Need Assessment of Digital Solutions for the Management of Sustainable and Equitable Water Use within Water User's Associations in Atpadi

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Abbreviations

FGD	Focus Group Discussion
IWRM	Integrated Water Resources Management
SHG	Self Help Group
SOPPECOM	Society for Promoting Participative Ecosystem Management
WUA	Water User's Association

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Project stakeholders: The project is part of SEWOH Lab Project supported by TMG Research GmbH, Berlin and executed by SOPPECOM, Pune. The need assessment on digital solutions for the management of WUAs is undertaken among the primary stakeholders such as farmers and specific target groups such as women, landless households, Dalit and other vulnerable sections and youths.

Background

- The Tembu lift irrigation project implemented in Atpadi Taluka, is an innovative pilot project aimed at establishing a model of equitable allocation of irrigation water to all families residing in the project area irrespective of whether they own land or not. It is a break from the conventional irrigation model of water rights being linked to land ownership.

- This is achieved through a protracted people's movement for equitable water rights known as 'Atpadi Samnyayi Paani Chalwal' led by Shramik Mukti Dal Paani Chalwal.

- The government has accepted the demands of the movement for equitable water allocation. Besides equitable water allocation, the project aims to develop a sustainable water use model through integrated use of surface and ground water, local and external water through Water Users Associations (WUAs) established at cluster levels. Integrated water resource management (IWRM), equity and sustainability are key concerns of TMG and SEWOH Lab Project

- SOPPECOM is closely associated with the movement and provides scientific and technical support to the community and WUAs in achieving the objectives through scientific and technical inputs, data support, awareness, and capacity building.

- As part of this, SOPPECOM with the support of TMG, is exploring the possibilities of introducing community driven digital applications for the management of water resources allocations by WUAs. At present WUAs in general are using manual methods

for calculating the water demands of individual farmer members and that of the WUAs. An app is developed based on the needs of the WUAs and in close consultations with water users.

- WUA members have to fill up their water demand at the time of each season, which include the information on their survey numbers, type of crops and area under each crop to the Management Committee (known as Board of Directors) which in turn manually aggregate the information and make their water demands to the Irrigation Department which in any way has to fit within the allocated quota of water to the WUAs for each cropping season. The manual management with more than 700 odd WUA members is a tedious, time-consuming and error-prone exercise.

- Besides the water demand filing, there are no systems for farmers to address their concerns and grievances in case they are not getting the water they are entitled to.

- A simple and easy-to-use digital tool could help in managing the water demand, make water allocation more efficient, timely, equitable, transparent and sustainable. It provides easy to use data for the WUAs for timely decisions on water allocation as well as managing the demand.

- Keeping this in mind, SOPPECOM and TMG undertook a need assessment with various stakeholders to understand the relevance, need, opportunities and challenges of a potential mobile-based app to facilitate the functioning of WUAs and their members as described above.

Objectives

The main Objective of the need assessment is (1) to understand the community's perspective regarding the need for a digital tool in the management of water resources and (2) to explore the opportunities and challenges involved in undertaking the deployment of the app among the water users. As part of this, the following specific objectives are explored:

1. To understand the existing crop production and water management systems and to explore sustainable practices being followed by farmers.

2. To explore farmers' view and readiness for sustainable cropping and water demand management

3. To understand the penetration of mobile and digital technologies in terms of its ownership, use and access including the spread and reliability of data connectivity

4. To understand the present use of digital apps especially the capability to manage apps and digital data, and the associated challenges; to understand the challenges in using the digital app *e- Peek Pahni*, a government digital tool to capture the cropping patterns of individual farmers

5. To explore farmers' awareness of WUA and its functions which include the process involved in estimating the water demand by individual farmers and consolidation of the demand to access bulk water from the irrigation department

6. To understand the specific concerns of women, youth and marginalised groups with reference to access to water resources and the need and challenges in using digital tools

Methodology

It was decided that guided focus group discussions (FGDs) with farmers, including women, youth, and Dalits, would be an appropriate method to understand in depth various factors related to communities' understanding of the issue at hand: managing the water demand, the need of digital solutions and its challenges. Since the irrigation project is in its initial stages and WUAs are only in the formation stage, they are not aware about various process of working of WUA or about managing the water demand and allocation. Hence the need assessment exercise also must give the participants an initial idea about how the irrigation management system by farmers will work.

Prior to the conduct of the need assessment exercise, two interactions were organised with farmer community, village leaders and gram panchayat members in Lengrewadi and Tadavale on 9th and 10th of May 2023. These meetings gave basic ideas about how to prepare for the need assessment exercise, who all stakeholders to meet and what all issues to be discussed. The meeting with Gram Panchayat members also exposed us to the use of *e-Peek Pahni*

Detailed interview guides were developed for each stakeholder groups. During the first stage of the need assessment, conducted on 24th and 25th of May 2023, general farmers (mostly men except for one women self-help group), community members, and Gram Panchayat members participated in the FGDs. Additionally, key informant interviews with a member of the Management Committee of an existing WUA in Atpadi town and the executive engineer of the Sangli District Irrigation Department were held.

In the second stage, different stakeholder sections, as explained earlier, were involved in the FGDs so that a cross section of people belonging to various marginalised groups could express their views. Youths were specially met because of their familiarity with mobile and digital technologies.

In order to understand how a WUA manages their affairs and to understand their views on digital applications (as they are now doing manual data management), discussion was organised with a key office bearer of an existing WUA of Atpadi Minor Irrigation Tank that is in operation since last two and a half decade. The inputs provided by the office bearer of the WUA helped getting clarity on various issues related to WUA functioning.

The FGDs as part of the need assessment were conducted in the villages of cluster 9 and 10 where the pilot is going to be implemented through the SOPPECOM-TMG action research. Altogether 7 meetings were conducted: 2 with farmers and general community leaders, 2 with women representatives, 1 with youth, 1 with Dalit (administratively called Scheduled Caste) community and 1 with landless groups. All the key respondents were contacted and informed about the purpose of the meeting by the field level project staff of SOPPECOM well in advance.

Table 1: Itinerary of the Focussed Group Discussions with various stakeholders in villages

Date	Target group	Village	Approximate participants	Resource persons
24-05-2023	Farmers, village key informants	Masalwadi	18-20 (only men)	Larissa, Joy, Kiran, Neha, Abraham
25-05-2023	Farmers, village leaders, key informants etc	Lengrewadi	20-25 (only men)	Larissa, Neha, Abraham
25-05-2023	Women, Asha (community) worker	Tadavale	7 women and community leader	Larisaa and Neha
8-06-2023	Village youth	Masalwadi and Lengrewadi	15-18 (all male youths)	Neha and Abraham
8-06-2023	Dalit community members	Tadavale	12-15 (all men)	Neha and Abraham
9-06-2023	Women farmers	Lengrewadi	13-15 women[1]	Neha and Abraham
10-06-2023	Landless households (all from Dalit community)[2]	Madgule	25-30 men	Neha and Abraham
25-05-2023	Discussion with Office bearer of WUA	Atpadi	1 key informant	Larissa, Abraham and Neha

[1] Participation of women at present is very less even though they were very active during the movement earlier It would require concerted effort to bring them back into the project. The effort to get a women staff locally was also not successful. Women were invited for all the meetings by the local coordinators but hardly any women attended the meetings. Now the focus is on having special interactions to bring them into the project.

[2] Most of the landless belongs to the Dalit community and vice versa. Landlessness is not very high in the villages. However, we should keep in mind that all families have a minimum entitlement of 5000 Cu. Meters of water entitlement irrespective of landholding.

The data is in the form of qualitative information and it is being analysed and interpreted around broader themes as described under the objectives. We also propose a future path for empowering the users, so that the digital application can be embedded among the members and office bearers of the WUA.

Results

Present cropping and water management practices

Atpadi is a drought prone area having rainfall around 350 mm per year. However, during the last 3 years the area received good rainfall hence the local water situation (both ground water and surface water) is good. The last 5-year average rainfall is around 620 mm (77% increase in the annual rainfall from 2018- 2022). Tembu lift irrigation scheme is also supplying water to the villages[3]. Almost 70% of the farmers have access to water through wells, borewells and from local reservoirs, and more than half of the cultivated area has seasonal and protective irrigation while a substantial area also has year-round irrigation. Those who do not have access to any irrigation source depend on single cropping depending on the rainfall.

During droughts (1972 was the watershed drought year followed by severe droughts in 1986, 1987, 2002, 2008, 2012. 2014, 2016 and 2019) people used to manage the water demand through various strategies. Drinking, domestic and livestock water would be the first priority followed by water for high value crops like pomegranate which has been widely taken up over the past 2-3 decades. Farmers used to resort to saving the water for the crop or even getting water brought by water tankers from where it is available, often outside the village. One of the strategies commonly adopted was not let the crop 'fruiting' (keep a lean season without taking the harvest) in such situation. Since the agrarian economy is also closely linked to livestock herding, it is a major source of livelihood in such situation.

Cropping is a mix of growing grains (millet, sorghum, maize, wheat etc), pulses (minor grams, Bengal gram, pigeon pea etc), onion, vegetables and to some extent perennial crops like sugar cane. A substantial area is under horticulture of which pomegranate is the major crop

[3] The scheme is not fully functional in terms of reaching the connectivity to farmers field and the work is in progress. However, common water harvesting structures are filled by the Thembu Lift Irrigation Scheme which helps in recharging the ground water. For example, this year water is being supplied since January and still continuing at the time of the need assessment. Farmers can approach the department and make their case for filling the local reservoirs.

followed by grapes. Recently due to heavy rains and the advent of diseases, pomegranate area is reducing and people are shifting to maize and sugarcane as reported by farmers. Maize is also cultivated as a fodder crop in villages having hybrid cattle.

Water management practices exist to some extent. It is in the form of use of micro irrigation system such as drip irrigation for horticulture and to some extent for other annual crops. The horticulture is fully on drip irrigation and crops like drumstick, vegetables etc are also using drip irrigation method. The use of drip for sugarcane is not very popular due to the attacks by rodents as told by the Atpadi WUA office bearer. Awareness about the need of sustainable water management is still not felt strongly even though it is drought prone area. There are other methods for reducing the water use through improved agronomical practices like mulching, improving the soil quality etc by some farmers. Livestock based backyard manure use is practised by almost all farmers as there is substantial population of sheep and goats besides large ruminants.

Farmers also felt that direct irrigation for pomegranate through Tembu water may not be good for the crop as its pH value is high (which needs scientific substantiation). Because of this, farmers would prefer ground water-based irrigation and Tembu water to some extent used to recharge the ground water wells. People also felt that more area may come under sugar cane cultivation with more water being supplied as reported in Masalwadi village.

At present there are not many experiences of sustainable practices in the villages, though some farmers have interest in exploring these methods. For example, there are some farmers cultivating residue free organic pomegranate for export markets which fetch them a better return. Overall sustainable agronomical and water management practices have a good potential and needs strengthening. Since this is within the mandate of the WUA, it could be taken up through awareness and by building alternative field experiments, popularising alternative agronomic practices and some training and handholding.

Need for a digital tool

At present the WUAs have not been fully established or are not functional as an institution as it requires some more formalities to be completed by the irrigation department. Thus, the farmers who are expected to become WUA members, and office bearers, do not have a clear

idea about how to access irrigation water and no clarity regarding the process. Current practice is that the farmers belonging to a specific area where an existing water harvesting structure is located approach the irrigation officials and put a request for filling the reservoir. The official charges the group based on the quantity of water supplied to them and fills the reservoir.

Farmers were informed that this pattern would change once the WUA come into existence and each farmer then must make a demand in writing to the WUA management committee and the committee would access water from irrigation department. They would then supply water based on specific schedules/rotations. Farmers have the opportunity to either directly irrigate their field, or store in private sources like wells, farm ponds, tanks etc., or as a group in common water harvesting structures. In this context how a mobile based app could ease the process of filing the water demand, farmers have shown a genuine interest and expressed the need of it as it reduces their work such as filling the paper and taking it to office etc, even though they could not fathom the complexity of aggregation of demands of hundreds of farmers at the WUA level.

The assessment team based on interaction with various stakeholders felt that there is a real demand for an app to support the functioning of WUAs. This was very clear from the inputs we received from the already functional WUA in Atpadi. Managing the data and water allocation manually for a large number of members is tedious and time consuming and easy to use digital app could reduce this burden according to the key informant of the WUA. In addition, the WUAs could use the data to get a good overview of the total water demand in time, schedule the irrigation optimally and take appropriate action to sensitize their members if total demand exceeds total supply. Hence the idea to digitize the filling of water demand forms was a welcome idea.

The interaction also showed that a grievance mechanism through which farmers could notify the WUA office bearers, in case they have not received the water they are entitled to, or if they observe any technical problems such as leak in the system would also be helpful.

Current penetration of mobile and use of mobile based app

Almost all households own more than one mobile handset. Mobile phone having android application is mainly owned by men and youths. In our discussion with women groups, it was noted that most of the women have mobile phones (non-android) not the smart phone. Those who do not have a phone, use their husbands or childrens' phone. There were couple of educated women who use android handsets. Difficulty in using the android technology and touch screen is found to be limiting factor in the use of android phones. Almost all android sets have data connections and are active in use of WhatsApp and various other mobile based entertainment.

Men and youths are very active in the use of mobile phones. Youths use various marketing apps also for buying things, for applying for admissions, jobs etc. Most of the career-based processes are now digital as also accessing various government schemes. In case of farmers who are not very well versed in the use of such digital solutions, they take the help of others or there is support they can get from Gram Panchayat or e-Seva Kendra (support centre for digital services)

One of the commonly used digital app is *e-peek pahni* which almost all farmers use. As mentioned earlier, it is a government app used for getting the cropping information from farmers. Since it is used for ensuring payment for crop loss or getting crop insurance in case of crop loss all farmers are filing the information. In case someone is not able to do it on their own, they take help from others. Most of the households have youngsters who help in filing the information. Initially village leaders invited the local revenue official (talathi) to the village to give the demonstration and trainings to those who are well versed with mobile applications and its use. Now villagers are not facing any difficulty in filing the information.

Figure 1: Initial meeting held with farmers in Masalwadi

Mobile data connectivity and access is also not found to be a major problem. Like every household own a phone, most of them also have data connection.

However, it was felt that deploying an app which is to be managed by farmers and WUAs is not an easy task as most of the farmers are not well versed in filing information own their own. In case of women headed households she may also have problems of not having an android phone. This was one of the reasons why we conducted a specific meeting with village youths to explore the possibility of them taking leadership in facilitating the process. Most of the youths now residing in the village play some role in agriculture, and it was found that they would be willing to help in the process. One may have to identify few interested youths and training them to become local resource persons.

Discussion with specific stakeholders

Even though not directly linked to the need for an app for irrigation management by WUAs, understanding specific issues associated with women and landless/ Dalit community is

important from the perspective of understanding the ways and means to introduce strategies for ensuring participation, inclusion, and equity and access to water resources.

Discussion with women

Two meetings were conducted with women- only groups, one mainly members of Self-Help Groups (SHGs) in Tadavale and women farmers and agricultural labourers in Lengrewadi. SHGs have a lot of significance from the point of women getting themselves organised and creating economic platform for credit and business purpose. However, SHGs are not always engaged with issues related to natural resources such as water as experiences show. Even in Watershed development the role of SHGs is mostly limited to savings and credit and non-farm income generation activities. There are exceptions where such groups have come together to undertake group cultivation as is the case of Kudumbashree movement in Kerala. Facilitating women's groups such as SHGs and training them to undertake specific tasks related to water resource management or group cultivation is an important aspect and SHGs members could be supported along this line in the project.

Most of the women, except for those with good land holding and better economic background, also work as agricultural labourers. Women earn Rs. 200-250 for shift of 7am to 1pm. This supports them in the household expenses and savings a little bit. They informed that it is difficult to sustain only on farming as most people have smallholdings. Nobody among those attended worked in other sectors but their daughters are slowly getting to work outside.

As the discussion among women in Lengrewadi suggests, they are actively involved in all aspects of agriculture, except for ploughing which otherwise also is mainly managed through tractors. Some of the women also told that they manage the irrigation and use of drip-based irrigation in orchards. Since agricultural electricity supply is mostly available in nights men manage water pumping from wells as they are located far in most cases. Work done by women is land preparation for cultivation, sowing, de-weeding, making beds for sowing, harvesting and post-harvest works. A couple of attendees also reported spraying pesticides, fertiliser application etc.

Decisions on crops choices, marketing etc are taken at the household level and men play a decisive role but women are also consulted. Women also have access to earnings to buy things for themselves and their children. There are many factors considered while cropping decisions

are made such as price, the dominant cropping followed in the area, availability of water resources and so on.

There is some awareness about the irrigation project as well as knowledge that water is being released this year. The women were not aware of the requirement and formation of the WUAs. However, they said that they would be interested in taking up a role in the managerial committee if an opportunity is given. This is when they were told about the rules regarding inclusion of women in the WUA and the management committee formation.

Figure 2: Meeting with women farmers

Out of 13 women present only 2 women did not have their names in land records which is quite encouraging. Only 3 women owned smart phones, one a very young girl who just came to the village as a new bride. This girl was aware about mobile app etc and others felt that a mobile app is good if it helps the WUA, but they are not at all familiar with such applications. Any information needed through a smart phone was given to them by their children or spouses. One of the elder women said that the only thing she could do with the phone was to receive and end the call. The women said that they cannot afford SMART phones too. However, we found that the group was very engaging and the overall approach of the women is positive and if they are capacitated through either SHGs or other women groups they would proactively involve in WUA and some could take up leadership roles.

Dalits and landless

Landlessness and caste are closely linked in India. Most of the oppressed and numerically smaller castes in villages are landless while upper and numerically dominant castes own most of the land. For example, the Dhangar (shepherds) caste in Atpadi villages, even though is denotified nomadic tribe (other backward class) and lower in the caste hierarchy they own land and other assets as they are a dominant caste of the region. In the project villages most of the Dalit households are also landless while some of the Dalits who own land have very marginal, often unirrigated lands as we gathered in Tadavale and Madgule. In Madgule, Dalits got land belonging to Mahar Watan (land gifted to Mahar caste by king). Their main source of livelihood is labour as agricultural labourers and as casual labourers outside agriculture.

Since the Tembu scheme ensures water irrespective of land holding and is designed to cover all families, there is possibility of all the households getting minimum entitlement for irrigation water. his was informed to the gathering (some of those who attended the meeting was aware about it) and they were asked the strategies and means to access theis water as well as using it for productive purpose. One of the constraints they felt is lack of availability of land as well as difficulty in accessing land on lease or share cropping and lack of resources for investment.

Land owned by Dalits are either in the upper reaches or of very poor quality and unirrigated. So, most of them cultivate it during kharif and grow millet. The produce is not sufficient for even home consumption. Agriculture labour, seasonal migration (sugar cane harvesting), working in construction sites and other odd jobs as casual workers are the main occupation. In Madgule, there are around 60 landless families and almost half of them earn their living through seasonal migration.

Lack of irrigation is a major concern of Dalit land holders. One of the reasons is that their land is often located in upper reaches or are ignored by the irrigation department. For example, in Madgule, the dalit lands could be irrigated through the existing Bhudiyal talav (tank) which is irrigating other lands, but they could not get access at least for part of the Watan land that could be included in the plan as it is on lower reach. They felt that as areas already being irrigated by earlier schemes (like that of Bhudiyal Talav) is excluded, it looks difficult for them to get water from Tembu.

Figure 3: Meeting with the dalits and landless

One of the strategies could be taking land on lease. Share cropping is not the preferred strategy of landholders as it is found to be risky if the rain fails or crop is lost. Thus, the landholders who wish to provide land for cultivation prefer a lease amount for few years (generally 3-5 years as the practice shows) than share of the product. Most of the landless felt that it is very difficult for them to mobilise a substantial amount as well as other expenses to invest in cultivation. Most of those who have taken land on lease is those who are farmers and not landless as told in meeting. There were couple of landless who leased land but their experience is not very encouraging. However, there is a new possibility opening for equitable sharing of produce between the landholder and the landless as the landless has water entitlement. This has to be further explored.

Most of them are aware about the Tembu scheme and felt that water entitlement for landless is a positive step. However, they are yet not clear how they can access the water or what are the chances of using it. Some of them felt that they can trade the water with those who are in need of it. There is very little awareness among them about the formation of WUA or the strategies for getting membership. At present the WUA list consist of only landholders (khatedars) and the project is exploring ways to include non-khatedars also in the membership. SOPPECOM has submitted all the names of the landless households to the irrigation department for their inclusion.

Most of the dalit and landless including women have mobile ownership and all the younger lot own smart phone. Those who own land also use apps such as e-peek pahni. Youngsters use WhatsApp and other apps. There is a strong community group for celebrating Ambedkar Jayanti in which all Dalit households are members.

There are many genuine concerns among the landless and Dalits in accessing the benefits of the scheme as their experiences so far in such irrigation projects are not very encouraging. For example, Dalits who got land from the Mahar Watan (gift of land to Mahar caste) in Madgule could not get irrigation from the Budhiyal talav as reported or they finding it difficult to get inputs for farming (seeds, fertiliser etc) on loan which is easier for the upper caste farmers as reported by Dalits in the meeting. Caste feeling and discrimination is also reported as major issue by many youngsters who are more sensitive and aware about their rights.

Village Youths

The main purpose of meeting with youths was to understand the changing aspirations and to explore the possibility of them getting more involved in the project as they are more digital friendly.

Most of the youths felt that agriculture is not a preferred profession for many and they are only into it as other avenues are limited. There are some youths who are progressive farmers and pursuing agriculture professionally, but they are mainly from medium to large farmers. Around 30% of the youths are away from the village either working or studying or training for government Jobs. There are many youths involved in gold and silver purification business (in Marathi they are called Sona -Chandi dukaandars) which is a major occupation among many in this part of the state. Many youths also work in agriculture especially as skilled labour in orchards undertaking cutting and pruning.

All the youth have SMART phones. All the youth are digitally literate, and all the attendees said that each household has at least two SMART phones. WhatsApp and other social media apps are commonly used. They are aware of apps like *e-peek pahni* and help in filling the information. Use of apps related to farmer advisories, weather etc are not very common among the youths. Two youths who are trained by Paani Foundation has formed farmers group for sustainable and organic cultivation. However, they found that very few farmers are taking the initiatives in this direction.

They have shown interest in being involved in the project and help farmers in the use of digital solutions. There are no other constraints like internet connectivity in the area.

Figure 4: Meeting with the youth

The way forward

Farmer managed digital solution is new concept in the sites visited. Even though the access to smart phones and internet solutions are easily available in the villages, still many farmers, especially the older generation, find it difficult to manage digital applications own their own. This is evident as many farmers felt that they take the help of their children or those who are digital educated to file the information on e-peek pahni. However, the need for an app is felt by all in managing the irrigation and the proposed WUA functions. Some of the preconditions or non-negotiables for it to become successful are the following:

- The app should be very user friendly, simple and easy to record information by farmers or their family members. Too complicated and multilayered solutions won't work. This would help in melting the 'digital resistance' and ensure high adoption
- Hand holding and capacity building is essential in the initial stages. Group meeting of 30-40 farmers in different hamlets should be organised with live demonstration. Easy WhatsApp instructions and videos could help. Also, small posters on spreading awareness about the app to be stuck on main areas.
- The existing WUA from Atpadi Talav could also be included in the piloting of the app as they are very familiar with the process of making water demands and is functioning for the last two and a half decades.

- Village resource persons (VRPs -- youths who are digitally educated and interested) to be selected and trained who will provide handholding and backstopping support to farmers., One VRP can manage around 200-250 farmers. They can also be used to spread other messages on sustainable water use, alternative farming practices etc. they need to be compensated for the work
- Initially pilot the App with small group of innovative farmers and slowly spread it widely from learnings from this. Farmers needs to be informed about the use of data and also on data protection
- Special effort needs to be taken to ensure participation of women farmers. The law ensures women membership in WUA and its management body. Special capacity building and awareness programs with women is important
- Other marginalised sections like Dalit and landless also need focus. First and foremost, among this is ensuring that the water entitlement to them is facilitated and put into productive use through innovative approaches. As far as possible the idea of water trading needs to be discouraged which would encourage water markets and those outside also could come and purchase water which is entitled to the community through a protracted struggle. Among those marginalised who own land special effort is needed to ensure that they get access to irrigation water.