A Study for the Project on Climate Resilient Agriculture (PoCRA)

Water Case Studies in Osmanabad District:
Participatory Water Management,
Farm Ponds and Protected Agriculture

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WATER CASE STUDIES IN OSMANABAD DISTRICT

PARTICIPATORY WATER MANAGEMENT, FARM PONDS AND PROTECTED AGRICULTURE

A Study for the Project on Climate Resilient Agriculture (PoCRA)

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ACKNOWLEDGEMENTS

I am very pleased to present this report titled “Water Case Studies in Osmanabad District: Participatory Water Management, Farm Ponds and Protected Agriculture” to readers and scholars of Agriculture Economics.

Climate change is here to stay, and some of its adverse effects are seen today on agriculture. Agriculture in some of the water stressed districts of Maharashtra, has become extremely risky, driving a high level of variability in farming incomes. The Project on Climate Resilient Agriculture or PoCRA, is a World Bank funded project being implemented by the Government of Maharashtra in Marathwada and Vidarbha regions. PoCRA not only focuses on introducing new climate resilient agriculture techniques to the farmers within the Project Area, but also wishes to enhance their water access, which will really help them to enhance the current income levels. In fact, water interventions will be at the core of the PoCRA activities over the next few years.

In Osmanabad district, the years between 2011 and 2015 were ones in which water stress was acute. This created a variety of responses from different stakeholders. The Government came out with some schemes such as creating farm ponds, farmers applied for these individually or in groups, and in some cases, villages came together to practice participatory water management to conserve the existing water and enhance ground water tables in the future.

Has this created a change in Osmanabad? Have those farmers who created farm ponds in their fields managed to break-even? If so, in how many years did they do so? Some farmers, with assured water supply, have gone a step further in practicing climate resilience by moving into Shade net agriculture or polyhouse agriculture. What are the experiences of these farmers? Has their income increased? How has agriculture fared in the villages where participatory water management has been practiced? Are these models replicable? And very importantly, are these models sustainable?

These are the issues on which the Project Management Unit team at PoCRA has been mulling. Gokhale Institute of Politics and Economics was given the task of creating some case studies on these issues in Osmanabad district in Marathwada. I am very pleased to state that the Institute has completed the designated task on time; the results of the study are very interesting and are presented in this report.

I thank Mr. Vikaschandra Rastogi, IAS, Project Director, PoCRA, Government of Maharashtra for granting this interesting study project to the Gokhale Institute of Politics and Economics. Shri Vijay Kolekar, Agronomist, PoCRA, Government of Maharashtra from the Project Management Unit at PoCRA was our mentor and guided us through the entire project period; I wish to extend my heartfelt thanks to him too. I specially wish to thank Mr. Ranjan Samantaray and Mr. Patrick Verissimo, Task Team Leaders, PoCRA, World Bank Group, who
have been interacting with us through the entire project period and have taken a keen interest in all of our research findings.

Many subject experts generously shared their experience with us. We received a lot of inputs from Mr. Sunil Joshi, Jal Biradari. The Block Agriculture Officer at Kalamb Shri More and his Taluka Agriculture Officers were extremely helpful. They not only helped us to make contacts with farmers, but also accompanied our team through the day to facilitate the interactions with the farmers. I must put on record my heartfelt appreciation for Shri B B Thombre, Founder, Natural Sugar and Allied Industries Ltd., who also has been the social philanthropist who has led the participatory water management system in Ranjani village in Kalam taluka of Osmanabad. Shri Thombre not only hosted us in Ranjani and facilitated all our interactions with water experts, practitioners and farmers in Ranjani, but was kind enough to personally talk to the entire team about his thoughts on the process. Mr. Rajshekhar Patil has pioneered the participatory water experiment in village Nipani. Again, Mr. Patil personally spent time with our team on field, walked us through the forests that are again alive and green thanks to his efforts, and also facilitated our interactions with the villagers. Shri Shekhar Gaikwad, Director, GSDA and Dr. Bhoyar, Joint Director, Research and Laboratories were instrumental in giving us key inputs about the sustainability of various water interventions. Last but not the least, I wish to thank all the farmers in the different villages we visited, whose responses helped us to carry out the factual assessment of the water interventions in Osmanabad.

Mrs. Bhushana Karandikar and Mrs. Manasi Phadke were the chief co-ordinators of this project and have been deeply involved in getting the questionnaires for the case study interviews ready, interacting with experts, carrying out the field survey, and supervising the process of creating and writing the case studies. I congratulate both of them for coming out with such a timely and interesting publication. Our PhD student Mr. Vishal Gaikwad was instrumental in providing field and research assistance for this project. Our young and enthusiastic students’ team comprising of Ms. Rutuja Chaphekar, Ms. Saishwari Patil and Ms. Ashwini Velankar carried out the interviews and created the case studies for this publication. Ms. Manisha Shinde gave us admin assistance very efficiently. Mr. Vilas Mankar gave us all the technical assistance needed for this publication.

This project helped us to gain deep insights into the dynamics of water management in the water-stressed district of Osmanabad. I am sure that the report will serve as a useful addition to the existing literature on the subject.

Rajas Parchure
Officiating Director
Gokhale Institute of Politics and Economics
Pune
CHAPTER - I

INTRODUCTION

“Water is the living force of all nature”

Leonardo da Vinci

The Project on Climate Resilient Agriculture (PoCRA), the flagship scheme financed by the World Bank to build resilience in farming systems across Marathwada and Vidarbha, will be implemented by the Government of Maharashtra from 2018 to 2024. The Project Development Objective is to enhance climate-resilience and profitability of smallholder farming systems in the project districts of Maharashtra over the next few years. The project aims to achieve the objective through promotion of climate resilient technologies and commodity value chains across approximately 4,000 drought-prone villages in 15 districts, namely, Jalgaon, Aurangabad, Jalna, Beed, Parbhani, Hingoli, Osmanabad, Latur, Nanded, Buldana, Washim, Akola, Amravati, Yavatmal, and Wardha and approximately 1000 salinity affected villages in the basin of Purna river spread across Akola, Amaravati, Buldana and Jalgaon districts.

The Project aims to develop agricultural systems capable of coping with climate change, while at the same time enhancing the participation of farmers in agricultural value chains. In coping with climate change, the first issue faced by the farmers in Project Area is that of water-stress. That rainfall has shown huge variance in the last 2 decades is obvious to even the most casual observer in Marathwada. The change in rain patterns has occurred in two different ways: first, the date of arrival of the monsoons has changed and second, recent years have witnessed a sudden dry spell between two showers even after the monsoon commences. Rainwater is the chief source of recharge of ground water in Maharashtra; the change in rainfall patterns and the reduction in the average rainfall in Marathwada between 2011 and 2015 means that the recharge of ground water is deeply affected. On the other hand, there are multiple demands on the groundwater. Maharashtra has the dubious distinction of hosting 16 borewells on 1 sq. Km. of land in several districts, whereas what is prescribed by the Government is no more than 8 borewells. With this kind of demand on the water and reduced recharge, the groundwater tables have dipped alarmingly. Some users have started digging deeper and deeper wells thereby accessing the deep aquifers, which indicates that acute water crisis is already here and will worsen unless careful provisions are created for the future.

What are the immediate steps that can help Maharashtra in general and Marathwada in particular to mitigate the water crisis? The immediate solution to the present crisis is two-pronged: One, conserve whatever water we have today and two, create systems that will help the water to percolate into the aquifers thereby recharging the groundwater tables. To enable the latter, it is important that the natural nallahs and small streams be identified, be cleared of silt and other non-degradeable garbage so that the water starts flowing its natural course. The next step is to create small bunds on these natural streams to create backwaters that will then allow seepage and percolation to recharge the groundwater.
The main issue in Marathwada is that the naturally running small streams are almost unidentifiable. Most farmers have expanded their farms towards the water sources and it is not uncommon to find farmers encroaching on the natural streams and nallahs running through the villages. The streams go dry immediately after monsoon and can be mistaken with rough hewed paths with pebbles and garbage lying in it. The main problem is to convince the farmers that they have encroached on a common natural resource and that it needs to be freed from any private property rights. The second issue to get multiple such natural streams into a line and then practice Drainage Line Treatment on the nallahs to ensure that water starts flowing through it. Farmers are normally loathe to give up that part of the field through which the nallah runs and this has continued to be a major issue in terms of undertaking Drainage Line Treatment (DLT) or building of check dams or nallah bunds.

As has been mentioned before, as a project, PoCRA has an intensive focus on water management and enhancement of water resources in the Project Area. This is to be facilitated by catchment through Continuous Contour Trenches (CCTs), DLTs and check dams, water harvesting structures such as farm ponds, rejuvenation of water harvesting structures, and ground water recharge strategies. The project also takes a deep interest in participatory water management, which can go a long way in making the water systems more sustainable. To this end, Gokhale Institute of Politics and Economics was given the task of studying the existing participatory water management models in Marathwada. Cases of whether farm ponds have given economic benefits to the farmers were also to be created. Finally, farmers with access to water also can take the next step towards climate resilience by engaging in protected agriculture. The Institute was also asked to study the economics of polyhouse farming and shade-net agriculture. The entire approach was one of building case studies on participatory water management models, farm ponds and protected agriculture.

Our study took us to the Kalamb taluka within Osmanabad district, which has experimented extremely uniquely with participatory water management systems. In the village Ranjani in Kalamb, efforts of the founder of a private sugar factory, have not only created huge employment opportunities within the village, but have also led to the creation of a unique water model. Since the sugar factory is connected to thousands of sugarcane farmers, it has built a huge network of people all of whom are hugely dependent on water resources for their livelihood. When the drought came-a-calling in Osmanabad, it was the factory that created a water model and took the onus of convincing the cane farmers to participate in it. When the village finally cleared a 4 km water line and created check dams and bunds, the effects of the water management could be seen in a perpendicular as far as 6 kms across the line, wherein suddenly farmers in neighbouring villages witnessed an increment in the water tables in their wells. This created curiosity and hope and over a period of time became a huge water movement that has changed the face of Kalamb.

Whilst covering this inspiring story, we also met a man in village Nipani (no water) who likes to, in his own words, “just plant trees”. This man was the pioneer of the water movement in Nipani and has created an entire forest of lush trees in a Drought-Prone Area. He has also brought back to the village the traditional supporting occupation of sericulture. Availability of water has meant lush mulberry plantations and with this, most farmers have started a secondary sericulture occupation on their farms, bringing in a regular cashflow to the family. Presence of a secondary occupation has also meant more gainful participation from the women folk within the family.
Elsewhere in the Kalamb taluka, participatory water management has yet to see the light of the day. Here, farmers have opted for creating farm ponds on half an acre or an acre of land. This has again hugely enhanced the income profiles of the farmers. In many places, it is evident that farm ponds have been followed by polyhouses or shade-nets and the cropping patterns have changed towards high-value agriculture.

The report presents detailed studies on all of these cases, where water intervention has been the harbinger of change. Whilst recording the success stories, there have also been voices of concern and dissent that are increasingly talking about the sustainability of these water interventions. The report also presents this counterview to the readers.

Chapter 2 discusses participatory water management cases, chapter 3 discusses the farm pond cases and chapter 4 looks at protective agriculture as a natural corollary to the presence of water. Chapter 5 presents the view about whether the interventions such as the Jal Biradari model or farm ponds are sustainable. Chapter 6 concludes with findings and observations.
CHAPTER – II

CASE STUDIES ON PARTICIPATORY WATER MANAGEMENT EXPERIMENTS

CASE STUDY 1: BRINGING WATER TO WHERE NO WATER EXISTS “NIPANI”

Pic 2.1: Wells in Nipani carry water post water conservation

Village: Nipani
Block: Kalamb
District: Osmanabad

Village profile

A humble village of around 300 households named Nipani, translated as ‘no water’ in colloquial language, literally defines prolonged water scarcity faced by the village until a few years back. Hundreds of such villages in Kalamb block of Osmanabad district face water scarcity due to drought prone conditions, irregularity of monsoon and lack of water management. But Nipani, along with 10 neighboring villages aren’t one of them now. These villages have been not only surviving such conditions but also prospering by management of water resources through community participation.
Nipani, Naigaon, Wadgaon, Padoli, Borgaon, Wathawada, Hasegaon, Ekurka, Jaiphal, Ghargaon and Shiradhon, together have a population of 32676 of which 14155 people are involved in agriculture related work as cultivators or agricultural laborers (43 per cent of the population and 86 per cent of total workers respectively). The demographic and economic profile of these villages is as follows:
Table 2.1: Demographic and Economic profile of the villages participating in the Nipani Water Model

<table>
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<tr>
<th>Village</th>
<th>HH</th>
<th>Population</th>
<th>Literate</th>
<th>Total Workers</th>
<th>Main Cultivators</th>
<th>Marginal Cultivator</th>
<th>Main Agri labourers</th>
<th>Marginal agri labourers</th>
<th>Main other workers</th>
<th>Marginal other workers</th>
<th>Main HH Industries</th>
<th>Marginal HH Industries</th>
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<td>3508</td>
<td>16333</td>
<td>1706</td>
<td>1709</td>
<td>476</td>
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<td>Shiradhan</td>
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<td>9452</td>
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<td>4362</td>
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<td>71</td>
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<td>77</td>
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<td>1340</td>
<td>1145</td>
<td>446</td>
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<td>631</td>
<td>19</td>
<td>34</td>
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<td>8</td>
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<tr>
<td>Wathawada</td>
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<td>2297</td>
<td>1584</td>
<td>1360</td>
<td>510</td>
<td>12</td>
<td>716</td>
<td>42</td>
<td>55</td>
<td>2</td>
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<td>3</td>
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<tr>
<td>Total of 11 villages</td>
<td>6781</td>
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<td>23052</td>
<td>16476</td>
<td>6019</td>
<td>354</td>
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<td>649</td>
<td>1714</td>
<td>118</td>
<td>286</td>
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</tbody>
</table>
Background

Kalamb block falls under Drought Prone Area zone according to the categories of rainfall in Maharashtra. The historical data shows that Kalamb received lower rainfall than average for a few successive years from year 2013-2015. The Government of Maharashtra had declared drought for the same years of which Marathwada region was the worst hit. Many claim that the drought of year 2015-16 had been the most severe in Maharashtra in last century. Newspapers reported the ever increasing toll of farmers’ suicides during the same time and images of crop failure and barren lands were published as the face of agricultural districts in Marathwada.

Amidst such crisis, a farmer from village Nipani was growing a Garden of Eden on his 54 acres of land. “His land was the only green color we had seen in the village then” described another farmer from same village.

The man who planted trees

Pic 2.2: Mr. Rajshekhar Patil walked us through the forest he has planted
Mr. Rajshekhar Patil is a farmer who pioneered method of water conservation in Nipani based on logic and traditional knowledge of water resources rather than a very scientific one. The basic concept involved deepening & widening of the water streams and construction of check dams/ bunds on each stream at optimum intervals. This enables percolation of rainwater resulting into natural recharge of groundwater.

Mr. Patil, an innovative farmer, is a graduate in Agriculture from Rahuri Agricultural University in Maharashtra. From his father, he inherited 54 acres of land on which he carried forward traditional farming. Soon after realizing the profit potential in horticulture, he decided to grow fruits and vegetables. His income skyrocketed to Rs. 20-22 lakh per year. On the other hand, in a water stressed area such as this, failure/irregularity of monsoon cost him a fortune a few times due to crop failure. To overcome the risk of crop failure, considering inferior quality of soil and increasing market demand he decided to venture into forest farming. He planted bamboo, casuarinas and eucalyptus. Still, he had to dig deeper and deeper in search of water to grow his farm. While searching for a sustainable alternative for water problem, in the year 2012, he came across Shirpur pattern mainly associated with the renowned Geologist Dr. Khanapurkar in Maharashtra. Further, while doing research, he also came across a model advocated by the Waterman of India Dr. Rajendra Singh. After some field research on such water conservation techniques; he decided to apply those in his farm. A 500 ft. long natural water stream running through his farm was cleaned and then was widened to 30 ft. & deepened 30 ft. with the help of heavy machine. Bund on that stream was strengthened. As a result of this, the water table increased, evident from the increased water level in his 100 ft. deep well. In his words, “I had to spend lakhs of Rupees but it was definitely worth it. Water level in my farm has increased so much in the last few years that I can even draw water from the well with my hands in monsoon”. His 100 ft. deep well had water level of 10 ft. which has now increased to 90 ft. post monsoon. The externality effect of this experiment was an increase in the water levels of the neighboring wells as well.

Pic 2.3: A deepened and widened natural nallah flowing through the forest
With round-the-year water availability and judicious use of the same, his annual turnover has now increased from average Rs. 20 lakh to Rs. 50 lakh of which he spends approximately Rs. 6 lakh as labor cost per year, most of which could be termed as investment in new techniques for higher production such as dense foresting. He has developed his own nursery and doesn’t need intensive use of fertilizers hence ultimately, incurs negligible additional cost of input material. The transport and other cost are also borne by the customers so according to him, his net cost per year is only approximately Rs. 6 lakh and the remaining is profit. His forest farm consists of 1 lakh trees of eucalyptus, 50,000-60,000 bamboo trees and 10,000-15,000 casuarinas. He plans to expand his bamboo plantation as it is the most profitable and low risk plant according to him.

**Approach**

**Participatory Water Management**

Out of curiosity and anticipation, farmers from the nearby villages started to ask Mr. Patil the reason behind this green miracle and hence began the movement of participatory water management in Nipani village approximately 2-3 years ago. The plan for rejuvenation, widening and deepening of the 10 km long natural water stream was prepared voluntarily which was presented to philanthropist and industrialist Mr. Thombre from Ranjani village of Kalamb block where such intervention had already been implemented by his ‘Natural Sugar and Allied Industries’. Work of 4.5 km was sponsored by the same industry. The total cost of the 10 km project was estimated to be Rs. 40-50 Lakh. (Details of the total project of 32 km have been given in following table.) The work was appreciated by the villagers, politicians, bureaucrats as well as activists.

Further work in surrounding 10 villages (additional 22 km) can be attributed to the following factors- guidance from water activists associated with Jal Biradari movement such as Mr. Sunil Joshi as well as willpower of the farmers to fight prolonged water scarcity. The cost of the project was estimated at Rs. 3-4 crores. The financial model of this intervention is a collaborative one. The details of which are as follows:

<table>
<thead>
<tr>
<th>Total cost of the project</th>
<th>3-4 crores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grampanchayat</td>
<td>20 lakh – 30 lakh</td>
<td>(2 – 2.5 lakhs per villages)</td>
</tr>
<tr>
<td>MLALAD</td>
<td>55 lakh</td>
<td>(Average 5 lakhs per villages)</td>
</tr>
<tr>
<td>District department</td>
<td>20 lakh – 30 lakh</td>
<td>(Including reimbursement of the diesel and other bills)</td>
</tr>
<tr>
<td>Individual donors / philanthropists / industrialists</td>
<td>remaining</td>
<td>(including sponsorship of heavy machinery)</td>
</tr>
<tr>
<td>Crowd funding</td>
<td>1 crore</td>
<td>(including the funds and contribution in goods etc.)</td>
</tr>
</tbody>
</table>
Community mobilization in these villages was initiated by active leadership of village leaders and fellow farmers. The farmers were convinced with the concept of ‘rejuvenation of veins of the farms: the water streams’. Information on the action plan was communicated to farmers in Gramsabha (village meeting) of each village where villagers agreed to let use the machinery in their farms. The events for collection of crowd funding and sponsorships from the philanthropists were conducted in the villages. The 32 km (including 10 km water stream in Nipani) water stream was cleaned, widened and deepened with no major scientific guidelines followed in the process. Check dams were also fortified at each approx. 500ft. distance.

**Results**

The work has been completed in the year 2016-17. Better monsoon in the last two years have been boon to the hard work. To quote one of the farmers, “the very same nallas used to be dry in December, now we can see them filled with water round the year”. The effect of this intervention has been multifold.

![Pic 2.4: Mr. Rajshekhar Patil explains the intervention to the GIPE team](image)

Mr. Patil also takes pride in saying, “I can assure you that this has definitely helped poor farmers to come out of the depression and has curbed their suicidal tendency. It has given positive hope and encouragement to work on farms to every farmer in the village. Every farmer needs water, electricity and fair price for their produce. Out of which, we have literally created our own water now so we are happy.”

- Assurance of water has enabled farmers from these villages to take 3-4 crops a year which was 1-2 crops per year at monsoon’s mercy before intervention. The intervention has also increased water level and irrigated area across villages. The increase in water level as reported by a few farmers has been more than average 70 ft. since the last monsoon.
- It has contributed in increase in agricultural income. Though the income change has varies according to other factors such as cropping pattern, quality of land etc., overall positive change has been reported by the farmers.

- The changed cropping pattern has shown shift from the traditional crops to sugarcane and horticulture in general.

**Sericulture**

Unique case of Nipani has given a huge boost to sericulture. Mr. Ashok Nipanikar, who runs Chawki center in Nipani mentions that sericulture existed in Nipani even before the intervention but water availability has tremendously increased sericulture activity. 30 farmers were involved in sericulture a few years back. The count is now 100 farmers since mulberry cultivation is water intensive. An average turnover is Rs. 1500 per farmer per day or Rs. 1,50,000 for village per day.

![Pic 2.5: Silkworms in the racks in a mulberry farm at Nipani](image)

Following are some of the most powerful impacts observed as a fall-out of water availability and the boost given to sericulture.

- The most prominent impact of sericulture is bi-monthly cash flow to the farmers since one batch of silkworms lasts for around 2 months. The Chawki centre rears young silkworms for first 10 days (two molts), and then these are sold to the farmers. The farmer buys 100 eggs from the Chawki center at approx. Rs. 1600/-. Each egg contains approx. 400-500 larvae. Depending upon the quality of mulberry leaves and maintenance of temperature in the shed, 70kg-110kg cocoon
is procured from 100 eggs. A farmer typically needs 1 acre of farm land to lay 100 eggs. Farmers from Nipani usually carry out sericulture activity on 1-2 acres of their farm land. The farmer gets price Rs. 400-628 per kg cocoons. The cocoons from Nipani are high in demand in Karnataka and are sent from the village every 10 days. A farmer typically takes 4-5 batches (of eggs) in a year hence earns approximately Rs. 2,00,000-3,50,000 per acre.

Mr. Shravan Gund is involved in sericulture activity since last two years. His net household income has increased because the cost of production is very less in sericulture. The initial cost of the set up was approx. Rs. 1 lakh which was managed by Mr. Gund through other farm income and this has been reimbursed under state government subsidy for sericulture. He quoted, “Though sericulture activity is intricate and toiling, it pays off very well, I am very happy.”

Table 2.3: Cost of eggs, Price Per kg of cocoons, and production of cocoons per year for a single sericulture farm in Nipani

<table>
<thead>
<tr>
<th></th>
<th>Per 100 eggs</th>
<th>Per year</th>
<th>2 acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>Rs. 1200</td>
<td>6000</td>
<td>12000</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>Rs. 475</td>
<td>261250</td>
<td>522500</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>110 kg</td>
<td>550</td>
<td>1100</td>
</tr>
</tbody>
</table>

Another prominent observed characteristic of sericulture is high participation of women. It was observed that due to the intricate nature of work, majority women from the household were involved in sericulture. Mr. Ashok Nipanikar confirms that farmers are increasingly opting for sericulture because it has low production cost due to cheap raw material and because in most of the cases household women work as laborers so no additional labor cost is incurred.

Pic 2.6: A lady farmer shows us around the sericulture project at her farm
Way Ahead

Agriculture in such drought prone area is a risky occupation but this participatory model has definitely become a success story of 11 participating villages as is evident from the thriving, lush green farms even in the off-season. The striking features of this participatory model are

- No land acquisition: The natural streams from the fields have been encroached upon over the years. The real tricky part in the intervention is to convince the farmers that the streams need to be brought in one line and cleaned up. This requires considerable convincing skills and an overall social movement about water, pending which farmers are unwilling to give up the land on which they have encroached upon the natural streams. However, once that is accomplished, the intervention rejuvenates historical streams without using additional land to construct a pond or a water reservoir because of which there is no rehabilitation or migration costs involved.

- Cost effective if participatory, otherwise has externality costs: The effect of water percolation is not constrained to manmade boundaries. As Mr. Patil explains, ‘When I carried out the intervention on my farm, I bore the costs alone, but the horizontal effect of better water levels was seen up to 6 km on both the sides of nallas on the downstream. Wells in this patch were observed to have increased water levels. When a nallah is cleaned up and begins to accumulate water, the water naturally percolates in a perpendicular to the nallah. How far will the percolation go depends on the topography, geology and type of soil and rocks in the area.’ In the participatory intervention that followed later in the 11 villages, the per capita cost of the intervention was much lower. Considering that every household in the village is a beneficiary of the intervention, and that according to census 2011, there are 6781 households in 11 villages, the cost borne by each household is only Rs. 5000-10,000 as opposed to lakhs of rupees borne by Mr. Patil. Hence it could be said that more participatory the intervention is, more cost effective it is since the cost of the intervention since per capita cost will be reduced significantly.

- The intervention doesn’t exclude small & marginal farmers: Though the intervention is highly capital intensive as it uses heavy machinery, the effects of the interventions are not limited to those who afford to pay the cost. The intervention will also benefit those who don’t have affordability.

- The intervention, though needs low maintenance, has some costs and hence could be quarrelsome in future. But few farmers in the village ensured that due to the increased purchasing power, the beneficiaries will voluntarily contribute to the same.

To conclude, this model of 11 villages in Kalamb taluka has set an example for community participation, sustainable intervention and inclusivity. With some additions such as target setting for water conservation and better documentation of the project; this is definitely a replicable model for water conservation at micro level.
CASE STUDY 2: A UNIQUE SOCIAL PHILANTHROPY MODEL ON WATER TO SOLVE ECONOMIC ISSUES AT RANJANI

Pic 2.7: Small Water bodies at Village Ranjani

Villages- Ranjani, Ghargao
Block- Kalamb
District- Osmanabad
The villages of Ranjani and Ghargao for ages have borne the brunt of monsoon irregularity, climate vagaries and droughts.

The villages of Ranjani and Ghargao are located in the sugarcane-rich block of Kalamb in Osmanabad. As one takes the winding roads to the villages, a lot of tractors ferrying sugarcane chug-by.

For a very long time, both these villages faced water scarcity due to consecutive droughts and a lack of water management system. However, 2017 paints a rather greener canvas.

Ranjani is a village of 723 households and the neighbouring village of Ghargao has 432 households. The literacy rate in Ranjani is 71.38% and of Ghargao is 72.69%.

The percentage of marginal workers is negligible in Ranjani. It is 0.78%, while in Ghargao it is 9.90%. This can be attributed to the sugar factory, Natural sugar in Ranjani.
Background

Kalamb block falls under Drought Prone Area zone according to the categories of rainfall in Maharashtra. The historical data shows that Kalamb received lower rainfall than average for a few successive years from year 2013-2015. The Government of Maharashtra had declared drought for the same years of which Marathwada region was the worst hit. Many claim that the drought of year 2015-16 had been the most severe in Maharashtra in last century. Newspapers reported the ever increasing toll of farmers’ suicides during the same time and images of crop failure and barren lands were published as the face of agricultural districts in Marathwada.

Here we will see an inspiring story of water management systems at Ranjani and Ghargao and how a private sugarcane industry supported the overall development.

Introduction

Jalasandharan or participatory water management system is a water management method to conserve water. It is of great importance that water seeps in ground and creates reserves of groundwater. This method helps replenish the ground-table and create a perennial supply of water resource.

Shri B. B. Thombare rightly recognized the need and the channels of implementation. He is also the frontier of the water revolution in the villages of Ranjani, Ghargao and other 100 villages which have benefitted from the water management schemes taken up by Natural Sugar.

The drought of 2004-2005 gave him a great impetus to develop models of water management. It should be noted that he internalized the philosophy in Natural Sugar and also put into operation a huge project of Jalasandharan under the CSR wing of the company. However since the Jalyuktashivaaar scheme has been implemented by the government, this activity under the CSR fund is now discontinued.

Through this case we aim to understand the motivation, the impact and the capacity of replicating similar models.

Benefits of Jalasandharan

- Decentralized, perennial storage of water
- Deepened rivers, enhancing water levels in wells
- Reducing water stress
- Creating sustainable water management system
- Reducing reliance on rains
• Increased levels of ground water
• Efficient water management
• Heightened awareness about resource management
• Social awakening through collaborative effort.

Case of Natural Sugar and Allied Industries Ltd.

Enter the village of Ranjani, and tall sugarcane fields welcome the visitor. Ranjani is a well known village for Natural Sugar, the private sugarcane factory which acted as a catalyst of growth.

Background of Mr. B. B. Thombare

Mr. B. B. Thombare, the founder and Chairman of Natural Sugar comes from a humble background. Shree Thombare was born and raised at Village Ranjani, District Osmanabad.

Shree Thombre is a student of commerce and a postgraduate in management (B Com., M. B. A.) He has more than 25 years of experience in sugar industry.

In the capacity of a Managing Director, he successfully executed various sugar factory erection projects in record time. These include Ambajogai, Godawari Manar, Jai Jawan Jai Kisan, Manjra and Vaidyanath sugar factories.

Pic 2.8: Team GIPE in discussion with Shri B BThombare

He is also a founder, chairman and MD of Natural Sugar and Allied Industries Ltd. at village Ranjani in Osmanabad District. In a short span of seven years he successfully implemented various projects like sugar factory, distillery, and generation of power from agro waste, dairy
products, agro produce, and solar power generation and also a ferro alloys manufacturing plant at Village Ranjani. To his credit he has the first of its kind, private sugar factory which is also a FPC. His experiments such as recycling of sugarcane water, use of solid agro waste as fuel, prudent water management etc have set an ideal example before the industry. He is an astute social philanthropist.

**Recreating the movement**

**Pic 2.9: Natural Sugar and Allied Industries Ltd.**

The de-licensing of sugar factories is 1998 gave birth to Natural Sugar. Natural Sugar and Allied Industries Ltd is located in the sugarcane rich zone and enjoys proximity of the Manjara dam. Come the drought of 2004-2005, Shri Thombre realized that water scarcity pinches him on two levels. Owing to drought conditions, the produce that year was relatively less. Also, sugar processing is water intensive. The drought presented to him water woes. Natural Sugar had to get water tankers to meet the factory needs. This invariably led to burgeoning costs. Shri Thombre understood that this model is not sustainable. It can be said that in face of adversity, grows a revolution. He invited various technical experts from the West to find a long term solution on the problem of water management.
“Recycling water 100%”

Natural Sugar decided to use the water available in sugar cane itself and has succeeded in running the sugar plant with water available in sugar cane without availing water from outside sources by recycling and prohibiting misuse of water with a well planned close circuit of activities. This also reduces the effluent generation big way. The lessons of water management are deeply internalized. “100% recycling and re-using of steam off the bagasse-boiling process is done. The entire factory operates on the water obtained from this recycle process. 12.5 lakh litres of water is created daily”. These are the priceless learnings from the terrible drought.

“Enhancing cash-flows”

2014 was a tough year. Osmanabad was getting the repute of being a hot-bed of farmer suicides. Shri Thombre offers an interesting insight. “It is not the dearth of profitability which leads to farmer suicides, but the uncertainty of cash-flows which is the evil”. Farmers hugely rely on the kharif and rabi seasons to generate income. With uncertain climate and rain-failures, the entire cycle collapses, leaving the farmer to despair. Enhancing cash flows is a solution Natural Sugar has identified.

Natural Sugar is commercially associated with 10,000 farmers. They have created cold storages for women to deposit milk and have also installed a modern and a fully automatic Dairy Plant of 25,000 ltr capacity per day. “35,000 families contribute to the Natural sugar Ltd dairy, and there is no suicide incidence amongst these families”, Shri Thombre proudly volunteers.

Pic 2.10: Dairy Products of Natural Sugar

The dairy is his esteemed project. The factory has extended loans to buy two cows for widows in these villages. The women deposit milk into these cold storages and receive
money on every 4th, 14th and 24th of the month. These women now have a regular source of income.

**Tracing the growth story of Natural Sugar**

Shri B. B. Thombre says “He, who runs a sugar factory, can run farms too” Natural Sugar is also a registered FPC. They have built cold storages for farmers to pool and store the produce. The produce is then sent to cities through integrated transportation means.

Natural sugar has implemented a unique project. They have installed RO water vending machines in the village.

13 MW additional power is now generated in addition to existing 10 MW installed in 2010. This power is used for functioning of Sugar Plant, Distillery, Bio-gas, Dairy, Ferro Alloys Steel Plant for manufacturing of Ferro Steel etc. Even after this distribution the surplus which remains is exported to the state grid. Hence by 2008, Natural sugar had become fuel sufficient and water sufficient.

Natural Sugar and Allied Industries Ltd has created huge employment opportunities in the village of Ranjani and other neighbouring villages. Shri Thombre has fully used to capacity the natural ecosystem of Ranjani.

Shri Thombre is successful in creating a socially sustainable structure through various initiatives. The village is conditioned regularly and groomed to be socially sound. The factory organizes various lecture series of the Prajapita Brahmakumari and aims at building morally strong ethos in the village.

As a part of CSR initiatives, schools, healthcare and women education has been an area of primary focus.

**“Pension PalyaYojana”**

The distinctive scheme of giving a pension to parents of employee is voluntarily implemented. With this scheme, 10% of gross salary of all employees under this scheme is deducted and paid directly to their parents monthly, which helps old aged parents to have some corpus.
The Participatory Water Management Model

Pic 2.1: A Board declaring that the Jalasandharan Project has been undertaken by Natural Sugar

Natural Sugar and Allied Industries Ltd. has to its credit a Jalasandharan or water management program that was implemented in in Ranjani and villages around Ranjani. This work is done as a CSR initiative. Shri Thombare was deeply influenced by Sunil Joshi of Jal Biradari and has drawn major inspiration from the Shirpur pattern.

The water-movement or Jalasandharan movement was incepted during 2013-2014. On 17th Sept, on the occasion of Mukti Din, he met with 2000 farmers and led the slogan of “Paani Adava, Paani Jirwa”. The farmers he met were not water literate. However, through this involvement, they became more sentient.

Shri Thombare is an advocate of decentralized water campaigning. Initially, when he started out on this movement, he realized that there is a lot of encroachment by the farmers on the nulla banks. They began to convince the farmers to clear the encroachment. An initiative was taken to explain to the farmers the benefits of nulla widening, deepening and construction of check dams.

In the very first phase in 2014, an awareness programme was conducted for 10 villages. It was met with immense enthusiasm. Word of mouth spread like wild fire and villagers started to agree to the implementation of this project.
The projects of nalla widening, nalla deepening, creation of samatalkalvas and ground table water revival are taken up by Natural Sugar from their CSR fund.

A staggering amount of Rs 2, 50, 00,000 has been spent so far on different aspects of the project.

**Samatal Kalva at Ghargao**

Samatal Kalwa is a percolation project undertaken by the factory in Ghargao. Samatal is a structure which follows the philosophy of “maatha te paaytha” or from top to bottom. A nulla-resembling structure is dug at an elevation. These structures look like trenches. They are dug in a rocky topology or an aquifer topology. This is called as “samatal” because the level of the bottom is very uniform and equal at any direction. The levelling is of crucial importance. Villages on both sides of the samatal benefit from it. The mechanism is simple. Water is caught in the kaalwa and because of the aquifer and the topology, water percolates within two hours.

Shri B. B. Thombare opines that this is the most impactful method of water management. Below is the project in a snapshot.

**Table 2.6: Features of the Samatal Kalwa at Ghargaon**

<table>
<thead>
<tr>
<th>Samatal Kalwa in Ghargao, Osmanabad</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>&quot;Maatha te paaytha&quot;, &quot;from top to bottom&quot;</td>
</tr>
<tr>
<td>Purpose</td>
<td>Percolation</td>
</tr>
<tr>
<td>Cost</td>
<td>Rs 5lakh/km</td>
</tr>
<tr>
<td>Impact on ground table</td>
<td>increase by 4 or 5 mtr</td>
</tr>
<tr>
<td>Length in mtr</td>
<td>3840</td>
</tr>
<tr>
<td>Width in mtr</td>
<td>8</td>
</tr>
<tr>
<td>Capacity in litre</td>
<td>63360</td>
</tr>
<tr>
<td>Number of wells within 1 km radius</td>
<td>112</td>
</tr>
<tr>
<td>Number of Bore wells</td>
<td>55</td>
</tr>
<tr>
<td>Radius of impact</td>
<td>768</td>
</tr>
<tr>
<td>Depth</td>
<td>3</td>
</tr>
</tbody>
</table>
Nallah widening and revival of stream in Ranjani

There exists a natural steam of water in the village. However, initially it was not visible at all. The stream used to be full of sand, rubble and pebbles. It is a large 100 kms patch.

There are fields on both sides of the stream. One major aspect of the project was to straighten the stream and get it in one line. Machinery was used to widen it. The nalla is approximately 14mtr*6 mtr at the bottom. Check dams are made at every 400 metres to obstruct the water. This creates a reserve as well as helps water percolate. The work was undertaken in the years from 2013-2014. In 2015, work slowed down and 2016 saw the birth of the Jalayukta Shivaar scheme.

Even though the project is largely inspired from the Shirpur pattern, they have tried to avoid the disadvantages of it. In the Shirpur pattern, the rocks in the stream are chiselled by using breakers. But here they have never used breakers. They let the rocks be in situ. This aids percolation and also is very cost effective. In this process they have also controlled the usage of putting additional pipes which is seen widely in the Shirpur pattern.

Mr Pathan, the engineer from Natural Sugar claims that the Jalasandharan project undertaken by the factory has created a 4 times increment in incomes of farmers.

Prosperity is evident. Shri B. B. Thombare and Natural Sugar has indeed acted like an agent of change and helped reducing water angst and water stress in this region.

Table 2.7: Features of the water intervention at Ranjani

<table>
<thead>
<tr>
<th>Nalla straightening and widening in Ranjani</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length in mtr</td>
<td>4265</td>
</tr>
<tr>
<td>Width in mtr</td>
<td>10</td>
</tr>
<tr>
<td>Capacity in litre</td>
<td>119420</td>
</tr>
<tr>
<td>Number of wells within 1 km radius</td>
<td>169</td>
</tr>
<tr>
<td>Number of Bore wells</td>
<td>105</td>
</tr>
<tr>
<td>Radius of impact</td>
<td>853</td>
</tr>
<tr>
<td>Depth</td>
<td>4</td>
</tr>
<tr>
<td>Check dams</td>
<td>Old 5, New 7</td>
</tr>
</tbody>
</table>
Tale of two farmers- Noor Khan Pathan and Pathan Ali

Table 2.8: Personal Profile and Asset holding of Farmer Noor Khan Pathan

<table>
<thead>
<tr>
<th>Noor Khan Pathan-personal profile and asset holding</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>60</td>
</tr>
<tr>
<td>Education</td>
<td>10th pass</td>
</tr>
<tr>
<td>Land</td>
<td>1.5 acre</td>
</tr>
<tr>
<td>Electricity</td>
<td>yes</td>
</tr>
<tr>
<td>Fan</td>
<td>no</td>
</tr>
<tr>
<td>LPG stove</td>
<td>yes</td>
</tr>
<tr>
<td>2 wheeler</td>
<td>yes</td>
</tr>
<tr>
<td>TV</td>
<td>no</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>no</td>
</tr>
<tr>
<td>Washing machine</td>
<td>no</td>
</tr>
<tr>
<td>PC/laptop</td>
<td>no</td>
</tr>
<tr>
<td>Car/van/jeep</td>
<td>no</td>
</tr>
<tr>
<td>AC</td>
<td>no</td>
</tr>
<tr>
<td>Farm pond</td>
<td>no</td>
</tr>
<tr>
<td>Well</td>
<td>yes</td>
</tr>
</tbody>
</table>

Pic 2.12: Team GIPE in talks with local farmers at Village Ranjani
Noor khan Pathan is a farmer in Ranjani. He owns 1.5 acre of land. He quips that earlier he could not take crops all year long. Post intervention, he takes crops the entire year.

Prior to the project, he primarily sowed soybean and chickpeas but now he crops sugarcane and wheat. Initially the yield was very low. The yield was mere 10-15 sacks which are about 1.5 ton. But now the farm yields 10 ton wheat and 22 tonne sugarcane.

Noor khan Pathan has benefitted a lot from the Jala-sandharan project and is very vocal about it. He owns a well and tells that the well has sufficient storage of water.

Table 2.9: Personal Profile and Asset holding of Farmer Pathan Ali

<table>
<thead>
<tr>
<th>Pathan Ali personal profile and asset holding</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34</td>
</tr>
<tr>
<td>Education</td>
<td>10th pass</td>
</tr>
<tr>
<td>Land</td>
<td>6 acre</td>
</tr>
<tr>
<td>Electricity</td>
<td>yes</td>
</tr>
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<td>Fan</td>
<td>yes</td>
</tr>
<tr>
<td>LPG stove</td>
<td>yes</td>
</tr>
<tr>
<td>2 wheeler</td>
<td>no</td>
</tr>
<tr>
<td>TV</td>
<td>no</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>no</td>
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<tr>
<td>Washing machine</td>
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<td>no</td>
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<tr>
<td>AC</td>
<td>no</td>
</tr>
<tr>
<td>Farm pond</td>
<td>no</td>
</tr>
<tr>
<td>Well</td>
<td>no</td>
</tr>
</tbody>
</table>

Pathan Ali

Pathan Ali is a farmer in Ranjani. He owns 6 acres of land. He tells that earlier he could not take crops all year long. Post intervention, he takes crops the entire year.

Prior to the project, he primarily sowed soybean and wheat but now he crops sugarcane and chickpea.

Initially the yield was very low. Pre intervention and in drought conditions, the income per annum from was Rs. 1 lakh-2 lakh. Now it is Rs. 6 lakh per annum.

Pathan Ali has gained a lot from the Jalasandharan project.
Conclusion

To conclude, this model is an excellent example of how intervention by a private player can set in motion the wheels of change. Natural flowing water is the vein of the agricultural landscape. These kinds of models can be replicated to combat water stress. Every drop counts. The highlights are collaborative effort, sizeable contribution by a private player, followed by tremendous impact and sustainability.

References

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CHAPTER - III

CASE STUDIES ON FARM PONDS IN OSMANABAD

CASE STUDY 1: UNCERTAINTY IN AGRICULTURE TO SWEET GAINS FROM GRAPES AND BANANAS

Pic 3.1: The grapevine that became possible due to water availability

Village- Yermala
Block- Kalamb
District- Osmanabad

“We had to rely on water from nearest reservoir only. But even the reservoirs were dry then. There wasn’t a drop of water in that summer. Sugarcane on my farm field was a failure. I couldn’t repay my debts”, recalls Mr. Purushottam Munde from Yermala village of Kalamb block in Osmanabad district. He shares his experience on how he could barely survive the
drought in the year 2015-16. It is exactly then that he decided to take appropriate measures to protect his farm from uncertainty of monsoon and thereby uncertain availability of water in the future.

**Village Profile**

Yermala is a small village of around 1000 households in Kalamb block of Osmanabad district. Out of the total working population of 2500, 66 per cent is involved in agricultural employment as cultivators and agricultural laborers. The village primarily cultivates crops such as sugarcane, soya, chana, tomato, brinjal. Some also take traditional crops such as tur, moong, urad and jawar.¹

**Background**

The average rainfall in Kalamb block is 715 mm and with the good monsoon this year, actual rainfall has been as close to 96 per cent of the average.² “Before this year, for last few consecutive years, farmers from the village have suffered drought like conditions. In 2011-12, the average recorded rainfall was 387 mm only. The Bhoom, Paranda, Washi and Kalamb talukas have been declared as DPAs (Drought Prone Areas). Due to this, farmers have realized importance of water storage. Earlier, we used to barely receive applications for farm pond schemes but now we receive thousands of more applications than the target. We had to start the lucky draw system to ensure non-partiality towards applicants” says Mr. More, Block Agricultural Officer (BAO) of Kalamb block, Osmanabad.

After the drought of the year 2014-15 and 2015-16, Government of Maharashtra as well as Government of India announced multifold schemes for water conservation and irrigation. Irrigation department is primarily responsible for interventions such as Drainage Line Treatment, cleaning of the reservoirs etc. though participatory efforts by various NGOs and local community organizations are highly acknowledged in Maharashtra. The Government of Maharashtra has announced various schemes such as Jalyukta Shivar, mainly with the aim of ground water conservation. The other water related schemes announced by the government target individual/group of farmers. ‘Magel Tyala Shet-tale’ is one such scheme started in the year 2016 which now includes all the districts of Maharashtra. The target of 1, 11,111 farm ponds has been set in two phases by the government. The allocated funding is Rs. 2000 crore for the same.³ The Central Government in its budget last year has announced construction of 5 lakh farm ponds through Mahatma Gandhi National Rural Employment Guarantee Scheme across India. In the same budget, ever highest Rs. 35,984 crores was allocated for umbrella schemes targeting agriculture and farmers’ welfare⁴.

In Osmanabad district, 3 types of schemes for construction of the farm ponds are available. The benefits of the scheme are disbursed through agriculture department of the government. The details of which are as follows:
Table 3.1: Schemes for construction of farm ponds

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Specifications of the Farm Pond</th>
<th>Subsidy</th>
<th>Average Cost (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Size</td>
<td>Occupied Land</td>
<td>Stake Holders</td>
</tr>
<tr>
<td>Rashtriya Krishi Jeevan Yojana / National Horticulture Mission</td>
<td>44* 44* 3 mtr.</td>
<td>1 acre</td>
<td>Multiple</td>
</tr>
<tr>
<td>Mahatma Gandhi National Rural Employment</td>
<td>15 * 15 * 3 mtr.</td>
<td>0.5 acre</td>
<td>individual</td>
</tr>
<tr>
<td>Magel Tyala Shet-tale</td>
<td>30 * 30 * 3 mtr.</td>
<td>0.5 – 1 acre</td>
<td>individual</td>
</tr>
</tbody>
</table>

Source: Interview with Mr. More, BAO

According to the official data, in the years 2009-2012, under RKVY, around 73000 farm ponds were built and under MGNRGS, around 16,500 farm ponds were built in the state.5

- Construction of farm ponds initially served a dual objective of water conservation and assurance of water. But today, farm ponds with 5 mm plastic lining have become popular due to its durability and usage.
- Earlier, farm ponds were dug at the ground level, the main source of water being rain to fill up the ponds. Now, majority of the farm ponds are dug on the highest point of the farm, the water through which is circulated in the farm with drip irrigation based on ‘water by gravity’ principle. Water source to fill up the ponds is groundwater which is extracted from bore well or dug well. The most important advantages of this technique for the farmers are better and constant water pressure and protective irrigation in summer as well as in droughts.
Mr. Munde’s Farm Pond and the Combination with Drip Irrigation

Pic 3.2: Farm pond at Mr. Munde's farm

As stated in the first paragraph, Mr. Purushottam Munde barely survived the last drought when he decided to act on the problem. He then decided to construct a farm pond and started his field research related to the same. He convinced 3 of his relatives with whom he shares the 20 acre of land. 4 of these young farmers applied for a collective farm pond under a scheme by National Horticulture Mission. After their selection in the scheme, main task began to pool the financial resources. Mr. Munde sold off his 1 acre of land and collected remaining funds from the relatives. Excavation was completed for a farm pond of size 34x34x3 mtr in a month after which they had to wait for reimbursement for this incurred expenditure. Due to lack of finance, the next stage of construction was delayed by almost a year. After the reimbursement, second stage of plastic lining and final work was completed. The information and guidance on quality input material, technicalities of farm pond etc. was provided to them by a team from agriculture office at Kalamb. Their farm pond is barely 8 months old. Now that their expenses have been reimbursed and monsoon has been more than merciful this year, they are enjoying the prospering green fields now. The total cost of construction incurred was around Rs. 4 lakh from which Rs.3.38 lakh were reimbursed by Government. Mr. Munde says, “I have decided to stop sugarcane plantation since I lost my fortune in the drought. I have planted banana, grapes and vegetables on 6 acres of my farm this year.”
To avail the utmost benefit of Farm Pond, he has invested in drip irrigation. The cost of pump, RO filter and drip costs around Rs. 3 lakh for which he has taken loan from a credit society called Safal finance at 12 per cent interest per annum. He is waiting for the reimbursement of Rs. 1.5 lakh (50 per cent) from government. Considering the benefit of Farm Pond, he firmly mentions that he would have gone for the same even if there wouldn’t have been any subsidy.

The details of his income-expenditure are explained below:

**Table 3.2: Cropping Pattern pre- and post-water intervention**

<table>
<thead>
<tr>
<th>Total Land</th>
<th>6 acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Land</td>
<td>6 acre</td>
</tr>
<tr>
<td>Crops</td>
<td>Yeild / acre</td>
</tr>
<tr>
<td>Before intervention</td>
<td>Sugarcane</td>
</tr>
<tr>
<td>After intervention</td>
<td>Banana</td>
</tr>
<tr>
<td>Vegetables</td>
<td>NA</td>
</tr>
<tr>
<td>Grapes</td>
<td>Rs. 4-5 lakh</td>
</tr>
</tbody>
</table>
• Mr. Munde now can take fruits and vegetables during summer due to assured availability of water. The stalled monsoon/any irregularity in monsoon could reduce farmer’s income by almost half. Because of assured water availability and pressure, the quality of the produce has substantially increased and hence the income, mentions Mr. Munde.

• Like him, many of the farmers from village with farm ponds have shifted from traditional farming to horticulture as it is more profitable. Their cropping pattern has generally changed from Tur, Moong, Jawar to Tomato, Bringal, Soya etc. mentions one of the farmers on the field.

Pic 3.4: Team GIPE interacts with farmers and Government officials at the farm pond site

• “Earlier, when monsoons were relatively better, our village used to produce Grapes and bananas but farmers stopped taking it because of the high risk involved and irregular water conditions.”, but he further adds, “only few have started to take banana in the entire village and I am one of them”. As both of these are water intensive as well as labor intensive crops, it involves higher risk. The fact that Mr. More is ready to take the high risk indicates his confidence and increase in capacity of taking high risk due to insured water supply.

• Farm pond has been a source of allied activity of pisciculture. Many of the villagers are experimenting with the same. Mr. More has invested Rs. 20 thousand 3 months back and is excited to see the success of his experiment.

The tangible effects of farm pond are certainly positive from a farmer’s perspective for aforementioned reasons. But there are a few observed points which need to be mentioned;

• The farm pond scheme could create selective bias because of its capital intensive nature as well as the size of land holding: The initial investment in the farm pond could be difficult due to which a farmer might not self-select himself in the scheme.
Secondly, since it occupies minimum 0.5 acres of land, small and marginal farmers might not be able to avail the scheme.

- Tragedy of the commons: Water storage in farm pond is highly dependent on dug well and bore well, hence extraction of groundwater. Since a farmer with bigger farm pond extracts more water to only store, the other farmers are depleted from a common pool of water resource.\(^6\)

- Evaporation loss: since the ground water is stored in an exposed farm pond, evaporation loss especially in summer is an issue\(^7\).

- A temporary fix: Since farm ponds don’t necessarily act to replenish the ground water due to the plastic lining, unless the intervention is complimented by other compulsory water conservation schemes, this is a temporary fix.

- Mr. Munde has mentioned nil maintenance cost of farm ponds but at the same time he anxiously mentions, “If any pest/animal ruins the lining, the repair cost not only includes monetary costs but also stored water because the tank has to be emptied for cleaning”.

- Difficult exit and informal agreement: In collaborative model of farm pond, usually some portion of land of any one of the members is used. It makes it tough for that landholder to exit the contract. Secondly, the water is shared between the members but the terms of sharing aren’t written or even clearly spoken about. As Mr. Munde mentioned, he receives some indefinite cash payment from other three shareholders for sharing of water 2 days a week for each shareholder, the volume of shared water isn’t accounted/decided.

**Way Ahead**

To conclude, farm ponds have been very important in boosting confidence of the farmer thorough water insurance. It has most certainly helped in increasing income of the farmers. But with the same, there is dire need of enhancing water conservation efforts. Farm pond schemes can work in compliment to the water conservation schemes. There is also an important need to improve water literacy among people so that water resources are more sustainable. Comprehensive measures will ensure the objective better than stand alone water related schemes.
CASE STUDY 2: WATER AND A STUDY OF MARKETS BRING PROSPERITY IN YERMALA

Abstract

There is broad variation in rainfall in Maharashtra. An undependable and unreliable monsoon introduces an element of risk, uncertainty and instability in crop production. This case highlights the story of a farmer from a village called as Yermala who has successfully reaped the benefits from a farm pond and prudential drip irrigation. It also discusses the challenges that may creep in eventually, but overall brings to spotlight the positive changes that came through and the value he received.

Introduction

The district of Osmanabad has been in news for a long time for all the wrong reasons. Known as heavily drought-affected, it is also recognized as a breeding ground for farmer suicides. However, 2017 paints a rather greener picture. The water starved district received a rainfall of 715 mm, which is rather good. In fact, as one drives down the NH-52, the Verde green fields on both sides welcome US to Osmanabad.
What is a farm pond / Shet-tale?

A farm pond is a dugout pond for water storage. It is used as an alternative to check dam where the topography does not permit the storage of water by construction of embankments. The farm pond can be with lining or without lining. The water is obtained by pumping through a bore-well or by rain water harvesting.

Functions of a typical farm pond are-

- Irrigation: Raising nursery or for protective irrigation of crops
- Drinking water for livestock
- Domestic use for human population
- Pisciculture

Advantages:

- Creates a water resource for the tough months of summer when shortage is acute.
- Ground water rejuvenation if there is no lining.
- Fodder and vegetables cultivation

Background on farm ponds/Shet-tale in Maharshtra(https://egs.mahaonline.gov.in/)

When was it incepted?: The scheme was first started in 2010 and is still being implemented. In 2016, the Maharashtra government further boosted the scheme calling it “Magel Tyala Shet-Tale Scheme” and raised the funds made available for farmers. Under the first phase of this scheme the government looks to create at-least 52,000 ponds in the drought hit areas of Maharashtra.

Subsidy from Government: One can get a subsidy of 70-75% of the cost involved in construction of the pond. Example: If the cost incurred is of Rs. 1 lakh to build the shet-tale, then a subsidy of an amount which is a little more than Rs. 70,000 is expected from the Agriculture Department.

Shet-tale Plastic Sheet

Recently the government has also introduced subsidy for the plastic paper which is used to cover the bottom of the shet tale (pond). By using a plastic sheet, the percolation can be prevented. The cost of plastic sheet for shet tale varies from Rs 50 to Rs 100 per square feet. So if the pond is 600 square feet in area,700 sq feet of plastic sheet will be required which will cost somewhere between Rs 30,000 to Rs 40,000. These rates are for 500 micron HDPE plastic sheets of superior quality. Cheaper plastic sheets are also available.
Shet-tale Size and Location

The most common shet-tale size is 30 meter x 30 meter x 3 meters. 3 meters is the depth of the pond with half of it being dug below the ground while the other half is built by making a boundary wall with soil collected from the surroundings. Approvals are needed from the Department of Agriculture for the size and location of the pond. Different districts have different limits on size and location. Farmers can locate the pond at a height or in a depression if the intention is to implement rain water harvesting.

Who to contact to avail this subsidy?

Applicants need to contact the agriculture officer of the district or town who is appointed by the Agricultural Department of the Government of Maharashtra. They can also inquire in the nearest Panchayat or Taluka office.

Magel Tyala Shet-Tale Scheme

The government of Maharashtra launched a farm pond scheme Magel Tyala Shet-Tale Yojna for the farmers in Maharashtra. Under this scheme, State Government of Maharashtra gives a subsidy to build farm ponds for the conservation of water in the farm. The state government has directed the district administration to lend a helping hand to small and marginal farmers across 14 distressed districts. A large number of farmers suffer in Vidarbha and Marathwada region due to dearth of water resource. Farm ponds are significant for farmers. It helps them to save water in their own farm and use the same for agriculture purposes. The farm ponds get full in a few days of good rainfall. In the Vidarbha region, the districts like Amravati, Akola, Yavatmal, and Nagpur can get benefits of this programme.

In Marathwada region, the three districts identified are Latur, Beed, and Osmanabad, among the worst hit by the water crisis. The farmers who seek for farm pond can apply online through the government of Maharashtra portal. Before applying, one needs to decide the purpose and then what quantity of water one wants to preserve. One can either harvest rainwater or pump water from a seasonal water stream or bore/well. To use rain as the source of water, it is necessary to understand catchment area, average rainfall in the area, type of soil, water flow and topography in general. The location of shet-tale has to be approved by agricultural department and the standard size for shet tale is prescribed by government.

Benefits of Magel Tyala Shet-Tale Yojna:

- Creates a water resource
- Beneficial and crucial for the tough months of summer
- Reduces dependency on rains
- Creates a psychological well being effect
- Can take more crops and improve efficiency
- Helps to get more revenue
- Can take up pisciculture in the farm pond
Eligibility of Magel Tyala Shet-Tale Yojna:

1. The farmer should have minimum 0.60-hectare farm
2. Individual farmers are eligible for this yojana
3. Beneficiaries farm should technically eligible as per government norms
4. A group of farmers is eligible to make one common farm pond

Table 3.3: Other prominent schemes for farm ponds by the Government

<table>
<thead>
<tr>
<th>Scheme Description</th>
<th>Cost Details</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic/RCC based water harvesting structure/ farm pond/construction of community</td>
<td>Plastic/RCC based water harvesting structure/ farm pond/construction of community tank (100</td>
<td>NHM/HMNEH/NMSA</td>
</tr>
<tr>
<td>tank (100 meter x 100 meter x 3 meter) For smaller size ponds/tanks, cost will be</td>
<td>3 meter) For smaller size ponds/tanks, cost will be admissible on pro rata basis, depending upon</td>
<td>Sub schemes under MIDH</td>
</tr>
<tr>
<td>admissible on pro rata basis, depending upon command area</td>
<td>command area</td>
<td></td>
</tr>
<tr>
<td>Water Storage in Farm Pond/ Dug well</td>
<td>Water Storage in Farm Pond/ Dug well (Measuring 20 meter x 20 meter x 3 meter) by individual.</td>
<td>NHM/HMNEH/NMSA</td>
</tr>
<tr>
<td>For smaller size ponds/dug wells, cost will be admissible on pro rata basis</td>
<td>50% of cost and limited to Rs. 0.75 lakhs per beneficiary for plains &amp; Rs. 0.90 lakhs / beneficiary for hilly areas with 300 micron plastic lining/RCC lining, for 2-hectare command area. In case of non-lined ponds 30%, less assistance will be provided.</td>
<td>Sub schemes under MIDH</td>
</tr>
<tr>
<td></td>
<td>Source: (<a href="https://govinfo.me/magel-tyala-shet-tale-yojna-farmer/">https://govinfo.me/magel-tyala-shet-tale-yojna-farmer/</a>)</td>
<td></td>
</tr>
<tr>
<td>(a) Construction of new Farm Ponds with lining to reduce the percolation losses</td>
<td>(a) Construction of new Farm Ponds with lining to reduce the percolation losses</td>
<td>NMOOP</td>
</tr>
<tr>
<td></td>
<td>Rs. 40,000/- per pond of 20m x 20m x 3m for construction and Rs. 40,000/- for lining purpose</td>
<td></td>
</tr>
</tbody>
</table>

Identified Issues in Osmanabad district

- Low rainfall with uneven distribution
- Poor crop yields due to moisture stress and climate vagaries.
- Non-availability of sound water harvesting structures
- cropping of sugarcane and soybean and lack of alternative choices for prolonged periods
- Inadequate fodder supply to milch animals

Construction of a farm pond by a studious farmer in Yermala

Osmanabad is a drought prone district. However, the rain gods appeased this district for two consecutive years of 2016 and 2017. The government also announced the unique scheme of “Magel Tyala Shet-Tale”, which has proved to be an agent of change in this case.
In this case study we try to recreate the process that led to a certain revolution and changed the water starved landscape of Yermala.

The reasons for this research were

- To understand the dynamics behind the construction of a farm pond
- To understand the factors and motivation behind this choice of strategy.
- To study the challenges faced while undergoing the process of building the farm-pond.
- To examine the post intervention effects and the viability of such projects.
- To identify the post intervention challenges which emerge eventually
- To analyze if such type of intervention is all inclusive.
- To gauge if the model can be successfully cloned.

**Methodology**

The paper attempts to create a case study of a collaborative farm pond project in the village of Yermala.

The case study was primarily constructed through Focus Group Discussions with the agriculture department officials, the agriculture officer and through Personal Interviews with farmers so as to develop a 360 degree understanding of the implications, challenges and benefits of such a scheme.

*Pic 3.6: Team GIPE at Mr. Lombate’s farm pond site with Government Officials*
Yermala

Tall sugarcane, heavily studded tur, and stubby harbhara fields welcomes one to Osmanabad. Farm ponds dotting the agricultural fields immediately grab your attention as you enter Yermala – a small village of about 1160 households, in Kalamb tehsil of osmanabad District. The village is located just off NH-52, the national highway connecting to Pune.

Table 3.4: Census information on village Yermala

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Households</td>
<td>1160</td>
</tr>
<tr>
<td>Total Population Person</td>
<td>5404</td>
</tr>
<tr>
<td>Total Population Male</td>
<td>2845</td>
</tr>
<tr>
<td>Total Population Female</td>
<td>2559</td>
</tr>
<tr>
<td>Scheduled Castes population Person</td>
<td>900</td>
</tr>
<tr>
<td>Scheduled Tribes population Person</td>
<td>88</td>
</tr>
<tr>
<td>Literates Population Person</td>
<td>4069</td>
</tr>
<tr>
<td>Total Worker Population Person</td>
<td>2566</td>
</tr>
<tr>
<td>Main Working Population Person</td>
<td>2488</td>
</tr>
<tr>
<td>marginal worker population</td>
<td>78</td>
</tr>
</tbody>
</table>

Source: (http://www.census2011.co.in/census/state/maharashtra.html)
Lush green fields wave at us as we stop by the national highway. A grand highway takes us from Indapur to Yermala. We are here to study how these small scale irrigation facilities now set to be implemented on massive scale through the country are performing on ground.

Gopal Sahurao Lombate greets us as we reach his fields. Small saplings of chana flutter gently in the pleasant climes of December. The farm pond is a slightly elevated structure flanked by a protective compound. Lombate explains that it is very important to protect the farm pond.

Gopal Lombate mutually holds 16 acres of land with his brothers. He volunteers that earlier, the vegetable patch was in two acres of land but owing to good rains and courtesy of the farm pond, it now occupies 4 acres.

The farm pond is built in his share of the land and is constructed under the NHM scheme. The structure occupies nearly one acre of the total area. The size follows the conventional model of 44 feet *44 feet.

The pond is full to its brim and carries 1 crore litre of water! It is quite a sight. Lombate says that the farm pond cost him approximately Rs 5,50,000. He is quick to report that under the subsidy scheme, he received Rs 5,33,000. The subsidy was received in his bank account within one month. He understands our bemused expressions and offers an explanation. He had to dig the pond and pay for the expenses from his own pocket. However, post completion, he had to submit the relevant bills and the part subsidy was transferred. This is very convenient. The farmer doesn’t have to spend a fortune. After the plastic lining is set, he
can submit the new bills and obtain the final instalment of the subsidy. It is very pertinent that the farmer procures plastic lining which has an ISI mark.

Gopal Sahurao Lombate has three brothers and with mutual understanding, they share the farm pond. It is interesting to note that he did not avail a loan from banks to build the farm pond. The brothers happily contributed towards the expense.

Table 3.5: Description of Gopal Sahurao's farm pond project

<table>
<thead>
<tr>
<th>Description of Gopal Sahurao’s farm pond project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Land holding</td>
</tr>
<tr>
<td>Area of land under the farm pond</td>
</tr>
<tr>
<td>Dimensions of the pond</td>
</tr>
<tr>
<td>Type of holding</td>
</tr>
<tr>
<td>Capacity of the farm pond</td>
</tr>
<tr>
<td>Scheme</td>
</tr>
<tr>
<td>Days taken for completion of project</td>
</tr>
<tr>
<td>total expense</td>
</tr>
<tr>
<td>Subsidy received</td>
</tr>
<tr>
<td>Lining/without lining</td>
</tr>
<tr>
<td>Sources to replenish</td>
</tr>
</tbody>
</table>

One muses that how do these farmers know the technical aspect of building the farm-pond. Many questions arise. Which part of the fields is more suitable? How large should be the farm-pond? From where to procure the inputs? How to apply for the subsidy scheme?

However, Gopal Sahurao Lombate shrugs it off. He had received all the information and support from the local agriculture officer, Mr More. Very often, the local agriculture officer is the agent of change and helps farmers avail the benefits of various schemes.

But Gopal Sahurao is a studious farmer. He is a regular and an avid reader of the newspaper Agro-One. He shows elevated levels of awareness about the marketing of his produce. Currently he has sown tomato in his vegetable patch because he very astutely understands that tomato attracts a good demand and price in the month of March. Similarly, he says that he has prospects of growing capsicums next, because they are market attractive in the month of May. He has spent a lot of time and energy in studying the exact fluctuations in market prices of different vegetables and has now a fairly detailed plan of which vegetables need to be grown at which time of the year to be highly profitable.

The farm pond scheme has proved to be a blessing for him. Earlier he used to grow vegetables in a patch of 2 acres, but now owing to the abundance of water, the patch is a wholesome 4 acres big. The cropping pattern has also slightly changed. He now feels empowered to sow soyabean and chickpeas. He admits that he has grown slightly experimental with the vegetable patch. Lombate is candid about disclosing his income from the vegetable patch. He volunteers a figure. The average income per acre of the patch is Rs.2-3 lakh rupees.
Table 3.6: Area under vegetables, and revenue therefrom pre- and post-water intervention

<table>
<thead>
<tr>
<th></th>
<th>Pre intervention</th>
<th>Post intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area under vegetables</strong></td>
<td>2 acres</td>
<td>4 acres</td>
</tr>
<tr>
<td><strong>Revenue per acre</strong></td>
<td>2 lakh rupees</td>
<td>2 lakh rupees</td>
</tr>
<tr>
<td><strong>Total revenue for vegetables</strong></td>
<td>4 lakh rupees</td>
<td>8 lakh rupees</td>
</tr>
</tbody>
</table>

The above table implies that Lombate comfortably break evens in a year, just from the gains of the vegetable patch, without adding the effect of subsidy.

Did the farm pond intervention radically hike the yield per acre? Definitely yes. Earlier the yield used to be 600 kilos per acre, however now it has grown to 1000 kilos per acre.

Prosperity gleams on the face of Gopal Sahurao Lombate. His wife joins in the conversation. “Earlier we used to grow a nursery of saplings for the vegetable patch, but now we get it from Osmanabad”.

Pic 3.8: Mr. Lombate and his wife- Proud owners of the farm pond
One clearly sees the change that has come through. There is visible prosperity and abundance. But definitely there are a few challenges. The lining of the farm pond is crucial to the sustainability of the structure. The lining is very susceptible to damage from rats and other rodents. Lombate has been very proactive in this area. He keeps the area surrounding the pond clean and free from grass. A slight tear in the lining can lead to leakage. In this scenario, the lining has to be patched. The costs for maintenance are relatively low. But in case of a major leakage, the pond has to be emptied and then the lining can be serviced.

Utility of such ponds for the farmers is cannot be denied. “Farm ponds are of absolute help. “We can be assured about the months of summer and drought situation through this storage system. And since water source and irrigation is assured, the number of crops per year, quality of the vegetables, their size has radically improved a great deal.” says Lombate who owns 4 acre of agricultural land under a vegetable patch and community farm pond of size 44 feet*44 feet.

“Crops are now given water with better pressure from the pond. Giving water directly from the bore well would often be with low pressure as the bore wells acquiesce water very at a snail’s pace.”

We also asked Lombate about what he feels about sustainability of the farm pond structure. After all, dissidents of farm ponds have been aggressively stating that farm ponds basically get the groundwater to the surface from where it evaporates, and hence, they believe farm ponds to be inimical to the cause of ground water tables. However, Lombate offers a quick repartee. “I have another way of looking at it,” he offered. “We load up most of the farm pond during the rains,” he said. “What happens later in terms of pumping the borewell is only a case of topping up the pond. We do the final top up in March, after which the borewells anyway run dry. In the absence of the ponds, the entire requirement would have been pumped from the borewell; thus, farm ponds are not as inimical to the cause of groundwater tables as they are perceived to be.”

### Table 3.7: Changes in cropping pattern, yield and area under vegetables pre- and post- water intervention

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Observations pre intervention</th>
<th>Observations post intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Bore well</td>
<td>Bore well and farm pond</td>
</tr>
<tr>
<td>Method of irrigation</td>
<td>Drip irrigation</td>
<td>Drip irrigation</td>
</tr>
<tr>
<td>Number of crops taken annually</td>
<td>1 or 2</td>
<td>2 or 3</td>
</tr>
<tr>
<td>Crops</td>
<td>vegetables, moong</td>
<td>vegetables, soybean, chickpeas</td>
</tr>
<tr>
<td>Yield per acre</td>
<td>600 kilos</td>
<td>1000 kilos</td>
</tr>
<tr>
<td>Area under vegetable patch</td>
<td>about 2 acres, Revenue was Rs 4,00,000</td>
<td>about 4 acres, Revenue is Rs 8,00,000</td>
</tr>
</tbody>
</table>
From our conversations, we note that Lombate is a well-to-do farmer and very aware about water conservation and water strategy. He is also acutely aware about marketing strategies of various crops. It becomes important to note that his revenues from the vegetable patch more than doubled post intervention and the revenues from other crops. Lombate is a true advocate of “a stitch in time saves nine”.

**Conclusion**

Is the scheme all inclusive?

It becomes imperative to ask that are these structures meant for all farmers of all sizes? Lombate could afford to build the farm pond on 1 acre of the land, but so many farmers have land holdings smaller than his. Thus, the scheme necessarily benefits those with larger land-holdings and higher income profiles than benefitting the truly small farmers.

For small or marginal farmers to acquire farm ponds, there will necessarily have to be an underlying land and water sharing contract, pending which this scheme cannot really benefit the really small farmers and cannot offer them water enhancement.

The farm ponds are indeed a quick fix, but it is vital to ask how to renew the ground table reserves that the farmers keep extracting from. While the effectiveness of the ponds is perceptible, not so clear is the accelerated rate of groundwater extraction.

Bore wells were a distinct technological leap in pulling out groundwater and now the farm ponds speck the next marker on the landscape of water management by providing for a personal and adapted surface storage of groundwater. In addition to increasing extraction, this system also introduces the risk of groundwater to losses through evaporation, excessive drawing, wastage etc. A dwindle in the groundwater may not demonstrate its effect immediately but in approaching years the harshness of the dilemma is bound to increase.

Such is the nature of deep anxiety and loss of confidence that the farmers have developed about water availability. The farmers solely cannot be blamed for it. They have been constantly bearing the impact of failed irrigation projects, failed monsoon, labour shortage, uncalled-for pricing systems, growing claims of urban development and industries on irrigation water among numerous other factors. Right now, farm ponds are one of the last resorts and best bet that is assuring them irrigation and helping them reap crops in the times of anguish. This system guarantees a sustainable revenue stream for the farmers. That’s why every farmer—small or big— is trying to invest in farm ponds. If not eligible for subsidy then farmers take loans to build farm-ponds.

Water conservation and groundwater revitalization through watershed development is a time-consuming course of action. Its central constituent is people’s participation and their learning in the due course about using common property resource such as water more dutifully.

This development model hinges its success upon the level of bonds amongst people, their willingness to innovate and their keenness to learn how to obtain water a bit more responsibly.
All the success stories of watershed development are essentially people-driven and look a lot like a revolutionary movement. These tales are much more than just building physical structures like nallabunding, gully plugging, continuous contour trenches etc. They involve people taking ownership of the resource and sticking to the prudential practices of sharing water, cropping pattern, keeping the water use within revival capacity etc.

Summing up, the process is still a work in progress. The collaborative movement to get water and grow is indeed worth applause. However, there should be a scientific approach towards the process and the water resource should be treasured. The infrastructure should be sustainable and there should be a cohesive system to replenish the ground-table reserves.

References

1. District Statistical Abstract of Osmanabad district, 2015 & Interview with officers from Agriculture office, Kalamb
2. Interview with Mr. More (Taluka Agriculture Officer)
CHAPTER - IV

CASE STUDIES ON PROTECTED AGRICULTURE IN OSMANABAD DISTRICT

Pic 4.1: Protected Agriculture: Polyhouses in Osmanabad

CASE STUDY 1: ECONOMIC ANALYSIS OF SHADE-NET BASED AGRICULTURE

Villages: Avhadsirpur, Babhal
Block: Kalam
District: Osmanabad

Abstract

The cases discussed in this section throw light on one of the modern day agricultural technique which seems to have been a success for whosoever has tried it. Shade net farming is still new and not many farmers aware of this technique of agriculture. The following paper throws light on the cost benefit analysis of installing and using the shade net farming method. Taking into account two exceptional cases from villages in Osmanabad district, this article highlights the way in which the farmers were able to overcome the water challenges faced by them in the near past where drought seemed to be a norm for the past four years. It also discusses about the innovative ways in which the farmers are able to get the best deal for their output with minimum transportation cost.
Shade net Farming

Shadenet is constructed with GI pipes, angle iron, wood or bamboo. A plastic net made from 100% polyethylene thread with specialized UV treatment is used to cover the framed structure of a shed net. The plastic nets have different shade percentages. Seasonal and off-seasonal cultivation is possible as it provides a partially controlled environment and atmosphere. It efficiently can reduce the intensive sunlight and the scorching heat during the day according to the requirement of the crops grown under it.

Shade nets are available in varying shade percentages ranging from 15%, 35%, 40%, 50%, 75% to 90% (“Shednet House”, 2014). A 35% shade factor indicates that the net cuts thirty five percent of light intensity thus allowing sixty five percent of light to pass through the net. Each plant requires different percentage of sunlight and shade for it to flourish best. Hence proper guidance and consultation is required to choose the shade percentage in order to create an optimum climate condition.

Shade nets are believed to be beneficial on a variety of parameters. They help in the efficient cultivation of flowers, vegetables, fruits, medicinal and aromatic plants, spices, foliage plants, etc. They can also be used for growing nurseries of fruits and vegetables. Shed nets are particularly helpful in enhancing the yield during the summer season. Shade nets provide protection from pest attacks and also protect the cultivation from extreme weather conditions. Shade net agriculture can also be used to harden the tissue cultural plants. It is also effective in ensuring quality drying of the agro products. Shade nets also help creating a conducive environment for the vermin compost production.

If the shade net project is not properly implemented, there be may be some temporary and localised adverse impacts for which some mitigation measures need to be prepared. Normally, this technique of protected cultivation should reduce the adverse pest attacks, but under certain circumstances, the incidence of pest attacks may be higher. In fact, if there is an incidence of a pest attack in shade net agriculture, it is next to impossible to save the other plants in the net from it. According to Munoz, following are the potential mitigation measures suggested so as to avoid pest attacks in shade net agriculture:

- Sterilize the soil by solarisation.
- Avoid fumigation of soils by chemical wherever possible.
- Remove debris materials that might provide habitat for pest multiplication on the site of the Shade net.
- Double entry gates minimises the risk of pest entry.
- Preparation of bed by building up rich flora of biological control agents for the management of soil borne pathogens.
- Introduction cultural control methods like resilient seed varieties.
- Integrated Pest Management strategies.
- Suggested use of insect-proof net screens.
- Applying pesticides only when pest populations are large enough to cause economic losses.

NHB (National Horticulture Board) is an autonomous society set up by the Government of India in 1984. Under the scheme of ‘Development of Commercial Horticulture through Production and Post Harvest Management of Horticulture crops’, subsidy is provided to the
farmers of Maharashtra for setting up a Shade net ("Schemes of NHB", 2010). As per the general conditions of the project, this subsidy will be considered as one time assistance for the benefit of the horticulture projects.

**Case Studies**

The following case studies throw light on various aspects related to Shade net farming. Both the case studies have been taken from different villages of Osmanabad under Kalamb Taluka.

**Objectives of the case study**

- To understand the reasons for setting up a Shade net and from where the inspiration was taken to do so.
- To understand the time required to construct a Shade net
- Time taken to receive the subsidy
- To know if any prior training was taken and if so from where.
- To understand the sources of funds used to raise the capital and challenges faced if any.
- To know the operation and maintenance cost involve if any.
- Change in the annual income before and after the intervention.
- To know the number of years taken to break even.
- To understand the various sources of irrigation used.
- To understand the marketing techniques used and any issues faced in doing so.
- To understand what the Government could further do for the betterment of the farmers using a Shade net.

**Methodology**

The case study was primarily conducted through group discussions and structured Personal Interviews with the people who have set up a Shade net.
CASE STUDY 1.1: AN EXCEPTIONAL CASE OF 90 FARMERS PRACTICING CO-ORDINATED SHADE NET FARMING

Pic 4.2: Mr. Avhad in discussion with the GIPE team

Mr. Pandurang Avhad is a very respected and influential person in the Avhadsirpur village. He is on the Board of Directors at the Natural Sugar factory in the neighbouring Ranjani village. Being an expert in growing sugarcane, he is invited to train farmers all over the country by the Government. Being a B. Sc. Agriculturist, he is one of the rare educated farmers with a vision. Both his sons are well educated and have come back to farming. Getting good returns from their farm, he children are no more enticed to move to urban cities.

Mr. Pandurang Avhad is one of the 90 farmers in Avhadsirpur village near Ranjani village in Kalamb taluka of Osmanabad district, each having a Shade net in their farms. His Shade net is about 1 acre in size. The last five years i.e 2011-2015, this region had experienced severe drought. Mr. Pandurang’s farm is about 3 kms away from the Manjara dam. Around 22nd September 2015, Manjara dam with its huge water storage capacity was fully dried out to the extent that not a single drop was left even to suffice the thirst of a sparrow. Sugarcane had been the major crop in this area then. Sugarcane is popularly known to fetch good money to the farmers. Thus with the habit of earning fairly well and with less water for the same, the main question faced by the farmers of this region was what to do with less water?

This led them to the concept of a Shade net. For 1/2 acre Shade net at the most 3000 litres of water is required. Even if one rents a tanker in case no water is available for cultivation and
grows fruits and vegetables under Shade nets, then to it is quite affordable for him. Thus accordingly, 90 Shade nets were set up in the area.

It is important to visit the cultural facts of the village before understanding the specifics of the finance raised for the Shade nets in Avhadsirpur. All the farmers of the village have traditionally been sugarcane growers and have been suppliers to Natural Sugar and Allied Industries Ltd., one of the biggest private sugar factory in Osmanabad, and indeed in Maharashtra. The sugar factory plays a huge role in the social-economic fabric of Kalamb taluka. The factory has not only created an economic livelihood for the farmers, but has also established schools, clinics, cold storages etc. for the farmers. The factory also has established a credit society for giving loans to the farmers.

Now, between 2011 and 2015, when the small farmers in Avhadsirpur decided to move into Shade net farming, they were firstly required to raise funds for constructing the Shade nets. The cost of setting up a shade net is approximately Rs.7 lakh. Of this amount, as per Government schemes, 50% subsidy is provided by the Government to the farmers setting a Shade net. Since banks are sceptic of providing loans to small and marginal farmers and in this case the number of farmers opting for a bank loan was quite large, the Sugar Factory stepped in and took the responsibility of repaying any loan if it went bad. Thus, the factory gave a guarantee to the bank, which greatly aided the process of the farmers receiving a loan from the bank. Thus, because of this action of the Sugar factory, the farmers were able to get loans and start the work of setting up Shade net agriculture in Avhadsirpur.

The loan taken had tenure of 5 years for all the farmers. The Shade net nets were setup around late 2013. The farmers there proudly tell that they could break even in around 2 to 3 years and most of the farmers thus had paid off the loans completely since they had the cash and did not want to pay the interest rates when they could repay the loan amount.

A Farmer Producer Company called Natural Organic Farm Producer Company was registered by the Sugar factory way back in 1998 itself. This FPC now truly came into action with the 90 farmers practicing Shade Net agriculture. Under the aegis of the company, the farmers hired consultants to guide them on those crops that could get them maximum revenues. All 90 farmers started co-ordinating amongst themselves. They now grow the same crop which has enabled them to exercise collective input buying, collective technology solutions for agriculture and collective marketing.

Thus, under the framework of the company, now the farmer is concerned only with growing the vegetables on his farm. The sapling and seed requirement for his farm is put forth to the company which arranges and provides the farmer with the same. Right from sowing till harvesting, the consultants provide guidance to the farmers in each and every step of cultivation. In this smart phone world, these farmers have comfortably made a place for themselves. All of them have a Whatsapp group which includes experts and specialised consultants. Any smallest of their problems gets solved in matter of few minutes by sending their doubts or a picture of the problem on the group to which the expert gives his solution accordingly. Not only that but weekly, fortnightly or monthly agendas are also discussed and planned accordingly in their Whatsapp group.

Once their harvest is ready, all the farmers bring their produce to the Cold Storage set up by the Sugar factory by 10-11 am. Each farmers produce is then weighed and recorded. Once all the stock is collectively gathered, it is then graded and packed under their company’s logo.
‘Natural fresh’. The deal is struck on phone with the interested buyers and accordingly the stock is transported to the respective buyers. The buyer then sends the payment on the company’s name with the driver. Then the expenditure incurred for grading, packing and transportation is deducted from the payment which is then distributed to the farmers based on their share in the total produce. This payment is directly deposited in the bank account of the farmers.

In the fruits and vegetables business, marketing plays a key role. If the farmer alone is responsible for both producing as well as marketing his product, he is not able to devote his 100% in producing his vegetables which affects his total produce. However, with the setup created in the village, the farmer is solely concerned with his production only and the rest is looked after by the company, ensuring that the farmer gets a fair deal. On 1/2 acre land, the farmers are able to earn about Rs. 2 to 3 lakh a year after deducting the costs incurred. This again implies a break-even period of about 2-3 years.

Pic 4.3: Team GIPE after detailed site visit with Mr. Avhad
CASE STUDY 1.2: AN EXCEPTIONAL SUCCESS STORY OF 5 YOUTH PRACTICING SHADE NET FARMING: MAKE IN MARATHWADA

Pic 4.4: Bitter Gourds in the Shade Net Farm

Where the Make in India is spurring industrial activity at full force within the country, we came across a very interesting and inspiring case of 5 youth contributing to the agricultural activity in Marathwada, tempting us to coin the word “Make in Marathwada”.

5 farmers in the Babhal village, Kalamb Taluka, Osmanabad district, have come together and constructed Shade nets on a fraction of their respective farm holdings. Each has his own unique story to tell but and the interesting fact observed in all of their stories is the basic underlying fact that they had earlier thought that agriculture would not be able to sustain them and hence had moved to urban areas. Despite being placed in prominent automobile and telecommunication industries, they were not satisfied with their urban 9 to 7 jobs fetching them a mere 10 to 15 thousand a month. After some soul searching and a lot of research, the friends consulted with each other and came back to experiment with Climate Resilient Agriculture. Thus, this is something of a rarity in that it is a case of reverse migration and the interest, effort and eagerness of theirs in adapting and incorporating different techniques and modern technology in agricultural cultivation along with their zest to work for the same is quite overwhelming.
The group of friends had already read up on how profitable Shade Net agriculture can be. What they did not know was whether this could be as profitable as it was made to sound in Marathwada. Once they got back, they next visited a group in Dhowali village in the neighbouring Vashi Taluka in Osmanabad district itself, where a group of farmers were successfully using Shade nets for their cultivation. Accordingly they sought guidance and support from an officer and proceeded with this endeavour.

All of them have continued with the traditional open agriculture, even while experimenting with Shade nets on small parts of their land. Mr. Rajesh Waghmare, one of the five farmers, with a farm area of 35 acres, has constructed a Shade net on \(\frac{1}{2}\) acre land. The Shade net was put up in the later half of 2015.

The construction of a Shade net took roughly around 1 month. The construction of the Shade net cost Mr. Rajesh Waghmare Rs.10.5 lakhs, of which he was able to raise a loan of Rs.7 lakh from the State Bank of India. He had to raise the balance amount himself. Of the Rs.10.5 lakh cost of the Shade net, the cost of setting up the structure cost him about Rs.7 lakhs and the rest includes the cost of setting up drip irrigation, layering soil etc. The rate of Interest charged by the bank was 13.5%. He got the subsidy of Rs. 7 lakh after one and a half year. A thing to be noted about Shade nets is that the cost of drip irrigation is not included in the subsidy and is self financed. Therefore the Rs.7 lakh that he got as subsidy from the government includes only the cost of building the Shade net.

<table>
<thead>
<tr>
<th>Area</th>
<th>Cost</th>
<th>Funding</th>
</tr>
</thead>
</table>
| Half acre (20 gunthe) | Rs. 10.5 lakh | Rs. 7 lakh – loan from SBI  
Rs. 3.5 lakh- self finance |

Initially Mr. Rajesh grew capsicum on his farm land, but now he is growing bitter gourd. He was discouraged by many who had failed miserably in growing bitter gourd earlier, but astoundingly, today, Mr. Rajesh and one of his friends are successfully growing bitter gourd which is healthier and much bigger in size than a normal bitter gourd grown outside. The secret behind his this success is because of pollination by honey bees. Some farmers in Beed region had experimented this technique which proved to be a success. Taking guidance from them accordingly, Rajesh set up a small setup of bee hives inside the Shade net to aid pollination.

Rajesh claims that the use of Shade nets has enabled him to earn 50% more of what he was originally earning. While he is yet to understand the operation and maintenance cost of Shade nets as his is fairly a newly constructed one and thus so far the O&M charges incurred are zero. He is impressed with the change he is witnessing in his profit levels and believes that in the future, if he incurs any O&M costs, it would not reduce his profit substantially.
The main advantage of using a Shade net as claimed by Mr. Rajesh is that he is able to cultivate even in the off season which indirectly enables him to earn more which nullifies the effect of having less output.

These five enthusiastic friends liked to be fondly called the ‘Yuva group’. As mentioned above they each have constructed a Shade net of which 2 people are growing bitter gourd, one is growing Marigold, one is cultivating capsicum and one is growing cucumber. Two of the farmers including Rajesh have 35 acre of total farm land, one of them has 30 acre farm land and the other two have 14 acre farm land and 6 acre farm land respectively.

Pic 4.5: The Yuva Group

All of them have collectively helped a friend of theirs to buy a truck which they use for transporting their produce to the market, thus minimising the transportation cost.

When asked what he will like to grow next, Rajesh expresses his wish to grow capsicum again. His initial attempt at growing capsicum on 1/2 acre land earned him Rs. 6 lakh, of which his cost was Rs.3.5 lakh and his profit was Rs.2.5 lakh. He is hopeful of now having significantly lower costs of cultivation with the huge savings in labour that he is witnessing in the Shade Net.
When asked if he will like to increase the size of his Shade net he expressed his wish to do so and in fact admitted to have applied for the same.

With the success of Shade net being observed by the farmers, many farmers want to get into Shade net farming and therefore, the number of applicants for the subsidy has increased and thus the government is now resorting to a lucky draw system for the same. Rajesh opines that if he gets a sizeable bank loan, he is ready to further more Shade nets in his farm even if he gets no subsidy for the same. This statement in itself shows the benefit of building a Shade net surpasses any costs involved in the method.

**Conclusion**

In conclusion, it can be said that Shade nets are extremely beneficial to farmers, requiring less land, less water and can cultivate healthier looking crops with a controlled environment. But one major drawback of a shade net is that it cannot be opted by small and marginal farmers for whom in fact this scheme was brought in action. This is so because the farmers have to bear the expenses initially and only after the construction of a shade net are they able given the subsidy. Now with the average construction cost per acre of a shade net excluding drip irrigation system being roughly around Rs.7 lakhs, it is clearly difficult for a small farmer to have this much capacity for raising personal finance. The banks to do not show much confidence in these farmers and hence the small and marginal farmers cannot opt for constructing a Shade net. This defeats the whole purpose of implementation of the subsidy scheme whose aim was originally to aid small and marginal farmers improve their viability and climate resilience.

Also, the time taken to get the subsidy ranges from 1 year to 2-3 years. The delay in receiving the subsidy costs the farmer a lot in the form of the interest rate. A delay of 2 to 3 years in getting the subsidy is of no use to the farmer as he ends up paying an equal amount to the bank as interest rate. Hence the farmer ends up not getting benefitted at all by the subsidy.

To counter this problem the Government could take the responsibility of the interest being charged on the subsidy amount. Another way could be that while taking a loan the farmer has two accounts. Say he is taking a loan of Rs.7 lakh, in which the Government is expected to pay him Rs.3.5 lakh as the subsidy. In this case, the bank can ask the farmer to create two accounts within the Rs.7 lakh account. One account is of a loan of Rs.3.5 lakh, in which the farmer undertakes to repay principal as well as interest amount. On the other loan account of Rs.3.5 lakh, the Government will directly undertake the responsibility of repaying the principal as well as the interest. In this system, whatever interest amount is charged because of the delay in giving the subsidy, would be borne by the Government and not by the farmer.

Overall, Shade net farming seems to be a successful technique in cultivating various fruits, flowers and vegetables. It helps in growing crops even during off season hence enabling the farmers to get optimum profits. Shade net farming has enabled the farmers to earn twice more than what they earned prior to using the Shade net farming technique.
References

CASE STUDY 2: ECONOMIC ANALYSIS OF POLYHOUSE-BASED AGRICULTURE

Pic 4.6: Flowers in a State-of-the-art Polyhouse at Osmanabad

Village: Kherda, Kalamb
Block: Kalamb
District: Osmanabad

Introduction

The history of the land is etched in the faces of the farmers who till it. The last four years Maharashtra has suffered from a prolonged drought, Vidharbha and Mahrathwada facing its maximum wrath.

The irrigation in this state stands low at about 16%, where the national irrigation average stands at 42% (Kelkar-Khamte, 2014). Overdependence on groundwater has led to a severe drop in ground water levels indicating its severe over exploitation. Irrigation seems to be more developed in western Maharashtra than in Vidharbha and Marathwada who need it the most.
Both in Vidharbha and Marathwada, sugarcane, cotton, tur and soyabean are grown widely. Thus overdependence on cash crops, on monsoon, poor irrigation, dependence on ground water coupled with poor electrification has made farming unremunerative.

The worst hit because of this drought undoubtedly is the small and marginal farmer. Vidharbha and Marathwada severely lack assured water supply which in turn has proven to be its major problem and the fact that no other method of irrigation is popular in the region is not helping the situation.

Thus the utmost priority now is to guide the farmers with different subsidiary occupations and techniques of agriculture for him to sustain himself. Technology, backed by effective government policies will thus drive agriculture in the future.

**Background**

India is known as an agrarian country since before its independence. In India, more than 58% of its population’s principle source of livelihood is agriculture. It provides with bulk of raw materials and wage goods required by the industrial and the non-agricultural sector. The Government of India has come up with various schemes to develop the agricultural sector. **Mission for Integrated Development of Horticulture (MIDH)** is a Centrally Sponsored Scheme for the holistic development of the horticulture sector including several varieties of fruits, flowers, spices, vegetables, aromatic plants, mushrooms etc. The Government of India bears about 85% of the total developmental programmes in all states except for North east and Himalayas where it bears full 100%. The rest 15% is borne by the respective State Governments. MIDH has many sub schemes, some of them being NHM (National Horticulture Mission), NHB, NCPAH, etc. ("Government Subsidy service assistance", 2009).

**NHM (National Horticulture Mission)** was launched under the 10th five-year plan in 2005-2006. Its main aim to develop the horticulture sector to its optimum potential.

NHM provides 50% subsidy for setting up a polyhouse as below:

<table>
<thead>
<tr>
<th>Component</th>
<th>Maximum Allowable Expense</th>
<th>% of Subsidy</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly House</td>
<td>844 / sqm</td>
<td>50%</td>
<td>Subsidy for maximum 4000 sqm</td>
</tr>
</tbody>
</table>

Source: [http://ethicsagrotech.in](http://ethicsagrotech.in) retrieved on 9th December 2017
NHB (National Horticulture Board) is an autonomous society that was set up by the Government of India in 1984. Under the scheme of ‘Development of Commercial Horticulture through Production and Post Harvest Management of Horticulture crops’, it provides 50% subsidy for different crops for different cost as below:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crop</th>
<th>Cost of polyhouse with drip and fogger system (in lakhs)</th>
<th>Cost of Cultivation (in lakhs)</th>
<th>Cost of ceiling per acre with add on components in project mode (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anthurium and Orchid</td>
<td>33.76</td>
<td>28</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>Rose, Lilium, Chrysanthemum</td>
<td>33.76</td>
<td>17.04</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Carnation and Gerbera</td>
<td>33.76</td>
<td>24.40</td>
<td>66</td>
</tr>
<tr>
<td>4</td>
<td>Hi-value vegetables under polyhouse</td>
<td>33.76</td>
<td>5.60</td>
<td>47</td>
</tr>
</tbody>
</table>

Source: [http://ethicsagrotech.in](http://ethicsagrotech.in)retrieved on 9th December 2017

Poly House Farming

A polyhouse is made from polythene which is commonly used for growing high quality agricultural products. The temperature, ventilation and humidity of air can be controlled by the various instruments installed in the polyhouse. The crops grown under polyhouse are thus protected from extreme weather conditions like intense heat, rain storms, hail storms, cold waves etc. ("Polyhouse- Advantages, Types and Cost of Polyhouse farming", 2015).

Polyhouses are used for floriculture, nurseries and horticulture. Considering the investment required, floriculture is the best and primary option. The most prime advantage of polyhouse is its ability to grow fruits and vegetables even during off season. Consider an example of tomato. In India, tomatoes cannot be grown during rainy season, thus leading to its shortage, soaring its price in process. Thus this proves to be an ideal time to grow tomatoes and that is made possible by growing them in a polyhouse.

Thus a polyhouse is designed in such a way so that it provides an ideal climate to the crop being grown. Every factor influencing the crop can be controlled as per its requirement in a polyhouse. Foggers are one such instrument that are used to increase or decrease the temperature. One such example of its application is by considering a where a farmer is situated in a tropical zone. Thus in tropical zone, the temperature tends to soar above all the normal levels. Here foggers can then be used to reduce the temperature. This process does not thus enhance the humidity levels in the polyhouse as the evaporated droplets are ventilated to open air almost immediately. High tech polyhouse even have the system of soil heating with purifies the soil of unwanted viruses, bacteria, etc. The environmental parameters maintained in the polyhouse are: CO₂, temperature, light, humidity and air flow.
There are three types of Polyhouses: uncontrolled, partially controlled and completely controlled. While in Uncontrolled polyhouse only its top part is covered, a partially controlled polyhouse has open and closed windows and in a completely controlled polyhouse the windows are absent, it is completely computerised.

While selecting a site for a polyhouse the following things need to be taken into account:

- The site should be pollution free.
- Water supply should be regular.
- The electricity supply should be regular.
- Soil should be levelled and drained.
- The polyhouse should be near to the road so that proper approachable path to the polyhouse is ensured.
- When required, the expertise and labour should be accessible and available.

The soil has to be first levelled and then the beds need to be risen by using red soil, fine sand, decomposed cowdung or coco-pit.

The different methods of irrigation that could be used in polyhouse include hand watering, tube method, over head sprinklers, drip irrigation, mist system, polythene tubing etc.

**Advantages of Polyhouse**

- It gives protection from extreme weather conditions.
- It can be constructed on unproductive soil also.
- It enables one to have optimum production of crops with minimum land.
- Humidity can be maintained.
- Enables efficient use of carbon-dioxide.
- It requires minimum labour.
- It reduces labour cost
- It ensures optimum use of available space.
- It enables a single person to have efficient control over thousand plants.
- Pest and diseases can be controlled and dealt with easily.
- It allows for production of crops all year round.
- The quality of the produce is excellent.
- Enables economic use of water.

**Case Studies**

The following case studies give a deep understanding of the various practicalities related to the polyhouse farming. Both the case studies have been taken from different villages of Osmanabad under Kalamb Taluka.
Objectives of the case study

- To understand the reasons for setting up a polyhouse and from where the inspiration was taken to do so.
- To understand the time required to construct a polyhouse.
- Time taken to receive the subsidy.
- To know if any prior training was taken and if so from where.
- To understand the sources of funds used to raise the capital and challenges faced if any.
- To know the operation and maintenance cost involve if any.
- Change in the annual income before and after the intervention.
- To know the number of years taken to break even.
- To understand the various sources of irrigation used.
- To understand the marketing techniques used and any issues faced in doing so.
- To understand what the Government could further do for the betterment of the farmers using a polyhouse.

Methodology

The case study was primarily conducted through group discussions and structured Personal Interviews (PIs) with the people who have set up a polyhouse.
CASE STUDY 2.1: GERBERA - THE SUGARCANE OF POLYHOUSE FARMING

Pic 4.7: The colourful Gerberas in the polyhouses

Mr. Dnyaneshwar Vinayak Lokare who has set up a poly house in Kherda Village, Kalamb taluka, Osmanabad District, has completed his BA in economics. He has a very deep understanding of the crops that are commonly grown in the village and hence is often seen giving advises on different techniques of farming and cultivating crops. He holds great ideas for the better functioning the various schemes implemented by the Government for the betterment of the farmers. Thus he is one of the rare farmers who is educated and knowledgable in his field of work.

Mr. Dnyaneshwar built a polyhouse in 2015 with dimensions 52 ft x 40 ft on1/2 acre farm land. Because of the drought that prevailed in the district of Osmanabad from 2011-2015, soyabeen, tur, udid crops that were earlier commonly grown on a wide scale, now remained unprofitable. In order to deal with the drought situation that prevailed then, Mr. Dnyaneshwar thought, read up and thus came across the HTC training centre in Talegaon. Accordingly he visited the place and took the training there and also visited other places where a polyhouse was setup and was a success. The packing and technical assistance was all taken by Mr. Dnyaneshwar at the HTC training centre.
He had already constructed a farmpond in his farm on 1/2 acre land in 2013. It cost about Rs. 5.5 to 6 lakhs. Since the subsidy is received after the work is done in two stages, he had to raise the money required for the construction by himself, and hence it took him about 6 to 7 months for the constructing the whole farmpond.

He further went on to construct a polyhouse in 2015 which cost him Rs. 30 lakh. The cost of setting up the structure was around Rs. 22 lakh. The cost of sowing gerbera was Rs. 4.5 lakh and labour, mud and transport for the same all amounted to the remaining Rs. 3.5 lakh. This money was funded by borrowing from the Osmanabad IDBC bank at the interest of 12% per annum. Of this he received a 50% subsidy of about Rs.15.5 lakh after a year. Now this subsidy amount was then deposited as a fixed deposit at the interest rate of 9% per annum.

Initially he grew cucumber in the polyhouses, but now has moved on to grow Gerbera flowers. Once planted, the life cycle of the flower is at least 5 years. Estimated production of flowers is 60,000 per month but actual production of the flowers happens to be around 50-55 thousand per month. The main reason for him to shift from cultivating cucumber to flowers was because of the high volatility in cucumber prices. On the other hand cultivation of gerbera faces less volatility. There is minimum break even associated with it. Depending on the market price for the flowers, on an average the break even accounts to 2 to 3 years considering average price of a flower to be Rs.2 to Rs.3. The production cost of 1 flower including the prices of fertilizers, packing and transportation is Rs.1.22.
On an average, Mr. Dnyaneshwar sends 1700 to 2000 flowers a day to the markets. The main markets of these flowers is Hyderabad, Aurangabad and Mumbai. Most of the times he gets the highest demand from Hyderabad as the temples need flowers in huge quantities for decorations.
The cultivation of Gerbera does not need much skill as required in the cultivation of roses. Also, one can easily control the mites in gerbera plantation which is not the case in rose plantation. Even if insecticides are sprayed twice a day it does not control the mites in rose cultivation. Also high risk is involved in the sense that if a rose plant dries, there is a high chance all the other rose plants start drying out which does not happen to be the case in Gerbera plantation.

An interesting opinion of Mr. Dnyaneshwar is that just as farmers tend to mostly cultivate sugarcane in open spaces, they mostly tend to cultivate Gerbera as a cash crop in polyhouses. Thus, he claims, Gerbera is the sugarcane of polyhouses in Maharashtra!

One disappointment showcased by Mr. Dnyaneshwar is that the national banks show lack of trust in local farmers and thus if any loan availed most of the times is provided by the private banks.

He expressed his wish of experimenting with different plantations eventually, but that he will do once he has repaid the loan amount as he does not want any botheration of the experiment going wrong.

He finds polyhouse very beneficial because normally labour is a major issue but polyhouse requires less labour and produces more output. According to him only 2 to 3 labourers are required to cut and pack the flowers daily.

His total earning from the plantation of this flower in the polyhouse is much more than his total income prior earned from the farm cultivation, prior to the construction of a polyhouse. This indeed is marvellous to listen to! He was glad to share that this November he got the highest rate for Gerbera till date (Rs.6 per flower). This is surprising because normally it is observed that the flower sells at a higher rate normally in the months of February and March.

When asked in what way could the Government help, he put forth a very crucial point and that is of providing a storage/ cold storage which would be helpful when the rates of the flower are very low and thus they could store till when the rates of per flower are decent enough.
### Table 4.1: Cost-Benefit Analysis of Mr. Dnyaeshwar’s Protected Agriculture

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Component</th>
<th>Particular</th>
<th>Sr. no</th>
<th>Component</th>
<th>Particular</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cost of polyhouse (Rs.)</td>
<td>32,50,000</td>
<td>1</td>
<td>Avg per month flower production</td>
<td>55,000</td>
</tr>
<tr>
<td>2</td>
<td>Loan amount (Rs.)</td>
<td>32,50,000</td>
<td>2</td>
<td>Total flower production in a year</td>
<td>6,60,000</td>
</tr>
<tr>
<td>3</td>
<td>Per annum Interest on loan</td>
<td>12%</td>
<td>3</td>
<td>Cost of 1 flower (Rs.)</td>
<td>1.1</td>
</tr>
<tr>
<td>4</td>
<td>Total interest charged in the first year (Rs.)</td>
<td>3,90,000</td>
<td>4</td>
<td>Total cost of production (Rs.)</td>
<td>726000</td>
</tr>
<tr>
<td>5</td>
<td>Subsidy received (Rs.)</td>
<td>15,50,000</td>
<td>5</td>
<td>Min selling price of 1 flower (Rs.)</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Interest on fixed deposit</td>
<td>9%</td>
<td>6</td>
<td>Total selling price of 6,60,000 flowers (Rs.)</td>
<td>13,20,000</td>
</tr>
<tr>
<td>7</td>
<td>Interest earned on the fixed deposit</td>
<td>1,39,500</td>
<td>7</td>
<td>Min Total profit in a year (Rs.)</td>
<td>5,94,000</td>
</tr>
</tbody>
</table>

### Table 4.2: Break-even Analysis of Mr. Dnyaeshwar’s Protected Agriculture

<table>
<thead>
<tr>
<th>First year Interest cost (Rs.)</th>
<th>Second year onwards Interest cost (Rs.)</th>
<th>Min Profit in a year (Rs.)</th>
<th>Subsidy received after first year (Rs.)</th>
<th>Break even</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,90,000</td>
<td>2,50,500</td>
<td>5,94,000</td>
<td>15,50,000</td>
<td>In 2 to 3 years</td>
</tr>
</tbody>
</table>

(First year and second year interest costs should reflect the actual figures.)
CASE STUDY 2.2: AN EXCEPTIONAL CASE OF CO-ORDINATED MARKETING OF THE FLOWERS GROWN UNDER A POLYHOUSE

Pic 4.12: Gerberas and other plants in polyhouse environment

Mr. Pandurang Avhad is a very influential person in the region of Ranjani village, Osmanabad. He is often seen giving guidance to the fellow farmers. He prefers explaining ideas to the farmers with local examples. He states that just as the milk comes home to a man, but the man goes out to get alcohol, similarly, people catch bad things quickly, but good things need to be told repeatedly. Accordingly he is always ready and patient to explain things to the fellow farmers. He is often found quoting that if the road is not good or the driver is bad, the car may run at a speed of say 20 kms / per hour. For the car to run with a speed of 100-150 kms /hour, it is necessary that the road is good- here the fertilizer, the car is good- here the seeds/ saplings used, the oil/ petrol is good- here the fertilizer is good and lastly the driver is good- here he means that the organization of the farmer should be good. Mr. Avhad is an extremely visionary person way ahead of time.

According to him, there was a lot of wisdom in traditional Indian agriculture. However, the new education system took over and anyone who could adapt to the new system and turn to urban jobs did so. He lamented the fact that unfortunately, the only people left back in agriculture are those who are uneducated and have not shown adaption capacities; this by itself creates a situation wherein the farmer is not really aggressive about adaption to new techniques, new knowledge and new ways of cultivation, which works adversely for agriculture. Many a times, hence, farmers are seen taking advice about agriculture from people who have never tilled land; these are the service centre proprietors or salesmen, whose
only priority is to sell goods to the farmers without truly bothering about the quality of goods and/or advice. Thus often a farmer is misguided to some extent. A farmer, according to Mr. Avhad, should have 4 D’s: Duty, Devotion, Discipline and Determination, for him to be successful.

Mr. Pandurang Avhad owns two polyhouses of ½ acre each. The cost of polyhouse is about Rs.21 lakh. This total cost includes the cost of foggers and black curtain with automatic censors. The cost of red soil for plantation which cost him Rs. 2 lakh is also inclusive in the total cost of Rs.21 lakh.

On 1/2 acre of this land he has 12,000 plants. 1 plant cost him 30 rupees. Therefore 12,000 plants cost him 3,60,000 rupees. According to him from the time of the plantation of the gerbera, the life cycle of the plant is about 4 to 5 years. The maximum cost of the flower is can fetch in his opinion is 6-7 rupees. The bigger the diameter of the flower, the higher the rate fetched for it. A flower on an average stays fresh for 8 to 10 days. When sprayed with water and packed it could stay fresh for 10 to 15 days as well.

The subsidy received by him is Rs.14 lakh which includes the cost of setting up the structure and the cost of gerbera plantation. The balance of Rs.7 lakh was raised by him by taking a loan.

The main problem observed by him which incapacitates the farmer from fetching maximum price for his product is that the farmers are not often united and co-ordinated unlike the middlemen and the traders. He very simply explained the same. When traders are selling in a market it is observed that most of the times all of them are stating the same price for a particular good, thus enabling them to earn the maximum from their sale. Whereas say all the farmers have gathered in a market each selling the same product. One is asking for Rs.200 for a good, while some other farmer might be in a rush for any reason and wants sell his good quickly, and thus now he asks for Rs.150 for the same good. In this case, the buyer being rational, strikes a deal with the latter farmer and thus in this case both the farmers lose in the process.

Pic 4.13: Team GIPE interacts with Shri Avhad
In Osmanabad district as he states, there are many polyhouses. All the farmers of Osmanabad having a polyhouse have formed a group. For profitable marketing and affordable transportation cost a vehicle is arranged among every 10-15 farmers. The flowers are packed in boxes. 1 box contains 500 flowers. Each person prepares his box containing 500 flowers and writes his name on it and the name of the person to be delivered. The driver takes it to the desired destination and once it is sold, he messages the rate at which the flowers were sold to the respective farmer.

**Cost Benefit Analysis**

In line with the statistics given by Mr. Dnyaneshwar, Mr. Pandurang also states that about 50 to 55 thousand flowers are produced on an average in a month. The plant blooms every alternate day. His production cost of 1 flower is about Re.1 to Rs.1.10. Therefore if the average selling price of a flower is Rs.2 i.e. the farmer makes a profit of Re.1 on every flower. In about 10 months time on an average 4 to 4.5 lakh flowers are grown. Thus going ahead with the maths, the farmer can break even in about two years.

The most beneficial factor according to Mr. Pandurang is that this setup requires less water, less area and even though the capital required is a lot, it is a onetime investment and it yields a very profitable output. Along with plantation of flowers he has his own nursery, where he grows saplings of various flowers. The Polyhouse being completely computerised makes maintaining the temperatures and humidity level fairly easy for him. The Polyhouse ensures frequent cash flows which is not the case when cultivating sugarcane or some other crop where the cash flows are at most twice a year. Polyhouse enables him to cultivate all year round whatever the season may be.

**Conclusion**

Thus Polyhouse is a great way to grow crops all year round. With 50% subsidy provided by the government for setting up a polyhouse, the farmer can very comfortably break even within two to three year at the most. The crops grown under a polyhouse fetch the farmer a higher price than if it would have been grown on an open farm. The climate conditions being controlled inside a Polyhouse lets the farmer grow a particular crop even when it cannot be grown in that particular season. This enables him to earn a lot of profit because these are the times when the prices of those particular fruits/flowers/vegetables soar high up. Another major advantage of a polyhouse is that it enables the farmer to earn optimum profit, with less land and less labour. Finally, polyhouses with Gerbera guarantee a regular weekly cashflow to the farmer. This, by itself, is the major differentiating factor between a polyhouse farmer and a regular farmer. A regular farmer gets to see money only at the end of the two seasons; with cash flows restricted to only 2 times a year, farmers find it very difficult to make ends meet. Further, it makes the farmer extremely vulnerable to the vagaries of income. One bad season reduced the cashflow to only one time a year. This often results in frustration, distress loans being taken from moneylenders, addiction, quarrels and suicide. Polyhouses have a high capital cost, but once they become functional, they guarantee a healthy cashflow to the farmer.
Having said that, it is also pertinent to point out that it is very difficult for a small and marginal farmer to get a bank loan that can support the capital cost of the polyhouse. Also the national banks seem to be the most insensitive to these farmers. This thus creates a very unbalanced situation wherein the polyhouses are created by those farmers who are anyway rich and do not really depend on the polyhouse cashflow, whereas those farmers who are very small and in extreme need of the regular cash are the ones left out in the polyhouses scheme.

Another drawback of the Polyhouse is that it is much more expensive than setting up a shade net. Thus, a small farmer who with great difficulty might have gotten a loan to setup shade net agriculture, cannot dream of setting up or upgrading to a polyhouse at least for the following 5-6 years. Another point to be noted here is that polyhouses can only be set up where there is regular supply of ground water. This is so because in the absence of water, the huge capital costs become unwieldy very quickly and can lead to humongous losses for the farmer. That is why most polyhouses are normally seen to be set up by farmers who own a farm pond or are in a village wherein participatory water management projects have created assured water supply.

PoCRA can make a true difference by designing beneficiary identification programs in such a way that the small and marginal farmers in assured water supply regions can get a priority in getting a loan to create the polyhouses. Further, the project can further help the farmers by setting up cold storages near polyhouse circles or re-operationalize the storages that have already been built in those areas. This would help the farmer in storing his products in times where the transportation facility is being delayed or when his products are not fetching a good price in the markets.

References


CHAPTER - V

VOICES OF DISSENT AND POINTS TO PONDER

The case studies presented in the earlier chapters suggest that if water be provided, yields, production, and farm income can certainly increase manifold. Chapter 2 creates an understanding of participatory water management systems. It presents cases from Nipani and Ranjani, two villages in which the Jal Biradari model was basically upheld by gathering popular support of the villagers and was supported financially largely through crowd funding and philanthropy. Chapter 3 presents case studies of farmers who have built farm ponds on their farms. The cases go to highlight the major change in the income levels, cropping patterns and confidence of the farmers once the farm ponds were constructed. Chapter 4 creates case studies of farmers who found that they could experiment with protected agriculture once they had water assurance. In all the chapters, water is seen to be the main hero in every case study.

However, whilst the capacity of water to create good income profiles in agriculture is undisputed, one has to also account for the fact that water is a scarce resource and hence, its exploitation, whilst profitable, may not be necessarily sustainable. The PoCRA project area comprises of 15 districts across Marathwada and Vidarbha; all districts currently face acute water stress. It is tempting to experiment with the Shirpur pattern of “water angioplasty” or with the Jal Biradari model to quickly create water conservation works, or construct multiple numbers of farm ponds, which then can create a multiplier effect in terms of income, which is one of the Project Development Objectives. In fact, the case studies presented in the earlier chapters of this report precisely go on to highlight the major change that can be achieved, should water conservation processes be started in the Project Area. However, the case models by themselves only focus on what can potentially happen post-water intervention, but they are silent on whether the water interventions in Osmanabad have been sustainable or desirable at all.

The report would not be complete unless these issues are detailed. In this chapter, we hence present some of the serious objections that have been taken by Groundwater Survey Development Agency (GSDA), water NGOs and water experts to the current water conservation models such as the Shirpur pattern or the Jal Biradari pattern of water conservation. The GSDA also has serious reservations regarding the creation of farm ponds. The observations given below are based on our talks and interviews with various water experts as well as with the GSDA officers. Wherever relevant, references have been quoted at the end of the chapter.

- The Shirpur pattern of water conservation entails deepening and widening of streams, recharging wells through recharge pits and creating cement check dams at surface level. Water experts have reservations about all the three processes.

- In deepening the natural streams by nearly 15 to 20 metres, the thought in the Shirpur model is that the murum layer, which allows percolation of water into the soil is found below the rocky layer in the riverbeds, which prevent percolation. Thus, if the rocky layer is removed, it creates a huge percolation potential. The water volume flowing through the channel is further increased by widening the stream; this increases the percolation pressure into the soil. Last but not the least, gateless weirs or cement walls
are constructed on the streams. All of this creates the “angioplasty effect” wherein water pressure forces percolation into the soil. The immediate impact of this is seen in terms of the water levels increasing drastically in the wells within the watershed. However, removing the rocky layer in the river bed to expose the murum causes the shallower aquifers to get exposed. If the aquifers are in the basaltic belt, this can lead to groundwater evaporating quickly. If they are in the murum belt, there is a danger of the murum itself clogging the aquifers, leading to inefficiency in water conservation over a period of time. Hence, water experts have been against deepening the streams over 3 metres; in fact, a critical evaluation of the Shirpur model was done by the GSDA after which a Government Resolution came out in May 2013 in which prohibitions have been imposed on deepening in the basalt belt and deepening in the murum belt beyond three metres calls for GSDA supervision.

- There are some points of contrast between the Shirpur model and the Jal Biradari one. The Jal Biradari believes more in bringing the natural nallahs into a line and then widening the structures and constructing check dams across it. However, in this model, they do not really dig too deep into the water bed and upon hitting rock, they leave it in place like a natural check dam. Whereas the Shirpur pattern was largely financed by a company in Shirpur and through MLALAD funds, the Jal Biradari model has relied on participatory crowd funding and getting water literacy re-inforced through Gram Sabhas.

- Creating check dams at intervals is a common feature between the Shirpur model as well as the Jal Biradari model, and this, according to the GSDA, could be inimical to the overall water conservation idea at a watershed level. When the check dams are constructed, it creates focus only on small streams and nallahs, which actually takes away from planning water conservation and storage at a watershed level. Construction of the small check dams often does not take into account the run off at a larger level, and hence, the structures constructed earlier suddenly turn inefficient in terms of water storage. These check dams may also create a downward stream issue as well as ones pertaining to equity.

- The problem with many of the small structures created through participatory village-level micro models is that they do not do a scientific hydro-analysis of the watershed. One has to study the overall rainfall received within the watershed, and more importantly the patterns in the rainfall in the monsoon months, which are normally captured in the run-off data. Once this catchment analysis is carried out, i.e. the rainfall and run-off data is analyzed, then the next step is to understand how much water gets conserved in the existing structures within the watershed and hence, where new structures could be created and how much water can be then sustainably and efficiently conserved in new structures. These procedures are normally followed when GSDA or the Water Resources Department is involved in creating structures, but there is no guarantee that these processes are followed in models driven by villagers and NGOs; in fact in most cases, these nuances are not appreciated, understood or implemented at all.

- GSDA Director Shekhar Gaikwad and Dr. Bhoyar, Jt. Director, Research and Laboratories, GSDA, pointed out in their interviews that considering the geological
structure of Maharashtra, where only 1 to 3% of rainwater percolates and becomes ground water, mass implementation of farm pond scheme at a macro level is not sustainable in the long run.

- The original farm pond scheme was used mainly as rain water harvesting, for collecting the runoff water, in areas which were basically rain-fed. In fact, the location of the farm pond was to be selected after calculating the natural run-off slopes\(^3\). Further, the ponds were not to be lined with plastic; this would help in terms of recharging the ground water tables through percolation. What was envisaged was that at the end of the monsoon, the farm pond could be possibly lined with plastic so that the water would not drain away and could be used for agriculture. This was a sustainable scheme. But in last few years, farm ponds have not been constructed for these purposes at all and have de-linked completely from the groundwater recharge purpose. Further, most of the farm ponds are constructed in areas where borewells or dug-wells already exist as an irrigation source. Thus, today, farm ponds are viewed as a way of storing surface water all over the State, and are not seen to be structures meant for recharging the groundwater tables. Hence, many a times they are situated at greater height and they are lined with plastic sheets. The former implies that the farmers doesn’t have to use pumps to supply water to his fields; the water simply flows through pipes from a greater height to the fields at lower heights. The latter phenomenon of lining the pond with plastic is proof of the fact that the pond basically exists as a storage utility and not as a recharge structure. The source of collecting water in the ponds is basically rain and borewells/ dug wells.

Farm ponds in Maharashtra are thus, used mainly as storage, wherein ground water is pumped into the same. Thus, it exposes ground water to huge evaporation loss. And probability of this loss is even more in the PoCRA districts, where maximum daily temperature in the summer months reaches up to 40 to 45 degrees Celcius. In fact, with such high temperatures, the extent of evaporation is so high that it nearly equals the rainfall. There is thus a double whammy of errors associated with farm ponds; on one hand, we do not allow it to percolate and on the other, we further expose it to evaporation.

- Finally, water is a subject that necessarily has to be studied from many angles. Today, there is great angst over the issue of Latur, where the rainfall in 2017 was apparently normal and yet, there is not enough water for the impending summer season. Where has the water gone? Here, it is also pertinent to note that cropping patterns within these areas have also changed significantly. Farmers have switched to horticulture crops, largely because the farm ponds have given them reliable irrigation. Now, with horticulture, the agrarian ecosystem becomes acutely dependent on water. With the dry spells in the monsoon period, the farmer starts working the borewells in June itself. The wells in Marathwada normally yield for about 8 months; earlier however, those 8 month started after the monsoon, because the Kharif crops used to be largely cereals such as jowar or oilseeds. However, now, with the farmers planting vegetables and fruits, the wells are worked right from June itself and one stares at dry wells in the critical summer months. The other issue is the rampant usage of borewells. As the borewell technology and electricity usage became cheaper, farmers now use borewells rampanty. If the farmers works the borewells in the monsoon months itself, the water
from the dug wells moves downwards and the summer months bring about a huge water scarcity.

Thus, while the case studies present a very positive picture, the issues being raised by GSDA and water experts pertain to the sustainability of structures such as check dams and farm ponds. Since the Project Development Objectives of income creation within the PoCRA districts are to be supplemented with sustainable development processes, these issues will have to be carefully thought out before PoCRA carries out water-related interventions in Marathwada and Vidarbha.

References:

CHAPTER - VI

OBSERVATIONS AND CONCLUSIONS

The case studies presented in this report focus on water - what its absence implied for agriculture in Marathwada and what miracle its presence has brought about. The cases amply highlight the fact that water is the lifeline of agriculture - the mere presence of water has the ability to reduce yield volatility, spur high value agriculture, spur protected agriculture, increase farmer income multi-fold, bring about secondary occupations and create a system of social harmony in the rural areas. Whilst the importance of water is indisputable, it has been one of the most abused resources in Indian agriculture in general, and Marathwada in particular. The cases highlight the tremendous efforts taken by Shri Thombare and Mr. Rajshekhar Patil in creating participatory water management models in the villages of Ranjani and Nipani respectively. The cases also highlight the increment in income witnessed by the farmers who have opted for farm ponds and protected agriculture.

On the other hand, there are voices of dissent which claim that only focussing on the income relevance of water is completely misleading and that sustainability issues will have to be given full precedence. When viewed in that light, the participatory water models are seen to have major flaws and farm pond schemes too seem to be harmful from a ground table perspective.

So, what is the way ahead?

Some of the important observations and policy points that emerge from the study are as follows:

1. Clearly, participatory water management models work. They also create great positive externalities in their wake, the most important being water literacy amongst the villagers and a sense of ownership about the project. However, what these models lack is a scientific approach to water planning. Where PoCRA can score is that it can supplement water participation with water planning; whilst the element of participation will come from the Village Committees, PoCRA can make it mandatory to get all the structures and processes validated by a water expert appointed for every watershed.

2. It takes more than a Government scheme to create a Participatory Water Management Model: The cases of Nipani and Ranjani highlight the fact that the farmers came together under the umbrella of trustworthy local leaders to resolve their own issue of water. These villages neither started the process due to presence of a Government scheme, nor relied on any Government funds to take the process ahead.

Hence, partnerships with local NGOs, local social entrepreneurs and local opinion leaders is crucial for success of participatory water management: PoCRA aims at bringing about a water balance in the 5000 project villages. In doing so, it will have to look at innovative, complex and non-rigid solutions that involve local leadership which will make the intervention more people-friendly. The water interventions will have to be planned flexibly so that local knowledge can help the schemes to be implemented differently across different regions. This also implies, on the flip side, that successful water models are not necessarily replicable, in that there are different
socio-politico-economic forces at play in different villages and hence, one kind of intervention which might work wonders in one village might completely fail in another.

3. Farmers have to be trained to look at water conservation differently. Farmers are normally taught to practice drip irrigation since water is a “scarce” resource. This is a classic error, since no rational agent is worried about the scarcity of a public good. Instead, they have to be oriented to think that drip irrigation has to be practiced since it is a “profitable” activity. Once farmers re-orient their thoughts about drip irrigation from “water-saving” to “profit-enhancing”, the rest is simple. Rationality will itself promote usage of drip and other irrigation techniques in Maharashtra.

4. Currently, the farm pond schemes of the Government are normally availed of by those who can afford creating a pond on half an acre of their land. Thus, the schemes are availed of by those who have larger pieces of land; clearly the nature of the scheme itself precludes any participation of the truly small and marginal farmers with minimal climate resilience. If small farmers are to participate, they need to enter some kind of a contractual agreement with other small farmers about creation of farm pond on a common piece of land, usage of water and explicit exit clauses that allow them to sell their land without complications at a later date. There is currently no expertise on such contracts and the nature of the contracts is largely informal.

5. The number of applications for farm ponds exceeds the number of farm ponds that are being planned under various schemes and hence, in many districts of Maharashtra, a lucky draw is being adhered to for identifying the beneficiaries. This system has its own issues and could be supported by another system wherein some weightage is given to the vulnerability of the farmer applying for the scheme.

6. Some water experts opine that whilst Government schemes exist for particular farm pond sizes, deviations in these are observed on the field. Farmers often increase the depth of the farm ponds and hence, due diligence and some M&E processes on the physical verification of the farm pond size is necessary.

7. Perhaps the most important intervention required in the farm pond scheme is to identify the number of farm ponds that a particular watershed can optimally support, given its rainfall, run-off, recharge structures, cropping patterns, availability of potable water etc. PoCRA already envisages watersheds as the basic unit of management. It is hence crucial that the scheme calculates the optimal and maximum number of farm ponds that can be sustainably created within a watershed and then support the formation of only those many farm ponds.

8. In an EPW paper, Eshwer Kale, a WOTR expert claims that the existence of farm ponds has actually created an acute scarcity of water for drinking and domestic needs. He points to the irony that in some villages with farm ponds, whilst the water is stored for irrigating cash crops, drinking water is provided through tankers. The WOTR had hence conducted a unique experiment where a common farm pond was constructed in a village to provide for three months of drinking water. The feasibility and the
replicability of such innovative experiments could be examined under the aegis of PoCRA.

9. The farmers availing of shade-nets or polyhouses under different schemes ventured an opinion that it takes 2-3 years sometimes to get the 50 per cent subsidy that the Government has promised to them. In the meanwhile, the farmer not only has to take a loan of the entire amount, but also has to bear a huge interest burden on the entire amount inclusive of the subsidy. Faster clearances of subsidies under different schemes will go a long way in ensuring that protected agriculture gives the farmers the maximum possible returns in the future.

The case studies have created a number of insights into the cost-benefits of water management and water availability in Marathwada. The cases highlight that whilst water availability can truly usher good times for Indian agriculture, getting water through conservation techniques and recharge processes will require an approach that is unique and at the same time, participatory. Finally, sustainability as an issue cannot be compromised. The true challenge and in fact, the true opportunity for PoCRA is to create water structures that can usher in high income levels in the immediate term while not compromising on sustainability of the water balance in the longer term.
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