controlled environment. The major crop, being grown in the shadenet units in all visited villages are capsicum, tomato, marigold, muskmelon (summer season).

The intercropping system has also been introduced in irrigated area with cotton and soybean, cotton and moong/urd, cotton and red gram. In some of the villages, the Kharif cereal like bajra/Jowar with green gram, black gram is being adopted. Some farmers have adopted drip system for long duration like cotton and red gram. Wider adoption of such cropping pattern and intercropping with drip system was due to the impact of FFS where several agricultural modules on new technologies were taught to the farmers.

Major role was also played by the MGM Krishi Vigyan Kendra village Gandheli Aurangabad for advocating technical help to the farmers and other state governmentdepartment. Our agronomy expert visited this KVK on 13.8.2021 afternoon and saw their demonstration field where all agricultural enterprises (Horticulture, Animal Husbandry, and dairy, Sericulture, Poultry, Food processing) activities are operating at one place. The betel-vine cultivation under controlled conditions in those areas has shown a boon to the farmers. It is being cultivated in Shade net unit. This betel vine can be introduced in PoCRA project area, where a significant number of Shade net units are constructed. They are also imparting training to the farmers at their premises and showing live demonstrations of all enterprises. They are also collaborating their training programme with the government department at frequent intervals and enriching the new ideas to the government officials and progressive farmers.

The marketing facilities are not available in nearby places. However, the vegetable merchant / retailer, visit to the Shadenet unit and purchase all produce at very low rate. Proper market networking like vegetable grower association is urgently required to sell their produce at higher rate.

Figure 13: Shadenet in village Malisagaj in Vaizapur block

6.12.5 Woman farmer adopting protective cultivation

Smt. Kadubai Laxman Puri is a woman farmer owns 3.5 Acres of land in the Sarola village of Sillod block of Aurangabad District. She has been practising traditional farming of Cotton in one acre and Chilli in the remaining 2.5 acres of land as a major crop for her livelihoods. Her income was hardly up to INR 1 lakhs per year from farming. She was also facing problem of high labour cost for the harvesting of chilli as it took 7 Rs per Kg for harvesting. The amount she was receiving by selling chilli was also not sufficient to meet expenditure on farming for the last two years, which resulted in the loss. She also experienced high intercultural and cotton-picking cost which diminished the profit. She also owns an individual farm pond which was constructed three years ago under NHM. She has also taken the benefit of Drip from the project on her land

Figure 13B: Shadenet in village Malisagaj in Vaizapur block

Actions through PoCRA: Her son Mr. Somnath Laxman Puri is also an innovative farmer who owns a 1 Acre of Shade net, which is run in partnership with another farmer friend with the name of Ankur Hi-Tech nursery. This nursery is three years old and has a good customer base. Due to losses of cultivation of Chilli and cotton in the Farming and need to find income from some alternate farming, Kadubai along with her son decided to establish the shade net house and start the Nursery business using her son's experience. The village has number of farmers who grow the vegetable crops such as Tomato, Cauliflower, and Chilli. So, the decision was made to establish a Shadenet House and start a nursery business. The application was made for the same and the activity was approved by the Sub-divisional officer of Sillod after all the scrutiny checks. The total cost of the Shadenet was around 19,50,000 INR for which the grant as amount 15, 54, 000 INR was received covering 80 % of the total cost of Shadenet. The grant was received in March 2021. Initially due to shortage of fund it was decided to carry out the bell pepper cultivation and the cultivation was done in all 1acre of area. The mulching was also placed for the control of weed and evaporation losses from root zone. But after the cultivation in July 2021, there was excessive rain all the season resulting in the loss of saplings as well as damaging the crop. The damage occurred because of the damaged roots due to stagnated water. The total loss reported by Kadubai was 1,25,00 INR. After this, for starting the nursery Kadubai initiated purchase of raw material such as Coco pits and trays for growing the Saplings of vegetable crops in the Nursery. After this the Cauliflower was cultivated in half acre and whose production is yet to come in which 1,60,000 saplings were purchased from other nursery. With all the obstacles, Smt. Kadubai Laxman Puri is still putting efforts adopting different types of cultivation to get better income from farming.

Benefits and Future plans

The saplings were created in the remaining Half acre land in the month of August and September and total 10,00,000 sapling were created for the vegetable crops such as Tomato, Chilli, and the Cauliflower.Total of 3 Lakhs Saplings for tomato, 6 lakhs for Chilli and 1 Lakh of Cauliflower saplings were cultivated.

This gave the income of 10 lakhs which was around 1 Rs per sapling. The total cost incurred was around 7 lakhs which means that the total operating profit was limited to 3 lakhs rupees in span of 3 months.

Kadubai is expecting the income of 2.5 lakhs form the Cauliflower production in the Shadenet.

6.13 Key Experts Field Visits

6.13.1 Agronomy

As part of concurrent monitoring of PoCRA project, agronomy expert Dr. R.B. Singandhupe along with Mr. Dalbir Singh (Agri economy expert) visited three blocks viz. Phulambri, Vaizapur and Kannad of Aurangabad district to monitor the PoCRA project activities with the help of officials of State Agricultural Department officials, Govt. of Maharashtra from 11th to 13th August 2021. Just before visiting to field, agronomy expert Mr. Singandhupe, on 10th August 2021 also attended a meeting at PoCRA office, Mumbai on approach and methodology of the midline evaluation presented by the representative of SAMBODHI and TERI team.

The following villages were visited in Aurangabad district and required information were tried to be collected:

- Phulambri taluka (Villages: Relgaon, Sonari Bk, Sonari Khurd, Chincholi Leha Baraor Leha Janhangir)
- Vaizapur taluka (Villages: Chorwaghalgaon, Bhagur, Malisagaj, Taklisagaj, Hanumantgaon)
- Kannad Taluka (Villages: Tapargaon, Ruikheda, Alapur)

A. Major climate resilient agricultural activities along with its benefits, constraints, and level of adoption of the project activities by farmers observed during the visit of agronomy expert through interaction with farmers

1. Drip Irrigation

The activity has been found to be implemented in all the selected villages visited in three blocks (Phulambri, Vaizapur and Kannad) of Aurangabad district.

Benefits: The basic concept of the drip system is to increase water and fertiliser use efficiency in crops and cropping system as compared to surface irrigation system. The benefit accrued in different crops in terms of fertiliser use efficiency ranges from 25-30 %, in terms of crop yield from 10-15 % and water saving from 50-70% as compared to surface irrigation method (Indian National Commission on Irrigation and Drainage Report 1998.). The fertiliser and water are applied in effective crop root zone as per the requirement of the crop frequently without any deep percolation/leaching loss of water and fertiliser. The farmers of the project area have been following this system in shade net unit as well as in field where the high value vegetable and cash crops are being grown in different soils

Constraints: The marginal farmers need sufficient money at the initial stage to purchase the required items. Frequent monitoring of the lateral and accessories are required to avoid emitters clogging as the farmers are applying fertilisers, micronutrients, and growth stimulant products through drip system. In saline ground water areas, precipitation of the applied fertilisers with different salts of ground water occurs in the system and need frequent chlorination and flushing of the system. Frequent measurement of discharge rate of the emitter is required to apply the desired amount of irrigation water to the selected crop. In case of surface placement of the drip lateral, more labours are required to take out from the field and spread in the same field after sowing of second / third crops, but in case of sub-surface drip system, such practices are avoided, and significant share of labour cost is saved.

Reason of low adoption: This system is adopted by most of the farmers where the open wells, borewells, lift irrigation, community pond / secondary reservoirs are available with them. Initial cost is very high; hence the marginal farmers cannot spend huge money for purchase of the system.

Improvement in adoption: The cost of drip system particularly laterals and small accessories can be minimised if, the crop geometry i.e., paired row is adopted by the farmers. Once the water resources are created at village level then the farmers may initiate to implements this system with high value cash crops.

2. Sprinkler irrigation

The activity has been found to be implemented in all the villages visited in Phulambri and Vaizapur blocks and in Kannad village. A total 25 beneficiaries were found to have received one set of Rain gun. This Rain gun can be used for irrigating tall crops sugarcane, Jowar, fodder crops whose height is greater than the riser height of sprinkler set.

Benefits: The sprinkler irrigation system is being followed by the farmers in close growing crops like vegetables, pulses, oilseeds, cereals. The water saving through this system occurs to the extent of 16 to 70 % and increase in yield by 3 to 57 % over traditional method of surface irrigation in different agro-climatic situation in India (Indian National Commission on Irrigation and Drainage Report 1998.). In PoCRA adopted villages, the sprinkler irrigation system is being used by the farmers in rabi season crops like Bengal gram, wheat, and summer ground nut in irrigated areas. In kharif season, they are using in soybean crop if the prolonged dry spell occurs due to uneven distribution of rainfall. It is portable and used in undulating topography. The conveyance loss of water is negligible as the irrigation water is directly applied at field level from the sources of water. Only 10-15 % loss of water occurs through evaporation as the water droplets is exposed to air before falling on crop canopy / soil surface.

Constraints: Initial cost is high. The fertiliser application through this system is not feasible. Uneven distribution of water under high wind speed results into moisture stress in dried spot. It is not feasible in heavy soil.

Reason of low adoption: Due to non-availability of water resources structures and lack of irrigation water during rabi and summer season, large number of farmers have not taken initiative to adopt this irrigation system themselves.

Improvement in adoption: Creation of water resources structures at micro level is required for increasing more area under sprinkler system.

3. Pipes (HDPE/ PVC)

During the visit, the activity was found in Phulambri taluka (Villages: Relgaon, Sonari Bk, Sonari Khurd, Chincholi Leha Baraor Leha Janhangir). Information about 16 beneficiaries and 15 beneficiaries were also available in the visited villages in Vaizapur Taluka and in Kannad Taluka, respectively.

Benefits: The use of pipes reduces irrigation water conveyance loss to the extent of 27 % as compared to surface irrigation method. So, the irrigation pipes are highly useful to the farmers. The HDPE pipes with risers and other accessories in sprinkler system were provided to the beneficiaries. The farmers were also sharing those sprinkler sets to the neighbours when non- beneficiary farmers needed sprinkler sets for irrigating their field crops. Besides HDPE pipes, the PVC pipes were also provided, however these PVC pipes were installed underground to avoid any damage from heavy farm implement as well as from direct exposure UV rays. Adoption such practices increase the life span of PVC pipes.

Constraints: None of the farmers interacted during the visit reported any challenge.

Reasons for low adoption: Since the marginal farmers have minimum land holding and they are not having irrigation sources, use of such assets are minimal.

Improvement in adoption: Creation of water resources structures is required for effective use of such materials throughout the year

4. Water pump

This activity has been implemented in

Phulambri Taluka (Villages: Relgaon, Sonari Budruk, Sonari Khurd, Chincholi, Leha Baraor/ Leha Janhangir), but during the visit, the actual numbers could not be available.

Vaizapur Taluka (Villages: Chorwaghgaon, Bhagur, Malisagaj, Taklisagaj, Hanumantgaon: 30 beneficiaries.

Kannad Taluka (Villages: Tapargaon, Ruikheda, Antapur: 19 beneficiaries.

Benefits: Data on supply of electric pump for irrigation, for three villages of Kannad Taluka could not be available. In these three villages about 19 farmers have been benefitted from PoCRA project. The farmers are regularly exploiting ground water from open well, as well as from secondary reservoir for their crops particularly during kharif, rabi and summer season. During pre-monsoon, some of the farmers are irrigating their field crops till the onset of monsoon. In this area, the sub-surface ground water flow is available and the open well is being recharged regularly due to influence of medium irrigation project (Sivna Takli Medium Irrigation project).

Constraints: During rabi and summer season, the availability of well water for irrigation is reduced due to low transmittivity of aquifer because of hard rock region.

Reasons for low adoption: The farmers are very much interested to use the electric pump for irrigation but due to limited number of open wells, they are not availing this facility.

Improvement in adoption: If the rainwater recharging structures are created at micro-level, a greater number of open wells can be created, and irrigated areas can be increased substantially. However due to high well density, over exploitation of ground water may occur in future.

5. NADEP

One set in Relgaon village in Phulambri block was observed.

Benefit: The disposable farm residues are being kept in NADEP and the decomposed products are being used in the field crop as manure. Due to extra supply of the decomposed manure with various concentration of primary, secondary and micronutrients, the soil health is properly maintained for harvesting potential yield.

Constraints: Enough organic residues is required from the field to make compost. It helps in reducing the use of inorganic fertiliser considerably.

Reason for low adoption: The adoption of NADEP requires technical support to the farmers.

Improvement in adoption: The crop residues having more nutrients and quick decomposition rate like residues of leguminous crop may be beneficial unlike cereal crops (jowar, wheat, bajra millets) residues where the decomposition rate nutrient concentration is low.

6. Vermicompost

Four sets of this component were found to be available in identified villages in Phulambri Blocks. In Hanumangaon in Vaizapur block, it was under process of implementation, however in other villages, this activity is already in function.

Benefits: Advantage of the vermicompost is like NADEP.

Constraints: Since the vermicompost is prepared from molasses of sugar factory, fresh cow dung which are not available in ample quantity with the small farmers, it is not feasible to make a proposal for this enterprises except in a place where dairy enterprise is operating or there is provision of supply of sugar molasses and crop residues for quick decomposition of the more cellulose/ silica products.

Reason for low adoption: It requires technical support to the farmers.

Improvement in adoption: If large quantity of by-product of sugar industries / fresh cow-dung are available in villages, implantation of this activity in villages is feasible.

7. Construction of Farm Pond with lining

Phulambri Blocks: Lining of farm pond activity has been done in Relgaon village. The individual farm ponds are also available in other villages, which were constructed through PoCRA project.
Vaizapur Block: 38 farm ponds in individual farmland and 10 community ponds have been funded by PoCRA.
Kannad Block: Lining of one Farm Pond (size 34x34x4.7 m) has been done in village Ruikheda.

Water Resources: Sivna Takli Medium Irrigation project was constructed on Sivna River (Godavari River Basin) in Kannad Taluka during 2008-2009. The irrigation command area is 4069 ha, and two talukas are being brought in irrigation during 2008-2009. The cropping pattern is dominated with water exhaustive sugarcane crop followed by cotton and other high value cash crops.

Benefits: The farm pond is secondary reservoir. The harvested rainwater and pumped water from open well are being used during dry spell period in kharif, rabi and summer season as supplemental irrigation or full irrigation. The farm pond is generally lined with lining material to avoid seepage loss. The stored rainwater and refilled ground water in pond can be used for rearing fish to get additional income from the pond water. The unlined community is being used for recharging open well and further pumping during dry spell period in kharif season and as supplemental irrigation during rabi season.

Figure 14: Lining activity in farm pond at Malisagaj (Vaizapur block)

Constraints: Since the marginal farmers cannot spare their small piece of land for construction of the standard size farm pond, they can avail the basic requirement of water from community pond only. For use of the community pond water, adequate water rights should be framed through Water Users Association in the villages to use individual water share/ rights for domestic and for agriculture. In case of individual farm pond, the rainwater of the pond is not enough to cover more area under irrigation hence more catchment area should be considered to harvest more rainwater and store in individual farm pond.

Reason for low adoption: Since the initial investment cost is very high, the marginal or small farmer cannot spend the required money and construct the farm pond.

Improvement in adoption: Once the farm pond is developed, the utilisation of farm pond bund by growing horticultural fruit crop may be brought instead of keeping the area un- productive. Fishery component may also be introduced if sufficient water is available throughout the year besides irrigation.

8. Polyhouse (Open Vent) and Poly house (Tunnel)

Both components have not been developed through PoCRA project site, however some of the farmers have constructed vent type and tunnel type from their own resources.

Benefits: These are highly beneficial for development of tissue culture plants / seedlings for high value commercial crops under controlled condition. Inside the polyhouse, the atmospheric parameters for growth of seedlings are maintained artificially just like ambient environment condition for growth. It is used throughout the year and samplings are developed for commercial use.

Constraints: Maintenance of controlled condition inside the polyhouse is highly expensive as well as need experienced technically sound officials to operate the system.

Reason for low adoption: This unit is highly expensive and marginal / small farmers may not be interested to enter in such enterprises.

Improvement in adoption: Nil

9. Shade net

Phulambri Block: One unit in Relgaon village. In other villages the Shade net units are available as informed by Cluster assistant. During the visit, four units of Shednet units were found in each block, Vaizapur and Kannad.

Benefits: The large size shade net unit (0.4 -.45 ha), which have been installed by the farmers with the financial assistance from PaCRA are quite effective to increase net income of the farmers as they are growing three crops in a year. Since the farmers prefer growing high value vegetable crops, where the resources are under controlled condition, the utilisation efficiency of all the resources are very high as compared to the open field.

Constraints: Financial support through PoCRA project for construction of such units are very much beneficial to the famers, but the small land holding farmers may not spare their limited piece of land for construction of big size shade net unit. To extend this unit at village level to all beneficiaries, the irrigation resources should be made available to grow the crops in shade net unit throughout the year. In all villages such irrigation infrastructure is not available with the farmers.

Reason for low adoption: Due to lack of financial help to all eligible farmers, this system has been given to the farmers who have invested enough at the initial stages.

Improvement in adoption: Provision of small size shade net unit may be made for small / marginal farmers so that they may get benefit from the PoCRA project and earn their income throughout the year.

10. Planting material in Polyhouse

Phulambri Blocks: Two farmers have placed their demand to avail this facility from PoCRA project as informed by Cluster assistant. However, this activity was not reported in Vaizapur and Kannad Block during the visit.

11. Production of Foundation and certified seed of climate change

Phulambri Block: In Relgaon village, one farmer Mr Kailash Bhimarao Tathe is providing good quality certified seeds to the farmers. He is also selling the certified seed of soybean, moong, urd, arhar and onion seeds to seed company at higher price and earning more income as compared to ordinary seed, being used self for next crop year/season and for domestic consumption. This activity was not repoSrted in Vaizapur and Kannad Block during the visit.

12. Planting material

For shade net unit the farmers are acquiring good quality seedlings of different vegetable crops in all the selected villages in all three blocks visited.

13. Plantation of Horticulture crop

In Phulambri Block, this provision has been made in visited areas and the farmers are getting very good quality planting material particularly citrus/ mosambi, guava. In Vaizapur Block, this facility was also found to be available and in Kannad Block, it was also found nearly 15 farmers have availed the supply of good quality planting material through PoCRA project in visited areas.

14. Plantation of Agro- forestry

The activity was not observed in Phulambri and Kannad block. However, in Vaizapur Block, this facility was found to be available as informed by CA and agriculture Assistant.

Benefits: Planting of trees on the boundary of the field as well as on field bund, helps to restrict water loss from the field as trees act as wind barrier. It gives additional income to the farmers besides main crop.

Adoption: Provision may be made to supply medicinal plant through through PoCRA as the medicinal plants are high value plants. In such cases the medicinal processing industries may take up the produce once the contract/ agreement with pharmaceutical industries is made with the farmers.

15. Recharge of open dug well

Data were not available in Phulambri and Kannad block. It was found in Vaizapur Block, this facility has been extended to the farmers.

Benefits: The practice of recharging open well increase water availability in villages or in agricultural field as very high amount available rainwater goes waste during kharif season. Increased water availability in well increases irrigated area as well as yield as the supplemental irrigation from the recharge well saves the crop from dry spell if occurs during kharif season.

Constraints. Since this zone is semi-consolidated to consolidated, more amount of rain water cannot be recharged in the well.

16. Construction of open dug well

Data were not available in Phulambri and Kannad block. It was found in Vaizapur Block, this facility has been extended to the farmers.

17. Apiculture:/ Sericulture

Phulambri Blocks: Information on Apiculture and Sericulture was not available

Vaizapur Block: Information on Apiculture is not available, but the information on sericulture was available and one of the farmers from village Talisagar has developed sericulture and harvesting cocoon 6 times in a year due to supply of green leaves from mulberry plant. But the remaining 5 sericulture units have been harvesting silk cocoon three times in a year as the mulberry leaves are not available throughout the year.

Kannad Block: Information on Apiculture is not available but with respect to sericulture activity, three farmers are doing this farm activity in three different villages.

18. Backyard Poultry

Information could not be available in any of the three blocks visited.

19. Small Ruminants

Information could not be available in Vaizapur and Kannad blocks. However, in Phulambri block, it was found that the activity has been adopted by 15 landless households.

20. Inland Fisheries

Phulambrl Block: In Relgaon villages where the lining of pond has been done. To control seepage loss from the pond, the fishery component has also been introduced but the detail outcome has not been received from CA.

Vaizapur Block: This activity has already been provided to the beneficiaries in village Malisagaj, and other visited villages.About 38 farm ponds have been made in the visited villages. Some of the farmers are rearing fish by their own expenses instead waiting for the financial help through PoCRA project.

Kannad Block: In Ruikheda village, the pond has been constructed by one of the farmers and the fish component has been taken up through PoCRA project. The farmer was using open well water to maintain adequate water level in the pond and rearing fish.

21. Subsidy for farm Implements

Data were not available in Phulambri and Kannad block However data were available in Vaizapur Block. in Vaizapur Block, in village Malisagaj, the farmers have made a group of 15 farmers and purchased farm implements like, tractor with cultivator, furrow and small bund making machine, disc harrow, cultivator, cotton shredding machine, threshing machine, winnower, cleaner. They are sharing these farm implements for agriculture operation on hire basis and the money earned by the group was being further utilised to extend their farm activities in other areas. They have also constructed shed.

B. Case study on BBF technology

The agronomy expert Dr. R.B. Singandhupe also visited the BBF demonstration plots of soybean crop in villages Relgaon, (Phulambi Taluka), village Bhagur in Vaizapur Taluka and village Antapur in Kannad Taluka. He discussed with the farmers on various issues they are facing while implementing BBF technology in their fields through PoCRA project and its wider adoptability in other soybean growing areas. The outcome of the discussion on BBF technology is summarised below.

Figure 15: BBF technology in Soybean cultivation in village Relgaon in Phulmbri)

Table 50: Feedback on BBF Technology

S. No.	Questions to farmers	Brief Description about individual activity narrated by the farmers
1.	From where you got to know about the BBF technology?	The importance and techniques of broad bed furrow planting/sowing system has been given to the farmers by the state agric. department, subject matter specialist (SMS) of the district Krishi Vigyan Kendra and in Farmer's field school.
2.	From where you hired this BBF machine?	The BBF equipment for sowing of field crops were brought from the farmer who were providing on rent basis. This equipment was also available with group of farmers who have purchased through PoCRA project and giving to the farmers on rent basis.
3.	Was the machine easily available for rent?	Yes, it was easily available during lean period but during the peak period of sowing of field crops (soybean and other kharif crops), this equipment was not available. So they preferred sowing of the soybean crop by. drilling method with bullock pair.
4.	Do you have sufficient skills to operate this machine?	While using the BBF technology, it was highly essential to make proper alignment for maintaining line spacing, plant spacing to get adequate plant population. This was possible through the well-trained operator of the machine. The farmers were found to be hiring tractor and BBF machine, operator on acre basis.
5.	What crops did you plant after using the BBF technology?	After harvest of the soybean crop, they were using the same piece of land for rabi crop like Wheat and Bengal gram, onion (for seed production) after disturbing the BBF set up.
6.	Have you attended any FFS training on using this technology?	All farmers from the visited areas were found to have attended the Farmer's Field School in which the recent crop production technology along with BBF technology were taught by the SMS farm Machinery, Crop Scientist and State Agriculture department officials. Every year, the officials were imparting training on new methods of crop management and other agricultural related enterprises. In Kannad block (in three villages) about 19 times the financial help was given to FFS during the financial year 2020-21.
7.	What are the benefits you observed after using this technology?	In Relgaon village of Phulambi block, Bhagur village in Vaizapur block, and in Antapur village in Kannad block, the Soybean was grown in medium to heavy soil under BBF technology in a limited areas (about 0.40 ha each) and in rest of the adjoining area it was grown under normal flat -bed system. The soil was medium to heavy. But in Vaizapur block, more soybean area was occupied in light to medium soil. The total weekly rainfall distribution pattern in Aurangabad district during this kharif season was: 1)34.1 mm (288% of normal) on 2.6.2021 2) 59.1 mm (139% of normal) on 9.6.2021 3)12.5 mm (-63% of normal) On 16.62021. 4)15.8 mm ((-48%of normal) on 23.6.2021 5)53.8 mm (45% of normal) on 30.6.2021

S. No.	Questions to farmers	Brief Description about individual activity narrated by the farmers
		6)0.6 mm (-98% of normal) on 7.7.2021 7)109.8 mm ((281% of normal) on 14.7.2021 8)36.6 mm ((9% of normal) on 21.7.2021 9) 22.3 mm (-45% of normal) on 28.7.2021 10)7.6 mm (-78% of normal) on 4.8.2021 11)5.5 mm (-87% of normal) on 11.8.2021 12) 58.4mm (118% of normal) on 18.8.2021. The soil profile was well saturated during third to fourth week of June 2021 which was considered as sowing period of soybean. During flowering to initiation of pod development of soybean (particularly during 28.7.2021 to 11.8.2021), the rainfall was not enough, and severe moisture stress was observed in light to medium type of soil and very mild stress during mid-day in heavy soil.
	Increase in soil moisture	The increase in soil moisture was noticed, and more rainfall was in furrow, and subsequently drained out through furrow, which was made after four rows of soybean.
	Proper drainage of water in excess rainfall	Adequate drainage of excess rainfall was recorded by field observation as the crop stand was good.
	Aeration to roots of crops	In heavy soil, the aeration in BBF was good as compared to flatbed sowing method. However, in light to medium soil, the drainage was very high, which resulted into quick depletion of soil moisture during long dry spell period. Very high depletion in light soil caused severe moisture stress as compared to heavy soil.
	Increase in yield and income	About 25-30 % more yield is expected by BBF adoption technology as compared to flatbed method where the soybean crop yield is about 7-8 q/acre. In this case the seed rate for sowing has been reduced from 30 kg /acre in flat bed to 18-20 kg /acre in BBF method of planting. The expenditure incurred and the time required for sowing was also reduced considerably. Fertiliser application was also reduced as it was placed within the cropped area and not in uncropped furrow area if intercropping was not adopted. Due to thin plant population and efficient management, the plant canopy was well aerated during vegetative phase unlike overcrowded to dense population in flat bed system. Overcrowding of the plant canopy resulted into more vegetative growth and low crop yield.
	Others	As per the farmer's observation, / suggestions, this method may be followed in medium to heavy soil and not in light soil as the long dry spell during critical crop growth stage, damage the crop and the productivity was reduced considerably.
8.	What was the cost of using this technology on per acre of land?	The total expenditure for adoption of this technology was about Rs 17500 which included expenditure incurred on seed, sowing charge by tractor, fertiliser, weeding, hoeing, pesticide use, irrigation, harvesting by labour, threshing, cleaning, and marketing. The gross return from the total expected soybean yield was about 11 q/acre comes to Rs 42680(@Rs 3880 /q as per MSP rate for the year 2020-21). So, the expected net return is approaching to Rs 25180 /acre. This expected net return may vary due to the impact of soil types and overall management practices adopted by the farmers. However, in case of normal method of sowing, additional expenditure on seed, fertiliser and labour charges for sowing is involved. Besides this additional expenditure, the seed yield is also less as compared to BBF method of sowing.

C. Case study on Zero Tillage technology

The agronomy expert Dr. R.B. Singandhupe also visited Sonari Budruk and Chincholi village in Phubamri Block and Tapargaon village in Kannad block where the farmers had planted cotton under zero tillage cultivation. The soil of the Sonari village was medium to deep, however the soil of the remaining two villages was light to medium in texture. The cotton crop was planted on raised bed which was made last 2-3 years back at crop geometry 1.20 x 0.60 m under drip system.

In one of the villages at Sonari Budruk, intercropping system of moong was adopted during kharif season. After harvest of cotton crop, the farmers had taken maize crop during rabi season without disturbing layout. Accordingly, 200 % cropping intensity was adopted by the farmers in those area.

Figure 16: Zero Tillage In Village Chincholi(Phulmbra Block)

Table 50: Feedback on Zero Tillage technology

S.No.	Questions	Brief Description about individual activity narrated by the farmers
1.	From where did you get to know about the zero-tillage technology?	All farmers from the visited areas have attended the Farmer's Field school in which the recent crop production technology along with importance of zero tillage technology were taught by the SMS farm Machinery Crop Scientist and State Agriculture department officials. Every year, the officials are imparting training on new methods of crop management and other agricultural related enterprises to farmers.
2.	Have you received any FFS training for using this technology?	Farmers were found to have received FFS training on this relevant topic and on other agricultural enterprises also which are income generating.
3.	What crops did you plant after using this technology?	Since the cotton crop was taken up during kharif season with drip system, rabi crop like maize, marigold was grown without disturbing the existing set up, as the irrigation water was available with them
4.	What benefits you observed got adopting this technology?	The most significant outcome of this technology was to save the cost of land preparation, preparation of raised bed, fertiliser cost, manual weeding as pre and post emergence weedicide with hood was used for control of weeds. The base portion of the cotton stalk was mixed in soil with the help of rotavator and this stock improved the soil aeration after decomposition.
5.	Increase in soil moisture	Yes, because the shredded cotton stock was spread with rotavator and it was decomposed in-situ and improved porosity of the soil.
6.	Proper drainage of water in excess rainfall	Adequate surface run off through furrow was seen in this field during kharif season. But the infiltration rate of the soil might have got reduced due to moving of rotavator wheel in furrow. The raised bed where planting was done, was well aerated during kharif season.
7.	Aeration to roots of crops	Since sufficient amount of cotton shredded material was added after first season crop and in subsequent year, the soil aeration was very good. Due to more mineralisation rate, the nutrient availability of the undisturbed soil increased for plant growth. The cotton stalk which contain 60 % hemicellulose and 27 % lignin provide good support to plant growth once it is well decomposed, and reduces the expenditure towards the addition of inorganic fertiliser.
8.	Increase in yield and income	Yes, this method of crop production technology has reduced the cost of cultivation in term of land preparation, labour cost for weeding, inorganic fertiliser cost. Similarly, the residual nutrient which are retained in soil after harvest of cotton crop as residual, is also used by second season crop and save expenditure towards inorganic fertiliser.
9.	Others	The intercropping of leguminous crop in furrow, improve soil fertility status and add some additional income to the farmers as the wider empty space of furrow is fully utilised for short duration moong, urd and soybean crop.

S.No.	Questions	Brief Description about individual activity narrated by the farmers
10.	What was the cost of using this technology on per acre of land?	In first year the approximate cost of cultivation was Rs 26420 /acre (which included expenditure toward land preparation and making raise bed, seed cost, inorganic fertiliser, weedicide, insecticides and spraying, picking, marketing). In second year, the cost of cultivation was reduced to Rs 19666 as the cost of land preparation and inorganic fertiliser was reduced by Rs 6754 per acre. The gross return from the cotton crop in first year was Rs 56180 (seed cotton yield 10.6 q /acre and rate was Rs 5300 per quintal). The net profit in first year was Rs 29760 per acre. in second year, due to low seed cotton yield(5.0 q/acre) the net profit was very low, though the cost of cultivation was reduced by Rs 6754 per acre.. With the same set up of zero technology and drip irrigation, the farmers have generated good income from rabi maize and marigold. The expenditure towards rabi maize was about 10,000, gross return was Rs 30000(yield 20 quintal, rate Rs 1500 per quintal. So the farmers could get Rs 20000 from rabi maize crop. in second yea also, significant income was generated from marigold.

D. For analysis of cotton value chain

Table 51: Feedback on cotton value chain

S.No.	Activities in cotton value chain	Outcome from the visited villages
1.	**Production value chain**	We visited different villages to assess the impact of PoCRA project activities on cotton production technologies and generation of additional income through cotton value chain. In the visited villages, most of the farmers have been cultivating cotton crop under rainfed condition and very limited area under irrigated condition due to paucity of the water resources.
	Land under cotton cultivation (in ha)	In Phulambi block (Exact area on drip system is not available).
	Technology and inputs	
	- Procurement of seeds	From Krishi Seva Kendra located at Taluka level
	- Seed variety	Two packets (450+450 g), Total seed 900 g. Total seed cost Rs 1500/- The most popular Bt hybrids are : Mallika 207 BG II, Rasi 659 BG II, Ajeet 155, Ajeet 199.
	- Fertilisers and pesticides	Fertiliser (DAP 2 bags, MOP 1 bags,Urea 2 bags) Rs 3850 Water soluble fertiliser (19:19:19 N, P, K) of 25 kg bag through drip, cost Rs 2200. Pesticides : Rs 5000(five sprays)
	- Labour	For sowing by dibbling method Rs 400, weeding Rs 1600, Picking Rs 6000= Total Rs 8000
	- Machinery	i)Rs 4050(Deep ploughing, Cultivators, rotavators). ii) Removal of cotton stalk with cotton shredding machine Rs 2000 Interculture operation Tree times Rs 1800
	- Irrigation	Rs 2500 (It is applied during October to November and during long dry spell period)
	- Technology adopted (e.g drip, poly house)	**Drip irrigation**
	- Total expenditure	**Rs 30900**
2.	**Post production value chain**	
	Sorting	It is not being practised by the farmers, however some farmers keep their first two picking separately which are good quality. The fibre quality of subsequent picking are poor and they get less price. We advocate to all farmers to keep their farm produce separately for earning more income from the total produce.
	Grading	It is not being done by the farmers
	Packaging	Not followed
	Marketing channels	
	- Selling to middlemen	Yes
	- Through APMC	Not being practised
	- Through processing industry	No
	- Through agri-retailers	Being sold to the retailer
	- Through FPCs	No

S.No.	Activities in cotton value chain	Outcome from the visited villages
	Price realisation/ Selling cost (in INR per quintal)	It is being sold @ Rs 5500-6300 per quintal depending upon the quality of fibre. Seed cotton Yield : 12 q/acre (Irrigated cotton) Gross return: Rs 66000 as per lowest selling rate Net return Rs 35100(gross return Rs 66000 -Rs 30900 expenditure)
	Value addition from cotton stalk	In one acre area, the cotton stalk production from Bt hybrid comes to about 6-8 quintal. The calorific value of cotton stalk is 4252 kcal /kg of cotton stalk/ chips, which is high source of energy. Since the cotton shredding machine is available with a group of farmers as well in Agric department at Tehsil level, the powdered cotton stalk can be converted into cotton briquettes and used as energy source. The powered material can be used in paper pulping industries, panel board as well as for preparation of decomposed farm yard manure. It can also be used in mushroom cultivation.

E. Shade net units and intercropping system

In the visited areas, lots of activities, related agriculture have been implemented through PoCRA project. The farmers are receiving very high return from such enterprises. Through Shadenet system, the farmers are growing three high value crops in one year under semi-controlled environment. The major crop, being grown in the Shadenet units in all visited villages are capsicum, tomato, marigold, muskmelon (summer season). The intercropping system has also been introduced in irrigated area. The details of this have already been put in the previous section as a success story.

Farm Implements/ machinery purchased through PoCRA

6.13.2 Agri-Economy

The agri-economy expert Dr. Dalbir Singh visited some villages namely Choregaon, Chincholi Nakib, Leha Babra, Relgaon Sonari,Mali Sagar, Taki Sagar Antapur, Tapergaon, in Aurangabad district falling in Marathwara region of Maharashtra during the second week of August, 2021. The purpose of the visit was to understand outcomes of PoCRA implementation keeping in view economic aspects of project activities at farm level. The present discussion has been grouped into five sections such as first economics of sericulture, second, economics of shade net farming, third adoptions technological options, fourth challenges that farmers facing and last and fifth suggestions to deal with emerging challenges.

6.13.2.1 Economics of sericulture in the Project Villages

Rural poverty has many forms and much more complex phenomenon. Poverty alleviation requires suitable policy interventions and appropriate technological options that can increase agricultural productivity without adversely affecting the productive capacity of natural resources. It is viewed that agricultural sector alone cannot provide viable solution for alleviating rural poverty. Hence, sericulture, the production of silk has become a promising rural activity because of its minimum gestation period, minimal investment, maximum employment potential and quick turnover for investment. Similarly, sericulture activity was added in the PoCRA. An attempt has been made to understand the functioning of sericulture activity and its economics at household and village level. In the project areas, two villages were considered such as Taki Sagar and Sonari in Aurangabad District. In these villages about 12 farmers were linked with the sericulture activities. During the discussion with the farmers, it was emerged that about four farmers either left out or did it seasonally. It was because of the two factors such as involvement of farmers in farm and livestock-based activities and seasonal variations in the feed supply that determine by natural factor such availability of irrigation water.

The analysis shows that the total cost of mulberry farm establishment was about 56 thousand per annum (Table 1). The estimated cost consists of input cost such as human labour, animal labour, FYM, chemical fertilizers, irrigation, and interest on working capital.

Further, the analysis depicts that human labour component occupies the prime position with its share about 27 percent to total cost followed by cutting and saplings with about one-fourth share. FYM input also a considerable contribution in total cost i.e. about 22 percent, while an Irrigation component has its about 15 percent share that determines the functioning of sericulture activities. The share of other components such as machinery, chemical fertilizer and other such as interest on working capital varies from three to five percent.

An attempt has been made to work out the economics of silk cocoon production in the selected villages and among the beneficiary farmers. In sericulture sub-sector, output of farm is the input of sericulture. In this enterprise farm production constitutes the major share i.e. about 48 percent followed by cost of cocoon with two-third share. The shares other components such as transportation and labour were 4 and 5 percent respectively (Table 2). Usage of fungicide and packing material was less than one percent. The per farm average total cost was worked out as about Rs. 1.18 lakhs and total annual average revenue was Rs. 1.72 lakhs. Hence, the net return per ha/year was Rs. 54364 and the benefit cost ratio was worked out to be l.46. It can be inferred that the sericulture intervention in PoCRA is viable.

Table 52: Cost of Production of Mulberry farms (Cost/hectare)

Particular	Per Farm Average Cost	Share to Total Cost (%)
Size of farm (Ha.)	0.60	-
Machine	1667	2.96
Human	15333	27.22
Cuttings and saplings	13833	24.56
Farmyard Manure	12500	22.19
Chemical Fertilizer	2667	4.73
Irrigation	8333	14.79
Interest of working capital	2000	3.55
Total	56333	100.00

Source: Based on Field Observations

Table 53: Economics of Sericulture Production

Particulars	Per Household Average Cost (Rs.)	Share to Total Cost (%)
Cost of leaf (ha/year)	56333	47.89
Labour Cost	8333	4.84
Fungicide	800	0.68
Average no. of crop (/year)	3	
Cocoon cost (ha/year)	46667	39.67
Packing Cost	500	0.43
Transportation Cost	5000	4.25
Total Cost	117636	
Gross income (ha/year)	172000	
Net benefits	54364	
Benefit Cost ratio	1.462133	

Source: Based on Field Observations

Gender Participation: Experience that women play an important role in sericulture. It is a labour-intensive enterprise and it plays a vital role in providing employment and additional income to weaker sections of the society. In this context, an attempt has been made to examine the role sericulture in employment generation and gender participation. The discussion reveals that in overall the sericulture-based activities are generating average 330 employments days (Table 54).

Table 54: Extent of Employment Generated by Sericulture in the Selected Villages Under PoCRA.

Particulars	Proportionate Gender Participation		No. of Employment Days Generated
	Male	Female	
Brushing/ Shed Maintenance	66.67	33.33	50
Feed Collection	36.36	63.64	92
Feeding	37.50	62.50	67
Bed Cleaning	33.33	66.67	50
Disinfecting	35.33	64.67	10
Marketing	83.33	16.67	20
Others	40.00	60.00	42
Overall	38.42	61.58	330

Source: Focused Group Discussion in the selected Villages in Aurangabad District

The feed collection from the fields and feeding to the worms were generating maximum employment days. While marketing and disinfecting activities were generating minimum numbers of employment days. There exist variations in gender participation in employment generated. It can be noted from the fact that females occupy the leading position with the proportion of about 62 percent. The share of male participation was about 38 percent. The analysis reveals that male participation was considerable in case of shed maintenance and marketing of the production while females worked in more number of days than males in other activities of sericulture.

Concluding Remarks

The foregoing discussion highlights the following points.

i. The discussion concludes that this enterprise is yielding the considerable average benefits to the producers and proved as economically viable. Certainly, in the long term, these activities can be scaled up so that farmers can be benefited economically as well socially.

ii. Climate variability and farm practices followed by the farmers determine the sustainability of the sericulture practices. The institutional factors such as management skill among the farmers that can be improved through capacity building programme such as training and exposure. Similarly, social factors such as interaction among the farmers also useful in making the enterprise viable.

iii. The filed observations also highlight that rotational feed production practices are going to be popular among the farmers that helped in sustaining the sericulture practices throughout the year. In case of shortage of irrigation water as well as and other individual factors hampered the sericulture activities.

iv. It can also be concluded that in the promotion of sericulture, the demonstration affect has played an important role in the promotion of sericulture activities. Hence, such practices should be promoted through capacity building program.

v. The role women in sustain sericulture activities are noticeable. The participation of women in labour deployment was about 62 percent. They are occupying the leading position in all components of labour except physical work like installing and maintaining the structure and marketing activities.

6.13.2.2 Economics of Shade Net Farming under PoCRA

Shade house is a structure enclosed by nets or any other woven material to allow required sunlight, moisture, and air to pass through the gaps. It creates an appropriate microclimate conducive to the plant growth. It is also referred as shade net house or net house that is used for crop cultivation especially cash crop cultivation. Shade net farming is one of the most important PoCRA activities. It is capital intensive activity. But activity/ structure is highly subsidised i.e., more than 75 percent.

An attempt has been made to understand the economic aspects of shade net farming in the project villages. It is noted that the farmers grow cash crops in the shade net houses. The crops include capsicum, cucumber, muskmelon, and floriculture especially marigold. In the present context we have considered two cash crops such as capsicum and marigold that generally farmers grow, keeping it in view of market availability for these crops.

The analysis shows that total average cost that incurred in cultivation of capsicum was about Rs. 2.75 lakh per hectare. while the total revenue was worked out as Rs. 6.56 Lakh per hectare. Hence, per hectare average net returns were Rs. 3.81 Lakh. In case of marigold cultivation, per hectare average cost was about Rs. 1. 14 lakh and total revenue was Rs. 3 lakh and farmers were getting annual average net returns of about Rs. 1.87 lakh. In case of overall cultivation, the average annual net returns were Rs.5.66 Lakh that is substantial as compared to other farm practices followed by the farmers. Further, analysis shows that in cultivation of cash crops during the year, human labour component constituted as major share of total expenditure constituting one-fourth of total cost. This is followed by expenditure on seed and crop nutrients as FYM and chemical fertilizer with about one-tenth of total expenditure is incurred on each of these head. It can be noted from the analysis that the farmers apply the FYM once during the crop year. It is applied for capsicum cultivation and has the impact in the second crop. The shares of other cost components were varying from about 2 to 8 percent (Table 4).

Further, the analysis also shows that benefits-cost ratios are considerable and reflecting the viability of cash crop cultivation. Keeping in view of the viability of shade net intervention, the farmers were demanding and applying for support from PoCRA. The farmers expressed that it is a costly affair and even they manage the resources from owned and other sources. It can be said that those farmers have the management capacity to adopt this intervention.

The farmers reported that because of pandemic, they had to face certain marketing problem and they had to supply to market situated far away from their place.

Table 55. Economics of Shade net Farming in the Selected Villages

Particulars	Vegetables	Floriculture	Overall	Proportionate Distribution of Cost of Cultivation
Labour Cost				
Machine	16000	10667	26667	7.02
Animal	4667	4267	8933	2.35
Human	53333	40000	93333	24.59
Material Cost				
Seed	38000	20000	58000	15.28
Fertilizer	33333	4000	37333	9.83
FYM	40000	0	40000	10.54
Plant Protection Material	23333	2000	25333	6.67
Irrigation	8000	2667	10667	2.81
Mulching Paper	12667	9333	22000	5.80
Packing Material	20000	12000	32000	8.43
Transportation Cost	16000	9333	25333	6.67
Total Cost	275333	114267	379600	100.00
Production (Qtls.)	547	467	467	
Total Revenue	656000	300000	956000	
Net Returns	380667	185733	566400	
Benefit-Cost Ratio	1.38	1.63	1.49	

Source: Field Observation

Similarly, as in case of sericulture, participation of women was also crucial especially in shade net farming. Here, women were also less paid worker as compared to male counter parts. It reflects prevailing gender bias and taboos in the society and to overcome this, change of mind set is required in the male dominating society. Interestingly, when women are empowered, they start searching for alternative opportunities to deal with the problem inequalities[15]. Hence, it is essential to empower the women through alternative development programs at the village level.

Concluding Observations: The foregoing analysis highlights following observations

i. Shade net is capital intensive intervention. Mostly, it is beyond the reach of small farmers. They face certain difficulties in managing the matching amount from own resources. They are dependent on relatives/ friends and local money lenders.

ii. Human labour component occupies the prime position followed by material cost in terms of seed, FYM and fertilizer. Hence, it can be observed that the farmers are more concerned about better profit from the crop operations. it needs in-depth verification to see how the system would be viable in terms of resource conservation.

iii. The farmers are getting quantum of net returns as experienced from the analysis of the benefit-cost ratios at the overall level as well as at individual crop level.

iv. The women are playing an important role in farm operations. But they were low paid labour[16]. It can be pointed out that local and prevailing considerations at community level are stronger than the individual viewpoint.

[15] Ms. Rupali Mihiti, Head of PRI of Tapergaon, expressed her view point that there is no doubt that women are paid lower wages as compared to male counterpart. It is difficult to break the conservative mentality of the society. But as an alternative we are approaching the government to launch the women focused programs in the village. In this village all PRI members are women and they take the initiative to start the women related in the village.
[16] It is observed during the field visit and group discussion.

6.13.2.3 Adaptation of technological Options

Under the PoCRA, there is a provision of various technological options for crop production to make the agricultural practices climate resilient. In this section, an attempt has been made to understand the impact of various technological options on the cost of cultivation of various crops grown by the farmers. During the field visit and consultations with individual farmers and their groups, the cost of cultivation of various crops has been worked out. To compare the worked out cost of cultivation of various crops with that of non-project farmers, the secondary data that are available with the Directorate of Economies and Statistics, Ministry of Agriculture and Farmer Welfare, Government of India, New Delhi were referred. It is considered that this data belonged to non-project farmers[17].

It is noted that the farmers were following the inter-cropping practices on the limited size of land. As per the farmers' priorities and suggestions of the project staff and experience gained with the help of FFS they have started certain inter-cropping combinations. These combinations were cultivation of Soyabeen, Tuhar, Cotton, Soyabeen, Maize, Cotton and Moong together, and so on. Along with institutional support, technological support was also provided to the farmers.

The analysis shows that in case of onion cultivation, the farmers were getting more than double net returns as compared to that of the farmers in non-project area (Table 5.) Certainly, it is because of the support being provided by PoCRA in terms of micro irrigation facility including drip and sprinklers as well as water tanks that ensure the irrigation facilities. It can be also noted from the analysis that cultivation of pulses especially moong was viable (Table 5). It was difficult to estimate separately because input usage was combined[18]. The adoption of cultivation practices such as keeping appropriate gaps in rows among different crops and their varieties as well as sowing and maturity timings. The innovative ideas and practices that the farmers in project villages were following efficiently was the outcome of the Farmer Field School (FFS)[19].

The zero-tillage technology followed by the farmers in crop cultivation has also played in bringing down the cost of the cultivation and resource conservation. It is observed that the farmers were showing interest in following zero tillage technology in crop cultivation. Initially, the farmers were reluctant in following this technique due to certain constraints[20]. But as the zero tillage crops grows and matures, it created the interest of the farmers because of both quality and productivity of zero tillage crops. The benefits of zero tillage technology were about 35 percent higher than that of traditional cultivation (Table 6).

The available technological options followed by the farmers not only help increasing the crop production but also contributed considerably in bringing down the cost of production, resource conservation, increasing crop productivity, cropping intensity, improvement in soil health[21]. Keeping in view of the growing profits of PoCRA at the farm/ household level, there is a demand from the non-project villages to implement similar project activities. The local political and social activists were found to be concerned implementing the similar activities in non-project villages[22].

The other issues also emerged in certain cases which are not in line with the main objective of the project. Some of the farmers were more concerned with attaining maximum possible profits rather than usage of resources in a sustainable manner. Their priorities are to enhance the profitability from the limited land resources[23]. To deal with this challenge, there is a need to strengthen the capacity building programme so that the intervention can be made more climate resilient.

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[17] This data has been collected by the Ministry of Agriculture and Farmers that belonged to all types of farmers in the state. Hence, it is treated that this data belonged to non-project area and farmers.

[18] On the basis of experience, the farmers reported that the cultivation of crops including moong as well as other crops was viable. It was because of timely application inputs and cultivation practice keeping view the knowledge about the sowing and maturity period of the different crops.

[19] It is reported by the farmers/ groups of farmers that FFS played an important role in awareness generation among the farmers regarding input application and farm operations.

[20] The farmers reported that they were not interest in following the zero tillage technology because of certain constraints. There were not the constraints but farmers considering them as constrains. At the initial stage the field doest look good.

[21] This view point is based on the field observations and discussion with the group farmers.

[22] The similar experience shared by the project staff as well as sudden interaction with the people belonging non-project villages.

[23] This experience was shared by the project implementing staff. The similar issue was also merged during interaction the target groups.

Table 56: Cost of Cultivation of Principle Crops in Maharashtra

Particulars	Major Crop Growing by the Farmers in Marathwada Region in Maharashtra					
	Arhar	Cotton	Maize	Moong	Soyabeen	Onion
Labour Cost						
Machine	11658	6068	11797	5617	7604	10505
Animal	4941	10123	4352	6517	3820	1181
Human	12716	15897	10925	9550	6819	18580
Material **Cost**						
Seed	1936	2927	4371	1633	4114	15729
Ferti lizer	3425	7056	8674	2032	2975	14798
FYM	561	1521	1163	2096	1536	4582
Pesticise/ Insecticides	5505	3064	202	1203	1804	4261
Irrigation	802	2879	1154	216	333	8393
Other	259	188	108	80	250	416
Total Cost	41803	49723	42745	28944	29254	78445
Production	16	16	33	5	13	245
Price	4823	5531	1345	4602	3100	680
Total Revenue	75721	87224	44385	24068	39959	166920
Net Return	33918	37501	1640	-4875	10705	88475

Source: Compiled from the https://eands.dacnet.nic.in/Cost_of_Cultivation.htm

Table 57: Cost of Cultivation of Selected Crop Combination in the Project Villages

Particulars	Soyabeen+ Tuhar	Cotton+ Soyabeen	Maize+ Cotton+moong	Traditional Practices	Zero Tillage	Onion
Labour Cost						
Machine	1600	3125	2571	6250	4850	15000
Animal	1067	1500	2143	3250	1500	1500
Human	1600	14286	22143	16200	18200	17500
Material **Cost**						
Seed	1227	1313	1750	2625	3500	25000
Fertilizer	2800	1813	1250	3625	2500	11250
FYM	1333	0	1500	500	750	7500
Pesticide/ Insecticides	2667	1875	3750	2850	2480	3000
Irrigation	6667	2500	4000	1250	1475	12500
Other	1867	2750	3750	860	990	750
Total Cost	20827	27375	42857	37410	36245	94000
Production	12	5		14	16	350
Total Revenue	81000	95625	94286	72800	84000	280000
Net Return	60173	47625	51429	35390	47755	186000

Source: Field Observation

Concluding Remarks

The above discussion highlights following insights that would help in understating the performance of technology options and institutional intervention.

i. The analysis highlights that because of the project intervention, the concept of inter-cropping practices was followed in larger extent. These practices were not new but more farmers are following now in a more scientific way to deal with the climatic uncertainties keeping in view of the economic, environmental and agronomic factors.

ii. The project intervention has not only made the agriculture viable but also contributed substantially to increase the net return considerably by minimizing the cost of crop production. The discussion reveals that project has contributed considerably to resource conservation including water saving, maintaining the soil health that can help in sustaining the agriculture development in the long run.

iii. It is found that farmers are more concerned in attaining maximum possible profits from limited size of holding. Therefore, there is threat of diversion from the ultimate objective of the project. Hence, there is need to intensify the capacity building program and focus on training curriculum especially on climate resilience.

iv. The farmers remain in experiment mode. In other words, they are ready to practice the innovative techniques at the farms. It is also observed that the awareness about the project interventions has been increased substantially among the farmers that can be because of the institutional support and demonstration effects of the project activities.

6.13.2.4 Challenges in accessing benefits under PoCRA

The analysis highlighted certain challenges that the farmers are facing at the ground level that need due attention of the concerned stakeholders. These challenges are as following.

i. **Provision of ShadeNet Farming:** Under PoCRA, ShadeNet farming is one of the most growing activities. Certainly, there is a provision of substantial quantum of subsidy. But, the beneficiaries have to invest a considerable amount. Because of poor condition of the farmers, they have to manage it from other sources that push them to indebtedness. Hence, due to lack of funds from own sources, they couldn't access to Shadenet invention.

ii. **Closedown of some activities:** It is found that some of the activities such as pump sets and motor are closed. It may be because of the certain problems in the program implementations. But some of the interested farmers are deprived from the facilities. It is also emerged that when they became aware about the scheme, it was closed.

iii. **Inadequate Marketing Facilities:** During the discussion with the farming communities in different villages, it is emerged that inadequacy of market facilities is one of the major problem. The farmers reported that the regulated markets are located at a substantial distance that led to high transport cost. In such situation, local traders dominate the market scenario and farmers couldn't get the Minimum Support Price (MSP). The local traders purchase the farm produce at lower price and sell it in regulated markets at prevailing MSP.

iv. **Shortage of Labour:** The farmers reported that during peak farm operation, the shortage of human labour takes place and during this time, the farmers have to arrange labour from outside of the villages and talukas that resulted in high production cost. During crop season, the farmers have to depend on others state like Madhya Pradesh and Chhattisgarh for the requirement of labour.

v. **Lack of Storage Facilities**: It is observed that there is lack of adequate storage facilities that hampers the economy of the farmers. There are limited facilities for onion storage, while there is a quantum production of onion in the region. Due to the lack of adequate storage facility the farmers sell the products at lower price.

6.13.2.5 Suggestions

Relating to Project implementation

i. **Need of Policy Review:** There is a need for policy review in view of the farmers' interest and growing demand for certain project activities that are closed down. In this regard, the policies can be reviewed. Their activities can be restarted with effective monitoring at various level so that deprived farmers can be benefited.

ii. **Capacity Building Program (CBP):** The success of any development initiative depends upon the capacity building of various stakeholders. The capacity building program can be initiated at individual and institutional level. Under this project, the training programme for beneficiaries was essential. It can be in terms of workshops, seminars training and exposure visits. It was found during the discussion with stakeholders that neither in the first phase village nor in new village, capacity building programme (CBP) were organized. Certainly, it is desirable to organize the CBP for the beneficiaries so that they can understand about their farm actions and their relationship with the environment. Otherwise, the intervention as part of PoCRA may not bring the desirable results.

iii. **Infrastructure Facilities:** There is an urgent need to strengthen infrastructure base at the village level. It includes market roads and storing facilities etc.. Besides, there is a need to develop market infrastructure at the village.

Market Related Suggestions

i. It was emerged during the group discussion that a cohesive environment in terms of strong linkages between production and market systems should be developed. In other words, farmers should focus on cash crops such as vegetable and floriculture rather than producing traditional cereal crops. Certainly, the concept Farmer Groups (FGs) has multidimensional implications at production as well as marketing of farm produce that needs to be focused on.

ii. To establish a strengthened agricultural market system, there is a need to constitute the farmer's groups at various levels such as village, block/ talukas and district and beyond.

iii. There is a need to develop market centres at the village and in cluster of villages. This would help in minimizing transport cost incurred on farm produce on the one hand and would justify the price of the same on the other.

iv. There is an urgent need to make provision of storage facilities at the village level. In most of the villages, the storage facilities are missing. In certain villages, the farmers have arranged and maintained storage facilities especially in case of onion crop. In such situation, farmers sell farm products keeping in mind the price fluctuation. Therefore, it is essential to establish farm stores at the village level. These facilities can be promoted through project interventions and farmers' individual capacity.

v. Interestingly, PoCRA has generated awareness among the farmers regarding the agriculture development models. Some farmers were of the view that value chain model should be in the area. In this regard, there is a need of certain intervention that may help in sustaining the farm income of the framers. The issue relating to value chain was raised in most of the villages.

6.13.3 Agribusiness

Agri-business expert Mr. Deodatt Singh visited in the district and interacted with the following three FPOs in the month of August, 2021:

- Mastodhari Agri Producer Company
- Jamuwant Agro Producer Company
- Aambhi Baliraja Producer Company

The details of discussion and observations during the visit has been presented below along with insights and suggestions.

1. Production

This gives a description of the Production side of the organization, including the membership base, the product and the services offered to the external and internal clients.

Table 58: Products and services provided by covered producer companies

Name of the company	General Details	Major Products	Services
Mastodhari Agri Producer Company	Registered in July 2019	Pomegranate, Sweet lime. Tur and Cotton, Wheat, Jowar, Bajra, Soybean and Gram	○ Cleaning, marketing and storage services of commodity to members ○ Farm machinery rental services ○ Input supply
Jamuwant Agro Producer Company	Registered in September 2018	Processing of Neem Seed as organic fertilizer	○ Input supply ○ Organic compost supply ○ Organic produce trading
Aambhi Baliraja Producer Company	Registered in 2020	Cold press Groundnut and Castor oil	○ Oil cake supply for soil fertility management

2. Internal Organization

Name of the FPO	Governance and Management	Staff Strength
Mastodhari Agri Producer Company	○ 10 Directors (5 Directors and 5 promoters) - All Male ○ 250 members (233 male and 17 female) ○ 100 share per director (Share value Rs 10per share)	○ One CEO ○ Accountant ○ Field executive -2 ○ Part-time employees as per need
Jamuwant Agro Producer Company	○ 10 Directors (5 Directors and 5 promoters) - 9 male and 1 female ○ 340 members (270 male and 70 female) ○ Membership fee Rs 1000 per member	○ One CEO ○ Accountant ○ Field executive - 3 ○ Part-time employees as per need
Aambhi Baliraja Producer Company	○ 10 Directors (5 Directors and 5 promoters) - 8 male and 2 female ○ 306 members (180 male and 126 female)	○ One CEO ○ Accountant ○ Field executive - 2 ○ Hired labour as per need

Governance and Management

The FPOs are governed by a board. The board meets every month to discuss the various activities related to production, procurement, finance, loan and repayment. It was observed that the board members were not well versed with legal and statutory requirements. It was noticed that the board members understand the role of FPO in delivering better services and they are aware that the FPO belongs to all of them.

Staff Strength

All three FPOs have CEO, Field Executives, Service providers and Accountants (performing various duties of stock maintenance, loan, credit management and marketing etc.). The cost of maintaining the staff is borne by FPO and hence field positions are not retained for the entire year. They are hired on need basis. The current organization structure has weakly defined roles and responsibilities. The current performance appraisal system of the staff at the FPO was not found scientific. The central office of the FPO is located at the village which is good for operation management. The capacity of staffs related to key business functions and statutory & legal requirements has to be developed.

3. Capital and Finance

Mastodhari Agri Producer Company: Company started in 2019. Directors donated land worth Rs 27 lakh to the company. Directors invested INR 20 lakh in FY2019-20, 60 Lakh in FY 2020-21 and 10 Lakh in FY 2021-22 respectively. The money was invested for buying cleaning machines worth Rs 1985256 against which company already received 60% subsidy from PoCRA. An amount of INR 1999415 and INR 1995300 was invested for construction of Godown and Farm Machinery Bank respectively; 60% subsidy against both the investments have been received.

Jamuwant Agro Producer Company: Company started with Director's share capital of INR 5 Lakh and bank loan of INR 2 Lakh. The turn over of the company in FY 2018-19, FY 2019-20 and FY 2020-21 reported INR 12 Lakh, 40 Lakh and 60 Lakh respectively. Company has received a grant of INR 12 Lakh from PoCRA. The company has not achieved break-even as yet. Profit loss assessment could not be done as financial reports were not available at the time of field visit.

Aambhi Baliraja Producer Company: The company has not completed its first year of operation. Promotors and Directors have invested INR 20 Lakh in the company. The company has also received grant of INR 9 Lakh from PoCRA.

4. Long Term Perspective

The FPOs long term strategic plan was not clear to the staff and board members. They all were agreed to make the FPO into a profit-making organization. They also have the plan to change the legal structure of the FPO. They have a production plan at the beginning of the year, and they revise the plan as per need. They don't have scenario analysis for their business.

5. Accountability and Transparency

The accounts are computerised and it is known to the CEOs and staff. The cheques are being singed by the director and the CEO for the clearance. The financial situation is also a discussion point at the governing body meeting. The members of the FPO have immense trust and respect for the FPO staff and PoCRA. The major decisions are taken by the staff and known to all the board members of the FPO.

6. Monitoring and Evaluation Systems

The FPOs have learnt the process for effective monitoring. They feel the current system need to be revamped with a scientific plan as it is becoming increasingly difficult to manage the increasing business. The production planning and demand estimation and loan repayments needs to be automated to the higher extent.

7. Risk Management

The FPOs doesn't have a clear understanding about risks related to its business and operations. The FPOs realized the importance of identification of risks, their impact on the organization and strategies to mitigate them. They appreciated the idea of implementing the risk management matrix.

8. Linkages and Sustained Support

The FPOs reported good relationship with the PoCRA and government.

9. Market

Mastodhari Agri Producer Company: Mastodhari Agri Producer Company sells their produce to the local traders and few processors. A firm and regular market tie-up is lacking. Company is also exploring possibility of establishing direct to consumer marketing channel.

Jamuwant Agro Producer Company: Jamuwant Agro Producer Company sells organic manure to their member farmers. Company is also looking at establishing their own outlet for selling agri-inputs and organic manures.

Aambhi Baliraja Producer Company: Aambhi Baliraja Producer Company has established a strong marketing channel through retailers in the market. The company also runs a retail store to reach out walk-in customers. At present company is not able to meet market demands because of low production capacity.

10. The relationships

The relationship of the FPOs with the members seems to be very good as they can access the technical inputs and can sell their produce at fair price. The FPOs has very good relationship with the PoCRA and they feel they need their support during their transition. FPOs believe that PoCRA should be helping them in providing the legal and statutory support. FPOs have good relationship with government functionaries.

11. Social and Environmental Aspects

Gender and Inclusive Growth

The FPO works with mostly small farmers cultivating priority products of the FPO. There is no clear policy for gender inclusion, but members seem to be open to include women farmer as a member of their FPO.

Environment and Sustainability

The members understand very well about the impact of climate change and they are helping their members to adopt climate resilient technologies and practices. FPOs members understand the benefit of organic and natural products and are promoting less chemical farming to reduce environmental pollution and sustainable farming. Aambhi Baliraja Producer Company has built their business around cold press oil mainly because the members feel that refine oil is causing damage to the health and that is why they should promote some alternate healthy option.

Fair Trade Practices

The members, the promoters, staff and the governing body are very much aware that children need to go to school and hence no child labour is used in production or in the processing work. FPO is encouraging its members to register for government pension, insurance schemes.

12. Strengths and Challenges of FPOs

As a result of detailed discussions, deliberations the following strengths and challenges were identified.

Strengths of FPOs

- FPOs have very good relationship with promoters, buyers, members, and government.
- The FPO staff and BOD members are well informed in technicalities of FPO management and standard POP is available to all members.
- The business processes are defined, and adequate infrastructure is in place.
- Staffs are mostly young, and they normally want to experiment with new ideas.

Challenges of FPOs

- Long term business strategies have to be developed at the FPO along with the board and staff.
- Organization structures need to be defined with clear job description and appraisal systems.
- The primary business of the FPO is agriculture or allied activities and hence risk analysis and mitigation plan need to be in place.
- The FPO's dependency on market will increase as they scale up hence the business model around them is not very clear to the staff and BOD.
- Capacity of the Governing board need to developed in terms of understanding their roles and responsibilities, businesses, finances, production, marketing and other operational issues

- Risk assessment and mitigation strategies need to be developed by the FPO
- The benchmark of efficiency for each of the business process need to defined and milestone based approach need to be followed by staff and management team.

13. Recommendations

The following aspects are important for the FPO to scale up its business. The needs can be prioritized through mutual discussions for implementation and evaluation:

- Vision and Mission building exercise for BOD and staff
- Design of organization structure and performance appraisal system
- Legal and statutory assistance
- Business process analysis and bench marking
- Business plan formulation
  - Defining product basket
  - Production planning
  - Procurement plan
  - Working capital and loan management
  - Sales and revenue
  - Risk assessment matrix
- MIS
  - Production planning
  - Demand estimation
  - Production estimation
  - Accounts, Payments, and receipts
  - Finance and loan management
  - Distribution and supply chain
  - Statutory and legal requirements
  - KPIs, ratios, and M&E
- Capacity building of Staff and BOD
  - Business management
  - Production, operations and efficiency related

6.13.4 Agri-engineering

The field visits was conducted on 27th and 28th September 2021. Compartment bund in Dera village of Paithan taluka and cement nala bund in Adgaon villages in Aurangabad taluka in Aurangabad district were visited and studied.

a. Case Study of NRM Structure (Water harvesting) in Adgaon village of Aurangabad tehsil

Background

The village has total geographical area of 1327 Ha. The main crops in the village are taken as cotton, pigeon pea and horticulture. The village is facing the problem of mining and Murum extraction for the Highways going through the outskirts of the village. In 2019, under the PoCRA four Earthen Nala Bunds were constructed in the Adgaon village. These ENB were constructed on the two different streams in a series. The village was also benefitted from the Jal Yukt Shivaar Scheme and the was mostly covered in the Compartment Bunding works in the village

Perceived benefits due to construction of the ENB

1. Increase in water level of the farmers in the village

The farmers residing in the village stated that there was increase in the water levels of the wells after construction if the ENB' s in the village. The water used to be available in the wells till only March, now there is availability of water for the month of April and May.

There has been increase in water level indicating the increasing in ground water level due to construction of ENB and Harvested in it. There are 500 Household in the villages and have 200 wells. Almost all wells have seen the increase in water level. The ENB's constructed have increased the Ground water to a range of 1-2 KM of Radius. The increased ground water has also resulted in the new opportunities to the farmers such as taking new crop availability of water to the cattle for drinking as well as domestic purpose

2. **Change in Cropping Pattern**

Due to increased availability of water the farmers have also been able to take the new Horticulture plantations and have reduced the dependency on the traditional crops such as cotton. The farmer named Vishnu Sandu Ghuge has cultivated 1 Acre of new Sweet Lime plantation after the water availability due to construction of ENB as his farm and benefitted from the percolation water in his well. He is also planning to take the new Sweet Lime cultivation which will be replace the 1 Acre of cotton on his field. The plantation took place in 2020 through the PoCRA support

Another farmer named Shamlal Lalmal Reswal who previously had sweet lime in 1.5 Acre has also cultivated additional 1 Acre of the sweet lime due to water availability. Previously he was facing the problem in summer and sometimes used to buy the water for watering the 1.5 Aces of Orchard.

3. **Future Benefits**

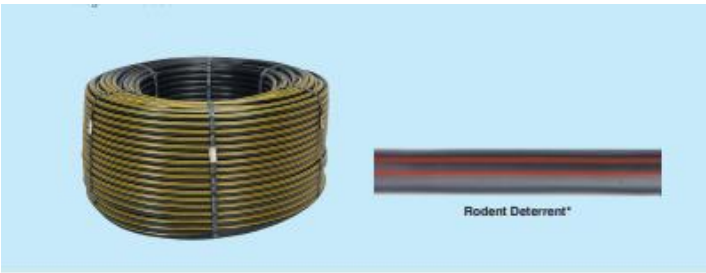
Both the farmers above are expecting the additional income for 40-50 Thousand through the horticultureplantation which was done due to availability of water in the ground water. Also, they are expecting to take the intercropping in the new plantation for extra benefits through the cash crop of Onion

4. **Other Benefits from PoCRA**

The farmers have also been capable for purchasing the assets such as Drips and Sprinklers through PoCRA due to confidence boosted and future earnings through the plantation crops.

b. Feedback on NRM structures

Structures in both villages were constructed during 2019-2020. It observed to be in good condition, well stabilized and maintained. The discussion with stake holders namely VRMC members and farmers indicated that they have experienced increase in water table /wells in command area following the construction of these NRM structures. The stake holders reported that due to increase in water level in wells they are now able to irrigate their crops throughout the year with sufficient frequency and quantity of water application to meet the optimum crop water requirement. The present cropping pattern includes Cotton, Sugarcane and Sweet Lime. The noted challenge faced by farmers using micro irrigation techniques such as drip (as mentioned by stake holders) is menace of damaging drip pipes laid over the ground by rats/ rodents which results in non-uniform applications of water to the plants resulting in reduced crop yield and additionally requiring regular costly maintenance. The remedial measure suggestion includes the recommendation of use of rodent resistant LDPE drip pipe.



Rodent resistant ldpe pipe

6.13.5 Hydrology

Because of health reason, hydrology expert could not travel to field in COVID situation.

6.13.6 Environment

Environment expert from the TERI visited Nanded during 1 September to 2 September 2021.

Manjaram Village

The Munjaram village is surrounded by hills from three sides and large part of the area of the village is under forest. Major crop of the Manjaram village is Soyabean. 1543 ha land out of total 2294ha sowing land of the

village is under soyabean cultivation. Apart from soyabean, there are Cotton, Black Gram, Green Gram, Jowar, wheat, chana are also cultivated in the village. Among the vegetable and horticulture crops there are Okhra, Capsicum, Guava, , Mango etc.

Meeting with villagers at Manjaram village

During the discussion at the village panchayat office, Gram Pradhan, VCRMC members, Agriculture assistant, Cluster assistant etc. were present.

The village has received individual benefits under the PoCRA schemes. According to the VCRMC members, there are 2200 landowner farmers' in the village, of which 768 people have already submitted 1861 applications. Three shade nets, one tractor, one sowing machine and several motor and irrigation pipes have already approved and transferred to the applicants. Around 17 more applications for shade net are still to be implemented. Few subsidies under the horticulture crop head of the PoCRA has already been approved, but not yet implemented in the field. These farmers' need to implement the horticulture crops in field by the end of the month of October 2021. Most of the applications in the initial days PoCRA was made related to motor, irrigation pipe, sprinklers and other irrigation equipment as the village is having tremendous shortage of water during the dry season.

Figure 17: Damaged newly constructed shade net in the Manjuram village

Two of the three shade nets, those were established under the PoCRA in the month of February 2021, have completely damaged during May 2021, due to sudden high-speed storm in the area. The crop under the shade net was also got completely damaged. This has created a financial loss to the farmer. However, both the damaged shade nets were not under the insurance cover and to reconstruct the structure farmers' need to spend additional money. Both the damaged shade nets were round shaped and the farmers' are looking for possible support to reconstruct the shade net from the PoCRA or from the construction company. One of the farmers informed that the company which had built the shade net has scarcity of required manpower to reconstruct the damaged shade net at present

and is also one constrain to reconstruct the structure. The damage of the shade nets and problems facing by the farmers to reconstruct the structure are concern for other farmers' to invest in the shade net.

However, in the other shade net, which is flat type is working profitable for the farmer. The farmer already had good profit from the first crop (capsicum) grown under the shade net and already planted the next crop (cucumber) and expecting another good profit in two months. This farmer is facing a problem with the pump due to non-availability of continuous power supply in the area. The village is having only 8-hrs power supply a day either during day or nighttime. This created a problem for the farmer to apply the fogging in time when the temperature was high. As the farmer was not able to maintain the temperature, he faced some crop damage, which had reduced his profit from the capsicum crop. The farmer suggested to include solar pump with the shade net under the PoCRA scheme, to avoid dependency on the Grid power supply.

The rabi crop growth has increased after the PoCRA activities in the village as several farmers have already received the support for irrigation equipment. The PoCRA scheme of motor and pipelines are still on the demand in the village, but the scheme has already been stopped by the PoCRA. VCRMC requested to reopen the scheme as it has a good evidential support to increase the crop productivity in the village.

The VCRMC during its initial meeting had decided to construct structures like check dams etc. to manage the runoff of water during the rainy season from the hills around the village. However, none of these were implemented under the PoCRA and VCRMC members are clue less about this.

VCRMC members and the Gram Pradhan informed that there are several government lands in the village which can be used for the development of community farm pond, check dams etc. to store the rain water; however, the community farm pond scheme have already been discontinued in the PoCRA. The cluster assistant informed that the villagers are not keen for the individual farm pond, but the VCRMC is looking for community farm pond and dug wells to manage the problem of irrigation water in the village.

The village has regular practice of burning residues of cotton crops, Package materials of fertilizers and pesticides. Farmers mostly use chemical pesticides to manage crops, which is a major cost of cultivation for the farmers. About 10 chemical pesticide spray are used for each acre of cotton 3 sprays of pesticides for the soyabean, tur and mung crops. Each pesticide spray costs INR 2500/- to the farmer. During the visit it was also noticed that farmers' has no clue to manage the lining polythenes after the crop harvest and generally they burn it or dispose in open land. It was also noticed the empty containers of chemical pesticides were lying here and there in the crop land.

Figure 18: Dumping of damaged plastic lining and pesticide bottles in the field

Farmers in the village do not have the soil health card. Some of the knowledgeable farmers have tested their soils from the local KVK at Sangrali with a payment of INR 100 – 450/- based on the parameters and crop of interest. There are 20-25 seed farmers in the village. Seed farmers develop seeds of chilly, cotton, tomato, bitter guard and okhra. However, farmers get best profit (about INR1,50,000/- per 10 Guntha) from the Chilly seeds. These farmers are using shade nets for more than five years. One of the seed farmers, have recently changed the nets of the shade net. The farmer is presently using the old net to drying his other crops, but he has no idea on disposing the material. The company through which he has changed the net has also not provided any support to recycle the net.

Farmers of the village regularly get weather and farming related information through WhatsApp and SMS from the KVK; however, there is problem of support from the CA and AA. The CA told that he is presently managing 16 villages and it is difficult for him to address the issues of each farmers of each village. Generally, the CA and AA organize meetings in the village in one- or two-months intervals to address the problem. But most of the cases this meetings are not sufficient to address the issues of farmers. The farmers of the villages have attended different FFS programs online during the COVID period. However, they are asking for in-field training/ exposure to get actual experience and discuss with successful farmers.

Villagers are happy with the progress of the PoCRA activities in the village, they also informed that PoCRA is the first scheme in the village, where the villagers are directly involved in all activities and all processes in the PoCRA are vey transparent. However, they are looking for the support related to community farm pond, development check dams and renovation of damaged dug wells in the village to store the rain waters from the PoCRA.

Navadi Village

One of the farmer in the Navadi village near Gadga have received support from PoCRA to develop a warehouse for harvested crops (mainly soyabean) for twenty farmers. The construction was made on a barren land. However, the complete operation of the warehouse is yet to start. The floor area of the ware house is 40ft/90ft. INR30Lakh was spend to construct the warehouse of which 60% was supported by the PoCRA. The same farmer has also got support from the PoCRA for 1 acre of horticulture crop. The farmer has planted guava with the support from the PoCRA. The farmer is having a total of 21 ha land.

Figure 19: Warehouse developed under PoCRA

Hottal village

The village is in the border area of Telangana (2km) and Karnataka (10km). Out of 350 households in the village 125 belongs to tribal communities. The village has around 250 tribal populations. Four members of the VCRMC are from the tribal community. Krishi Tai of the village got training from the KVK, Sangrauli. She has received online training from PoCRA related to Roles and Responsibilities. She also received a Skill Development training from the Art of Living through PoCRA. Farmers in the village are mostly small and medium size land holders.

The total area of the village is 330ha, of which 282 ha area is under plantation. 50% of the plantation area is under soyabean cultivation. Apart from soyabean green gram, blackgram, cotton are also cultivated in the village. Broad bed farrow cultivation is widely used for the cultivation of soyabean crop. The productivity of Soyabean crop varies between 5 – 7 Q/acre and the selling price of soyabean is about INR7200/Q. In addition, there are vegetable crops like bringel, cabbage, Okhra etc. also cultivated in the village. Villagers also practice horticulture crops, mainly Guava. They gets around INR 10Lakh/acre profit with different varieties of guava plantation. Farmers of the village are interested to undertake other horticulture crops like dragon fruit, coconut and fig.

Villagers have received support from PoCRA related to horticulture mainly Guava. 15 acre of horticulture cropping area got approved under the PoCRA. One Nala bund has already been constructed in the village under the PoCRA. The nala bund has 220m^2 reservoir area. Two more nala bunds are proposed in the village. Around fifteen shade nets have already been approved under PoCRA, but none of them have been implemented due to lack of initial money with the farmers.

Cement Nala bund constructed under PoCRA (18.477N, 77.562E)

Agriculture assistant has issues related to connectivity to different villages under him. He is suggesting for a map based TAB for better management of different activities. The village has different governmental ongoing activities, however, according to the villagers the activity under the PoCRA has better subsidy and transparency compared to others. Support for Motor and Pipes are in high demand from PoCRA. According to the agriculture assistant, there should be two village in the area for better and effective management. Farmers are looking for support to build up a pack house in field to temporarily store the harvest.

Villagers has problem of crop damage due to Nilgai and wild boars. Villagers is looking for some wear fencing to protect the crops from animals. There are lot of undulating land in the village, land leveling is important for optimal water use. NABARD arranges soil testing for the village. There is a weather station in the nearby

Kathewari village and farmers receive regular weather information through whatsapp. One weather station is under construction in the village.

The village has issue of cotton and plastic residue burning. Pesticides are generally stored in the households although they are aware that it should not be stored in the households; however, they have no options to store them in the field.

Few observations

Although women members are named in the VCRMC, it was found that they have no role in the decision making. Most of the women member did not attend the discussion at the village panchayet office.

The village has the issue related to crop residue burning, burning of used chemical pesticide, fertilizer packages and management of the plastic lining materials in the shade nets and nets.

The farmers have no knowledge of GHG emission avoidance. One of the farmers informed that they were informed about the health effect of GHG in one of the FFS. However, they were clue less related to extra profit they may earn to reduce the emission of GHGs.

Farmers of the village are interested to use solar pumps to avoid the problem related to irregular availability of power supply to operate the irrigation pumps when required. However, they are looking for support related to this from the PoCRA.

Farmers have the issue to arrange the initial fund to develop the shadenet after approval. The farmers have a problem related to the design of the shade net. Flat shade nets found more stable than the round top ones.

One of the cement nala bund constructed in the Bellur village near to the Hottal village, is creating waterlogging to the nearby fields after construction.

Figure 20: Flooding of the land in the left side, after construction of the cement nala bund

6.13.7 Social Expert

Villages visited –

- Pradhan Sangvi (tribal village)
  - Total households - 1303 (Nearly 70% of the households are tribal communities)
- Bodhadi khurd (tribal village)
  - Total household – 450 (More than 50% of the households are tribal communities)
- Hattal
  - Total households – 350 (Almost 125 households belong to ST communities)

- **Method of data collection** – FGDs/Key person interview
- **Date of field visit** – 1-2 September 2021
- **Team** – Vivek, Arindam, Shivani, Mini

Performance of VCRMC

- VCRMC meetings were conducted mostly once in a month in all the visited villages. The main activities undertaken were - review of project progress in their village, guidance to farmer regarding application for matching grant, approval of the application, payment information and liaison with department for payments.
- The key documents maintained were records of meeting, visitor register and documents related to individual applications
    - None of the VCRMC maintained minutes of the meeting
- VCRMC in the three village was actively working to ensure the marginalized are benefitted from the project through awareness generation regarding DBT system and facilitating registration and application process through portal/mobile. In Hottal, Agriculture assistant was quite active and attended all VCRMC meetings to facilitate application process and also undertook spot visits
    - Since the belt is involved in production of horticulture crops and off-season vegetables, majority of applications were support for micro-irrigation systems (drip/sprinkler) and horticulture plantations. Some farmers have also ventured into sericulture and applied for micro-irrigation systems.
    - Nearly 100 farmers in each tribal villages have submitted their application for micro-irrigation systems and around 30% of them have received pre sanction
        - Funds have already been disbursed to nearly 10 to 15 farmers in each of the three villages
    - In Hottal (non- tribal village), 432 farmers have submitted application, 291 have received pre sanction and funds have been disbursed to 40 farmers
    - Only 2 % of women have land in their names, so by and large they are excluded from the application processes and availing benefits
- No major conflicts were reported amongst VCRMC members. Transparency was maintained and all activities/developments (pre sanction, sanction, training etc.) were communicated to the beneficiary through WhatsApp groups that was specifically created for POCRA activities.
- Awareness generation about project activities were undertaken in Pradhan Sangvi village through announcements in temple during festivals and fairs.

Inclusion of vulnerable groups (SC/ST/Women/marginal and small farmers)

- In all the three villages the composition of VCRMC was representative in nature with the mandated representations from SC/ST/marginal farmers, women farmers (4-5) and women SHG member.
- Women/marginalised VCRMC members in tribal villages expressed that they actively participated in voicing their opinion about the need for improved varieties of horticultural crops (guava, sweet lime, watermelon and pomegranate). They also regularly followed up on the application status. Women who owned lands had also received disbursement for drip and sprinklers.
    - However, they expressed most of women in the village was landless and there were no specific activities/benefits targeted for marginalised women.
- Participation of women in FFS was reported to be low since they were engaged in many other household and farm activities.
- Small farmers had received training on good practices from Horticulture Department
- All beneficiaries, especially the small and marginal farmers who had received disbursement for micro-irrigation (drip/sprinkler/pipes/pumps) and horticulture plantation expressed that they have benefited from these assets. These technologies have led to water conservation and also saved their crops during less water availability in any season.
    - However, farmers who already had assured source of water supply (well/bore well) benefitted the most from these assets.
- Women also expressed that their confidence to speak in a forum (public speaking) increased after becoming VCRMC members.

- Unfortunately women sarpanch in village Hattal served as a token leader (proxy representation) and exhibited lack of knowledge regarding VCRMC working and was unaware of the projects objectives and goals.

Performance of Krishi Tai

- In Hattal village, Krishi Tai is drawing a monthy salary of Rs 500 and has recently undergone four days training on their roles and responsibilities. She was also nominated through POCRA to attend rejuvenation camp at the "Art of Living Foundation". She is active in raising awareness among women and motivating the community to apply and avail benefits of the program.
- In Pradhan Sangvi village, Krishi Tai has been working since one year but has not received any training till date. However, she is actively engaged in raising awareness about the project and application procedures through home visits, passing information about the proceeding of VCRMC meeting to the village community, motivating people to take up project benefits and mobilising women for FFS
    - Some of the training requirements expressed by Krishi Tai includes – awareness on project specific benefits exclusively ear marked for women and climate resilient agricultural practices.
- Krishi Tai has been appointed in Bodhadikhurd village in March this year, but yet to receive any training. Also she is not aware of any of her role and responsibilities as interface between project team and the marginalised (marginal/small farmers/women).

Project supported women SHGs

- There is no project supported women SHGs in any of the villages visited
    - They are mainly involved in credit, and some are involved in livelihood activity such as selling of vegetable saplings
- However, the other SHGs in village Pradhan Sangvi are creating awareness about POCRA through their members.

Main benefits reported

- There is no upper limit for the number of applications that can be submitted from each village, so a sense of unhealthy competition does not exist among farmers. Moreover, it was stated that small and marginal farmers application were considered favorably even though there was a delay in disbursement and some of them reported increased productivity and income due to drip/sprinkler.
- The documents required and the process of application is not cumbersome and VCRMC supported them in filling the application and getting the benefit.
- Farmers (small/marginal/big) have benefitted from community works like cement nala bunds and were satisfied with the quality of NRM assets.
- Pradhan Sangvi is the first village in the block to introduce sericulture under POCRA. Farmers believe it is a promising crop and are sufficiently motivated to take up this activity.
    - POCRA members in this village also remarked that COVID did not adversely impact their activities and their village fared better as compared to other villages in the block.
- Hattal village is the leading guava producer in Nanded district and it was mainly attributed to the support received under POCRA and the motivation and support provided by VCRMC.
- Another important aspect raised by the community in Hattal is that POCRA has ended the much needed freebie culture and changed the attitude of the community. They expressed happiness about the fact that nothing is given absolutely free of cost in this project.
    - Some progressive farmers (large) have undertaken exposure visits to neighbouring districts spending their own money to understand good practices of horticulture cultivation

Overall challenges identified by beneficiaries

- In Hottal village, the panchayat was newly formed and since VCRMC acts as cub committee of the gram panchayat, the new batch was yet to receive any training on role and responsibilities of VCRMC.
    - One on-line training was conducted by POCRA team, but many members were unable to attend since they did not have smart phones or faced connectivity issues.
- The members of the VCRMC would be appointed by the Gram Sabha and it would act as a sub committee of the Gram Panchayat,
- Common demand from women folk from tribal villages is support for allied activities such as poultry, goat rearing and dairy and these activities was stopped abruptly from January 2020. Moreover, it was a challenge for women to avail these benefits since it was meant only for landless households. Men in the households owned land and women were landless and expressed a feeling of non-inclusion of them as beneficiaries.
- Some of the landless households in tribal villages migrated to cities in search of productive employment. Other landless are working as agricultural labourers in the village.
- Mulberry saplings are not sold by government nurseries and often farmers procure them from local market or from other farmers where they do not get bill. This has been constraining farmers since they cannot upload bills to claim benefits from the project.
    - Sometimes good saplings are available only in Nanded and this constrained farmers from procuring quality saplings due to high transportation costs.
- The project requires that framers can get reimbursement only after the completion of activity and submission of bills. However, an important concern raised by them is the lack of resources (cash in hand) to invest upfront in micro-irrigation systems for horticultural crops since they would already be constrained due to other expenses like land preparation, buying of saplings and labour costs among others.
    - Common demand is that 50% of the amount has to be given to farmers (especially marginal and small) having pre-sanction as advance since they cannot afford upfront contribution.
    - In some cases VCMRC connected farmers with shopkeepers that can provide them with micro-irrigation systems on goodwill that the farmer will pay the shopkeeper when they get grant from PoCRA. Although this arrangement has benefited few farmers, there have been instances where the farmers have not paid the shopkeeper promptly even after subsidy disbursements. And in some cases farmers had to even take loan from moneylenders to pay the shopkeepers.
    - On an average it takes around 100 days for disbursement of funds – farmers request is to reduce the procedures and the time taken from application to disbursement.
    - Access to institutional finance to avail project benefits remains low.
    - COVID has delayed disbursement processes.
- Another important constraint flagged by farmers in Pradhan Sangvi village is the requirement of reliable source of water to install micro-irrigation systems. While most of them had access to perennial nala (with good water flow) in the village, the farmers who did not have access demanded support for open dug well. They reported that only few farmers (2-3) benefitted from this activity and apparently provision for this component has been stopped now.
- Farmers expressed desire to avail benefits of polyhouse and shadenet, but expressed that it required a much higher amount of investment and it becomes difficult for them to take it up at individual level.
- Most farmers preferred to avail benefits of horticulture crops as it assured good income over a period of time. But, they encountered a peculiar challenge since drip is compulsorily given with horticulture crops and it becomes difficult for farmers to arrange upfront costs. They opined that they can install drip after they earn some profit through horticulture plantation. Hence they requested bifurcation of the requirement of drip from horticulture activities.
- Mechanisation component has been stopped for more than a year and farmers appealed that it has to be resumed at the earliest.
    - There is a huge demand for tractors and field implements

- VCRMC members in tribal villages noted that there have been instances where small and marginal farmers took their own time to submit the required papers for application. Although they were keen to avail benefits, their lethargic attitude bothered VCRMC members.

Suggestions given by beneficiaries

- Since VCRMCs members keep changing (depends on change in panchayat) frequent training/follow up refresher trainings on project guidelines and climate resilient agriculture practices has to be prioritised.
- To maintain total transparency it was suggested that every GP should have a notice board which should clearly mention – eligibility to avail individual and community benefits, name of applicant, application status (pre sanction, rejection with reasons) and information about progress made in the village under the project.
- Awareness generation about the POCRA project has to be intensified since many development programs/projects are running simultaneously and people tend to get confused.
- There is a huge demand for solar pumps in the region and this need to be integrated into the project component.
- Solar fencing/wire fencing to protect from wild animals (wild monkeys/pigs/Neel ghai/wild boar).
- More training on latest technologies to improve horticulture productivity.
- Sericulture was identified as a potential profit making venture and training for women was requested to produce quality products.
- Farmers also expressed their interest to undertake Dragon fruit and Fig cultivation and expected technical support from POCRA.
- As most of the fruits and vegetables are perishable, there is demand for warehouse/storage facility in the vicinity.
- Provision of cattle shed has to be considered under this project. This will create employment opportunities for women.
- Steps have been taken to increase the availability of quality planting material by supporting the setting up of more Government nurseries/govt approved nurseries.

6.13.8 GIS

Our GIS expert Ms. Seema Kundu also visited field. The report is presented in the following matrix:

Interaction with CA and AA using GIS maps and field inspection	Location	Short notes/ Insights/ Sub-sections
To review Village Development Plan (VDP) (available with VCRMC/Krishi Tai) in the visited village and verify if the location of the constructed works (in field) is as per the location in the VDP	Manjaram Village	Three shade nets were constructed under PoCRA in the month of February 2021. Two of the three shade nets have completely damaged during May 2021, due to sudden high speed storm in the area. The crop under the shade net was also got completely damaged. This has created a financial loss to the farmer. However, both the damaged shade nets were not under the insurance cover and to reconstruct the structure farmers' need to spend additional money. Both the damaged shade nets were round shaped and the farmers' are looking for possible support to reconstruct the shade net from the PoCRA or from the construction company. However, the third shade net, which is flat headed, is working profitable for the farmer.
	Navadi Village	A warehouse was constructed under PoCRA for harvested crops (mainly soyabean) for twenty farmers.
	Hottal and Ballur Village	Two Cement Nala Bandra (CNB were constructed under PoCRA.

To understand if the Cluster Assistant (CA) or Agriculture Assistant (AA) need any further support in GIS/ or mapping which will help them to ensure better implementation of the project and increasing project outreach		GIS can help by providing the means to collect and use geographic data to assist in the development and implementation of the project. A digital map is generally of much greater value than the same map printed on a paper as the digital version can be combined with other sources of data for analyzing information with a graphical presentation. The GIS software makes it possible to synthesize large amounts of different data, combining different layers of information to manage and retrieve the data in a more useful manner. GIS provides a powerful means for agricultural assistant to better service to the farmers and farming community in answering their query and helping in a better decision making to implement planning activities.
To check their awareness about GIS map layer which displays information about soil health using data from soil health cards		As observed, the farmers are not aware about GIS maps indicating soil health. Through PoCRA they are not facilitated with any soil testing exercise. Farmers themselves got their soil tested from laboratories on regular basis.
		
		

7. Key challenges and way forward

In the concurrent monitoring round-IV for the period April,2020 to September, 2020, some of the recommendations were given to address the challenges. The actions taken by PMU to address these as identified during CM-V in discussion with the experts of PMU and MIS have been summarized below:

Challenges identified during CM-IV	Recommendations/ Way Forward	Action taken by the project for the suggested recommendation
1 Individual Farmer matching Grant Activities		
1.1 Financial constraints faced by small and marginal farmers in investing upfront to access project benefits remains a continuous challenge. This challenge has been further magnified due to COVID-19 as it has severely affected income of farmers. A very low percentage of beneficiaries are able to get access to institutional finance to purchase project assets.	• Support should be provided to beneficiaries so that they can access institutional finance • Ways should be explored by which the applicants having pre-sanction are provided partial disbursement or vouchers through which they can purchase assets from empaneled suppliers • It can be explored to develop tie ups with financial institutions so that they would provide loans to the beneficiaries based on the received pre-sanction	• The MOU has been signed by PoCRA with the Bank of Maharashtra and State Bank of India for ease to apply for loans as well as getting the loans sanctioned • Upfront investment is the world bank policy for this project.
1.2 The most vulnerable and needy farmers are still facing challenge in accessing individual activity benefits	• It should be considered to provide matching grant based on the land holding and economic status of the beneficiaries. • Beneficiaries with smaller landholding or higher vulnerability should be provided higher matching grant • The matching grant amount can be reduced and instead the project should aim to reach out to higher number of beneficiaries	• There was higher amount of matching grant for the vulnerable sections such as SC/ST and women farmer • The preference list in DBT enabled the vulnerable section to get priority.
1.3 Some of the initial project activities were closed (like pipes, motor, open dug well, community farm pond, goat rearing) though there is still demand amongst the farmers.	• It is suggested that the project should reassess if any of the closed activities can be resumed. It is suggested that, if feasible, decision for resuming can be decentralized, based on ground water levels.	• Open dug well activity has been resumed and the beneficiaries are applying for this activity.
1.4 Challenges in understanding and implementation of individual activities due to changes in project guidelines.	• Refresher training or six-monthly trainings should be conducted with project staff to keep them updated with the revised project guidelines	• Trainings and webinars were found to be regularly done by the PMU for the staffs and the revised guidelines were circulated to the staff from time to time
1.5 Some of the beneficiaries in horticulture and cash crop highlighted lack of appropriate market for their produce. In some cases, they	• Assets related to developing storage infrastructure should be promoted. Similarly, assets related to value addition/ increasing shelf life of these	• The training to the FPC directors related to Godown are being conducted regularly.

have to sell their produce at much lower prices to the local middlemen/traders.	assets should also be promoted along with small units to make the by-products of the perishable produce.	• The FPCs are actively applying for the Godown/storage facility.
1.6 Cases of delay in processing of disbursements were reported to be a key demotivating factor for the applicants. This issue was understood to have intensified due to COVID-19	• The project should try to minimize the cases with delay in payment (with respect to the set timelines). Cases for delay should be tracked and addressed on priority.	• This is regularized now and funds are available.
1.7 <u>Workload on project staff</u> is a continuous challenge, which results in a delay in approvals of the grant application. AAs on average have 5 villages (range 2-12) and CAs have 10 villages (range 6 - 15), thus lowering their response time in conducting verifications and assistance in the application process	• The number of villages under CAs/AAs with high number of villages should be reduced. • Hardship allowances and extra travel allowance can be provided to field staff working in difficult terrain or having high workload • Need to build the capacity of Krushi Tais to assist AA and CA in application assistance to the farmers	• The KT are being trained at the district level and 1738 Krushi Tais are trained till March 2021.
1.8 <u>Many farmers are not aware of the amount of water that should be used for irrigation per crop.</u> During expert visits it was observed that farmers were using drip and sprinkler system for turmeric and chick-pea respectively, but they were not aware of the volume of water that they must irrigate with. This led to damage of crop due to soil moisture in the root zone	• Capacity of framers should be built on irrigation practices through FFS and other suitable platforms.	• The FFS facilitators train the farmers in Farm Field school sessions regarding the water use and irrigation methods. • CA/AA also guide farmers during regular visits to the villages. • Water budgeting was also conducted in villages prior to the Microplanning Process.

1.9 Some problems in the <u>Online application at DBT portal still persist</u>
  • Difficulty in application in places where internet connectivity is poor
  • In case of the wrong upload of the document, the entire form has to be refilled
Issues in recording GPS in fields during spot verification and in remote locations
	• The offline application module should be strengthened. Also, the application needs to be further improved to be conducive to work in low-speed internet connectivity and areas with poor internet connectivity.
	• It is suggested that there should be a provision for re-uploading of a document in case a wrong document is uploaded.
		• There are relatively less problems now because there was back-up support drive to beneficiaries taken on large scale recently and the farmers were given chance to upload the correct documents.

1.10 The difficulty faced by <u>landless households</u> in goat rearing activity Challenges faced in buying and selling of goats, especially in cases where villages are far from the market at block level. • Challenges with quality of goats. E.g, the quality of	• In case this activity is resumed in future, better ties required with market players and the aggregation network. It might be important to think of a strategy of the cluster development to have a better-organized market and business planning.	• This activity is closed permanently.

goats procured from the Maharashtra Kharedi Kendra in Jalna not up to the mark as many died soon after being sold to farmers due to *Laalya Khurkut* disease (as were not vaccinated), causing losses to the project and the farmers.	• The procurement centres should be selected carefully, to ensure quality of the goats precured. Farmers may be given certain flexibility in buying the goats on their own, with relevant paperwork.	
1.11 Challenge faced by farmers on applying on their own through DBT application E.g in Chinchkhed village, Ambad taluka, Jalna it was observed that applicants had to pay INR 100 per application at e-sewa kendra. The eSeva Kendra operator persuaded them to fill more applications as it meant earning more money by the operator.	• Capacity building sessions for the farmers should be organized by CA/AA on how to fill DBT application forms. A more formal and reasonable application process should be developed to help farmers to apply for DBT. E.g, a resource person/Krushi Tai for each village should be trained and can help farmers to apply on a nominal fee	• It is now streamlined, and CA and AA are instructed to help farmers for registration and apply for the activities.
2 Farmer Field Schools		
2.1 <u>Relatively low attendance of farmers regularly</u> in farmer field schools, especially of women farmers. This issue was further amplified due to COVID-19 pandemic.	• More focus needs to be given in mobilizing farmers to attend FFS session. All project stakeholders including VCRMC members, CA and AA should have a more proactive role in mobilizing farmers to attend FFS session • Suitable incentives should be provided to framers to attend FFS sessions. This could include a small kit with cap, pen along with tea arrangements and agri inputs (possible to be given). • Suitable timing of the FFS for men and women farmers are different and so variable timings should be attempted for both the groups. Family members of the women participating in FFS should also be informed about the benefits of learning new agriculture technologies in improving their HH income	• Krushi Tai also plays an important role in mobilizing the farmers in the village. • The Kit have been provided to the guest farmers for attending the FFS, which includes the pen, cap and notepad.
2.2 Difficulty in <u>finding the host farmers</u> who are ready for a certain crop demonstration. Issues were also reported by host framers due to non-payment of honorarium.	• Exposure visits to progressive farmers plots act as a motivator for farmers as host farmers. • Timely payment of honorarium or conveying the status of honorarium can help in keeping the rapport of the FFS and its host farmers positive amongst the farmers.	• The guest farmers and host farmers are taken to field visits at the resource farmer for exposure visit and the sessions are arranged in which the resource farmer share his experience. • The exposure visits are mainly related to zero tillage and BBF plantation.
2.3 Lack of awareness to the framers regarding effective	• As part of FFS sessions, capacity of farmers should be built on	• Zero tillage is being promoted in the FFS as well as campaigns

use of crop residue and disposal of bottles/containers with pesticides. During expert field visits, it was observed that most of the farmers were burning their crop residue and/or simply throwing away the pesticide bottles	effective use of crop residue for developing organic fertilizers and correct way of disposal of pesticide bottles.	are also taken for zero tillage for utilization of crop residue • Incentives are given to farmers using the zero tillage technology.
2.4 Quality of FFS sessions need to be improved, instead of targeting a high number of FFS sessions (suggested by a few SDAOs).	• It is proposed that the number of FFS should be reduced while adding more crop related sessions in each FFS. This will help the farmers to understand different stages of crop growth and the measures to be taken in each case. • More focus needs to be given on capacity building of FFS facilitators.	• Currently the crops are reduced in FFS and only two crops are taken in FFS in Kharif season including one major crop.
2.5 The problem of quality of guidance received by farmers from FFS facilitator still persist.	• The retired staff of Agri department or the current staff may be involved with some hardship allowance or extra payment to increase the effectiveness and quality of sessions	• 5 days of training for facilitator is being taken to improve the capacity of the facilitator.
2.6 Challenge in filling FFS application while administering the sessions • The FFS app requires the facilitators to enter detailed information during the session, which results in loss of concentration and eye contact with farmers	• The information to be entered in FFS session should be reviewed. • FFS facilitators should be allocated separate time after the session and should be encouraged to fill the information (whatever possible) after the session.	• Data are now entered after the session and changes are made in the application accordingly.
2.7 Few cases were reported that inputs for the FFS sessions like pheromone traps and BBF marker were not received on time	• The FFS app can have mechanism to collect information (reported by participants or FFS facilitator) regarding inputs are not available/other feedback per FFS session. • Action can be taken accordingly by the project to ensure timely inputs for each session	• As per the mandate the inputs are given in first year only.
3 Community Benefits		
3.1 Community NRM works are still not being implemented at large scale. NRM works were observed in only three of the PoCRA villages	• More efforts need to be put in by the project to expedite the implementation of community works. • Workshops with key stakeholders should be conducted to identity the key impediments and practical solutions and realistic times should be set for their implementation • Micro planning and community works should be planned or	• The NRM portal is now live, and the capacity is of PS agri through time to time trainings at the WALMI and RAMETI for NRM works.

	priority basis for second and third phase villages.	
3.2 Limited understanding of VCRMC committees of their roles in planning of community work in the village	• It is critical to train VCRMCs in planning and developing of Detailed Project Reports (DPRs) for NRM benefits. Proper capacity building is also required for understanding the processes and role of VCRMC in applying for NRM benefits.	• The VCRMC are trained timely through the webinars and orientation trainings.
3.3 Individuals are not inclined to share personal water resource or land with others in community initiatives	• The project may require investments into behavior change for understanding the benefits of community work so that farmers do not feel they are at a loss in case of contributing to a community asset.	• Behavior change is not a project mandate as per guidelines.
3.4 Lack of awareness amongst farmers about the benefits of NRM structures Few framers perceive that soil and water conservations works might lead to soil erosion and productivity of the land might reduce	• Awareness needs to be created among the farmers about the benefits of NRM assets- both at community and individual level • FFS sessions can be used as platform to create awareness on benefits of NRM structures • Key members of the community should be taken for exposure visit to places where NRM structures have benefitted the nearby farmers.	• Exposure visits are being arranged in the villages to let the farmers know importance of NRM works.
4 PoCRA supported FPOs and SHGs beneficiaries		
4.1 Majority of FPOs are still facing difficulty in availing bank loans.	• Technical support (with help of expert agencies) should be provided to the FPOs to develop a bankable business plan so that banks would be ready to provide them loans • Facilitation support should be provided to the FPOs so that they can avail bank loan. The project should look for bank partnerships in this regard.	• The MOU has been signed by PoCRA with the Bank of Maharashtra and State Bank of India for ease to apply for loans as well as getting the loans sanctioned. • The CA and the dedicated Project Specialists for Agribusiness provides the Guidelines as well as details of experienced professionals for developing business proposals to the FPC representatives.
4.2 Lack of working capital for their activities is a key challenge faced by most FPOs	• Facilitation support should be provided to FPOs to develop a sound business plan and for getting loans from the bank • Representatives of FPOs should be provided professional training and exposure visits to build their capacity to run their FPO effectively • Support should be FPOs to enhance the farmer membership base and the membership fee from the members.	• The training to the FPC directors related to Godown are being conducted as well as the skilled Machine operators training are also organized for the skill improvement related to tractor mounted BBF machine and other skilled works related to tractor mounted equipment. • Training conducted through BIRD, Mangaluru for districts functionaries and FPCs for bankable DPR preparation,

		techno-economic feasibility and Project management.
4.3 Delay in approvals/technical sanction due to limited understanding of procurement and Agribusiness PSs in civil work estimation and following its technical language (related to construction of Godown and Warehouse for an FPC)	• Professional support from persons having civil engineering background should be provided for technical verification of civil works such as godowns and warehouse.	• The technical sanctions for the Godowns are taken from the Maharashtra State Warehouse Corporation which has reduced the dependency for the technical person need for the civil works.
4.4 Lack of capacity of PS Procurement to understand the scope of procurement activities was reported in a few cases	• More trainings related to scrutiny; techno-feasibility of projects should be provided to PS procurement on regular intervals	• Trainings for PS Procurement are conducted regularly online for the PS procurement regarding the procurement process as well as Techno feasibility of the proposals.
5 Other Key Challenges		
5.1 It was observed that project stakeholders like Krushi Tai's and host farmers were not getting their honorarium on time	• To keep them motivated, it should be ensured that these stakeholders get their honorarium on time.	• The VCRMC's are newly formed and the payments for KT's is being initiated.
5.2 Capacity of the women members of the VCRMC need to be strengthened so that they can effectively discharge their duty Some women are also constrained to not actively participate because of no land under their name even though they are actively involved in the farming business of their household.	• Follow up training sessions should be organized for women VCRMC members in case a significant number of members were not able to attend the training sessions	• All the newly formed VCRMC and KT's were oriented in the month of October.
5.3 Understanding of Krishi Tai regarding the project and their roles and responsibilities need to be improved.	• Capacity building training and refresher training need to be conducted for Krushi Tais so that they understand the project and their roles and responsibilities well. • Better coordination between CAs/AAs with Krushi Tai can help in both supporting each other on their role.	• First orientation training has been imparted to newly formed KT and the refresher training and advanced training will be imparted in due course of time. for newly appointed as well as existing KT's.
5.4 Capacity of VCRMCs regarding maintain records and utilization of funds need to be improved Most of the VCRMCs have unspent amount of financial budget provided to them under PoCRA. Reasons included non-awareness, and non-usability to any relevant expenditure that is identified by the VCRMC.	• Capacity building of VCRMC on record maintenance and its regular monitoring should be done	• Account assistants and Account officers' trainings have been conducted . • Also, due to COVID-19 pandemic, online trainings are conducted and new trainings are in progress.

The key challenges in the implementation of PoCRA as observed during CM-V and recommendations to address them are summarized in the below table.

Challenges observed during CM-V	Recommendations/ Way Forward
1 Individual Farmer matching Grant Activities	
5.5 Large number of pending presanctions for the individual works at the SDAO level as the the desk below SDAO cannot reject the application during the spot verification • This issue was understood to have intensified due to workload of the staff and unavailability to go timely on the sites for spot verification. The situation has further impacted because of COVID situation.	• The right of rejection may be given to the officer who does the spot verification if the work at site is found to be not suitable or activity not complying with the guideline. Higher level officials may monitor these activities.
5.6 Some of the activities as part of the project were reported to be closed (like pipes, motor, open dug well, community farm pond, goat rearing) though there is still demand amongst the farmers for these assets.	• It is suggested that the project should reassess if any of the closed activities can be resumed. It is suggested that, if feasible, decision for resuming can be decentralized, based on ground water levels.
5.7 Low demand for the E class farm pond in the project area as the area is encroached by the villagers and the ownership of maintenance post construction is challenging.	• This may be achieved through awareness and meeting with follow ups with the GP members and finding middle way by avoiding conflicts. Also some money to be deposited by the project in VCRMC account for post construction maintenance can help in solving the issue.
1.4 Low demand for the well recharge Activity due to high cost and sometimes due to non-casing of wells in many areas as well as good rainfall in Last two seasons	• The cost norms for the well recharge activity are low as per the actual construction cost, also farmer fear that the silt coming from the water may damage his well. Proper awareness is needed for this through FFS
1.5 Workload on project staff is a persistent challenge, which results in a delay in approvals of the grant application. • AAs on average have 5 villages (range 2-12) and CAs have 10 villages (range 6 -15), thus lowering their response time in conducting verifications and assistance in the application process.	• The number of villages under CAs/AAs with high number of villages should be reduced. • Hardship allowances and extra travel allowances can be provided to field staff working in difficult terrain or having high workload. • Need to build the capacity of Krushi Tais to assist AA and CA in application assistance to the farmers.
1.6 Problems in implementation of Mechanization and well activity due to very low target and high number of applications	• There must be higher side target for the activities such as mechanization and the well activity must be not limited to 3 per village must be more as per suggested by SDAO's.
1,7 Farmers apply for same activities twice on the same area for eg. If he already has drip then he again apply for horticulture with drip which shows his area more than the actual area owned by him.	• The check must be given to avoid such malpractices by introducing the data of E Thibak as well as Shadenet form other sources.
2. Farmer Field Schools	
5.8 Relatively low attendance of farmers regularly in farmer field schools, especially of women farmers. This issue was further amplified due to COVID-19, because of which issues are being faced.	• More focus needs to be given in mobilizing farmers to attend FFS session. All project stakeholders including VCRMC members, CA and AA should have a more proactive role in mobilizing farmers to attend FFS session • Suitable incentives should be provided to framers to attend FFS sessions. This could include a small kit with

Challenges observed during CM-V	Recommendations/ Way Forward
	cap, pen along with tea arrangements and agri inputs (possible to be given). • Suitable timing of the FFS for men and women farmers are different and so variable timings should be attempted for both the groups. Family members of the women participating in FFS should also be informed about the benefits of learning new agriculture technologies in improving their household income.
5.9 Quality of FFS sessions need to be improved, instead of targeting a high number of FFS sessions (suggested by a few SDAOs).	• It was proposed if the number of FFS can be reduced while adding more crop related sessions in each FFS. This will help the farmers to understand different stages of crop growth and the measures to be taken in each case. • More focus needs to be given on capacity building of FFS facilitators.
5.10 The problem of quality of guidance received by farmers from FFS facilitator still persistent.	• The retired staff of Agri department or the current staff may be involved with some hardship allowance or extra payment to increase the effectiveness and quality of sessions.
6 Community Benefits	
6.1 Community NRM works are still not being implemented at large scale. NRM works were observed in only three sample PoCRA villages.	• More efforts need to be put in by the project to expedite the implementation of community works. • Workshop with key stakeholders should be conducted to identity the key impediments and practical solutions and realistic times should be set for their implementation. • Micro planning and community works should be planned on priority basis for second and third phase villages.
6.2 Lack of awareness amongst farmers about the benefits of NRM structures. Few framers perceive that soil and water conservations works might lead to soil erosion and productivity of the land might reduce.	• Awareness needs to be created among farmers about the benefits of NRM assets- both at community and individual level. • FFS sessions can be used as platform to spread awareness on benefits of NRM structures. • Key members of the community should be taken for exposure visit to places where NRM structures have benefitted the nearby farmers.
7 PoCRA supported FPOs and SHGs beneficiaries	
7.1 Majority of FPOs are still facing difficulty in availing bank loans.	• Technical support (with help of expert agencies) should be provided to the FPOs to develop a bankable busines plan so that banks would be ready to provide them loans • Facilitation support should be provided to the FPOs so that they can avail bank loan. The project should look for bank partnerships in this regard.
7.2 Lack of working capital for their activities is a key challenge faced by most FPOs.	• Facilitation support should be provided to FPOs to develop a sound business plan and for getting loans from the bank • Representatives of FPOs should be provided professional training and exposure visits to build their capacity to run their FPO effectively. • Support should be provided to FPOs to enhance the farmer membership base and the membership fee from the members.

Challenges observed during CM-V	Recommendations/ Way Forward
7.3 Limit of 2 Custom Hiring Centre (CHC) per village is somewhat less for fulfilling the equipment need of big villages.	• The limit of two CHC per village may be revised as some villages have sometime area upto 2-3 thousand Ha. , therefore they will not be utilizing the equipment.
7.4 Requirement of the Test report for procurement of the locally manufactured tools designed for the specific topography- The farmers an CHC requirement is generally for the locally made tools which are made for that special soil type and region.	• The possibility of giving the permission must be analyzed for CHC to purchase the tools which are specially designed for the soil type in that area.
8 Other Key Challenges	
8.1 Non-Availability of PC/Laptop at the Taluka level leading to delay in presanctions and day to work.	• There was demand from almost all the TAO for the requirement of the PC or Laptop so that they can use it for day to day official works such as pre sanctions as well as generating reports
8.2 Some SDAO and PS reported of not getting the money of diesel for vehicle used during the field visit. Also one of the SDAO said that he has been giving the payment of driver as well as maintenance of vehicle used for the Field visits.	• The contingency money alike other parallel schemes of e-Thibak and Jalyukta shiwar may be considered to be given to the subdivisional office to carry out the operational expenses.

8. Progress Monitoring Based on Results Framework Indicators

Indicator Nor[24]	Indicator	Measurement technique and data source	Progress at CM Round 5
5	*Number of farmers reached with agricultural assets or services (% of female)*	The data of number of farmers reached with assets or services has been collected from the project MIS, associated applications and relevant project personnel from PMU. The number of direct beneficiaries of the PoCRA include:	*Total number of farmers/beneficiaries reached through the project till 31st March 2021 is* 8,90,623 (Female % cannot be calculated as we do not have % of female registrations)
		1. The data on individual grant beneficiaries has been taken from DBT portal.	Total Disbursement online- 135682 (24145 Female and 111537 Male) Total Registrations till date- 457307 out of total Applications- 1310604 Total Number of Beneficiaries- 96625
		2. The data of beneficiaries of FFS has been taken from FFS application.	Total Number of FFS participants till date are 268012. The total number of Guest farmers are 255239 and host farmers were 12720. *Total Number of Host farmers attended during the season of Rabi 2021 are 2478 (286 female farmer and 2192 male Farmer). The total number of guest farmers attended the FFS sessions are 40832 (4221 female farmers and 36611 male farmers) Current Round*
		4. People who have availed trainings under the program.	12312 trainings events including Project Officials and Farmers (with participation from 100855 male and 33320 female); 76 exposure visit (with participation from 655 males and 435 females) have been conducted. 28301 VCRMC members have been trained along with 1738 KT

[24] as per PoCRA Results Framework

Indicator Nor[24]	Indicator	Measurement technique and data source	Progress at CM Round 5
6	*Farmers adopting improved agricultural technology promoted (% of female)*	This indicator has been tracked based on the beneficiary survey conducted as part of the concurrent monitoring. The surveyed beneficiaries are enquired if they were adopting any (at least one) of the improved agriculture technology which is promoted under the project.	Total 68 female farmer beneficiaries covered in survey: P=44, C= 24 Training received on any agriculture technology: P=32 (73%), C=16 (67%) Adoption of any (at least one) agriculture technology: P=43 (98%), C=24 (100%) Though it is to be noted that the sample frame for concurrent monitoring are the farmers who have benefitted from PoCRA and similar schemes in comparison area. This would not be comparable with the sample in the evaluation surveys i.e., baseline, midline and endline. Also, the sample size covered in concurrent monitoring is very less as that compared to evaluation surveys.
7	*Area provided with new/improved irrigation or drainage services (in ha)*	The data of area with new or improved irrigation services and drainage services through individual activities under the project has been taken from DBT portal report. The data of community level new/improved irrigation services has been taken from Project Specialists of the project districts. Total area under Irrigation Projects= IP (Irrigation Project)$_1$*Area under irrigation project+ IP (Irrigation Project)$_2$*Area under irrigation project+ IP (Irrigation Project) $_n$*Area under irrigation project	Area provided with 1. Sprinkler and Pump together- 313 Ha 2. With water pumps only - 1151 Ha 3. With only pipes is 17470 Ha 4. Sprinkler area - 44523.4 Ha 5. Drip area 35473 Ha Total Area – 98930.4 Ha
8	*Surface water storage capacity from new farm and community ponds (in 1,000 m3)*	The data of individual level farm ponds will be taken from DBT portal report. The data of community farm ponds has been taken from DBT Portal. 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	19571 (1000 *m3)*
10	*Oilseeds (soybean), Pulses (pigeon, chickpea) production area under cultivation w/ certified seeds of improved varieties (share in %)*	The percentage area under cultivation for oilseeds (soybean) and pulses (pigeon, chickpea) *using certified seeds of improved varieties has been assessed based on the beneficiary survey as part of concurrent monitoring.*	% of the area under cultivated using climate-resilient certified seeds – • Soybean: 85 % in Project and comparison • Chickpea: 72% in project and 76% in comparison • Pigeon pea: 54% in project and 69% in comparison Though it is to be noted that the sample frame for concurrent monitoring are the farmers who have benefitted from PoCRA and similar schemes in the comparison area. This would not be comparable with the sample in the evaluation surveys i.e. baseline, midline and

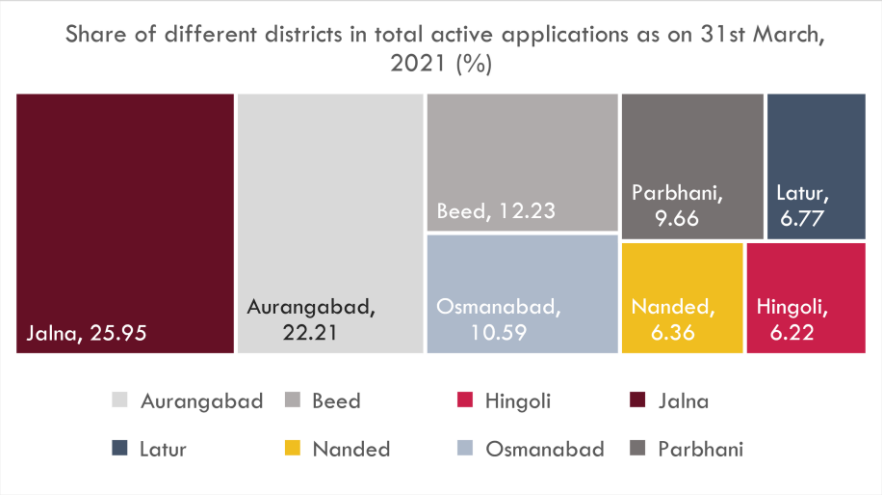
Indicator Nor[24]	Indicator	Measurement technique and data source	Progress at CM Round 5
			endline. Also, the sample size covered in concurrent monitoring is very less as that compared to evaluation surveys.
11.	*Number of project-supported FPCs with growth in annual profits*	With the support of PS agriculture, the FPC representatives was contacted and their annual profit details of current year and last were enquired. Based on the analysis of the change in annual profits of the supported FPCs this indicator was to be calculated	11 out of 20 whose audited financial statement for FY 2020-21 were available* *Of the 58 project supported FPCs, 2 has received grant in 2019-20, 32 in 2020-21, and 24 in 2021-22. Since most of the FPCs has received grant from PoCRA starting 2020-21, we analysed the financial statements of 32 FPCs for year 2020-21. However, of these 32 FPCs, 20 FPCs has shared their audited statement for FY 2020-21 in which it is observed that 11 FPCs has recorded profit. The RF indicator implying number of project supported FPCs with growth in annual profit can only be estimated when we monitor these FPCs and analyse their audited statements over next two financial years. The remaining FPCs will be subsequently included in the analysis over next monitoring rounds once their audited financial statements are available. Refer Annexure B for details of 20 FPCs whose audited financial statements are analysed.
14	*Number of approved participatory mini watershed plans implemented / under implementation*	This indicator is 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.	Number of approved participatory mini watershed plans implemented / under implementation are 533 till 31st March 2021 out of 533 villages in which implementation was done in year 1. However, we will discuss with PMU to get confirmation.

9. Insights from PoCRA MIS data

This section presents the analysis of the project's MIS data till 31st March,2021. This would help to understand the current implementation status of the project and draw insights from the same.

Review of active applications as on 31st March, 2021

As per the PoCRA MIS Data, the total active applications were 966317 as on 31st March, 2021. The pie chart presented here shows the district wise distribution of the same. Jalna has the highest number of active applications (26%), followed by Aurangabad (22%), Beed (12%) and Osmanabad ((11%). Latur (7%), Nanded (6%) and Hingoli (6%) have minimum number of active applications.



The below table presents the activity wise percentage pf applications received. Maximum applications were received for drip irrigation (19.7%), Sprinkler Irrigation (17.3%), Horticulture plantation/ agro-forestry (12.4%) Farm mechanization (9.1%), Pipes (8.9%) and Water Pumps (8.7%).This is in line with the findings from the stakeholder feedback.

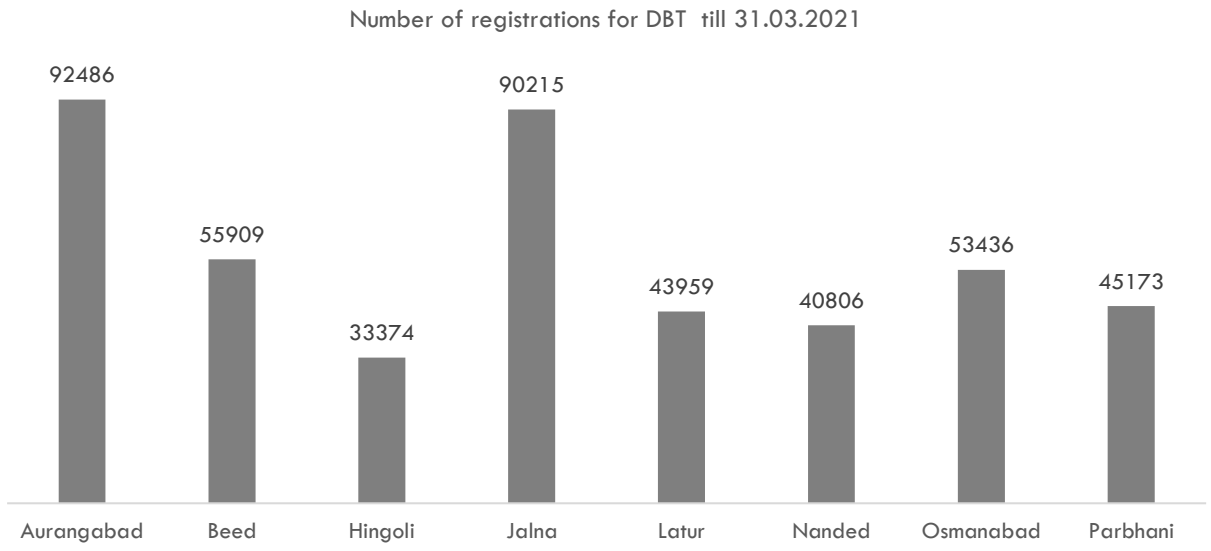
Active applications as on 31st March 2021 (Activity wise percentage of application received)

Activity	Total	% of applications from total
Drip Irrigation	190738	19.7
Sprinkler Irrigation	167035	17.3
Horticulture Plantation	119907	12.4
Farm Mechanization	87778	9.1
Pipes	86296	8.9
Water Pumps	83688	8.7
Well	51049	5.28
Shade net House	29191	3.02
Sericulture	25416	2.63
Individual Farm Pond	23077	2.39
Seed Production	17955	1.86
Small ruminants	12939	1.34
Community Farm Pond	9870	1.02
Compost (Vermicompost / NADEP / Organic input production unit)	9339	0.97
Recharge of open dug wells	7575	0.78
Farm pond lining	7182	0.74
Inland Fisheries	7091	0.73
FFS Host Farmer Assistance	6924	0.72
Backyard Poultry	6077	0.63
Agroforestry	4961	0.51
Polyhouse/ Poly tunnels	4622	0.48

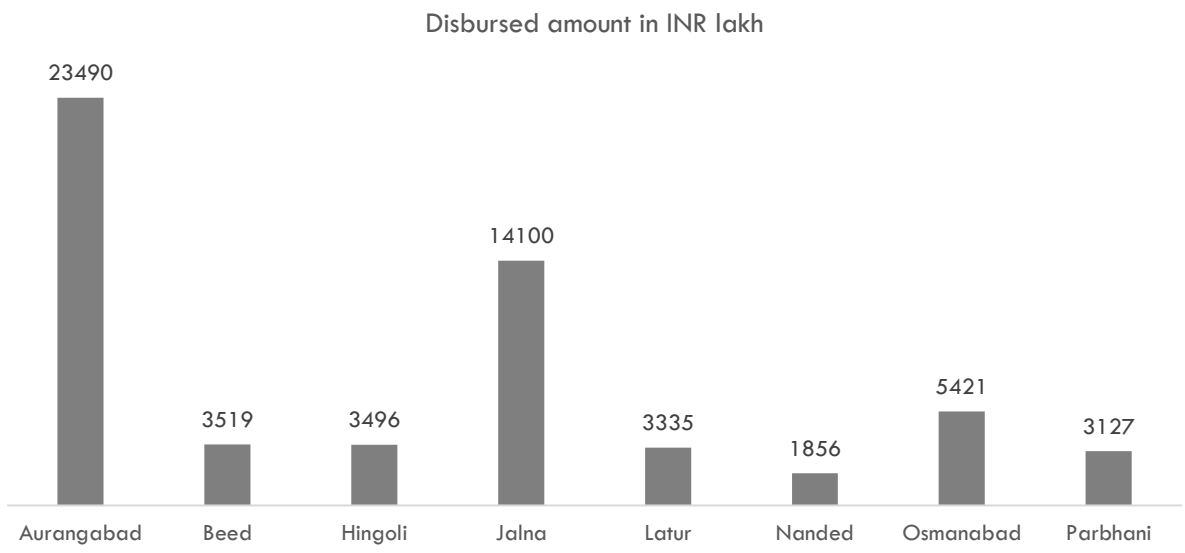
Activity	Total	% of applications from total
Planting material in polytunnels / Polyhouse / Shadenet house	3941	0.41
Apiculture	3004	0.31
Promotion for BBF Technology	662	0.07
Grand Total	966317	100.00

Status of Direct Benefit Transfer

Registration: The graph below highlights the overall status of registrations for DBT in different districts. As can be studied from the graph Aurangabad and Jalna districts have highest number of registrations for DBT as on 31st March 2021.



Disbursed amount: As on 31st March, 2021, Rs. 583.44 Crore were disbursed under DBT to eight districts under Marathwada region. As the following graph shows maximum amount was disbursed to the applications from Aurangabad district (Rs. 234.9 Crore) followed by Jalna district (Rs. 141 Crore).



VCRMC Formation

The two tables below show the status of VCRMCS formed in the three phases of the project. So far, 98% of the villages have already formed VCRMC committee, with almost 100% in Aurangabad and Beed and close to 95% in Nanded.

Status of VCRMCs formed, phase-wise

District	Status of VCRMC formed											
	Phase-1			Phase-2			Phase-3			Total		
	Village	Gram Panchayats	VCRMC formed	Village	Gram Panchayats	VCRMC formed	Village	Gram Panchayats	VCRMC formed	Village	Gram Panchayats	VCRMC formed
Aurangabad	77	59	59	194	135	134	135	106	106	406	300	299
Beed	58	51	51	218	162	162	115	107	106	391	320	319
Hingoli	39	33	33	129	102	102	72	60	59	240	196	194
Jalna	67	55	55	188	162	162	108	93	82	363	310	299
Latur	94	79	77	144	124	124	44	44	44	282	247	244
Nanded	70	61	58	215	189	189	99	96	80	384	346	327
Osmanabad	48	43	43	137	117	117	102	98	94	287	258	254
Parbhani	84	76	76	145	127	126	46	43	39	275	245	241
Grand Total	537	457	452	1370	1118	1116	721	647	610	2628	2222	2177

Status of VCRMCs formed as on 31st March, 2021

District	Status of VCRMC formed			% of GPs with VCRMC formed
	Total			
	Villages	Gram Panchayats	VCRMC Formed	
Aurangabad	406	300	299	99.67
Beed	391	320	319	99.69
Hingoli	240	196	194	98.98
Jalna	363	310	299	96.45
Latur	282	247	244	98.79
Nanded	384	346	327	94.51
Osmanabad	287	258	254	98.45
Prabhani	275	245	241	98.37
Grand Total	**2628**	**2222**	**2177**	**97.97**

Progress of soil and water conservation works completed

The district wise progress of soil and water conservation is presented below:

District	Microplan	As on 31st March 2019		As on 31st March 2020		As on 31st March 2021	
		Physical	INR (lakhs)	Physical	INR (lakhs)	Physical	INR (lakhs)
Aurangabad	77	36	45.44	60	69.44	64	73.92
Beed	58	0	0	17	30.55	17	30.56
Hingoli	39	17	31.38	20	33.06	43	102.83
Jalna	67	0	0	22	53.67	28	73.51
Latur	92	10	24.55	10	24.55	13	36.86
Nanded	70	0	0	6	6.44	23	32.75
Osmanabad	48	15	36.78	27	54.519	60	162.13
Prabhani	82	0	0	4	4.62	43	34.36
Total (Marathwada region)	533	78	138.15	166	276.85	291	546.92

10. Annexure

List of Sampled Villages

Sampled Project and Comparison Villages

Cluster code	District	Subdivision	Taluka	Census code	Village	Project/ Comparison
515_te-15a_01	Aurangabad	Sillod	Soegoan	548495	Sawarkheda	P (I)
515_te-36a_01	Aurangabad	Sillod	Soegoan	548440	Galwada (B)	P (I)
515_gv-46_03	Aurangabad	Vaijapur	Gangapur	549239	Kasoda	P (II)
515_gv-32a_05	Aurangabad	Vaijapur	Vaijapur	549152	Dongaon	P (II)
515_gp-11_02	Aurangabad	Sillod	Sillod	548603	Sarola	P (III)
523_sa-15_01	Bid	Bid	Ashti	558885	Ashta	P (II)
523_gv-69_01	Bid	Bid	Beed	559529	Aurangpur	P (II)
523_mr-8_03	Bid	Ambejogai	Ambejogai	559994	Lokh. Sawargaon	P (III)
512_gp-47_04	Hingoli	Hingoli	Sengoan	545833	Gondala	P (I)
512_ppg-7_03	Hingoli	Hingoli	Hingoli	545963	Sasewadi	P (II)
514_gv-54_04	Jalna	Partur	Ambad	547821	Bantakli	P (II)
514_gp-42_02	Jalna	Partur	Mantha	548169	Wadhegaon	P (II)
514_gpdg-1_01	Jalna	Jalna	Jalana	547605	Dhara	P (II)
514_gp-37_01	Jalna	Partur	Partur	548084	Lingsa	P (II)
514_gv-71_03	Jalna	Partur	Partur	548093	Ashti	P (III)
524_mr-55_03	Latur	Udgir	Deoni	560924	Sangam	P (I)
524_mr-34_01	Latur	Latur	Ausa	560658	Wagholi	P (II)
524_mr-24_02	Latur	Latur	Latur	560137	Jewali	P (II)
524_mr-16_01	Latur	Latur	Latur	560096	Murud Bk.	P (III)
511_mr-57_01	Nanded	Nanded	Kandhar	545375	Majare Warwat	P (II)
511_gv-105_04	Nanded	Nanded	Mudkhed	544795	Rohi Pimpalgoan	P (I)
511_mr-66_04	Nanded	Deglur	Deglur	545681	Malegaon (M)	P (III)
525_mr-7_03	Osmanabad	Bhum	Washi	561275	Sonarwadi	P (I)
525_sa-23_03	Osmanabad	Bhum	Paranda	561039	Jakate wadi	P (III)
525_mr-9_04	Osmanabad	Bhum	Kalamb	561353	Nagzarwadi	P (III)
525_sa-26_03	Osmanabad	Bhum	Paranda	561120	Hingangaon Bk.	P (III)
525_mr-10_01	Osmanabad	Bhum	Washi	561281	Terkheda	P (III)
513_gv-79_03	Parbhani	Parbhani	Manwath	546858	Wazur Bk	P (I)
513_gv-82_02	Parbhani	Parbhani	Gangakhed	546981	Dharasur	P (II)
513_gv-74_01	Parbhani	Parbhani	Pathri	546878	Hadgaon Bk	P (II)
515_gv-42_02	Aurangabad	Vaijapur	Gangapur	549313	Zodegaon	C
515_te-37_05	Aurangabad	Sillod	Soegoan	548460	Kinhi	C
523_gv-99_03	Bid	Ambejogai	Ambejogai	560056	Telghana	C
523_gv-60a_01	Bid	Bid	Ashti	558760	Patsara	C
512_ppg-5_02	Hingoli	Hingoli	Sengoan	545763	Changephal	C
512_ppg-7_01	Hingoli	Hingoli	Hingoli	545956	Wanjarwadi	C
514_gp-37_03	Jalna	Partur	Partur	548079	Mavpatoda	C
514_gp-42_02	Jalna	Partur	Mantha	548171	Maltondi	C
514_gpdg-1_01	Jalna	Jalna	Jalana	547615	Nagapur	C

Cluster code	District	Subdivision	Taluka	Census code	Village	Project/ Comparison
514_gv-66_06	Jalna	Partur	Partur	548106	Landak Tanda	C
524_mr-18_03	Latur	Latur	Latur	560186	Chikhal Thana	C
511_gv-106_02	Nanded	Nanded	Kandhar	545363	Bhutyachiwadi	C
525_mr-7_01	Osmanabad	Bhum	Washi	561257	Sonegaon	C
525_sa-29a_02	Osmanabad	Bhum	Paranda	561126	Ainapurwadi	C
513_gp-43_03	Parbhani	Parbhani	Manwath	546815	Sawangi Magar	C

List of 20 FPCs whose audited financial statements for FY 2020-21 are analysed

S.No	District	Name of the FPC which received grant from PoCRA for Agri Business Activity	FPC'c Annual profit/ loss as per audited statement 2020-21
1	Hingoli	Khodke Agro FPC	-98569
2	Hingoli	Anukaran FPC	408128
3	Hingoli	Siddhnath Nagnath Agrovet FPC	261088
4	Hingoli	Rayatecha Raja FPC	8561
5	Latur	Alzirath Agro FPC	10367
6	Latur	Latur Kisan FPC	-533986
7	Latur	Omsai Adhunik FPC	241303
8	Latur	Gutti Agro FPC	2346
9	Latur	Prayagbai Jadhav Agro FPC	-307763
10	Latur	Murudeshwar FPC	-16895
11	Latur	Rasika FPC	-96595
12	Latur	AV 28 Foods FPC	21565
13	Latur	Vikasratna FPC	361716
14	Osmanabad	ODSF Agro FPC	-1362532
15	Osmanabad	Sant Shiromani Maruti Maharaj Agro FPC	23783
16	Jalna	Agro tech FPC	9824
17	Jalna	Jeev Rekha Agri FPC	-53297
18	Jalna	Mstodhari Agri FPC	-90462
19	Jalna	Bhumi Putra Farmtech FPC	-17562
20	Jalna	Jamuvant Agro FPC	32624

List of Key Experts visits/interactions

Name of Key Expert	Position	Date of visit	District	Block	Villlage visited
R.B Singandhupe	Agronomy Expert	10-08-21	Aurangabad	Phulambri	Relgaon, Sonari Bk, Sonari Khurd, Chincholi Leha Baraor Leha Janhangir
		11-08-21		Kannad	Tapargaon, Ruikheda, Alapur
		11-08-21		Vaijapur	Chorwaghalgaon, Bhagur, Malisagaj, Taklisagaj, Hanumantgaon
Dalbir Singh	Agri Economist	10-08-21	Aurangabad	Phulambri	Relgaon, Sonari Bk, Sonari Khurd, Chincholi Leha Baraor Leha Janhangir

Name of Key Expert	Position	Date of visit	District	Block	Villlage visited
		11-08-21		Kannad	Tapargaon, Ruikheda, Alapur
		11-08-21		Vaijapur	Chorwaghalgaon, Bhagur, Malisagaj, Taklisagaj, Hanumantgaon
Arindam Dutta	Environment Expert	01-09-21	Nanded	Naigaon	Navadi
				Naigaon	Manjaram
		02-09-21		Deglur	Hottal
					Bellur
Shivani Sharma	GIS Expert	01-09-21	Nanded	Naigaon	Navadi
		02-09-21		Naigaon	Manjaram
		02-09-21		Deglur	Hottal
G Mini	Sociologist Expert	01-09-21	Nanded	Kinwat	Pradhan Sangwi
		02-09-21			Bodadhi Khurd
		02-09-21		Deglur	Hotttal
Deodatt Singh	Agribusiness Expert	18-08-21	Jalana	Ambad	Mastodhari Agri Producer Company
		19-08-21		Ambad	Jamuwant Agro Producer Company
		20-08-21		Ambad	Aambhi Baliraja Producer Company
Vijkumar Agrawal	Agri Engineering	27-09-21	Aurangabad	Paithan	Dera
		28-09-21		Aurangabad	Adgaon

List of Stakeholder Interviewed

List of Agriculture Assistants Interviewed

Sr No.	District	Subdivision	Taluka	Village
1	Aurangabad	Sillod	Soegoan	Sawarkheda
2	Aurangabad	Sillod	Soegoan	Galwada (B)
3	Aurangabad	Sillod	Sillod	Sarola
4	Aurangabad	Vaijapur	Vaijapur	Dongaon
5	Aurangabad	Vaijapur	Gangapur	Kasoda
6	Jalna	Jalna	Jalna	Dhara
7	Jalna	Partur	Partur	Lingsa
8	Jalna	Partur	Partur	Ashti
9	Jalna	Partur	Ambad	Bantakli
10	Beed	Beed	Ashti	Ashta
11	Beed	Beed	Beed	Aurangpur
12	Jalna	Partur	Mantha	Wadhegaon

Sr No.	District	Subdivision	Taluka	Village
13	Beed	Ambejogai	Ambejogai	Lokh. Sawargaon
14	Parbhani	Parbhani	Manwath	Wazur Bk
15	Parbhani	Parbhani	Gangakhed	Dharasur
16	Parbhani	Parbhani	Pathri	Hadgaon Bk
17	Hingoli	Hingoli	Sengoan	Gondala
18	Hingoli	Hingoli	Hingoli	Sasewadi
19	Osmanabad	Bhum	Washi	Sonarwadi
20	Osmanabad	Bhum	Washi	Terkheda
21	Osmanabad	Bhum	Paranda	Jakate wadi
22	Osmanabad	Bhum	Paranda	Hingangaon Bk.
23	nanded	Nanded	Kandhar	Majare Warwat
24	Nanded	Nanded	Mudkhed	Rohi Pimpalgaon
25	Nanded	Deglur	Deglur	Malegaon (M)
26	Latur	Latur	Ausa	Wagholi
27	Latur	Latur	Latur	Jewali
28	Latur	Udgir	Deoni	Sangam
29	Latur	Latur	Latur	Murud Bk.

List of Cluster Assistants Interviewed

Sr No.	District	Subdivision	Taluka	Village
1	Aurangabad	Sillod	Soegoan	Sawarkheda
2	Aurangabad	Sillod	Soegoan	Galwada (B)
3	Aurangabad	Sillod	Sillod	Sarola
4	Aurangabad	Vaijapur	Vaijapur	Dongaon
5	Aurangabad	Vaijapur	Gangapur	Kasoda
6	Jalna	Jalna	Jalna	Dhara
7	Jalna	Partur	Partur	Ashti
8	Jalna	Partur	Ambad	Bantakli
9	Beed	Beed	Ashti	Ashta
10	Beed	Beed	Beed	Aurangpur
11	Jalna	Partur	Mantha	Wadhegaon
12	Beed	Ambejogai	Ambejogai	Lokh. Sawargaon
13	Parbhani	Parbhani	Manwath	Wazur Bk
14	Parbhani	Parbhani	Gangakhed	Dharasur
15	Hingoli	Hingoli	Sengoan	Gondala
16	Hingoli	Hingoli	Hingoli	Sasewadi
17	Osmanabad	Bhum	Washi	Sonarwadi

Sr No.	District	Subdivision	Taluka	Village
18	Osmanabad	Bhum	Paranda	Jakate wadi
19	Osmanabad	Bhum	Paranda	Hingangaon Bk.
20	nanded	Nanded	Kandhar	Majare Warwat
21	Nanded	Nanded	Mudkhed	Rohi Pimpalgoan
22	Osmanabad	Bhum	Kalamb	Nagzarwadi
23	Nanded	Deglur	Deglur	Malegaon (M)
24	Latur	Latur	Ausa	Wagholi
25	Latur	Latur	Latur	Jewali
26	Latur	Udgir	Deoni	Sangam
27	Latur	Latur	Latur	Murud Bk.
28	Osmanabad	Bhum	Paranda	Jakate wadi

List of Krushi Tais Interviewed

Sr No.	District	Subdivision	Taluka	Village
;	Aurangabad	Sillod	Soegoan	Sawarkheda
2	Aurangabad	Sillod	Soegoan	Galwada (B)
3	Aurangabad	Sillod	Sillod	Sarola
4	Jalna	Partur	Partur	Lingsa
5	Jalna	Partur	Partur	Ashti
6	Jalna	Partur	Ambad	Bantakli
7	Beed	Ambejogai	Ambejogai	Lokh. Sawargaon
8	Parbhani	Parbhani	Manwath	Wazur Bk
9	Parbhani	Parbhani	Gangakhed	Dharasur
10	Hingoli	Hingoli	Sengoan	Gondala
11	Osmanabad	Bhum	Washi	Sonarwadi
12	Osmanabad	Bhum	Washi	Terkheda
13	Osmanabad	Bhum	Paranda	Hingangaon Bk.
14	Nanded	Nanded	Kandhar	Majare Warwat
15	Nanded	Nanded	Mudkhed	Rohi Pimpalgoan

List of FFS Coordinators Interviewed

Sr No	District	Subdivision	Taluka	Village
1	Beed	Ambejogai	Ambajogai	Lokh. Sawargaon
2	Latur	Latur	Latur	Jewli
3	Jalna	Partur	Mantha	Wadegaon
4	Osmanabad	Bhum	Vashi	Terkheda
5	Parabhani	Parbhani	Parbhani	Hadgaon
6	Nanded	Deglur	Deglur	Malegaon
7	Aurangabad	Vaijapur	Gangapur	Kasoda
8	Hingoli	Hingolli	Hingoli	Gondala

Sr No	District	Subdivision	Taluka	Village
9	Latur	Latur	Devni	Sangam
10	Aurangabad	Sillod	Sillod	Bantakali

List of FFS Facilitators Interviewed

Sr No	District	Subdivision	Taluka	Village
1	Aurangabad	Sillod	Sillod	Sarola
2	Aurangabad	Vaijapur	Vaijapur	Dongaon
3	Jalna	Partur	Partur	Ashti
4	Beed	Beed	Beed	Aurangpur
5	Beed	Ambejogai	Ambejogai	Lokh. Sawargaon
6	Parbhani	Parbhani	Manwath	Wazur Bk
7	Parbhani	Parbhani	Gangakhed	Dharasur
8	Osmanabad	Bhum	Washi	Terkheda
9	Osmanabad	Bhum	Paranda	Hingangaon Bk.

List of Agriculture Supervisor Interviewed

Sr No	District	Subdivision	Taluka	Village
1	Aurangabad	Sillod	Sillod	Sarola
2	Jalna	Partur	Partur	Lingsa
3	Jalna	Partur	Mantha	Wadhegaon
4	Parbhani	Parbhani	Pathri	Hadgaon Bk
5	Osmanabad	Bhum	Washi	Sonarwadi
6	Osmanabad	Bhum	Paranda	Hingangaon Bk.
7	nanded	Nanded	Kandhar	Majare Warwat
8	Nanded	Nanded	Mudkhed	Rohi Pimpalgoan
9	Latur	Latur	Latur	Jewali
10	Jalana	Jalana	Jalana	Dhara

List of FPC representative interviewed

S.No	Taluka	Post	Name of FPC
1	Khultabad+D2:D12	Chairman	MalojirajeKrushi Producer Company ltd, Sultanpur
2	Ambajogai	Chairman	Krantijyoti Agro Producer Company Bansaroda
3	Aundha nagnath	Chairman	Hitech Ata Mill Siddheshwar
4	Ardhapur	Chairman	Shetakari Farmers Producer Company. Malegaon
5	Latur	Chairman	SVR Agri Producer Company PVT.LTD Akhurwadi
6	Beed	Secretory	Mauli Agro Farmer Producer Company Doifodwadi
7	Hingoli	Director	Anukaran Farm Production Company Ltd Hingoli
8	Lohara	Chairman	Sant Shiromani Maroti Maharaj Agro Producer Co. Ltd. Matdi
9	Khult+D10abad	Director	Swarup Shetkari Utpadak Company Sultanpur
10	Kandhar	CEO	Shivkhande Farmers Producer Company.

S.No	Taluka	Post	Name of FPC
11	Aunsa	Chairman	Prayagbai jadhav Agro Producer co. ltd Karajgaon
12	Ahamadpur	Director	Krushi Avjare Seva Kendra Kalegaon
13	Ambad	Chairman	Ajintha Verul Farmer Producer Co.Ltd Chikangaon
14	Ambad	Director	Amhi Baliraja Producer CO.Manjalgaon
15	Amabad	Director	Bhoomiputra pharmatek Producer Co. Manjalgaon
16	Ambad	Director	Mahalokseva Agro producer Company, Rohera

List of Taluka Agricultural Officers Interviewed

Sr No.	District	Subdivision	Taluka
1	Osmanabad	Bhum	Washi
2	Nanded	Nanded	Kandhar
3	Jalana	Partur	Partur
4	Latur	Latur	Latur
5	Latur	Udgir	Devni
6	Bid	Beed	Beed
7	Hingoli	Hingoli	Sengaon
8	Parbhani	Parbhani	Gangakhed
9	Jalna	Partur	Ambad
10	Bid	Manjlegaon	Sillod

List of Project Specialists Interviewed

Sr. No	District	Project Specialists Participated in FGD
1	Parbhani	PS Agri Business
		PS HRD
		PS Procurement
2	Aurangabad	PS HRD
		PS-Procurement
		PS Agri
		PS Agri
3	Nanded	PS AGRI
		PS HRD
		PA AB
		PS-Procurement
4	Hingoli	PS-Procurement
		PS Agri Business
		PS AGRI
		PS HRD
5	Latur	PS HRD
		PS Agri
		PS AB

Sr. No	District	Project Specialists Participated in FGD
		PS-Procurement
6	Jalana	PS-Procurement
		PS Agri
		PS Agri Business
		PS HRD
7	Osmanabad	PS Procurement
		PS Agri
		PS HRD
		PS Agri Business
8	Beed	PS Agri Business
		PS Agri
		PS-Procurement
		PS HRD

List of Sub-Division Agriculture Officers Interviewed

S.No	District	Subdivision
1	Jalana	Jalna
2	Jalana	Partur
3	Nandd	Nanded
4	Aurangabad	Aurangabad
5	Latur	Latur
6	Hingoli	Hingoli
7	Aurangabad	Sillod
8	Osmanabad	Osmanabad
9	Osmanabad	Bhum

List of DSAOs Interviewed

Sr. No.	District
1	Nanded
2	Parbhani (PD ATMA)
3	Jalana
4	Beed
5	Latur
6	Aurangabad

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