Report on Extension Activities for Kharif Season

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Table of Contents

1. Introduction

1.1. Background and Motivation

One of the major contributions of the IITB in the IITB-PoCRA partnership has been the design and implementation of the water balance model framework to produce water budget charts for all the PoCRA villages. These charts provide crucial information to the local planners such as krushi sahayak (KS) and cluster assistant (CA) on planning and expenditure for NRM activities. Apart from the officials, these charts are also useful for the community for decisions on crop planning and personal private investments. This requires the community to be able to understand water budget charts, its components and to be able to comprehend the same with the realities of the ground situation in their respective villages. It is therefore needed that the extension mechanism by the state machinery accommodates activities which will facilitate communities in comprehension and quantification of the problems faced by them.

In this context, the IITB team proposed a data driven and evidence based extension approach which is closest to the conceptual framework of management of natural resources suggested by Ostrom and others which relies on game theory. The core idea that Ostrom proposes for effective management and better outcomes is to ensure that each of the agents in the scenario has reasonable and reliable information of the reality. In our case, these agents are state officials and planners, field level staff such as krushi sahayaks and cluster assistants, farmers and the community at large. Therefore information on various parameters that form key inputs and outputs of the agriculture systems needs to be made available to all these agents at appropriate levels and especially at the village level for the field staff to facilitate decision making by the community.

Based on this understanding, the IITB team has conceptualised ‘Maahiti-Gaavki Framework’ for the execution of community extension activities. ‘Maahiti’ essentially means that there needs to be an availability and access of the data on key issues to the community at the village level. This will reduce information asymmetry and help villagers understand and comprehend the realities in quantifiable terms. On the other hand, ‘Gaavki’ means arriving at the core agreement at the village level, making collective decisions and necessary action by the community based on the ‘Maahiti’ to move from the current situation towards the desired one. A detailed report on this overall framework was submitted to the PMU as deliverables at the end of phase III of MoU III.

The IITB team proposes that this extension framework needs to be executed by the krushi sahayak of the respective villages with assistance from cluster assistants with the participation of the community. The role of krushi sahayak in this overall process is that of the state's agent to facilitate and coordinate the different activities as a part of extension.

1.2. Delivery of Community Extension Component

Community Extension constitutes one of the important components of IITB-PoCRA MoU IV. The core idea of the overall extension framework is to strengthen agricultural and natural resource planning processes through different extension activities. The key objective of this component is to demonstrate easy-to-understand village level exercises and develop protocols which will feed into the information, comprehension and collective action based extension framework explained in the previous section.

The delivery for this component is in the form of multiple field visits and two reports, one report on the extension activities conducted during Kharif and another one on extension activities conducted during rabi season. These reports will be supported with the requisite formats for relevant data collection and training material for field staff in the form of presentations emerging from our case studies.

The role of the IITB team will be to design village-level surveys required for the collection of the village level information on different parameters related to agriculture. The IITB team will test the formats by conducting these surveys in the selected clusters. These formats will be improvised to be used by the field staff based on the findings and feedback from the conduct of this exercise.

1.3. Case of 'Kharif Aadhava Baithak'

The need of exploring different approaches for the extension mechanism under PoCRA was in the discussion for some time at the PMU. Last year in March, PMU issued detailed guidelines for the conduct of the 'Kharif Aadhava Baithak' at the village level to be organised and hosted by the Village Climate Resilience Management Committee (VCRMC) with assistance from the krushi sahayak and cluster assistant. It envisioned this meeting as a platform to collectively discuss different problems associated with the kharif season in the presence of the community and field staff from different agencies at the village level.

The guidelines for the meeting have explained the need and the procedure to discuss different topics to be covered in the meeting in great detail. These topics are essentially agriculture related issues faced by the farmers. The conduct of kharif aadhava baithak will therefore need different information for quantification of the problems and ground realities. The data collection formats to be designed by the IITB team thus will be used for the conduct of kharif aadhava baithak as well.

1.4. Objectives

The objectives of this report are listed below:

- To design simple and easy to use survey formats to be used by the field staff
- To document the pilot activities conducted by the IITB team in the selected clusters and the methodology used for the same
- To discuss a procedure for the conduct of such exercise by field staff

2. Methodology

This chapter discusses the methodology adopted by the IITB team for the design and conduct of different extension activities in the selected clusters.

2.1. Selection of villages

This year, the IITB team is actively working in more than ten villages under PoCRA and has field presence in the same for conceptualization, design and demonstration of different components in the MoU IV. These villages were finalised after considering various selection criteria relevant to the respective components. In case of water, four catchments, two each from Marathwada and Vidarbha region covering multiple villages were selected for the exercise of model validation. This selection was based on the representativeness of the catchments in terms of rainfall received in the recent years, soil types, terrain, and land use pattern.

Given that the IITB team was already working in these villages and could also build the rapport with the farmers, it was decided that the villages to be selected for the community extension component shall be from these villages. This has another advantage of linking the findings from both the components i.e. model validation and community extension in the same study area for better understanding the ground realities of these villages.

Out of the villages from the study area, two villages Mangrul and Adgaon, one each from Marathwada and Vidarbha region respectively were selected for community extension. Mangrul is comparatively a smaller village of moderate slope with dominant presence of medium soil types. Whereas Adgaon is a larger village with relatively flat terrain and combination of medium to heavy soils as dominant soils.

Table 1 summarises the comparison of different village attributes for both the selected villages. As can be seen from the table, this selected pair of the villages reasonably cover combinations of different village attributes while ensuring representativeness when compared with typical pocra villages.

Table 1: Village Details

Village	Mangrul	Adgaon
Taluka, District	Loha, Nanded	Ner, Yavatmal
Area	383 ha	1391 ha
Cultivable Area (ha)	184 ha	1241 ha
Population	598	1835
Average Rainfall: 2016-2021	1081 mm	754 mm
Slopes and Terrain	Relatively hilly terrain. Major part of the village is sloppy, especially in the southern region.	Flat terrain with minimal slopes.

Figure 1, 2 and 3 shows cadastral, soil and land use maps for Mangrul. The general direction of the slope is from south to north east. and the village drains the water to a stream through multiple streams that flows towards north along the north eastern boundary of the village.

Figure 1: Cadastral Map for Mangrul

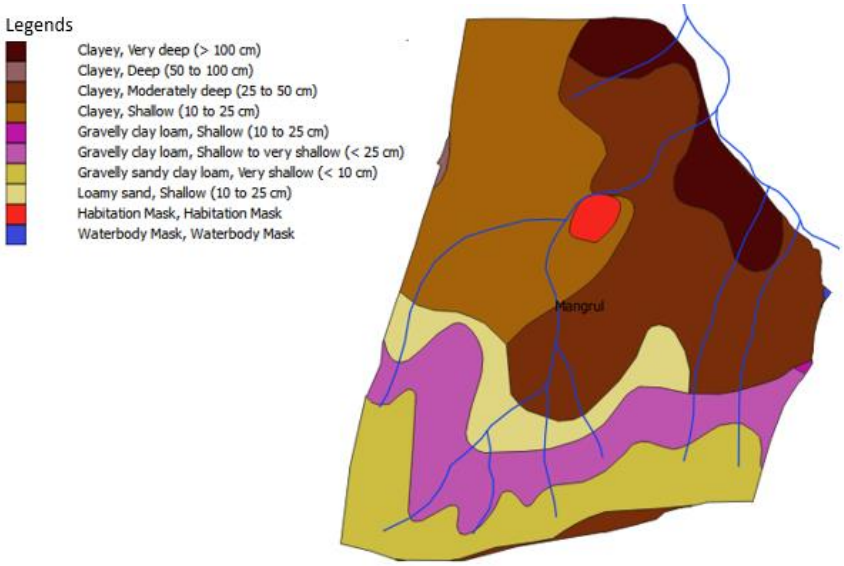

Figure 2: Soil Map for Mangrul

As can be seen, the hilly region of the village in the southern region has comparatively light and poor soils thereby contributing to fallow and scrub land. Similarly, the north-east region has a presence of good soils and stream proximity reflected in the land use map where the area of cropped with two or more than two seasons is concentrated. This is also evident from the fact that the gats in this region are much smaller than the gats in the rest of the village.

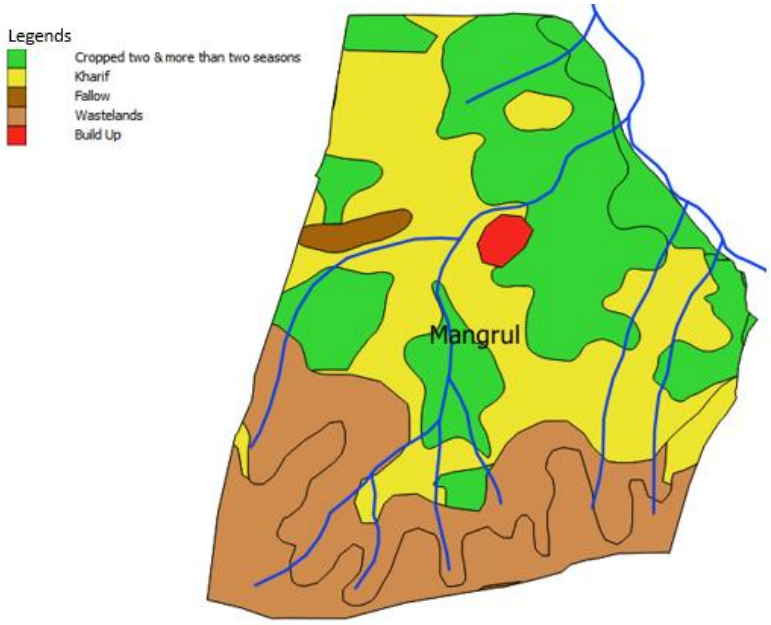

Figure 3: LULC Map for Mangrul

Figure 4, 5 and 6 shows cadastral, soil and land use maps for Adgaon. A small ridge that paases through the village (southwest to northeast) divides it in two regions. For the larger region which covers most of the village, the water flows towards east and drains the water to the neighbouring village Umartha through two major streams.

Figure 4: Cadastral Map for Adgaon

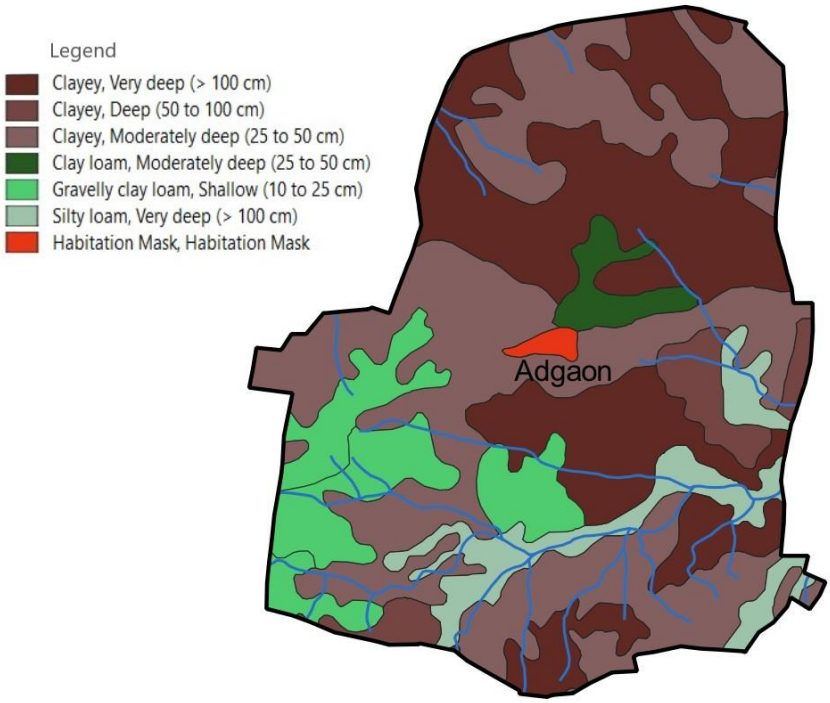

Figure 5: Cadastral Map for Adgaon

Except for the soils in the ridge area near the south west boundary of the village, most of the village is covered by good soil both in terms of texture and depth.

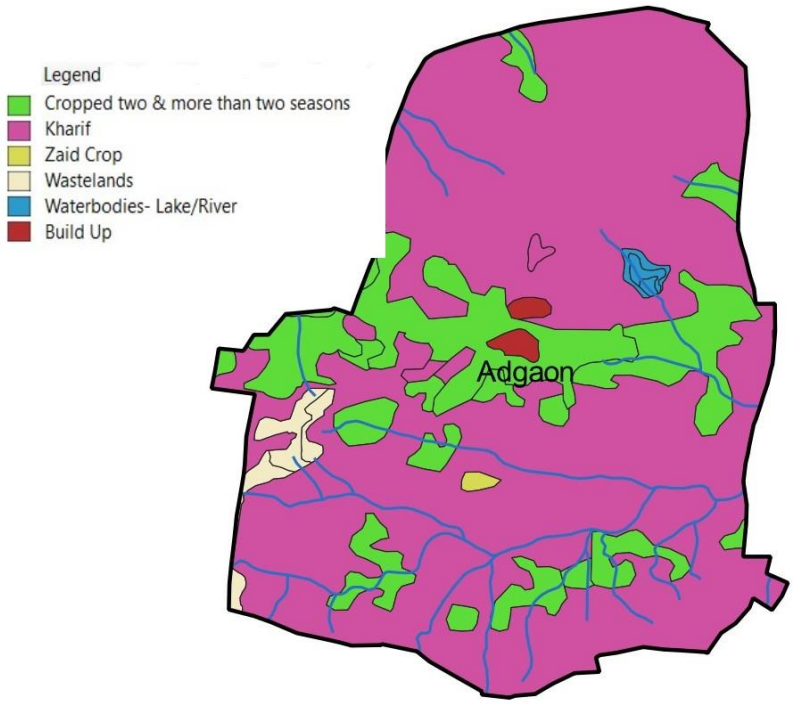

Figure 6: LULC Map for Adgaon

2.2. Design of survey format

One of the main objectives of the community extension component for the IITB team was to design simple and easy to use survey formats for the field staff. These formats will be useful to the field staff in the conduct of different village level meetings with the community.

The formats designed by the IITB team were focused on collection of the data for key attributes and parameters which forms key inputs and outputs to agriculture. This was aimed at documenting both, resource availability as well as resource constraints to the particular farmer for two main inputs to the agriculture viz. soil and water and linking it with the crop yields which is the prime agricultural output.

The survey form designed and used by the IITB team for data collection is divided in five sections each focusing on a particular theme. The survey form is attached in Annexure 1. The five themes covered in the survey form are listed as follows:

- Resource availability: In terms of land size, soil and its type, source of water for irrigation
- Irrigation infrastructure: Componentwise details on investments made and benefits reaped
- Current year details: Farmers' perception about monsoon for kharif and rabi, rabi crop plan
- Yields: Yields fetched for major crops in different years
- Farmers' perception about Broad Bed Furrow (BBF), a flagship technology promoted by PoCRA as a reliable solution for soil moisture optimisation

Since this was the first pilot exercise, the IITB team decided to focus on only five themes. The findings based on the data collected using this format can be discussed in the introductory community level meeting in any village. However, based on the requirement of the particular agricultural problem that needs to be addressed collectively at the community level, similar survey formats for data collection can be designed to better understand and quantify the problem to further explore different approaches to feasible solutions.

Except for the farmers' perception about the scheme, all other themes dealt with mapping available resources with the farmers along with the yields. The idea for selection of this combination of themes was also to understand the linkages of these resources with the vulnerability of the farmer. While designing the form, care was taken to keep it short and yet

document the meaningful data of our interest. Also, the questions were designed in a way that together they capture the spatial and temporal variation for the respective themes. The articulation and the order of the questions in the first draft of the form were improvised after conducting initial surveys to arrive at the final survey form.

2.3. Farmer Selection

To ensure that the findings from the data reasonably represent the ground reality of the particular village, farmers from different regions were selected. The maps of cadastral, soil type, drainage and land use were used in farmers' selection. Cadastral maps were used as proxy for selecting farmers with different land holding based on cadastral size and overall spatial spread. Similarly, soil maps were used to ensure farmers from both poor as well as good soils were selected. Drainage maps were used to select farmers with different water availability owing to stream proximity and land use maps were used as proxy for rainfed farmers and farmers with protective and assured irrigation.

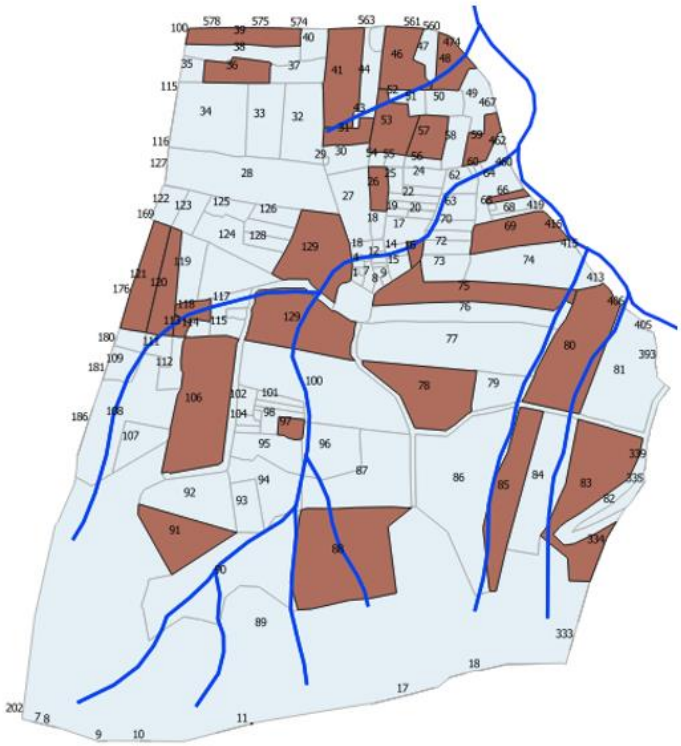

Figure 7: Location of the gats of the interviewed farmers (27) in Mangrul

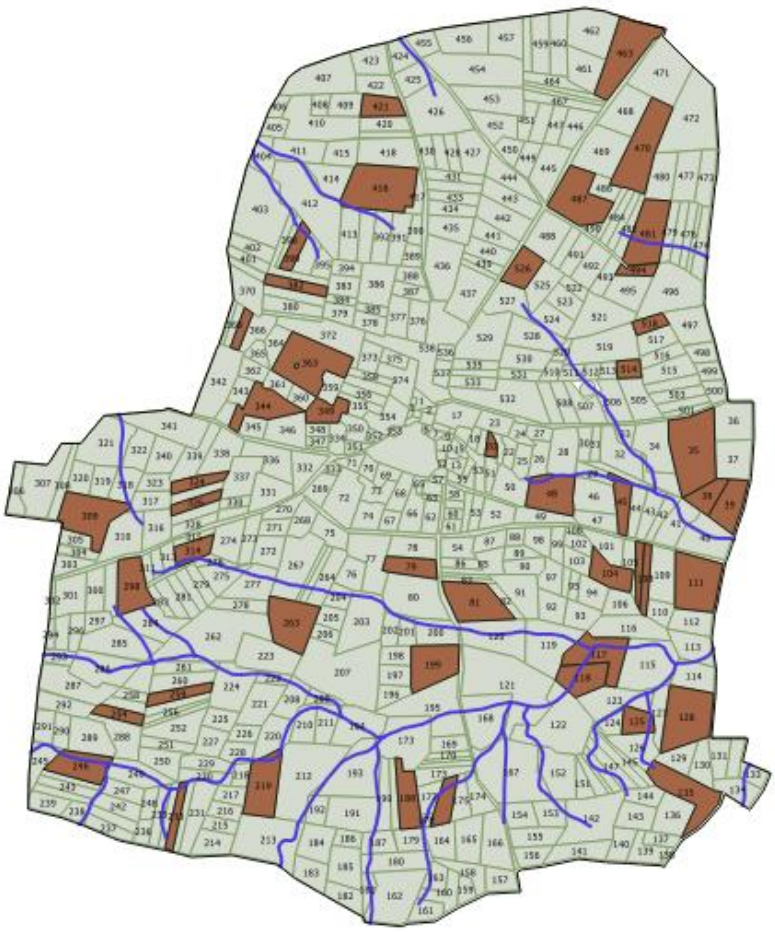

Figure 8: Location of the gats of the interviewed farmers (47) in Adgaon

Figure 7 and 8 shows the gat numbers of the interviewee farmers from Mangrul and Adagon respectively.

2.4. Interviews and Focused Group Discussions

The IITB team[1] conducted interviews of 27 and 47 farmers from Mangrul and Adgaon respectively using the survey forms. Similarly, multiple rounds of focused group discussions were also conducted. One round of discussion was conducted with the farmers on the very first day of visit at the gram panchayat office to inform them about the overall exercise and its objectives. Whereas, other group discussions were conducted on the last day of visit to triangulate the collected data and test preliminary findings emerging from the same.

Figure 4 shows the sample photographs of the farmer interviews conducted by the IITB team.

[1] Team members who contributed to the fieldwork included Amol Wadje, Rijyuta Kaabaadee, Jaydeep Tathe, Dinesh Paralkar, Vishal Mishra, Chirag MM, Asim RP and Dr. Hemant Belsare in both the villages and Gopal Chavan and Manasi Bhopale in Mangrul and Adgaon respectively.

Figure 4: Photos during farmer interviews and discussions

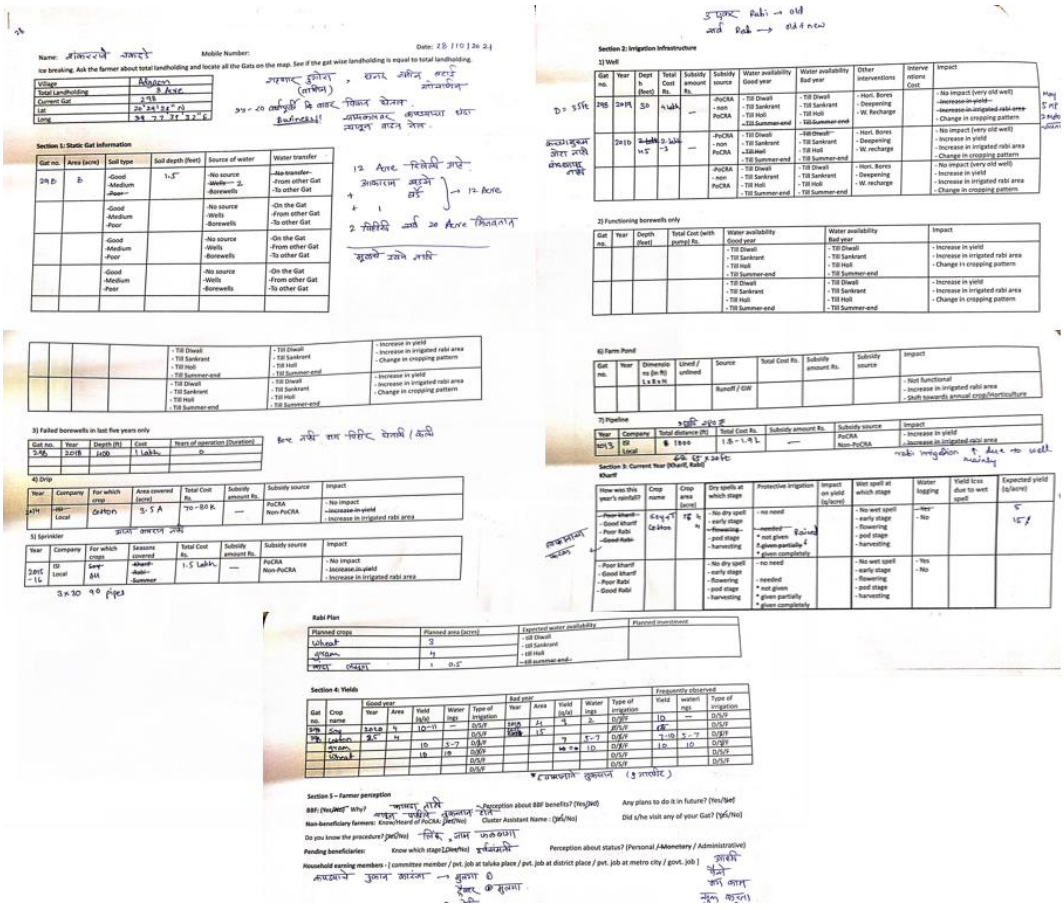

Figure 5: Snippets of a sample filled survey form

Figure 5 shows the photographs of a filled survey form for a farmer interview conducted by the IITB team.

The data recorded as farmers' response were later compiled and documented in the spreadsheet format for analysis. The data was arranged theme wise in different sheets with each row indicating a unique data point for the particular sheet or theme. These sheets included 'Mastersheet' to identify a farmer with an unique id; 'Farmer Details' that captured the location of farm land and response for section 5 about the farmers' perception about the PoCRA program; 'Static Gat Information' that compiled land owned by interviewee farmers in different gats along with attributes of soil and availability of water; 'Irrigation Infrastructure' that compiled all the details of different irrigation infrastructure in terms of investments and benefits reaped; 'Current Year Kharif' and 'Current Year Rabi' that compiled cropping pattern for the current year, and finally 'Yields' that compiled frequently observed yields, yields for good and bad year for a resective gats.

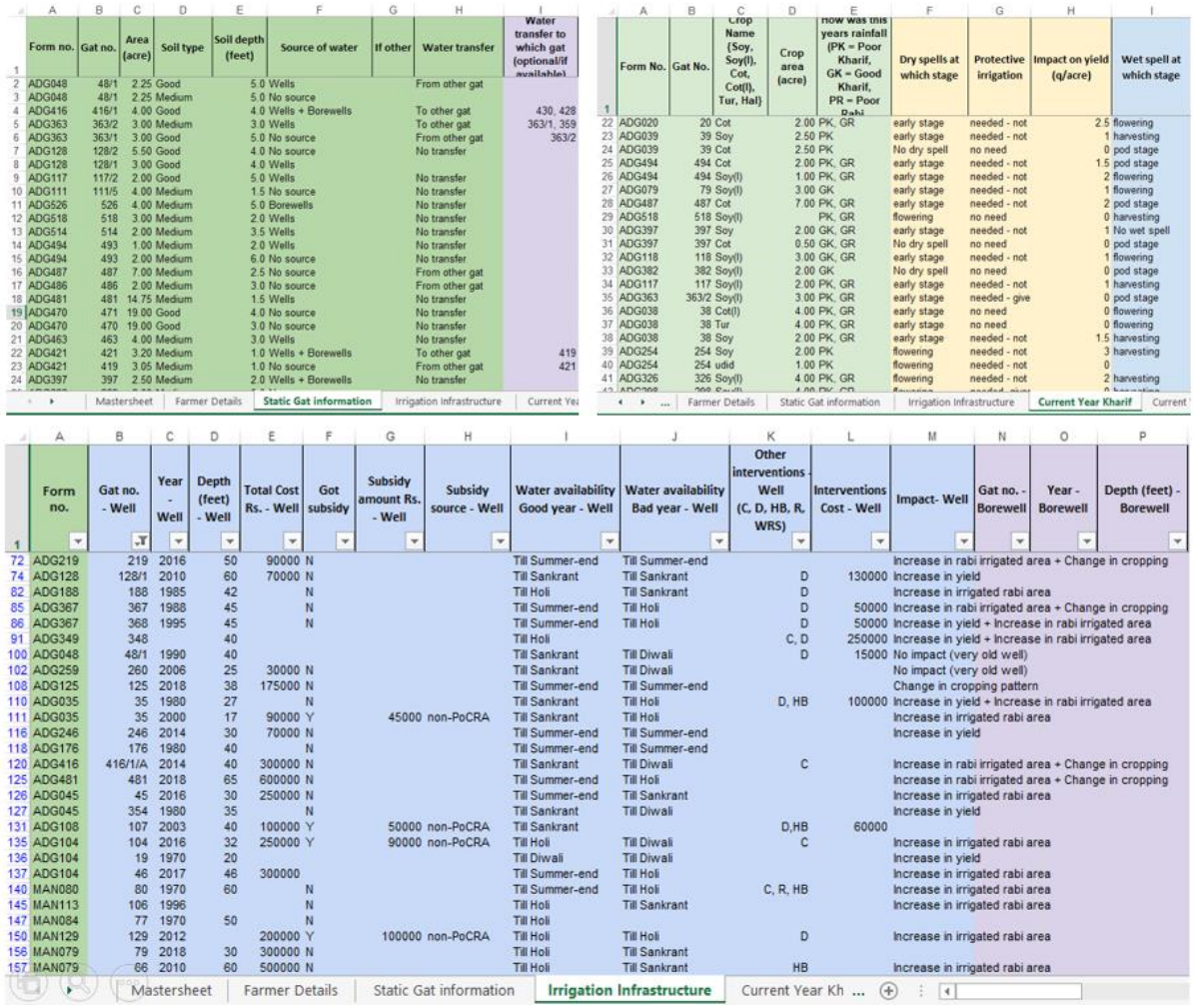

Figure 6: Snippets of the sample sheets with ordered data

Figure 6 shows snippets of the ordered data for the sample sheets.

2.5. Challenges in data collection

This section discusses the challenges met during the data collection exercise and the IITB team's response to the same. The IITB team initially decided to collect data using KoBo Collect App on smartphones so that the collected data can directly be used for the analysis in spreadsheet format. A sample form was designed in the KoBO Collect App as can be seen in Figure 7 which shows the snippets of the same.

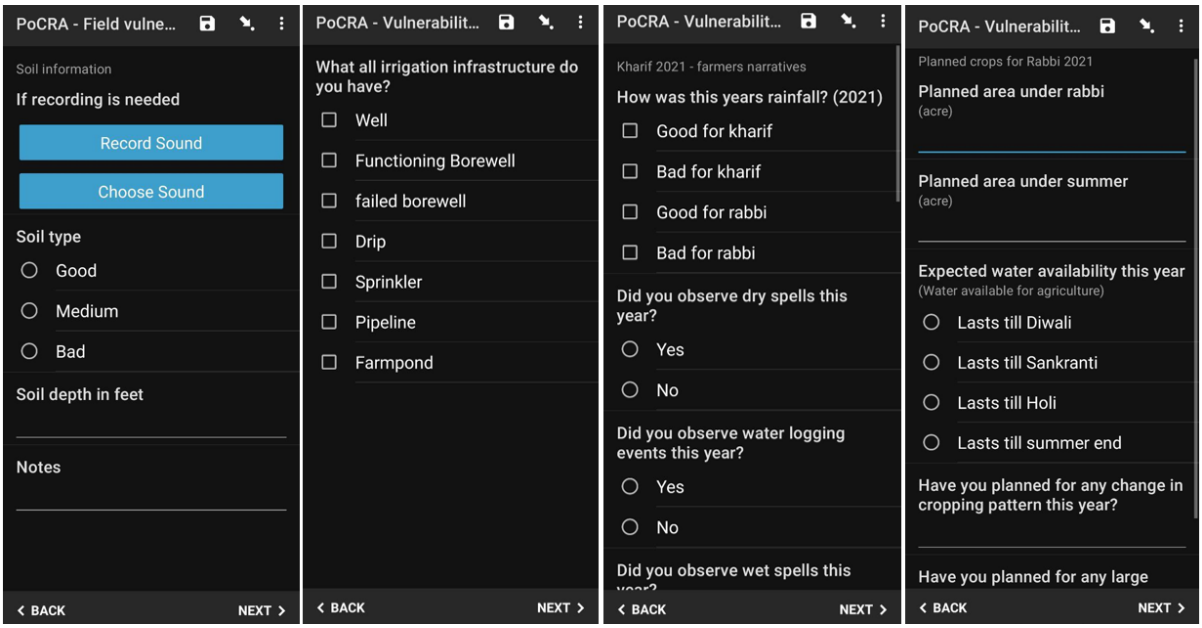

Figure 7: Sample snippets of the survey form designed on KoBo Collect App

However, it was realised that this was not a feasible option given the nature of the questions and farmers' detailed response to the same. Thus, the idea of data collection on the phone was dropped and farmers' responses were noted down on sheets of papers.

The prime challenge faced by the IITB team was however regarding the quality of the data on impact of dry and wet spells during this monsoon on kharif yields in section three. It was noticed during the interviews that the data reported by the farmers on the impact of wet spell on crop yield was very much on the higher side. Whereas impact of the dry spells did not seem very much consistent with the observations and findings from the earlier field visits.

This was possibly because of the timeline of the conduct of the interviews by the IITB team and declaration by the state government about compensation to the farmers hit by the heavy rain and wet spells. The visits by the IITB team were conducted in the last week of October

starting from 22nd October and continued till 29th October. Whereas the announcement from the government came on 13th October. We could sense that there was a general perception among the farmers that the interviews conducted by us were somehow linked with remuneration that they may receive as compensation for the losses incurred due to heavy rains. Hence there was a tendency to report the losses on the higher side to make sure that they don't miss out on compensation.

Another explanation is related to the farmers' perception about yield loss due to dry and wet spells. For the last two years wet spells have been witnessed in PoCRA region during the harvesting period of kharif crop and it is perceived by farmers as more detrimental to crop yield than dry spell. This is possibly because this year, these wet spells were observed at the later stage of the crop growth nearing the harvest, a time period where farmers are more hopeful of fetching good yield than that of early crop stage when dry spells were witnessed.

This issue of the data quality in section three was partly addressed by conducting group discussions with different farmers to triangulate the data regarding impact of dry and wet spells on the yields. Group discussions with farmers were also helpful to triangulate data on soil type and soil depth in different regions of the village.

2.6. Data Summary and Analysis

This section summarises the data collected during the fieldwork and discusses the interpretation of the same. Table 2 summarises key data points considered for the analysis.

Table 2: Summary of the data used for analysis

Sr. No.	Data Point	Mangrul	Adgaon
1	Soybean yields for farmers in 2021	17	29
2	Best yield fetched by farmers in different gats with respective soil types	23	49
3	Seasonality of the wells in term sof water availability	26	44
4	Irrigation infrastructure details for farmers	27	48

Key Findings:

- Wide variation in the yield within village

Figure 8 shows the variation of the yield for the soybean in Mangrul and Adgaon. Ordering of the collected data as shown, helps in visualisation of the spread of the yield and estimation of median yield, an important agriculture attribute of the village.

As can be seen from the figure, in both the village the minimum and maximum yield fetched in 2021 is 2 and 10 q/acre respectively. Although Mangrul has higher average and median yield (5.6 and 6) than Adgaon (5.1 and 5), the yield spread is more distributed in Adgaon (std. dev. 2.05 as against 2.36 for Mangrul). Therefore, a farmer from Adgaon can be said to have stabilised yield as compared to its counterpart from Mangrul. However, in both the villages more than 20% of farmers or one in each five farmers is fetching yield less than the breakeven point which is assumed to be 3 q/acre for soybean. These farmers operating at break-even point need to be prioritised for targeted extension and beneficiary selection followed by those above break-even point and below median yield.

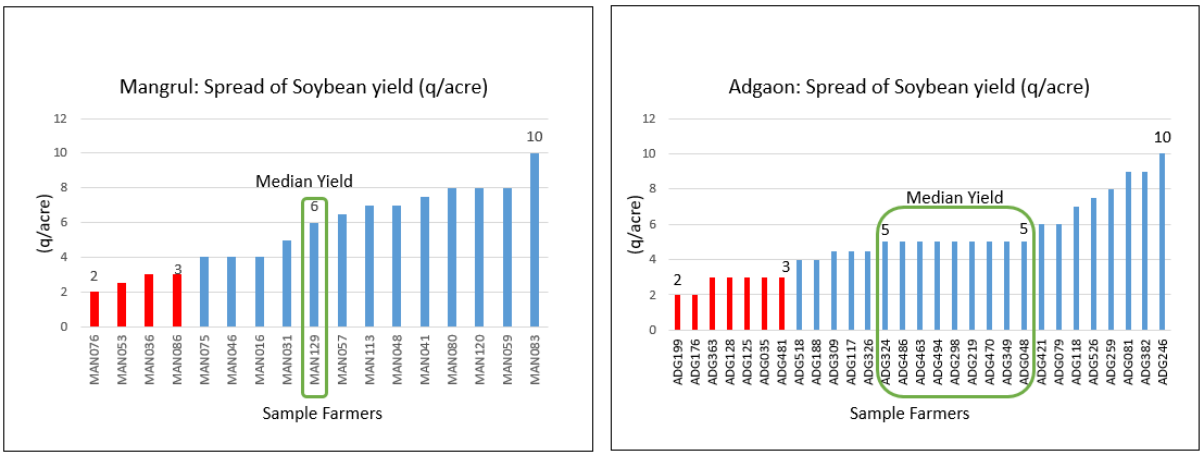

Figure 8: Yield variation for Soybean in Mangrul and Adgaon

These graphs also provide a yardstick to assess the profitability of the crop at farmer as well as village level. The same crop may be beneficial to some of the farmers and at the same time may prove to be loss making. Similar plots can be made and compared for different major crops in the village such as cotton and tur. The nature of the spread of such graphs help us understand the different insights of the respective villages for the respective major crops.

- Yield variation with soil type

During past field visits by the IITB team including this one, farmers have reported and emphasised the role of soil type as an important determining factor for the yield. This is also evident from the IITB water balance model results for crop deficits for different soil types wherein good soil are shown to have lesser crop water deficit than the poor soils.

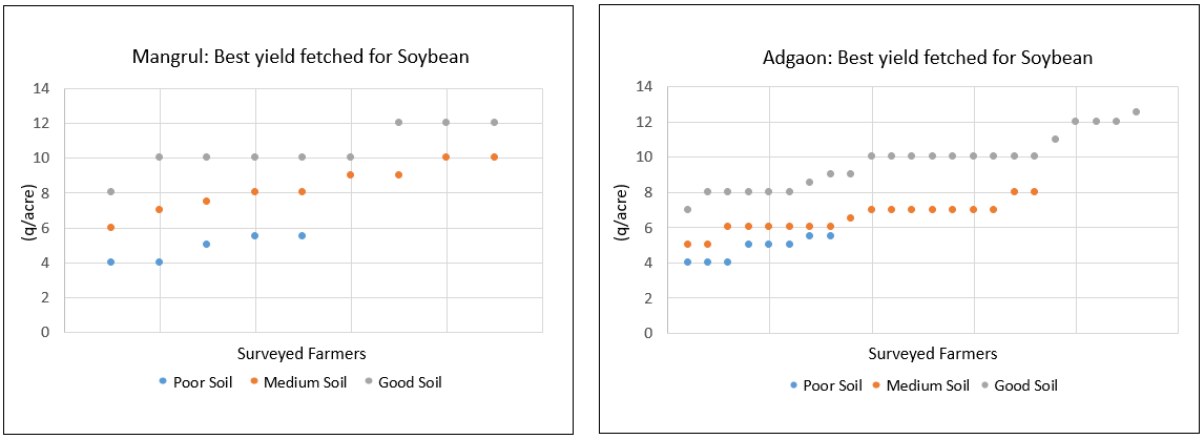

Figure 9: Yield variation (best yield fetched) for Soybean with soil type in Mangrul and Adgaon

In the previous section, yields fetched by farmers in both villages for soybean in the year 2021 were compared. In this section we compared the best yield fetched by different farmers for soybean in both the villages. Figure 9 shows the variation of the best yield fetched for soybean with respect to soil type in both the villages. As can be seen for both the villages, there is clear correlation of the soil type with the yield fetched.

Similar graphs can be plotted for different major crops both in kharif and rabi. These graphs for different crops can be useful to assess the suitability of the crop for a given soil type in a village over other crops for the respective season viz. kharif and rabi. Presenting these graphs in the village meeting also provides a case for highlighting the importance of soil type, an important biophysical attribute of the farmer which can be used as proxy for prioritisation and targeting of the beneficiaries.

- Seasonality of the water availability in the village for good and bad years

One of the important indicators to understand the spatial imbalance in the village is water availability in the wells for the farmers in different regions of the village. Figure 10 summarises the water availability for both the villages in good and bad monsoon years.

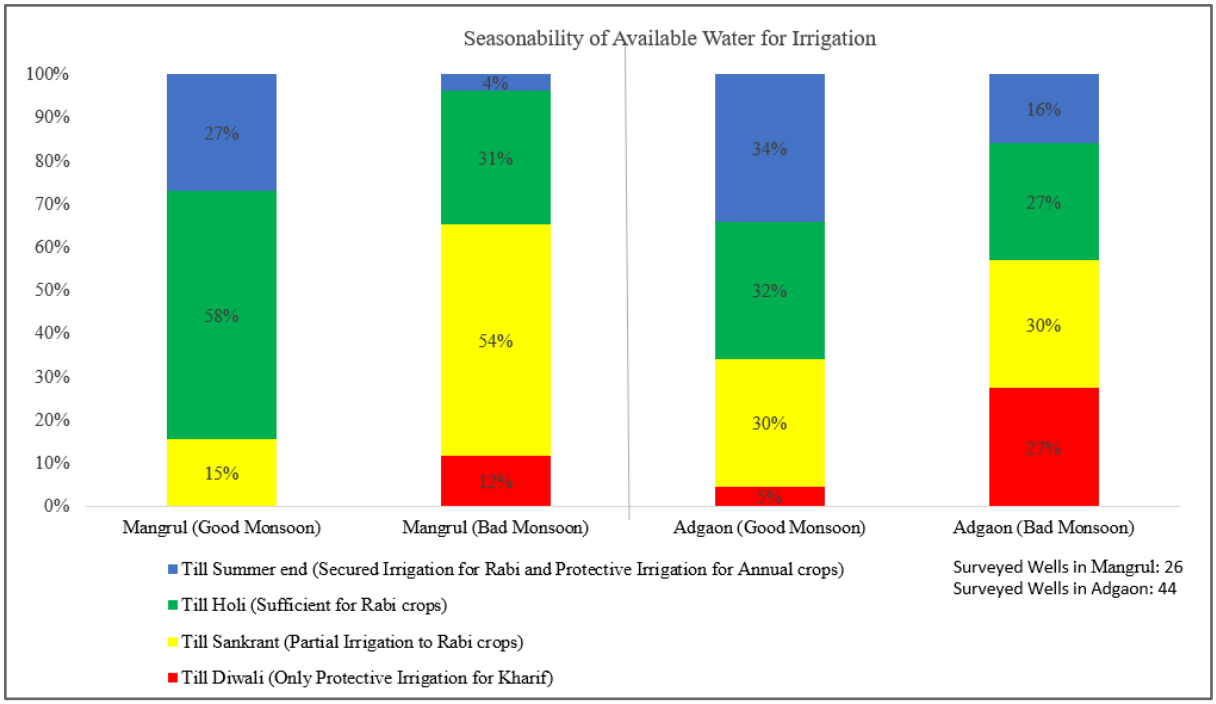

Figure 10: Seasonality associated with water availability in wells

As can be seen from the figure, wells in Mangrul show more seasonal variation as compared to wells in Adgaon. The same is evident from the farmers' narratives on rabi cropping of both the villages for a given year and satellite imagery for the cropped area where Adgaon is reported to have a larger percentage of rabi cropping area under assured irrigation than that of Mangrul. This is due to higher slopes and comparatively thin aquifer in Mangrul as compared to Adgaon resulting in lower water storage and availability of groundwater in Mangrul which is the primary source of irrigation.

Such analysis is useful in estimation of assured cropping area in rabi for a village, limits on the expansion of the rabi area in the village and demonstrates the need for rabi crop planning. It also gives an idea about the variation in the rabi cropped area for good and bad monsoon years. Similar comparison can be made for a particular village and its neighbouring village or that of the taluka to understand how the village is placed with respect to them for rabi.

This may also be supported with the mapping of the surveyed wells with their respective water availability which then can be used to discuss in the village meeting. It can also be used to identify priority regions for possible interventions if any based on the water availability as per these four categories.

- Mapping of farmers on 'Irrigation Ladder' and test cases in the form of narratives

We propose a concept of 'irrigation ladder' to understand the status of the privately owned irrigation infrastructure by the farmers in the village. This requires data on the different sources of irrigation such as well, borewell or farm pond; supplementary infrastructure used such as motor, pipelines, drip and sprinkler; and finally the seasonal water availability for that particular farmer. Figure 11 shows visual representation of the irrigation infrastructure ladder.

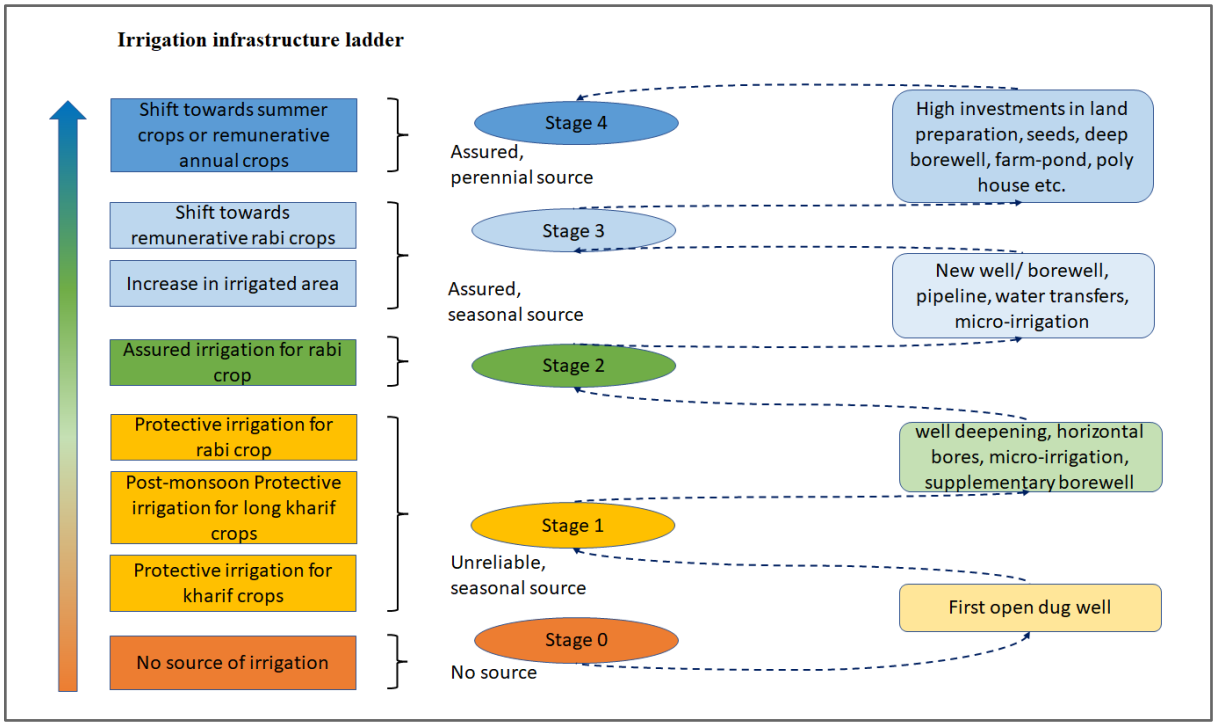

Figure 11: Conceptualization of irrigation ladder

The bottom most step (labelled as stage 0) of this ladder is occupied by a farmer without any source of protective irrigation and could fetch only kharif crop whereas the top most step (labelled as stage 4) is occupied by a farmer with assured source of irrigation, facility of micro irrigation with an ability to afford intensive investment for annual crops and high end technology solutions such as farm pond, polyhouse etc. This ladder depicts a typical journey of the farmer where the motive is to move up the ladder.

The trajectory of the journey for climbing up the ladder is to first get access to irrigation followed by ensuring protective irrigation and then to assured irrigation simultaneously attempting to increase the availability of water for irrigation by tapping to the new sources of irrigation.

Table 3: Irrigation ladder for Mangrul and Adgaon

Steps of Irrigation ladder	Mangrul	Adgaon
Stage 4	1	7
Stage 3	4	3
Stage 2	10	13
Stage 1	11	15
Stage 0	1	10
Total Farmers	27	48

For example, it can be seen from Table 3 that in Adgaon there are considerable farmers without source of irrigation and hence have no access to groundwater which is not the case for Mangrul where almost all the farmers have at least some access to irrigation. Therefore, interventions such as construction of dug wells can be targeted in Adgaon which may not be the priority in Mangrul. However in Mangrul, availability of assured irrigation is less and hence interventions to improve the availability of groundwater such as contour trenches and bunds, and other NRM activities can be taken up.

Further, when most of the farmers move up the ladder and occupy stage 2 or above, to progress further they will need higher investments where intervention to provide credit to these farmers can be taken up. Thus, different strategies can be designed once we have such mapping of the farmers on the irrigation ladder.

2.7. Outcomes

The pilot conducted by the IITB team is expected to be taken up by the krushi sahayaks with the support from field staff cluster assistant in PoCRA villages. This section discusses some of the important outcomes of such exercise.

- Documentation of key attributes such as median and average yield for major crops, water availability in different parts of the village based on the primary data. Compilation of these attributes along with the secondary data and descriptors emerging from simple analysis of these various datasets will form important inputs to the village agriculture handbook, a publicly available document to be maintained at the village level which is envisioned to be a comprehensive and detailed account of the village geographics, natural resources, public infrastructure related to agriculture, economy and other relevant sectors to the agriculture.

- Establishing a realistic baseline for a village using various attributes and descriptors to depict the current state of the village. This baseline information along with the village handbook will help field staff to measure, assess and evaluate impact of various interventions and extension programs.
- Identification and documentation of the key descriptors. One such example is categorisation and mapping of the farmers on the 'irrigation ladder' to identify and prioritise the water related problems faced by different groups of farmers in the village. Such categorisation will also provide sample narratives for each of these categories about the water related issues faced, benefits of the irrigation infrastructure etc. which can be used as exemplars for discussing agriculture scenarios at village level.

The findings from similar exercises conducted will essentially provide important inputs for the village meetings such as *'kahrif aadhava baithak'* and a ground for discussing various agricultural problems in these meetings. The overall exercise will be helpful for the community and the field staff to comprehend the ground reality and discuss the course of actions to be taken up to address these problems.

3. Template for Kharif Extension Activities

This chapter discusses the details on the procedure to be followed for different activities to be conducted as a part of the proposed knowledge based extension framework.

3.1. Design of the survey formats

For the initial rounds, field staff will get ready to use survey formats for data collection from the PMU. Based on the local context of the village, field staff may improvise these survey formats for capturing additional information which they feel is important as far as the agriculture scenario of the village is concerned. Going ahead, the idea is to train the field staff not just to simply collect the data but also to design the survey formats, conduct interviews, analyse the collected data and present the findings in the community meetings.

The survey forms should be designed in such a way that they capture the key data points required in optimum time. As a thumb rule, the survey form should not be more than a page and should not take more than ten to fifteen minutes to record the farmers' response. Also the

questions should be framed and articulated in such a way that they can be comfortably answered by the farmers.

3.2. Selection of the farmers

Based on the nature and objectives of the survey forms, the selection process may be appropriated by the field staff. However, in general scenarios where the idea is to study phenomena for the overall village such as for the formats aimed at understanding the agriculture scenario of the village and documenting the ground realities, resource availability and constraints following attributes of the farmers should be considered while selection.

- Farmers of varying landholding (large and small farmers)
- Farmers with good, medium and poor soils
- Farmers in zones of stream proximity and non-proximity
- Farmers with no irrigation facility (rainfed), and those with protective and secured irrigation
- Farmers with only kharif crops, with kharif and rabi crops and with kharif, rabi and annual crops

The selection should be made considering combinations of the above listed points ensuring adequate representation of the farmers population in the village and spatial coverage of the different biophysical attributes.

3.3. Conduct of Interviews and Documentation

The field staff are expected to conduct interviews using the survey formats and document the collected data. These field staff shall be provided with the simple spreadsheet based (such as MS Excel) templates which can be directly used to summarise and analyse the data in the form of tables, graphs and charts for better visualisation. Alternatively, they can also analyse the data on their own and look for the descriptors and better explainers based on their experience and interaction with the farmers.

One of the main outcomes expected from this exercise is to initiate a process of establishing a baseline by documenting some of the key agricultural attributes at the village level (to begin with for kharif season and later for rabi season too) which are currently not recorded in any administrative process. Some of these key attributes are listed below.

- Median yield for the major crops in the village

- Average yield in different zones for the villages
- Impact of dry spells and wet spells on crop yield in different soil types
- Seasonal water availability in different zones of the village

All of the above attributes are helpful in either identifying or prioritising the problem to be addressed, understanding the linkages and correlation between these attributes to better comprehend the reality. This documentation should feed to the village handbook which is expected to maintain a record of these attributes along with other important databases.

3.4. Maintaining Village Agriculture Handbook

It is proposed that a village level handbook needs to be maintained at the gram panchayat office. This handbook will be an important tool to conduct the village level meeting. It will be a compilation of all the available secondary datasets, known primary data, important farmer narratives, key agriculture descriptors and biophysical attributes which will provide a comprehensive and holistic account of agriculture at village level.

Apart from the important primary and secondary data, this handbook shall also include different maps of drainage, soil, NRM works, wells, vulnerability and visualisation of other important descriptors in the form of graphs and charts. This village handbook will also be used to document minutes of meetings conducted by field staff and record season wise produce for major crops at village level.

3.5. Conduct of Village Level Meeting

The next key task for the field staff is to conduct the village level meeting with the farmers. One such meeting is *kharif aadhava baithak.* The field staff should conduct such meetings using different maps and visualisations such as graphs and charts documented in the village handbook, and findings from the exercise conducted as a part of extension activities. All these findings and important documentation should be presented and discussed in such meetings.

This meeting will provide a platform to the community for giving feedback to the agriculture department through field staff and will start a discussion in the village about the agriculture issues at the community level. An important outcome of the meeting will be consensus among the farmers on the key agriculture issues in the village and need to address them at community level.

This meeting will thus provide a ground for collective actions which can be taken up to address some of the key agricultural issues thus facilitating farmers participation in the overall process. Further, it will also help the state agencies in the targeted extension and better identification of the beneficiaries. Such meetings can provide an important platform for participatory planning of different NRM activities.

4. Recommendations

Based on the learnings from the extension activities conducted by the IITB team and considering the broader picture of the overall knowledge based extension framework following recommendations are made.

- Season wise documentation of the cropping pattern (for the village) and the yields fetched by the sample farmers for the major crops should be recorded and maintained at the gram panchayat.
- Krushi sahayak should conduct and coordinate the activities as a part of extension with the support from VCRMC and other field staff such as cluster assistants.
- 'Village Agriculture Handbook' should be maintained at the village with all the available secondary datasets and maps, primary data collected during conduct of extension activities, important farmer narratives, key agriculture descriptors and other important biophysical attributes.
- VCRMC should own up to the overall content of the handbook, especially primary data, minutes of meeting and findings emerging out of it and shall be custodian of this village agriculture handbook while ensuring that it is updated time to time by the field staff such as krushi sahayak and cluster assistant.
- Taluka agriculture officers and higher officials should use the descriptors documented at the village such as median yield, percentage of farmers below break-even point etc. and different indices provided by PMU such as kharif protective index and post monsoon index for monitoring of the agriculture scenario of the respective villages.