



**The following is a sample interpretation of the interconnectedness of issues in Climate Change Adaption:**

Watershed Work is largely done in resource fragile and semi arid regions. Incidental learning, about WSD, in children takes place due to WSD. Sustainability of WSD is dependent on the level of awareness amongst community, especially children and also women. Women Empowerment is positively impacted by WSD. Forestation is dependent on WSD, water availability and amount of wood lopping by communities. Wood lopping is a function of community's domestic needs and agriculture needs, especially cash crop cultivation. Water availability in a village depends on WSD and forestration. Eco restoration is positively affected by afforestation. Agriculture is directly dependent on health of ecosystem and on water availability. Local Livelihood is dependent on agriculture and labour earned through watershed development within the village. Non local spending is dependent on local livelihood base, local production and level of migration. Migration is dependent on the extent of economic security and gainful livelihood opportunity. Exposure towards risks from globalization is dependent on non local spending i.e. non local market sale. Economic Security is a function of the exposure towards risks from globalization, cash generation, non local spending (local cash flow) and market price volatility. Cash generation is directly proportional to cash crop produce and gainful employment through migration. Food security is dependent on economic security, agriculture (on farm) and aquaculture (off farm) produce. Aquaculture is dependent on water availability. Cash crop cultivation is dependent on water availability. Cash Crop cultivation increases work load on women as animal power is substituted with human power. Cross breed cows increases work load on women due to activities like stall feeding. Crossbreed Cows are dependent on the water availability in a village.

# What are we in for?

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*Rural dynamics in the context of Climate Change  
– a look at Ahmednagar district*

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# Prologue

Climate change is upon us and we are faced with the challenge of understanding what is really happening, predicting what is likely to happen and more importantly, finding appropriate ways to address the key impacts. Today many technical studies are being conducted across the country related to the scientific aspects of climate change and its impacts – e.g. the impacts on various crops, capturing the trends on warming, the changing rainfall patterns, and the impending food insecurity, water scarcity and so on. Simultaneously, “scientific” data is being provided to farmers so that they can obtain agro-advisories to avert negative impacts. Studies are being conducted to assess vulnerability at macro levels to help the governments plan for appropriate measures. We are aware that the poor in the rural areas will be most affected. And they hold the key to our survival. Our basics – food, water and clean air come from rural areas.

Hence, while planning for a project on Climate Change Adaptation (initiated in 29 villages in 2 clusters) in the Sangamner block of Ahmednagar district, we began with the key question and went on probing some aspects of this question:

## **What is specific to Climate Change Adaptation that is different from just implementing watershed development/NRM?**

While watershed development has proved to enhance the water tables in the area and thus dramatically increase agriculture outputs, it has also brought about many changes within families and the village – politically, socially, and culturally. How is agriculture affected (despite good watershed development) by the varying weather conditions currently experienced? What are the challenges that the farmers now face within this context of climate change? What are the factors that influence agriculture that farmers and implementing agencies need to understand, so as to ensure sustained agriculture productivity? These questions were taken up in the study: *“Analysing Challenges in Agricultural production System: A Case Study of Darewadi Village”*.

How does the village community understand weather variability and the impacts? Do women and men and the various groups within a village respond in the same way to the varying weather conditions? What drives their re/action when the weather is unseasonal? And is it an appropriate response? These questions were taken up in the study: *“Community Response to Seasonal Variations – Learnings from a Watershed Village”*.

Prior to watershed development, in semi-arid regions, people migrated for sugar cane cutting, and agriculture labour to meet their survival needs. It is generally assumed that post watershed development, seasonal migration is reduced. With the weather playing truant (Ahmednagar district experienced 4 consecutive years of very severe drought between 2000 and 2003, and the more recent years of delayed monsoons and the crop loss), what has been the impact on seasonal migration? And if people do migrate, who migrates and for what purpose? Answers to these questions were sought in the study titled: *“Livelihood and Mobility: Challenges for Watershed Development”*.

Aforestation plays an important role in the regeneration of degraded watersheds. Hundreds of thousands of trees are planted. The choices are made by the local community and are generally local varieties. Yet, in the post project period, trees are cut. Trees are an important carbon sink, important for climate change mitigation. Therefore it was found necessary to understand the purposes that trees serve in the lives of the local community. What are the local needs for wood to be taken into consideration while planning watershed development? This study was taken up and is presented in the paper: *“Protect Trees: Understand the Village’s Need for Wood”*.

During project period, money comes into the village because of labour available for watershed development measures. Money begins to flow in the post project period because of the benefits of the impacts – improved agriculture, allied and other income generating activities. Does the cash that comes in really benefit the people? Does it revolve within the locale benefitting other households?

Or are there strong dependencies on the outside market that draw the cash out? These questions gave rise to the study *“Estimating Local Money Multiplier of Rural Enterprise in a tribal village of Akole, Ahmednagar District”* to understand the pre-project status of the money flow in a village.

Once watershed development is completed and soil and water conservation is improved, it is expected that the household food basket will improve. In the climate change context, farm ponds and water bodies will contribute to food security. In times of unseasonal rains by Climate Change, can Aquaculture be promoted? Aquaculture will play a role in reducing protein-calorie malnutrition which is high among children in rural India. Yet aquaculture is not sufficiently taken up despite waterbodies emerging. While general criteria are proposed for identifying the viability of individual locations for aquaculture, when large scale watershed development and NRM projects are taken up, the donor institutes and implementing agencies need to make quick assessments, identifying viable sites and thus reduce failures. Hence it was proposed to assess the GIS tool for site location. The findings of the assessment using GIS for aquaculture site selection is presented in the paper: *“Potential Sites Selection for Inland Aquaculture in a Semi-Arid Region”*.

In the recent years, rural women have come more to the fore as compared to previously, though not sufficiently. Their involvement in SHGs, in the village development committees (VDCs) or the VWC has encouraged them to express their opinions and to contribute to decision making. Yet participation of women in the PRIs is far from satisfactory, even though she may be the sarpanch. While preparing for climate change, all resources need to be harnessed. It is from an area of concern that solutions emerge. At present in villages, women’s concern is the home front and that what is immediately related to their

lives and work within the village. Can this interest be tapped so that their role in governance (PRI, VDC) becomes meaningful? What are the hidden strengths that can be tapped as we prepare for climate change? What are the constraints they have in fulfilling their role? These queries stimulated the study on: *“Women in Panchayat Raj Institutions: Development Preferences, Role and Constraints”*.

While watershed development is implemented in a village, children are silent observers mainly uninvolved. What is it that children gather as they see the land transforming work take place? Sometimes they participate in gram sabhas and SHG meetings. They listen to discussions at home. What is it that they have captured of the many activities and processes? The findings of this study is presented in the paper: *“Incidental Learning in School-going Children during Watershed Development”*.

As we present this set of studies we realise full well that this is but a nano-micron of the work and study that needs to be done. There are plenty of lacunae. We have attempted to draw the connectedness between the studies. We saw links. We saw that the emphasis of one leads to the decline of the other. Thus we present as it has touched with its linkages and complexity.

We invite you to share your comments, thoughts and reflections as this will help us prepare our communities to respond better to climate change. Do respond at <publications@wotr.org>.

Thank you and looking forward to your valuable suggestions,

**Marcella D’Souza**  
Executive Director – WOTR

## A brief description of the study villages

Most of the studies were conducted in the villages, which fall under the Akole and Sangamner Talukas of Ahmednagar district. Villages that were involved in one or more studies in the Akole Taluka are Shiswad, Purushwadi, Kohane, Pimpri and Pimpaldari. Those involved in the Sangamner Taluka are Wankute, Bhojdari, Pemrewadi, Borban, Kauthe Khurd, Kauthe Budruk, Malegaon Pathar, Gunjalwadi, Warudi Pathar, Sarole Pathar, Mahalwadi, Sawargaon Ghule, Jawale Baleshwar and Darewadi.

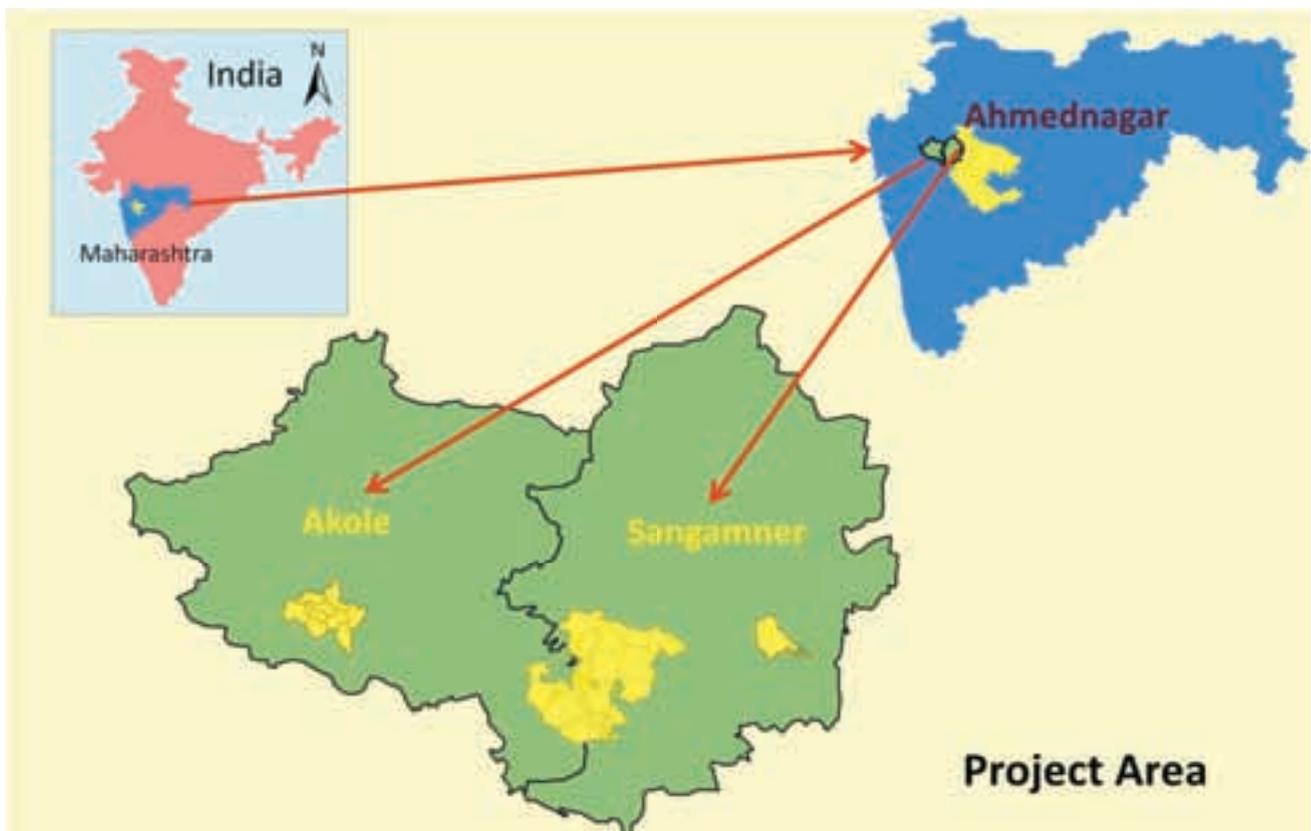
The villages in the Akole taluka are in the hilly zone, having a predominant population of Mahadev Koli tribal community and about 3-7 percent other caste communities. Except for Shiswad and Pimpaldhari, the other 3 villages have had watershed development implemented earlier. The villages that fall in the

Sangamner taluka are in the direct rainshadow having an average rainfall of 450mm. The villages are situated in the Pathar or plains. The population is mixed, with slightly higher numbers of Maratha caste and Thakar and Bhil tribal communities. Six of the villages have had watershed development implemented earlier.

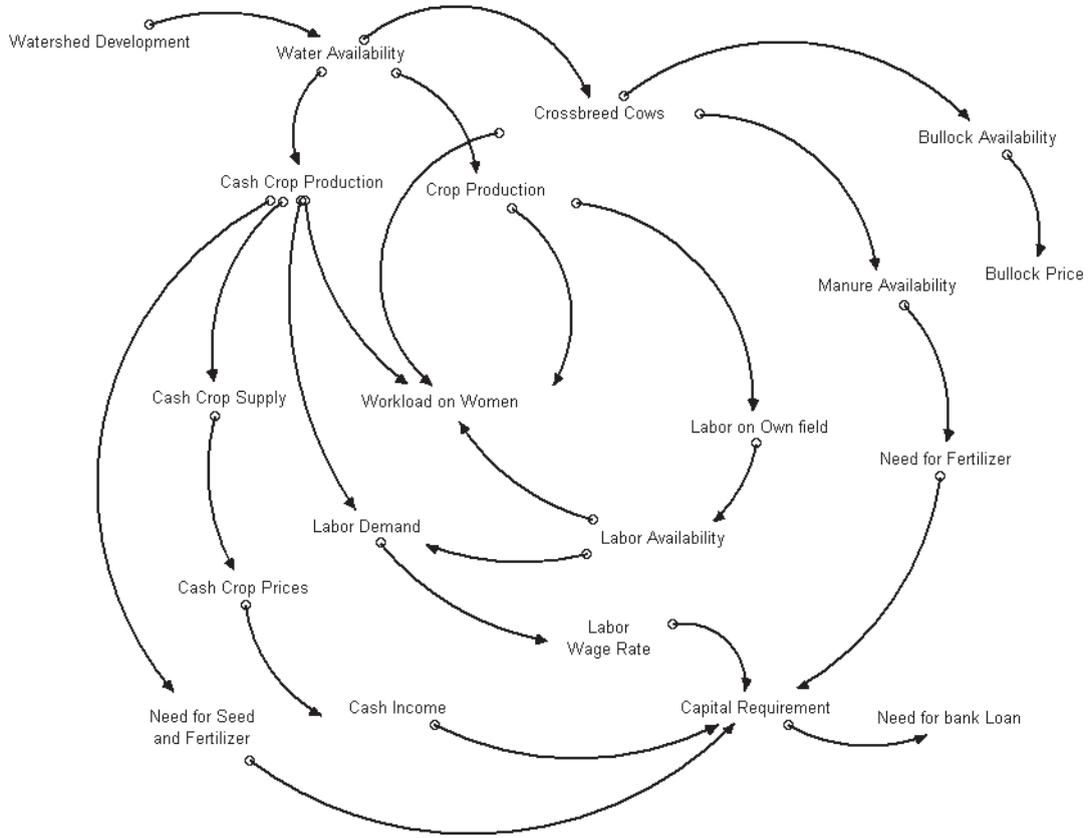
Some of the villages like Purushwadi are compact with a comparatively small population. These come under a group gram panchayat.

Agriculture is the primary occupation of most of the households of both talukas.

Except for Darewadi, these villages are now participating in a Climate Change Adaptation project being implemented by WOTR.









# Analysing challenges in Agricultural Production System: A case study of Darewadi village

Dipak Zade

## Abstract

Agriculture is the major driver of Indian economy and is a primary employment provider for a majority of rural households. Presently, this sector is under stress with the farmers being confronted by many problems under the modern market driven economy. In this scenario, the present study tries to identify the problems faced by farmers during kharif season and their possible causes. The study is located in Darewadi village of Ahmednagar district. Understanding of the problems at the micro level could help in devising situation specific solutions. The study is qualitative in nature. Informal group discussion and informal interviews were used as tools of data collection. Relevant stakeholders in the village agriculture production system were identified and selected using purposive sampling. Some of the important problems that surfaced during the study are labour shortage, water scarcity, lack of access to credit from formal institutions, lack of awareness about management practices, market insecurity and increase in women's workload. Some possibilities that could address these problems could be crop diversification, community involvement in government development process, coordinated planning between stakeholders and development of market feedback mechanism within the system.

## Preamble

Traditionally, agriculture in India has been of subsistence type. It was characterised by conventional and labour intensive farming, and smaller land holdings. Farmers cultivated crops that provided them with food sufficient for satisfying their family needs for the forthcoming year. In this sense, the farmer's dependence on external factors was limited. However, with the Green Revolution of 1960s, this scenario changed substantially. It was characterised by high yielding seed varieties, mechanised farming, and use of chemical fertilisers, insecticides, pesticides and agricultural credit ([www.climatechange.thinkaboutit.eu](http://www.climatechange.thinkaboutit.eu)). As a result these created dependence in farmers on external factors; many new stakeholders emerged within the system whose role became important from the farmer's perspective. Any significant attempt at understanding the farmer's current condition

necessitates looking at a broader framework and taking into account the roles of these stakeholders. This paper studies the agriculture production system of Darewadi village. Clarifications of some of the terms used are given below:

**Agriculture Production System** in this paper comprises of all stakeholders related to all activities from the production stage to the marketing stage and their interactions. In order to have a holistic understanding of the problem faced by farmers, it is necessary to see their linkages with all stakeholders within the system. **Stakeholders** refer to all persons/institutions and organisations who are involved in the particular agricultural production system under consideration.

**A system** is a group of interacting, interrelated and interdependent elements forming a complex whole and it maintains its existence through the mutual



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interaction of its parts ([www.thefreedictionary.com](http://www.thefreedictionary.com) and [www.systems-thinking.org](http://www.systems-thinking.org)).

**System boundary** separates a system from its environment ([www.umsl.edu](http://www.umsl.edu)). Defining a system boundary is highly subjective and depends on the objective of the study. For this study, many stakeholders were considered within the boundary of the system whereas many other were kept outside. The detailed list of the stakeholders has been provided in the paper.

In India, agricultural seasons can be broadly classified in three categories- *kharif* (monsoon), *rabi* (winter) and *unhali* (summer). Kharif has been the most important season for the farmers economically. A good harvest in Kharif season ensures the farmer a good year ahead. Hence this season becomes critical to study.

**Sawad system** is an informal method of cooperation between villagers in Darewadi. Villagers help each other during the agricultural season for various activities that involve ploughing, sowing, harvesting etc. Households form small groups and then work in each other's farm on rotational basis. Traditionally this method was used predominantly for ploughing the fields using oxen. Two farmers would combine their pair of oxen and then plough each other's fields. In the post watershed development period, the area under cultivation has increased and farmers have moved to production of cash crops resulting in more farm work. The *sawad* system was used by farmers for sowing and weeding of onion crop and for sowing and harvesting of *bajri* crop usually referred to as *bajra* in literature. This method had two main benefits to the farmers. It helped them save money that would have been spent on labourers and it ensured timely availability of labour. In this system no monetary transactions are involved, everything is compensated with labour.

In the post watershed development period, it is generally found that majority of farmers cultivate the same type of crops in line with market demands. This results in over production of some type of crops and subsequently lower prices for the same. Hence, some sort of **market feedback mechanism** needs to be developed within the system so that farmers get a feedback about the optimum level of produce they need to grow for ensuring a good market price. Through this mechanism the farmers could also be informed about different crops to be grown that would not only fetch them good money but also help in diversification of crops. Crop diversification can also help in reducing losses due to seasonal variations and farmers can organise labour availability properly.

**Seasonal variation** is a component of a time series which is defined as the repetitive and predictable movement around the trend line in one year or less. It is detected by measuring the quantity of interest for small time intervals, such as days, weeks, months or quarters ([en.wikipedia.org](http://en.wikipedia.org)). Seasonal variations may cause severe damage to the crop if all farmers cultivate the same crops.

**Top down approach of community development** is an approach wherein the main activity of development is initiated by the government or an external agency. In fact, in this approach everything is managed by government or external agency and the community members are passive. Top down approach emphasizes central planning ([www.eurojournals.com](http://www.eurojournals.com)). However, this model of development often does not take into account local diversity and context. In order to have effective solutions to varying conditions, there is a need for a participatory form of development with the community's needs and demands at the centre.

The current study is an attempt at having a better understanding of the problems that the farming community in Darewadi village are confronted with during the kharif season. There is a big potential for improvement in agriculture using modern technologies, agriculture diversification and likely increase in the market demand potential. But this potential cannot be realised unless the challenges confronting the farmers are tackled effectively.

## Introduction

Agriculture is the backbone of Indian economy. Agriculture sector is the only livelihood for two-third of the population and gives employment to the 57% of work force in India. (Behere, Behere, 2008). Traditionally, agriculture has been a way of life for the farmers. The farmers cultivated the same crops with not much change over the years and farming was much of the subsistence type. However, with the technological improvements and increased market demand, agriculture is becoming more commercial. To keep up with the market demands, the farmer has had to depend on external factors and agencies. All these changes have brought about a relative complexity in the system and with these, a new set of problems for the farmers. Farmers, especially the small and the medium ones find it difficult to cope with these changes and complexities.

National Commission for Enterprises in the Unorganised Sector (NCEUS) report (2009) states that in India, marginal and small farmers constitute 84% of agricultural households and they contribute

to half of our agricultural output, but they are economically worse off. The report underlines the issue that small and marginal farmers do need special attention. It states that “*With the marginal and small farmers constituting the majority of farmers in the country, accounting for a substantial proportion of operated area, and with mounting evidence of an agrarian crisis, especially affecting marginal and small farmers, there is a special requirement to focus on these farmers*”.

A review of the available literature related to agriculture problems of Indian farmers gives some important insights into this issue. Some of these problems are fragmented landholdings of an unviable economic size, unprogressive farming, low productivity, peculiar banking practices, non-availability of loans from formal sources for farming operations, inadequate infrastructure in rural areas, inability of the official machinery to provide appropriate services to the farmers, inefficient use of public funds, imperfect markets for inputs/products and low bargaining power with the traders (Rajivlochan, 2008; Agarwal and Lal, 1996; Bheenaveni, 2007; NCEUS, 2009)

In Maharashtra state where this study was conducted, 84% of the cultivable area is rain fed and is vulnerable to the vagaries of monsoon. (Agriculture in Maharashtra, 2010). Some of the reasons given for the pathetic situation of farmers in Maharashtra are average rainfall, heavy load-shedding, lack of small irrigation projects, poverty and pressure of private moneylenders and banks (Behere, Behere, 2008).

Keeping the above background in mind, the present study tried to analyse the agricultural challenges of farmers from Darewadi village. The System under consideration in the study is termed as the *agricultural production system*<sup>1</sup>.

The objectives of the study are to identify the problems faced by farmers of Darewadi during kharif season during the last five years and to understand the possible causes for these problems from farmer’s perspective. The farmers will not be able to contribute effectively in the agriculture development of the nation and improve their living standards unless the challenges they are confronted with are tackled well (NCEUS, 2009). For tackling these problems, it is important to understand them clearly within the specific geographical and social context.

## Methodology

### *About the village*

The study was carried out between June-October 2010 in Darewadi village, located in Sangamner taluka of Ahmednagar district, Maharashtra. This village is situated at a distance of 30 km from Sangamner towards its south west side and is around 12 km off the Pune Nasik highway (Darewadi village Feasibility Study Report, 1995). As per the agro climatic zone classification of Maharashtra state, the village lies in the scarcity zone which is characterised by very low rainfall with uncertainty and ill distribution. Drought occurs every three years. ([www.mahaagri.gov.in](http://www.mahaagri.gov.in)). There are 132 households in the village. As per land holding criterion<sup>2</sup>, small and medium farmers together form the majority (80%) of the farmers. Large farmers constitute 9% of the households.

Watershed development (WSD) was carried out by Watershed Organisation Trust (WOTR) in Darewadi in during the period 1997-2001. Prior to WSD, the village was depleted of much of its natural resources. Even drinking water was not assured. Farmers cultivated only during the kharif season; they migrated for work at sugarcane factories or brick kilns during the rest of the year. After watershed development the picture has completely changed. There is sufficient water for drinking as well for agriculture and distress migration has reduced substantially.

Agriculture is the primary source of income for most of the households in the village. All the households cultivate kharif crops whereas about 90% of the households take rabi crops. The important crops taken during kharif season are tomato, onion and sorghum (*jowari*) whereas minor crops include pulses, groundnut, and chilli. Most of the farmers do mono cropping in their fields. However, few of the farmers who do mixed cropping sow pulses like green gram (*mug*), red gram (*tur*), cow pea (*chawli*), horse gram (*hulga*) and moth beans (*math*) in between pearl millet. *Sakur phata* situated 18 km from the village is the market place for purchasing seeds, fertilisers and pesticides and selling of tomato yield.

In order to understand the problems in a comprehensive manner, it is important not only to look at the farmers but also at the other stakeholders who are linked with farmers at various stages in the agricultural production system as defined above.

The stakeholders considered relevant in this system are farmers (classified in three categories-

1 All the stakeholders related to all the activities from the production stage to the marketing stage and their interactions.

small, medium and large depending on their landholding)<sup>2</sup>, farm labourers, traders and transporters of agricultural produce, gram sevak, Village Development Committee (VDC), banks and informal money lenders. However, consideration of these stakeholders could be somewhat subjective and the stakeholders relevant for this study may not be so for other studies and vice versa. However, keeping in mind the scope of the study, there are many stakeholders who were not considered to be within the boundary of the system under consideration.

The data were gathered using qualitative data collection methods – informal group discussion and informal interviews. One informal group discussion and six informal interviews were conducted in the village. A total of 20 participants were involved in the discussion. The participants included the small, medium and large farmers, farm labourers, livestock rearers, informal money lenders, gram sevak and women. The informal discussion, lasting for 2 hours, touched upon crops cultivated and the cropping patterns of the farmers, the problems faced in agriculture during the kharif seasons, the causes of these problems and their history, the farmer category getting affected by the problems and the different stakeholders that are linked with the problems within the agricultural production system. One informal interview was conducted with each of the following groups: small, medium and large farmers, trader cum transporter of agriculture produces, Village Development Committee (VDC) president and bank representative of that area.

Purposive sampling was used for selecting the participants and respondents of the discussion and the interviews. Purposive sampling has been defined as a method in which the individual units are selected by some purposive method (stats.oecd.org).

Oral consent was taken from all participants of the informal group discussion and the respondents of the informal interviews. They were informed about the purpose of the study and they had the freedom to withdraw their participation at any point they wanted to. The informal discussion was facilitated by a researcher having a strong understanding of the local situation. Selection of the participants was done keeping in mind the requirements of the discussion- that they be representative of the particular group and importantly, willing to share their views during group discussions. These

participants were informed a day earlier about the purpose, time and the place of the meeting. On the scheduled day, they were again reminded about it.

### Study Findings

Prior to watershed development the agricultural system of Darewadi village was relatively simple with farmers cultivating only a single crop a year and had no agriculture allied activities. However, watershed development has brought about a significant change in this system. Increased availability of water, subsequent rise in the area under cultivation and more cropping seasons have benefitted the farmers economically. Agriculture allied business like dairy has started. All these have made the system relatively complex. This complexity has also brought about some problems for the farmers. Informal discussions with the farmers and other associated stakeholders helped in bringing out these problems. They have been presented and discussed below.

**Water scarcity:** Farmers during the informal discussion reported that scarcity of water was a major problem. They have sufficient water for cultivating kharif crops. However if the rains are not sufficient then less water is available and cultivating rabi crops becomes a problem for them. They are also aware that the geographical location of the village also augments this problem. According to them the village land is rocky thus water does not percolate into the ground but rather flows away. Farmers stated that excess water usage and inefficient irrigation systems result in water wastage in their village. Water also drains out of the water harvesting structures which are actually meant for trapping and storing it. Small farmers facing water shortage reported using variety 8203 of pearl millet which is drought resistant whereas other farmers having sufficient water use hybrid seeds.

**Labour shortage:** This problem was reported during informal discussion and interview with the farmers. The problem affects large farmers acutely. Farmers were of the view that this issue has emerged post watershed development period in the village. With increase in water availability, more land has been brought under cultivation. Small farmers who earlier would work as labourers are now engaged in their own farms thus creating a labour shortage. Farmers were also of the opinion that cultivation of the same crop, i.e. tomato or onion leads to the harvesting time being the same for almost all farmers thus leading to labour scarcity. Farmers

2 For the study purpose the farmer classification as per land holding is: 0-1 hectare: small farmer, more than one and less than or equal to 4 hectares: Medium farmer, More than 4 hectares: Large farmer

reported that they follow *sawad*<sup>3</sup> system to overcome this problem.

**Reduction in manure availability:** According to medium and large farmers, shortage of organic manure is a constraint for them. They believe that ban on open grazing of animals as a part of watershed development in the village has led to reduction of indigenous cattle in the village. Indigenous cattle need to graze freely but this ban restricted their movement. As a result farmers reported substituting their large herd of cattle, especially indigenous cows with cross bred cows. However the number of these cross bred cows is significantly less than that of the indigenous cows creating shortage of cow dung manure. They now resort to using fertilisers which are purchased from market. This reduction in cattle size has also led to shortage of bullocks for agricultural operations as reported by medium and small farmers. They said that they try to overcome the problem by hiring a pair of bullock for tilling the farms as purchasing a new pair and maintaining them is expensive. As of now only about 30% of the households own bullocks as compared to pre WSD period and rest of the 70% hire from these farmers.

With increase in income in post WSD, farmers purchased cross bred cows with the motive of increasing their income by selling the milk to the dairy. This could also be a reason for this shortage of manure and bulls.

**Credit:** Non availability or untimely availability of credit for agricultural operations is another issue that affects farmers. This is a predominant problem of small and medium farmers as reported by them during the informal discussion and interview. They knew that their limited resource availability aggravates this problem further. The farmers feel that they are in a vicious cycle of poverty. This is because untimely availability of money leads to delayed sowing of their crops. Thus their produce reaches the market late and fetches less price for their yield. Many of the farmers reported that in such situations they are not able to pay back the loan from banks and thus they become ineligible for getting loans during the next year. Under such circumstances they take loans from the informal money lenders of the village or from large farmers at very high rate of interest. This increases their input cost and subsequent reduction in their profits. Thus the small farmers reported getting trapped in this cycle of poverty. The farmers also reported that the loan amount they get from the banks is

insufficient for them. Banks provide a sum of four thousand rupees per acre of land as loan. Farmers feel that this amount is meagre for them and so they have to revert back to informal money lenders.

**Increase in women's workload:** During informal group discussion, women reported that their work load has increased post WSD period. Increase in agricultural work and introduction of cross bred cows are the reasons perceived by the women for this increase in work. Cross bred cows need stall feeding and require a lot of care to remain in good health. However women reported feeling satisfied if the produce fetches a good price for the produce; if it doesn't they feel that their hard work and efforts have gone waste. Labour shortage also results in indirectly increasing the workload of women.

**Inefficient government mechanisms:** Small and medium farmers during the informal group discussions and informal interviews revealed that they do not get the seed and fertiliser supply from the government on time. Generally they require these supplies at the beginning of June when the rains have arrived. However, the government supplies arrive much later. Government supplies arrive at a fixed period whereas the period of monsoon arrival varies every year. Thus there is a mismatch between the demand and supply as reported by farmers. Farmers also indicated that many of them were not aware about the proper registration procedures to be followed through the gram panchayat for getting these supplies. Under such situations they are left with two options – delay their sowing or purchase from the market. Both these options are not profitable for the farmers. The gram sevak also acknowledged the fact that the time lag between demand and supply of the seeds and fertilisers are unfavourable for the farmers.

**Lack of knowledge on management practices:** The small farmers during the informal interview and informal group discussion conducted with them expressed the need for knowledge on improved agricultural practices and efficient management of available resources. One example they gave was that of the irrigation system. Lack of drip irrigation system was currently leading to inefficient water usage. If they have this they would be able to reduce the water loss. Another point they mentioned was regarding the increase in the cost of farm inputs over time and decline in the profits. Even the gram sevak acknowledged that farmers at present are not aware about the deteriorating soil quality of their farms and there is a need for making them aware so that they can take remedial measures on time. The trader also pointed out during an informal discussion with him that there is an urgent need to reduce the use of fertilisers and pesticides in tomato production since it has deteriorated the soil quality.

3 Sawad system is an informal way of farmers helping each other. They form a group and work in each other's field on a rotation basis thus overcoming labour scarcity and also saving on the money.

**Markets and profitability:** This lack of knowledge is also affecting the profits of the farmers. The trader of the agricultural produce during informal discussion reported that seasonal variations affect the produce of the farmers. According to him, during the current season (when the data were collected) the high intensity of rain fall had damaged 50% of the tomato crop. Thus the farmers had suffered losses. All the farmers and the trader also acknowledged the fact that mono-cropping leads to oversupply of the crop thus affecting their profit margins. However, they also said that since farmers were not aware of other options available, they continue with the same cropping pattern. Informal group discussion also revealed that as many as 30% of the seeds purchased from the market do not germinate resulting in decreased yield. Another point highlighted by the trader was the direct linkages of farmers with the market, in the absence of which the farmers are unable to anticipate the demand and price fluctuations. Many of the farmers feel that the pattern of mono-cropping could be the reason for this.

## Discussion

The discussion with Darewadi farmers highlighted the important problems that they are confronted with, during kharif season agriculture. Since the data pertains to one village it will not be apt to generalise it. Nevertheless the problems are relevant in a broader rural scenario given the social coherence of rural India.

Better understanding the challenges necessitates taking into account the geographical and cultural settings in which the farmers and their agriculture is embedded in. Water scarcity has been mentioned as one of the problems by farmers however it is important to note that the water availability as compared to pre WSD period in the village is sufficient. However, the present scenario of increase in cash crop production of onion and tomato results in greater water utilisation and hence its availability looks scarce. In this regard, it is also important to keep in mind that the average annual rainfall of the area is just around 416.6 mm. Cultivation of cash crops leads to maximum water consumption. At the same time lack of efficient water management and irrigation methods lead to water wastage as mentioned by Darewadi farmers. Efficient water management and irrigation systems help in reducing water scarcity (Jaikar, & grailresearch, 2009). Effective use of maintenance fund by the VDC for upkeep of the water harvesting structures can also help.

Regarding the labour scarcity for kharif crop harvesting as mentioned by the farmers, the

introduction of Mahatma Gandhi National Rural Employment Guarantee programme (MGNREGA), which pays higher labour wages as compared to the farm wages could also be a cause (The Economic Times, 2010 and Business Line 2010). For low germination of seeds, spurious or inferior quality may be responsible as has been in the case of Punjab farmers experiencing decline in wheat production due to this reason (Sood, 2010). However the farmers think that cultivation of tomato and onion since many years without crop rotation could also be a reason for this because not following crop rotation leads to depletion of certain nutrients from the soil. The opinion of trader is that over use of fertilisers and pesticides have led to decline in the soil quality. This is particularly important given the fact that in the post WSD period there has been increase in fertiliser use by farmers for improving their yield. The Economic survey 2007-2008 also highlights the overuse of fertilisers leading to decline in soil quality and stagnation in yields (Financial Express, February 2008). Similarly efficient water management practices need to be given special preference (Jaikar). Techniques such as drip and sprinkler irrigation can be promoted. The villagers also had voiced the same opinion.

The shift from traditional crops to cash crops, as seen in the case of Darewadi farmers, combined with lack of adequate knowledge and support from agriculture experts and extension workers could prove to be ruinous. This has been observed in the case many Indian farmers in case of cotton crops (Mehta, Ghosh, 2005). Mono-cropping over years has resulted in declining yield over a period and has also made farmers more vulnerable to seasonal variations. Crop diversification is needed to counter this problem, as suggested by Dr. Narendra Jadhav in his report submitted to Government of Maharashtra (Jadhav, 2008). Regarding the problem of obtaining loan from financial institutions, the same report advocates restructuring of the rural financial institutions and also making them socially more sensitive.

The problem of increasing work load of women in agriculture is a fact which doesn't get highlighted. To reduce this work load, introduction of work reducing technologies and use of women friendly implements and tools has been recommended (Planning Commission, 2007). However, given the financial situation of the farmers, it does not seem possible without external support. Lastly, some form of market feedback mechanism needs to be developed in the system which could inform the farmers about issues like crop choices and optimum level of production.

To sum up, it is evident that most of the problems confronting Darewadi farmers are the ones that are

common to many of the Indian farmers, though some of them are typical to the village. However, the small and the medium farmers are more affected due to their limited access to resources and knowledge. The typical top down development approach of government being followed since independence has not proved effective (Rao, Jeromi, 2000). To make development more effective and to bring in sensitization to local problems, there is a need for effective involvement of community, right from the planning stage. Farming community should be taken into confidence while responding to their needs. Secondly, coordinated effort and effective feedback mechanism between various stakeholders in agriculture production system is now imperative to have effective solutions. Third, there is also a legitimate need for diversification of crops so that the farmers are safeguarded against market fluctuations, seasonal variations and more importantly the oversupply of produce as a result of mono cropping by all the farmers. And when looked at in the context of weather variation and market fluctuations the farming community needs the information, knowledge and capability to take appropriate decisions that will help them to be better prepared for climate change.

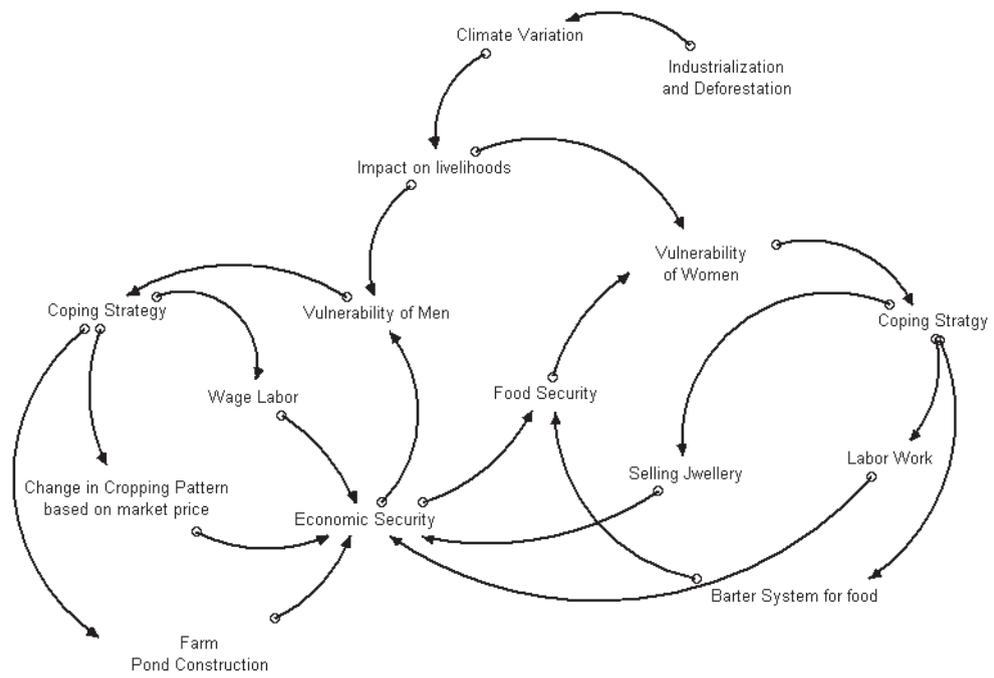
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### References

1. Agrawal, A.N and Lal Kundan. 1996. "Agriculture Problems in India". Vikas Publishing House Pvt. Ltd. New Delhi.
2. Agriculture in Maharashtra. Available at [http://www.maharashtra.gov.in/english/chiefminister/agriculture\\_in\\_maharashtra.pdf](http://www.maharashtra.gov.in/english/chiefminister/agriculture_in_maharashtra.pdf). Accessed on 13 July 2010
3. Behere, P.B and Behere, A.P. 2008. "Farmers' suicide in Vidarbha region of Maharashtra state: A myth or reality?". Available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2738339/>. Accessed on 13 September 2010.
4. Bheenaveni, R. 2007. Agriculture in India: Issues and Challenges. Available on <http://www.articlesbase.com/self-publishing-articles/agriculture-in-india-issues-and-challenges-203476.html>. Accessed at 11 October 20.
5. *Feasibility Study Report, Darewadi Village*. 1995. Watershed Organisation Trust, Ahmednagar.
6. Jaikar, A. Year not known. Declining Water Tables and Water Management In Maharashtra. Available at: <http://www.esocialsciences.com/data/eSSResearchPapers/eSSWParticle200936174210.doc>. Accessed on 16 October 2010.
7. Jadhav N. 2008. Farmer's suicide and debt waiver: An action plan for agricultural development of Maharashtra. Available at [www.drnarendrajadhav.info/Farmers'SuicideReport\(English\).pdf](http://www.drnarendrajadhav.info/Farmers'SuicideReport(English).pdf). Accessed on 20 October 2010
8. Mehta, A and Ghosh, S. 2004, Globalisation, loss of livelihoods and entry into poverty. Available at [www.daanishbooks.com/.../aes2004\\_05\\_aasha\\_kapur\\_mehta\\_\\_13991.pdf](http://www.daanishbooks.com/.../aes2004_05_aasha_kapur_mehta__13991.pdf). Accessed on 16 October 2010
9. National Commission for Enterprises in the Unorganized Sector (NCEUS). 2009. The Challenge of Employment in India: An Informal Economy Perspective. Vol. I. Available at [www.nceus.gov.in](http://www.nceus.gov.in). Accessed on 18 September 2010
10. Planning Commission, 2007, Report of sub-group on gender and agriculture. Available at [planningcommission.nic.in/aboutus/committee/.../wg11\\_subgenagr.pdf](http://planningcommission.nic.in/aboutus/committee/.../wg11_subgenagr.pdf). Accessed on 18 October 2010
11. Sood Jyotika, April 2010, Not as Wheatful as Expected, Down to Earth.
12. Maharashtra farmers face acute labour shortage, 24 May 2010, *The Economic Times*. Available at <http://economictimes.indiatimes.com/news/economy/agriculture/Maharashtra-farmers-face-acute-labour-shortage/articleshow/5966805.cms>. Accessed on 17 October 2010
13. Farm Sector's Decline to Hurt Growth, 29 February 2008, *The Financial Express*. Available at <http://www.financialexpress.com/news/farm-sector-decline-to-hurt-growth/278345/>. Accessed on 17 October 2010
14. Maharashtra looks to bumper harvest, 12 August 2010, *The Hindu Business Line*. Available

- at <http://www.thehindubusinessline.com/2010/08/12/stories/2010081250712300.htm>. Accessed on 17 October 2010
15. Rao, V.M, Jeromi, P.D. 2000. Modernising Indian Agriculture: Priority tasks and critical policies. Available at [www.rbidocs.rbi.org.in/rdocs/Publications/PDFs/15484.pdf](http://www.rbidocs.rbi.org.in/rdocs/Publications/PDFs/15484.pdf). Accessed on 21 October 2010
  16. Rajivlochan, M. 2008. Rejuvenating Agriculture with the Help of the Small Farmer. *Economic and Political Weekly*. Vol 43, No. 11.
  17. Water, the inside study, 2009. Available at [www.grailresearch.com/pdf/.../Water-The\\_India\\_Story.pdf](http://www.grailresearch.com/pdf/.../Water-The_India_Story.pdf). Accessed on 18 October 2010.
  18. [www.mahaagri.gov.in/CropWeather/AgroClimaticZone.html](http://www.mahaagri.gov.in/CropWeather/AgroClimaticZone.html). Accessed on 24 August 2010
  19. [www.stats.oecd.org/glossary/detail.asp?ID=3902](http://www.stats.oecd.org/glossary/detail.asp?ID=3902)
  20. <http://www.umsl.edu/~sauterv/analysis/intro/system.htm>. Accessed on 9 October 2010
  21. <http://www.systems-thinking.org/systhink/systhink.htm>. Accessed on 9 October 2010
  22. [www.eurojournals.com/ejss\\_11\\_1\\_14.pdf](http://www.eurojournals.com/ejss_11_1_14.pdf). Accessed on 10 October 2010
  23. [en.wikipedia.org/wiki/Seasonal\\_variation](http://en.wikipedia.org/wiki/Seasonal_variation). Accessed on 11 October 2010
  24. [http://climatechange.thinkaboutit.eu/think4/post/need\\_for\\_second\\_green\\_revolution\\_or\\_evergreen\\_revolution\\_in\\_india](http://climatechange.thinkaboutit.eu/think4/post/need_for_second_green_revolution_or_evergreen_revolution_in_india). Accessed on 9 October 2010
  25. <http://www.thefreedictionary.com/system>. Accessed on 15 October 2010





# Community Response to Seasonal Variation – Learnings from a Watershed Village

Bhupali Mhaskar

## Abstract

As Climate Change is universal, there are programmatic and policy implications. Climate Change imbalances the livelihoods of communities and consequently increases their vulnerability. Various coping strategies are mentioned in literature, to battle impacts associated with climatic variations. The present study attempted to document how seasonal variations influenced the livelihood strategies employed by a community from rural Maharashtra. Six group discussions with men and women from different land use categories and landless poor were drawn by using proportionate sampling method to provide community level understanding of seasonal variations and coping strategies.

Climate Change is poorly understood by the participants. Men and women viewed the impact of the seasonal variations differently. Men mostly mentioned economic security while women talked about food security as its consequence. Though coping strategies are differently expressed, they implicitly boil down to economic security. The community was also not aware about sustainable strategies.

The community has little scientific information about the causes of Climate Change. They state their understanding of the causes of seasonal variations. At the same time they are not able to connect these causes to Climate Change. The study brings out a clear need for more interventions to address the need for authentic information on Climate Change. Also, there is a need for helping the community to adapt to the current climatic situations. The study is important as it provides insights for program development related to Climate Change and sustainable adaptation.

**Keywords:** *Climate Change/seasonal variations, livelihood, livelihood/coping strategies, land use categories and gender.*

## Preamble:

Climate Change and its impact, particularly on rural poor, have been at the center stage in recent times. In India, where majority of the population is engaged in agriculture and allied activities, it is important to understand the entire issue from an emic perspective. Climate, Climate Change, variability of seasons, livelihoods, coping strategies and such other scientific concepts need to be

understood prior to getting an idea about how communities understand them. The following section deals with various scientific definitions of the concepts mentioned above.

Review of literature has brought out several ways in which the term *climate* is understood. It is referred to as average weather conditions at a particular place<sup>1</sup>, over a long period of time<sup>2</sup>, predictable and yet affected by physical features.



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It also means weather pattern, as opposed to the actual weather at any given instant. It is the Meteorological conditions<sup>3</sup> and also takes into accounts any extremes<sup>4</sup>. It is also mean state and variability of temperature, precipitation, humidity, and windiness over an extended time period. While the weather can change in just a few hours, climate takes hundreds, thousands, even millions of years to change<sup>5</sup>.

*Climate Change* also has been defined as a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions limited to a specific region, or may occur across the whole of Earth. It is also a statistically significant variation in the mean state of climate or climate variability<sup>7</sup>.

The causes of *Climate Change* as mentioned in literature are *natural internal processes or external forcing, or persistent anthropogenic changes in the composition of the atmosphere or in land use*. More generally Climate Change is known as global warming or anthropogenic global warming (AGW)<sup>8</sup>. The Climate Change and climate variability are used synonymously by scientists<sup>9</sup>.

Many experts feel that despite several attempts at defining Climate Change have been made; there is still a lot of uncertainty about the causes of climate variations<sup>6</sup>.

*Seasonal variation* is defined as the repetitive and predictable movement around the trend line in one year or less. It is detected by measuring the quantity of interest for small time intervals, such as days, weeks, months or quarters<sup>10</sup>.

It is well known that the rural poor are adversely affected by Climate Change. Climate Change and/or seasonal variations affect their livelihoods and make them more vulnerable. Of course, they devise and adopt certain strategies to cope with the effects of Climate Change. It would thus be appropriate to understand these concepts within the scientific framework.

*Livelihoods* are understood as ways and means of making a living. It comprises of capabilities, assets (both material and social resources) and activities as means of living. Livelihood constitutes all productive tasks<sup>11</sup>.

Livelihoods essentially revolve around resources such as land, crops, seed, labour, knowledge, cattle, money, social relationships etc. Livelihoods are also about creating and embracing new opportunities. While gaining a livelihood, or attempting to do so, people may, at the same time, have to cope

with certain risks and uncertainties, such as erratic rainfall, diminishing resources, pressure on the land, changing life cycles, chaotic markets, increasing food prices, inflation, epidemics etc. These uncertainties, together with new emerging opportunities, influence how material and social resources are managed and used, and on the choices people make<sup>11</sup>.

*Coping* is thoughts and actions directed at the resolution or mitigation of a problematic situation. There are a number of ways in which coping may be attempted<sup>12,13</sup>. In general, research has shown that problem-focused coping strategies are the most effective way for dealing with stress<sup>14</sup>. Coping mechanisms and/or strategies are closely related to the idea of threat and survival. Coping is a capacity, a capacity to *respond* and *recover* from some stressful condition like a disaster. There are no standards for coping strategies, they vary depending on, and are influenced by socio-cultural factors. People can adopt new coping mechanisms on the basis of lessons learned in the past<sup>15</sup>.

*Sustainability* has different understandings like the financial viability (usual long term) of an activity and environmental sustainability issues<sup>16</sup>.

### **Link between Climate Change and livelihoods and coping strategies**

Climate Change will impact natural and human systems to alter the productivity, diversity and functions of many ecosystems and livelihoods around the world. For poor, natural resource-dependent communities, Climate Change may compound existing vulnerabilities. As the availability and quality of natural resources decline, so does the security of their livelihoods. Limited resources and capacities for responding to stresses such as floods and droughts constrain their ability to meet their basic needs and ability to move out of poverty. With Climate Change impacts already being observed, there is an urgent need for adaptive response measures. By understanding the dynamics of the livelihoods of poor and near-poor, there is a need to understand how they will be affected by Climate Change impacts, how they might respond with the resources they have, what additional resources may be required and how these conditions can be reflected and built upon for successful adaptation strategies. The impacts of climate variability and Climate Change must be addressed by interacting with and understanding the community's view points. Evidence has shown that Climate Change will affect the distribution and quality of Indian natural resources which will ultimately threaten the livelihoods of the most poor and marginalized sector of the population who are

closely tied with the India's natural resources. With this background, it is necessary to understand the community's perception about Climate Change and coping strategies.

## Introduction

Climate Change is often used synonymously with climate variability and yet the two are different. Climate Change refers to the long-term significant change in the "average weather" that a given region experiences, while climate variability refers to variation in the mean state and other statistics of climate on all temporal and spatial scales beyond that of individual weather events<sup>5</sup>. Since the last two decades, issues concerning environmental degradation, globalization and Climate Change have become major economic, social and political challenges for development of a community because these events raise the most difficult issues of economic disparity, political power, social cohesion and justice<sup>11</sup>. As recognized by IPCC, Climate Change will impact the most marginalized communities with limited access to resources and avenues to deal with changing weather patterns and the resulting environmental phenomena<sup>5</sup>.

India has 75% of the population living in rural areas, most of whom are poor and marginalized relying on agriculture as their primary source of Income<sup>20</sup>. Rural livelihood is associated with the people's entrée to natural resources like water and land. A watershed/ecosystem is not only a geographical area, but also a living space. It is basically the area on which the community depends on for its survival and draws its sustenance from it. Watershed and ecosystems development play an important role in building up the resilience of the local ecology and environment to climatic variations and extreme meteorological events<sup>11</sup>. Keeping this in mind watershed development activities are carried out. Watershed development is introduced to reduce water scarcity, and increase the resource base and enhance rural development by improving livelihoods. Climate Change imbalances the livelihoods resources of communities and that leads to increase in vulnerability. While climate affects everyone, it's the world's poor who are on the front line<sup>15</sup>.

Climate Change has been sufficiently studied in India and the situation of livelihoods during climate variation has also been documented<sup>2,3,8,13,14</sup>. Yet past data does not indicate what the future will see.

India's climate is diverse and changing<sup>15</sup>. The changing climate has impact on water availability and its quality, agriculture production, food quality which has an impact on vulnerable groups<sup>20</sup>.

Smaller farmers are dependent on timely and sufficient rainfall during the monsoon for a high crop yield. However, with the changing climate, rainfall pattern has become erratic. Long dry spells between untimely and erratic precipitation, exposes farmers to too many risks including droughts, floods, diseases of crops and animals as well as market irregularities<sup>21</sup>.

Thus the exposure to these risks and vulnerabilities has forced the rural people to cope with the climatic variability by changing certain practices and look for alternate livelihood strategies. There are various international and national studies done on Climate Change and coping strategies<sup>9,10,13,16</sup>. A study conducted in Andhra Pradesh mentioned that there is strong gender dimension to impacts of climatic shifts, their livelihoods and the coping strategies that they adopt<sup>4</sup>. In brief, these studies have mainly highlighted the current climatic variability and the coping strategies.

Poverty is a universal phenomenon and the Millennium Development Goals <sup>(18)</sup> talk about poverty alleviation. Appropriate external aid for traditional development projects as a strategy for poverty alleviation is not sustainable and hence more research on understanding the present strategies and possible modifications or development of alternate strategies that would be sustainable is a need of the present time.

Hence an effort was made to understand community's perceptions about climatic variations and their coping/livelihood strategies to adapt to climatic variability.

## Methodology

### *The study population*

The study was conducted between June and September 2010, in Malegaon Pathar village of Sangamner Block in Ahmednagar district. Ahmednagar district lies in the direct rain shadow of the Western Ghats It is the largest district of Maharashtra covering 5.66% of the total area of the state. The district has three physical divisions which are western hilly region, central plateau region and the region of southern and northern plains. Sangamner block falls in a relatively flat uplands.

The total population of Malegaon Pathar village is 789 consisting of 149 households. Majority of the population belongs to the Maratha Caste (34%) and Other Backward Class (27%). Farmers owning less than 2 ha of land constitute 46.31% of the households. The average gross landholding for the

village is 3.60 ha. There are 31 landless households in the village. Agricultural is the main occupation of the study population<sup>1</sup>.

The study was qualitative in nature. Proportionate sampling method (selection of a sample of the population to ensure equal representation) was used to get overall geographical representation and maximum variations in the opinions expressed by the community. It was done based on the land use categories from 76 rainfed, 10-15 seasonally irrigated land owners and 31 landless families. A total three group discussions with women and three with men were conducted to understand the views about climatic variability. On an average, group discussions took one and half to two hours and on average 10-12 villagers participated in each group.

Assuming that the coping strategies of the sample might be different, the group discussions were conducted among both genders and land use categories. In addition, to facilitate group discussions, scenario building method was also used wherever required. Trained and experienced staff moderated the group discussions. A note taker took detailed notes of the discussions. The researcher then transcribed and translated the notes into English. Data were coded after repeated reading of the notes and a thematic analysis was done. The themes discussed in the group discussion with each community were as follows: understandings of climate variations, livelihoods and current coping strategies practiced by communities.

Before starting data collection a meeting was conducted in the village to share the purpose of the study. Oral consent was sought of those who were willing to participate in the study.

## Findings

The results from all types of land use categories and from landless poor are presented hereunder.

### Understanding seasonal variations

Data from group discussions with men and women from all land use categories revealed that weather was better in earlier times (70's and 80's). The participants mentioned that monsoon, winter and summer made the seasons. All three seasons used to arrive in time more or less one after another and for 4 months starting from June to May. There was regularity in seasons. As there was regularity in seasons the yield was of good quality and adequate and offered economic security. Women also mentioned that as the yield was of good

quality they got the strength to fight with different illnesses.

Both men and women mentioned that the seasons have changed their pattern. They aren't regular now. It's not in the regular pattern. Rains ("pankala") have become irregular and intense. Winter is mostly not there at all while summer has become more prolonged and intense. The seasons are not there for four months as in earlier times. The respondents mentioned that any change in regular pattern of season was understood as seasonal variations.

Women mentioned that nature's whim has changed. They used terms as "Vatavaran Badal", 'Havamaan Badal', 'Naisargik Badal"', for seasonal variations. Women participants from all the land use categories also said that "everything is in god's hand and the world is coming to an end and the extreme weather is one indication".

According to the participants, humans could not control natural phenomenon at their will and hence they had to be accepted. Most of the participants were also aware about the effects of seasonal variations on their livelihood.

During group discussions with men, they said that the reasons for seasonal variations were deforestation, pollution, increase in carbon level, industrialization, and increase in number of vehicles. They mentioned that there could be some scientific reasons for the change but admitted that they were not aware of it.

Even women participants mentioned that deforestation and nature's whim were the causes of seasonal variations. *They said that this is 'Kaliyug – a period of expiration at which the world is to be destroyed, human being have sinned, so we have to suffer now at any cost'*. They also mentioned that in earlier times trees were big and large but now the trees are small ones which led to shifts in seasons. Women mentioned that "We don't know things like you all know". Men and women stated that they had observed the pattern of seasonal variations since last 4-5 years. Women mentioned that rains have become unpredictable. They also mentioned that they hoped that it would rain at the usual and expected time this year.

Men and women had some information on seasonal variations but men articulated more reasons than women. However, both did not understand the term Climate Change. The community had limited knowledge about the Climate Change and they could not differentiate between Climate Change and seasonal variations.

## Community response to Seasonal variations

The results from group discussions with rainfed land owners, landless poor and seasonally irrigated land owners revealed the following impacts and coping strategies.

According to all the participants, livelihoods are those resources which are sources of income for them. All the participants who owned land felt that there was a negative effect of seasonal variations on agriculture.

### *Seasonally irrigated land owners*

According to seasonally irrigated land owners, agriculture and income generating occupations formed their livelihood.

**Effects of seasonal variations:** For seasonally irrigated land owners coping was not that much of a concern because according to them they had enough resources with them. Women and men talked about the irregularity in rainfall as well as seasonal variations and its effect on livelihoods. They mentioned that water scarcity was not an issue for them.

*“We have other livelihood options as some members from the family go out for work or have some business. Hence we have that much money in which we can satisfy our primary needs. We need not struggle as much as rainfed land owners and landless poor.”*

Thus men and women from this group perceived that their livelihood is not as affected by seasonal variations as that of landless poor and rainfed land owners. At the same time they also emphatically mentioned alternate livelihood options available to them.

**Coping strategies:** This group of farmers, consisting men and women mentioned that bore wells had helped them to solve water availability problem. They could take 2-3 crops in their farms and also supplemented it with horticulture and floriculture. They use fertilizers to get surplus yield. They also had supporting income generating occupations like milk production, tailoring, grocery shop, flour mill etc. They said that, they usually stored their produce and waited for higher market prices for their produce to earn a profit, instead of selling it immediately after the harvest. However, in times of financial crisis they also worked as laborers on somebody else’s farms in 2003. There was lot of water scarcity for some years and the last year was worst. During those years people took major losses due to water scarcity. They could not produce yield properly so had to go for agriculture labour work to deal the financial crisis and satisfy their hunger.

*The women group mentioned that “the fertilizers give power to the soil resulting into more yield. This is important for us as we can then save our extra yield and earn money”.*

This group mentioned that the impact of seasonal variation on their livelihood isn’t large enough. Their coping strategies are rather insignificant and minimal. All the group discussion participants stated that seasonal variations had some impact on their livelihoods and agreed that occasionally, household finances was an issue of concern for them in the current varying seasons.

### *Rainfed land owners*

For this community the understanding of livelihood consisted of agriculture and daily wages.

**Effects of seasonal variations:** The respondents, during group discussions, mentioned that erratic rainfall caused agricultural losses. Natural soil moisture could keep crops alive only for certain period but prolonged gap in rains could result in crop failure. Erratic rainfall also resulted in dry winter season instead of moist which resulted in reduced yield of the ‘rabbi crop-vernal crop’.

Women from rainfed land owning category said that the changed pattern of seasons had disturbed their agricultural practices including traditional crops. They even expressed that seasonal variations led to fluctuations in crop yield. They were not able to meet family’s food requirement with the current farm yield. To secure food women had to earn daily wages by working elsewhere as laborers. They also mentioned that they had to cover large distances to collect fuel wood and fodder for their livestock. This had not only resulted in increased, physically taxing work but also affected their health. Water scarcity affected livestock rearing too which in turn resulted in low production of milk and organic manure. They mentioned that agriculture and agriculture labour income were the main income sources for them.

**Coping strategies:** According to men, as crop varieties have changed due to seasonal variations, they had to plan for selected crops, based on their financial condition and also according to market demand. So they used fertilizers to have more yield in short time. They also started cultivating onions, tomatoes and bajra, which took less time for production as compared to pulses. Again, to address the issue of water scarcity they adopted water management practices such as rain water harvesting in a group. A rain harvesting structure “farm pond” is built by a group of farmers which could be called as indigenious.

Women also mentioned that they had to go for agriculture labour work in nearby villages in order to generate resources for supporting family income. Sometimes women borrowed food grains from their neighbors and returned it after the harvest. Because of less production of pulses and vegetables, they had to purchase these from the market. This resulted in higher household expenses. Women also mentioned that seasonal variations resulted in non-availability of fodder which made it difficult for them to maintain livestock and they had to sell their livestock. If they didn't sell it, they had to feed them with crop residue from their own farm. In emergencies, they even sold their jewelry, if they had, to have cash.

Thus, men mostly mentioned about impact of seasonal change, primarily on agriculture which affected their income and financial calculations. Women mentioned about food security and consequent health effects. Thus, the coping strategies of men were mainly related to financial side whereas for women they were food security, water, fuel collection and livestock rearing.

#### *Landless poor group*

The landless participants mentioned that only daily wages was their livelihood. It was something where in they could just manage their everyday expenditure.

**Effects of seasonal variations:** According to women they had to cover longer distances to reach their work place. At the same time they could not ignore children and household chores. Hence they had more physically taxing work than men which led to many illnesses. Men, in their village, did get employment but that was rather infrequently. Discussion with group of men revealed that bore wells were the reason for water scarcity in post-watershed development.

**Coping strategies:** Women's group expressed that work was available to them throughout the year which was not the case with men. Whole family worked at the brick kilns during summers but when they returned to the village, it was mostly woman who got employment as farm laborers. They bought less grocery than what family needed and compromised. Many times they borrowed money from the land owners. It was also reported that if they were assigned work by land owner for 7 days, they would try finish before the assigned time. This gave them an opportunity to find work elsewhere and earn extra income. In order to address the issue of savings, women started informal savings group of landless poor wherein they saved ₹100 per week and gave money to needy members. They

expressed that if they didn't go for work it would not be possible for them to satisfy their hunger.

Hence according to men and women, the money earned at the brick kilns sites outside village was not sufficient to run their households for the period when they stayed in the village. So they had to work as laborers when they came back to the village. But they also reported that, it was easier for women to find work as laborer whereas for men it was according to the availability of work i.e. small isolated jobs that men could do.

*Landless poor mentioned "Other than daily wages we do not have any options for livelihood or survival".* They also mentioned that even if they wanted to start their own brick kiln in the village itself, the main problems were initial capital investment and water scarcity. It shows that if they are provided with the resources they would find their livelihoods options in the village itself.

Thus data from landless poor revealed that they had to go for an employment as daily wage workers. The women were more worried about immediate family needs food security and health and men were more concerned about the financial matters and food security.

#### **Knowledge about effects of coping strategies on livelihoods**

Participants from all the land use categories could not discuss elaborately on the effect of their coping strategies on their livelihood. Men and women of rain fed and seasonally irrigated land owners mentioned about soil degradation as an effect of abundant use of fertilizers.

Landless men and women stated that they finished work in rush so that they could earn extra money by finding other work. When they finish the work in hurry they could not give quality work to their owners. This could affect their employment with the same land owner in future, as he would not want to employ them to have for similar work done.

In all the discussions with women of all types of land use categories and landless poor revealed that, they didn't know much about Climate Change. At the same time it showed that they had made some adjustments to cope with the changing seasons. Men and women also viewed the impact of the seasonal variations differently.

*Men mostly said "We have to take care of our family at any cost if we don't earn who will do for our children and who will do for us? Finally everybody has own family to take care off".*

Women group mentioned “we have to go for daily wages for feed our hunger. When we go for work then we have something in our hand to cook quality food. Those food expenses we could manage from our work”.

Thus, it is seen that men are more aware about Climate Change than women. The community did not have scientific information about Climate Change and the knowledge is superficial. Participants from all the group discussions were aware that there was seasonal variation and they had to cope with it to secure livelihood. Men mostly talked about meeting cash needs of family while women talked about food security.

### Discussion

The present study has provided data about the responses of a rural community towards seasonal variations and applied coping strategies. The detailed study findings cannot be generalized outside study settings. But the findings are important because they give insights for further research.

The study shows that more risk taking ability is seen among seasonally irrigated land owners, which is very low amongst rain-fed land owners and landless poor.

Climate shocks and stresses already have a devastating impact on the vulnerability of the poor. Increasing frequency and intensity of weather-related extremes and gradual changes in the average temperature will exacerbate these impacts. This has implications for the vulnerability of the poor to shocks of all kinds (DFID key sheet 2004).

### Seasonal variations and its perceived reasons

Climate Change is a new concept to the community. The community members perceived that there is climate variation over past few years. The DFID key sheet (2004) as well as Manyatsi et.al (2010) study also has similar findings where respondents use words like climate variability as seasonal changes, inter-annual variability and the likely frequency of weather-related extreme events, poor rains, change in rainfall pattern, increased temperature. This variability is often an ongoing stress in people’s lives.

In the current study the reasons for seasonal variations as mentioned by respondents are deforestation, pollution, increase in carbon level, industrialization etc. UNFCCC (2007) also reported similar kind of finding where green houses gases, global warming and resultant Climate Change are documented. The community lacks scientific

information. It is visible and more amongst women than men.

### Impacts on livelihoods

The participants from group discussions mentioned that water scarcity, crop damage, poor crop yields and loss of fodder as some of the important effects of seasonal variations. Similar to these findings studies done in different geographical locations, Manyatsi *et al.* (2010) mentioned that inadequate food supply, poor crop yield and poor performance of pastures, effects on ecosystems and services which include agriculture and economic growth as mentioned in DFID key sheet (2004). Similar to findings of Andhra Pradesh study (Dr. Lambrou Y. 2009), this study also mentioned about impact of seasonal variation is seen differently by men and women.

### Coping strategies

The majority of the farmers rely upon rain fed agriculture as a source of primary income. During seasonal variations such as irregular rainfalls, the farmers are forced to adopt different coping strategies. Some of the strategies are water management, mixed cropping and crop diversification. However, the respondents are not aware about the sustainable strategies. Similar to these findings, the study conducted in Manyatsi *et al.* (2010) and Kahinda *et al.* (2007) in South Africa showed that one of the livelihood strategies used was rainwater harvesting to enhance water productivity of rain-fed agriculture whereas the study done by Tumbo *et al.* (2006) mentioned that mixed cropping and taking cash crops is a useful strategy to ensure the adequate income. The present study also showed that the main coping strategy among the community members is going for daily wage work either during summer or whole year. Similar to this finding, a study undertaken by Kadigi *et al.* (2007) in Great Ruaha catchment in Tanzania, mentioned that the dominant livelihood strategy and coping mechanism was daily wages after and during summers.

Climate Change is new concept to the community so there is a need for many more studies and also intervention to help people to cope with changing weather there is need to take them for sustenance living. Thus, it can be concluded that the community has superficial information about the causes of Climate Change and they also lack scientific information about the same. They are aware about the causes of seasonal variations. At the same time, they are not able to connect these causes to Climate Change. Hence, there is need for

developing a program to build awareness about Climate Change. Hence Watershed Development and NRM agencies need to revisit and assess which are the coping strategies that are still in practice. What is that missing element that would reduce vulnerability?

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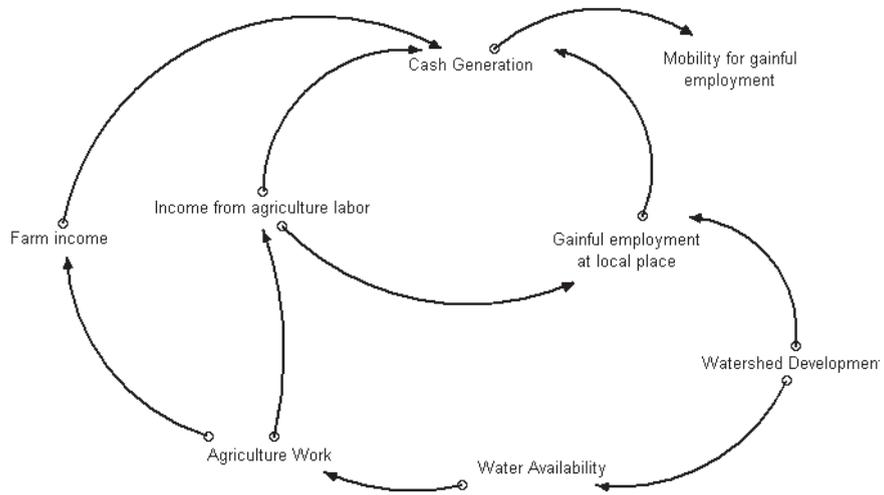
### References

1. Baseline report of Malegaon Pathar 2009, WOTR.
2. "Climate Change & its possible Impact on India," available at: [www.greenpeace.org/India/Climate Change](http://www.greenpeace.org/India/Climate%20Change). (Accessed on June 2010).
3. UNFCCC, (2007), Climate Change and Adaptation (Chapter II), Climate Change: Impacts, vulnerabilities and adaptation in developing countries in developing countries," Germany, pg: 8.
4. Dr. Lambrou Y. (2009), "Does gender make a difference in dealing with climate shifts? Research results from Andhra Pradesh, India".
5. IPCC fourth assessment report, 2007.
6. Kadigi R.M.J., Mdoe N.S.Y. and Ahimogo G.C., (2007), "Collective arrangements and social networks: Coping strategies for poor households in the Great Ruaha Catchment in Tanzania", Phys. Chem. Earth, Earth 32, pg.1315-1322.
7. Kahinda A.E., Taigbenu A.E. and Boroto J.R., (2007), "Domestic rainfall harvesting to improve water supply in rural South Africa", Phys. Chem. Earth 32, pg: 1050-1058.
8. KPMG, (2008), "Climate change: Is India Inc prepared?", available on [www.KPMG.com](http://www.KPMG.com). (Accessed on June 2010).
9. Maikhuri R.K., Rawat L.S., Phondani P. and Farooquee N., (2007) "Impact of Climate Change and coping strategies in Nanda Devi Biosphere Reserve (NDBR), Central Himalaya, India", IMBC Technical Working Group I – G.B. Pant Institute of Himalayan Environment and Development, Garhwal Unit, Srinagar Garhwal, Uttarakhand, India.
10. Manyatsi A.M., Mhazo N. and Masarirambi M.T., (2010) "Climate Variability and Change as perceived by rural communities in Swaziland", Journal of Environmental and Earth Science 2(3), pp 165-170.
11. "Meeting the challenges of globalization and Climate Change", (2009), WOTR, Strategy Paper on Climate Change.
12. More A., (2009), "Climate Change and rural Livelihoods in Tanzania: A case study of Ibuti and Majawanga", Master's thesis, University of Copenhagen.
13. Nandan, (2009), "Climate Change and trade policy, preliminary discussions".
14. Parikh J. and Parikh K., (2002), "Climate Change: India's perceptions, positions, policies and possibilities," Indira Gandhi Institute of Development research.
15. Seath F., (2009), "The human impact of Climate Change in India", New Delhi, Center for Legislative Research and Advocacy, OXFAM India.
16. Shamal, Pandey P., Sushil (2005), "Climatic risks, rice production losses and risk coping strategies: A case study of a rainfed village in Coastal Orissa", Agricultural Economics Research review, Vol: 18, 2005.
17. "The impact of Climate Change on the vulnerability of the poor", (2004), DFID, The key sheet of DFID.
18. The Millennium Development Report", (2000), Lois Jensen, New York, United Nations.
19. Tumbo M., (2006), "Community vulnerability and adaptation to the impacts of climate Variability and extremes on Simiyu Wetlands: The case Of Simiyu Wetlands, Lake Victoria Basin", Institute of Resource Management, University of Dare E Salaam, Tanzania.
20. World Bank, (2008), "Climate Change Impacts in Drought and Flood Affected Areas: Case Studies in India", No: 43946, IN.
21. Venkateswarlu, (2009), "Climate Change and Sustainable agriculture: Securing small and marginal farmers in India", The Human Impact of Climate Change: Policy Notes for Parliamentarian. Center for Legislative Research and Advocacy, New Delhi.

**Internet References (Preamble)**

1. [www.http://gei.newscorp.com/resources/glossary.html](http://gei.newscorp.com/resources/glossary.html)
2. [www.http://rredc.nrel.gov/solar/glossary/gloss\\_c.html](http://rredc.nrel.gov/solar/glossary/gloss_c.html)
3. [www.climatesmart.qld.gov.au/get\\_informed/glossary](http://www.climatesmart.qld.gov.au/get_informed/glossary)
4. [www.gozowe.accountsupport.com/glossary.shtml](http://www.gozowe.accountsupport.com/glossary.shtml)
5. [www.ucar.edu](http://www.ucar.edu)
6. [http://www.weatherquestions.com/What\\_is\\_climate.html](http://www.weatherquestions.com/What_is_climate.html)
7. [http://en.wikipedia.org/wiki/Climate\\_change](http://en.wikipedia.org/wiki/Climate_change)
8. <http://envfor.nic.in/cc/what.htm>
9. <http://www.britannica.com/EBchecked/topic/121632/climate-change/275776/Seasonal-variation>
10. [http://en.wikipedia.org/wiki/Seasonal\\_variation](http://en.wikipedia.org/wiki/Seasonal_variation)
11. <http://www.livelihood.wur.nl/?id=24> - (Carney, 1998:4)
12. <http://www.ncbi.nlm.nih.gov/pubmed/7100361>
13. [www.endthepain.org/learning/Glossary.html](http://www.endthepain.org/learning/Glossary.html)
14. [http://ocd.about.com/od/glossary/g/Coping\\_Glossary.htm](http://ocd.about.com/od/glossary/g/Coping_Glossary.htm)
15. <http://www.who.int/disasters/repo/5517.pdf>
16. [www.lfhe.ac.uk/governance/hefastfacts/jargon.html](http://www.lfhe.ac.uk/governance/hefastfacts/jargon.html)







# Livelihood and Mobility – Challenges for Watershed Development

Gaurav Chandakkar

## Abstract

**Introduction:** Rural livelihoods are linked to people's access to natural resources such as land, water and other biotic resources. Watershed development can overcome these constraints and create livelihood options for rural people. Migration, temporary mobility, seasonal movement and commuting are thought to be livelihood strategies, people adopt, in order to overcome livelihood challenges. The present study looks at the movement of people for livelihood in the context of watershed development.

**Methods:** This qualitative study was conducted in Malegaon Pathar and Pimpri villages in Sangamner and Akole block, respectively, of Ahmednagar district in Maharashtra. Data were collected through in-depth interviews (9) and group interviews (3).

**Findings:** Water scarcity forced people to move out of their village during pre-watershed development period. During watershed implementation period, creation of work days stopped people's movement in search of gainful employment. Post-watershed period showed peoples' continued movement. Lack of continuous employment and higher wages or ready cash availability outside their villages were the main reasons for peoples' continued movement. They commuted daily to these places as these were nearer to their village.

Watershed development has not resulted in creating enough livelihood opportunities in these villages. And when preparing for climate change adaptations, agencies should focus on skill development for farm based, allied, non-farm and services livelihood possibilities.

## Introduction

Rural livelihoods are intricately associated with people's access to natural resources, such as land, water, and other biotic resources. Sensing this watershed development is thought to be a way out, to overcome these constraints. Watershed development consists of harvesting the rainwater wherever it falls, regenerating the environment, increasing green cover and adopting sustainable land husbandry practices. The new guidelines of Ministry of Rural Development, Government of India, with its definite people-centred approach, brings watershed development program close to

sustainable livelihood framework (V. Ratna Reddy, 2004). Hence such program not only addresses the immediate need of water scarcity but it also addresses wider issues of development. Integrated and participatory watershed development and management has emerged as the cornerstone of rural development in the dry and semi-arid regions and other rain-fed regions of the world (B.R. Sharma, J.S. Sharma, C.A. Scott, S.P. Wani, 2005). Watershed development program should result in gainful employment, not only during implementation of the program but it should be sustained after the completion of the watershed activity.



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Agriculture and allied activities support livelihoods of nearly 70% of India's rural population (Hiremath, 2007). Hence, in the situation of water scarcity it becomes difficult for rural households to support the family's food requirements and fodder for their cattle. As a result, people are forced to look for alternative means to supplement their livelihoods. Moving out of the area of origin is one of the means for these rural households to find their alternative means for livelihoods. There are various types of population movement for different purposes. Absences from home may last from a few hours, to-days, weeks or even months and the frequency of such moves, and their periodicity, is highly variable (Bell and Ward, 2000). Hence it becomes necessary to examine the concept of movement methodically.

Permanent migration is a form of geographical mobility or spatial mobility between one geographical unit and another, generally involving a change in residence from the place of origin or place of departure to the place of destination or place of arrival (UN Multilingual Demographic Dictionary, 1982). Temporary mobility, which doesn't involve permanent change of residence, can be defined as any form of territorial movement which does not represent a permanent or lasting change of usual residence and which could be production or consumption related (Bell and Ward, 2000). Commuting, which is a form of temporary mobility (Bell and Ward, 2000), involves the daily or weekly journey from place of residence to place of work (UN Multilingual Demographic Dictionary, 1982). For the present study such distinction becomes necessary as lack of income generation opportunities in own village provide people, incentives, either to migrate or commute for livelihood diversification or getting out of destitution. Previous studies highlight that migration is much more common as a livelihood strategy than is often suggested (Scoones, 1998; De Haan and Rogaly, 2002; Waddington, 2003).

Present study looks at the livelihood opportunities available to the people in two selected villages where watershed development program has been completed. It also looks at the movement of people for livelihood in the context of watershed development.

### Methodology

Two villages, Malegaon Pathar and Pimpri, in Sangamner block and Akole block, respectively, of Ahmednagar district in Maharashtra were selected. Both the villages fall in the rain shadow region. As Pimpri village is situated on the hilltop farmers have their agricultural land uphill. According to the baseline survey conducted by Watershed Organization Trust (WOTR), agency which

implemented watershed development program, the total population of Malegaon Pathar village was 789 consisting of 149 households out of which 31 were landless households. The total population of Pimpri village was 533 consisting of 93 households out of which 2 were landless households. For both the villages income sources have been clubbed as income from agriculture and allied activities and non agricultural income. For the landless families, labour income from agriculture was major source of income. In Pimpri, watershed development started in the year 2005 and was completed in 2009 while in Malegaon Pathar it started in 1996 and ended in 2001.

The study was qualitative in nature. Data was collection through group and in-depth interviews. Before data collection, villagers were informed about the purpose of the study through a 'community meeting' (*gram sabha*).

The group interviews were thought to bring out general community's perceptions on watershed development, and its impact on people's livelihood. The participants in group interview were drawn from the general population. Separate group interviews were conducted with a land holding families and landless families in Malegaon Pathar, while in-depth interviews were held with the two landless families in Pimpri. In all two group interviews were held in the Malegaon Pathar and one in Pimpri. As the issues that were discussed in group interviews did not involve any sensitive information regarding personal life, it was thought that having a mix group of men and women would be appropriate. On an average, there were fifteen participants in group interviews, of one hour duration. They were recorded with a prior consent from the participants and notes were also taken.

In all nine in-depth interviews were conducted; four in Malegaon Pathar and five in Pimpri. In depth interviews were considered appropriate as they provide personal experiences of individuals during the course of watershed development. It also helps in understanding those details which may not have surfaced during the group interviews. The participants in in-depth interviews included land holding farmers, persons who were actively involved in watershed implementation work like a chairman of a village watershed committee, landless families and farmers to whom people from these villages go to seek employment as farm labourer. All the interviews were conducted at the place of residence of participants. On average in-depth interviews took about forty-five minutes. All the interviews were recorded with a prior consent from the respondents and notes were taken.

The recorded group interviews and in-depth interviews were then transcribed and translated. The main issues discussed in group and in-depth interviews were: reasons for migration/mobility, place and period of migration/mobility, employment opportunities available, income generated through employment, earning, saving and expenditure at the place where people find gainful employment, and general benefits of watershed development. All of these issues were discussed keeping in mind three periods viz. pre-watershed development period, watershed implementation period and post-watershed development period.

## Findings

The findings related to the livelihood options and mobility are summarized in this section. The data brings out the reasons for which people from these respective villages move in search of gainful employment that were prevalent pre watershed development, during watershed implementation period and post-watershed development period, employment opportunities available to the people at the place of destination, earnings and savings at the place of destination and farm income if they didn't move out of the village in search of employment.

- **Reasons for the movement**

- *Pre watershed development*

Participants from group interviews in Malegaon Pathar reported that before watershed development in the village, about half the population used to move out of the village in search of gainful employment. The main occupation of people was agriculture which was mostly dependent on rain water. There was scarcity of water in the area and the farm produce was also not sufficient for the entire family. Hence people used to go to sugarcane producers for cane harvesting and later to the sugar mills as unskilled labourers. Working on sugarcane plantation not only gave them gainful employment but an additional advantage of procuring fodder for their livestock. Participants from Pimpri said that there was enough drinking water but there was scarcity of water for agricultural. According to them, though there was enough rainfall in their area, as the village is situated at the hill top, there was heavy water runoff. The only time when they could have employment in their own village was during rainy season. Lack of irrigation made it difficult for them to work in their own farms during winter and summer season. This led them to move to nearby villages in search of gainful employment.

- *Watershed implementation*

The data showed that, in both the villages, during the period of watershed implementation as the

work was made available in the villages itself people did stop moving out of the village, including some landless families. Work not only included construction of watershed structures, but plantation also, which could be done throughout the year.

In-depth interview in Malegaon Pathar reported that sometimes people ignored their own farms to work on the watershed sites. As they were paid on the basis of work completed, people used to finish only essential work in their own farms and visited watershed sites so as to get maximum work done in a day and to earn in cash.

The landless families in Malegaon Pathar, who used to find employment on brick-kilns, before watershed activities, continued to go there in order to earn income every-day. During watershed implementation period the wages used to get distributed after 15 days or sometimes after two months whereas at brick kilns, they got paid every day.

*One women from landless family during group interview said, "Salary was not paid on time. We need money every day. At that time (for watershed work) we used to get money after 15 days or sometimes after 2 months and hence it did not fit in our budget."*

Group interview in Pimpri also illustrated that people did work on watershed sites instead of moving out of the village, but if watershed work was not there for few days, because of any reason, they preferred finding work anywhere in nearby villages where they could earn in cash.

*One respondent in a group interview said, "We need cash (for daily expenditure). When money is not available to spend, then somewhere something (work) has to be found."*

- *Post watershed development*

In group interviews and in-depth interviews in Malegaon Pathar respondents reported that some of the farmers have started cultivating onions, as a rabbi crop, as there was increased water availability. Where they used to cultivate only one crop during monsoon season now could cultivate two crops and earn from the farm produce. In depth interview with a farmer in Malegaon Pathar highlighted that farmers did not have demand for farm labourers as family members were sufficient to complete the work. Hence, people, who worked as farm labourers, could not find work in their own village. Even if they found any employment in the village itself, it didn't continue for a longer period of time. Such an employment could help them to earn only for the period of two to three days and again they had to search for employment. On the other hand in a nearby village water was available throughout

the year. Hence farmers from that village could cultivate crops throughout the year and they had constant need of labourers in their farms. Therefore, labourers from Malegaon Pathar found continuous employment in there.

*One respondent mentioned, "There is not much wage difference, but farmers (from nearby village) need them as everyone has got irrigated farms (so work is more) and hence they had to recruit labourers."*

*Other participant exemplified, "A person from our hamlet has 2-3 acres of non-irrigated agricultural land in village. But his entire family cultivates tomato near Ambi, a nearby village, on sharing basis. Last year, they earned about ₹200,000-₹250,000. Even if they work hard in their own land they will not be able to earn that much". Outside, lunch and dinner both are served. But in our village only lunch is served. This is a tradition here."*

Hence, according to respondents, people moved, whether landless or marginal farmer, because they earned more and saved expenditure on food. It was also reported that if the family consisted of four members two went out while remaining two remained in village to look after their farm.

*Respondents in a group interview in Pimpri exemplified, "Take an example of Tambekar Hamlet (near Pimpri) where each person used to go out for work. Few years back water was made available to their farms through pipeline. Now people stopped going out."*

*Another respondent from Pimpri in his interview said, "Even if I own much of a land, only few acres is useful for agriculture. We are a joint family. So we have to work as labourer also so as to suffice family's needs. Where earlier two families owned one acre (of land), now ten families owned one acre (as families have become nuclear and they have divided the land). If people remain in the village, they will have to spend money on food but if they go out, food is provided by the owner."*

Hence, group interview as well as in-depth interviews in Pimpri village illustrated that watershed activity had not resulted in providing enough water for their agriculture. Group interview reported the need of lifting water, with the help of motors, to provide it to the farms. Participants, in the group interview, emphasized that if water was made available for the agriculture then villagers would not move out of the village in search of employment. Participants exemplified during the course of discussion.

- **Employment opportunities at the place of destination**

- *Employment opportunities*

Participants from Malegaon Pathar village in their group interview pointed out that, people, who seek employment outside, mostly got employed as farm labourers. The farmers from a nearby village had constant requirement of labourers as the work could not be done by members of a single family. For example, to plant onions in one acre of land, farmer required at least twenty labourers. Such requirement of labourers had to be sufficed by recruiting them from places like Malegaon Pathar. Few people visited State Transport Bus Station in nearby villages where they got employment as a coolie to load and unload consignments.

Participants in group interview and in-depth interviews in Pimpri mentioned that the places where they visited did not yield any specific type of job. They worked as farm labourers, coolies, or as labourers on construction sites i.e. anything that owner asked for. The participants in a group interview also mentioned about the place in nearby village, where all the labourers from all the places gathered. People who needed labour would visit this place and they would hire labourers after finalizing upon the wages to be paid. Participants described the place as –

*"As customers come to bullock market to buy bullocks, similarly people come to this place. And as bullock is bought after negotiations, similarly owners buy our services."*

One of the respondents from Pimpri also reported that few people had skills in carpentry, welding or working as an electrician. The work that would match to their skills was available in nearby villages, but skilled people could not reach these sites in time because of lack of road transport. Hence, they were not employed at these sites as the owners wanted them to commute every-day.

- *Earnings*

The wage rates for farm labourers were not fixed and they varied every year. The wage rates reported in this paper are from a village nearby Malegaon Pathar where people usually visit. Women labourers were paid ₹100 while men labourers were paid ₹150 per day at the time of data collection. A farmer from Ambi, in his interview mentioned that he paid ₹20 for an hour to the labourers for onion plantation. However, in emergency situations farmers did recruit labour at higher wage rates.

Participants from Malegaon Pathar, who preferred going out to the place where all labourers from nearby villages gather, mentioned that they could earn ₹300-₹400 in an hour. In their opinion, even if

they worked hard on farms as farm labourers they could just earn ₹150-₹200.

Landless families from Malegaon Pathar, who visited brick kilns, reported that they could earn around ₹50,000-₹60,000 in six months. Contractor first paid them advance of ₹10,000-₹20,000 and at brick-kiln site they got paid ₹150 for every 1000 bricks. On an average they could make about 1000-1500 bricks in a day. However they were not provided with food and shelter by the contractor. Participants from group interview and in-depth interviews in Pimpri emphasized that the wage rates were usually fixed by labourers with the owners before they visited the place of work. It could range from ₹100 or ₹150 per day. Owners provided them with tea, water, food and also a place to stay at the place of work. Labourers only had to pay for their conveyance back home.

#### ○ Savings

In-depth interviews in Malegaon Pathar brought out the approximate saving of families that visited nearby villages to work as farm labourers. This might not be representative of the entire village. A respondent from Malegaon Pathar reported in his interview that he along with his wife earned up to ₹1200 in a week, out of which only about ₹400-₹500 were spent on food and as other expenses. Hence they saved up to ₹700-₹800 in a week.

One farmer from Malegaon Pathar, in his interview reported his observation about families who visited brick-kilns. According to him families, which went to work on brick-kilns, could save that much so as to have TV and Fans in their houses.

*The farmer said, "People, who worked on brick-kilns, have a high-class lifestyle; people won't believe that they work as a labourer (on brick-kilns)."*

According to the participants from Pimpri, whatever they earned at the place of work, all was saved. The expenses included travelling back home, children's school, ration etc. i.e. only when they came back home. Hence both, husband and wife could save up to ₹4000-₹5000 in fifteen days.

*Husband and wife from Pimpri village mentioned, "When (we) work outside the village then there is no need to spend. Expenditure will happen only if one has some addiction. If the owner is of good nature, sometime he will provide the worker with that also."*

#### ● Income from Farm

It was reported in the group interview in Malegaon Pathar that watershed development provided water to their farms to some extent. A farmer from Malegaon Pathar, in his interview, informed that water availability led to cultivation of onion crop

which was financially beneficial for farmers. Where, earlier, crops like *Bajra*, *Bhuimug* gave earning of only about ₹3000-₹4000, onions gave earning of ₹40,000-₹50,000 in one acre.

Participants from the group interviews and in-depth interviews were of the opinion that farm produce was not sufficient for them to run a household.

*Respondent from group interview stated, "If ₹25,000-₹30,000 per month cannot suffice a person who does service in a city then how farmer can survive in ₹15,000-₹20,000 that he earns in a year?"*

However, one farmer in his interview in Malegaon Pathar stressed that farmers need to look after their farms carefully and to work hard in their farms in order to have good production. According to him, because people went outside the village to earn some extra money, their own farms were ignored. *Farmer from Malegaon Pathar said, "Similar to any service, if farmers work for 8 hours in their farms then they may earn similar income to that of any service person."*

Participants from group interview and interviews in Pimpri mentioned that their farm produce depended upon rainfall. According to the group discussion they would produce 15 quintals of rice in an acre in conditions of good rainfall. According to two interviewees in Pimpri, the produce from farm (i.e. rice) was just enough for a family to satisfy their food requirement. Hence farmers didn't sell their produce in market; instead they kept it for their own consumption. However, main problem people faced in the Pimpri, according to the participants, was that they didn't have cash in hands for daily expenditure. They worked outside to get cash daily.

#### Discussion

The data clearly revealed that water scarcity resulted in lack of agricultural work. Since agriculture was the occupation of people residing in both the villages, it led to people's movement outside their villages in search of gainful employment during periods of pre-watershed development, and post-watershed development. As Waddington and Sabates-Wheeler (2003) mentioned, migration does play a significant role in people's livelihood strategies. Participants from Malegaon Pathar mentioned about their visits to sugarcane fields, so as to have gainful employment as well as fodder for their livestock. Hence they made tradeoffs between the advantages and disadvantages of their movement outside the village. As Tunali (2000) mentioned, migration is seen as a selective, rather than random, process, and whilst migrants 'self select' in this way.

Participants from Pimpri stressed the importance of water availability to their farms and not just drinking water availability. At both the places, it was seen that their decision to move out of the village was closely related to the availability of livelihood options. As Scoones (1998) mentioned, adopt migration as one of the livelihood strategies.

During the watershed implementation period, in both the villages, temporary mobility, seasonal migration as well as commuting were reduced because work was available in the village itself. Hence the creation of working days helped people to find their livelihood (Scoones, 1998). Participants from both the places not only stressed the availability of work in their own village but they mentioned about employment that fetched them cash. Landless participants from Malegaon Pathar also mentioned about the distribution of wage that happened after every month or so, which was not fit for them to run their households. Sen (2003) has highlighted the two aspects of employment, which are income i.e. wage for the employed and production i.e. employment providing a consumable outcome.

Watershed development was expected to curtail people's movement due to availability of water for agriculture. However, movement was seen in both the villages. Temporary mobility that existed earlier continued in Pimpri. In Malegaon Pathar, commuting to nearby villages, where they could either get continuous employment throughout the year or they could earn more money in short duration, was observed. As mentioned by Lucas (1997) migration decisions are made by rational self-interested individuals looking for higher paid employment. Also decisions to move out of village in search of gainful employment were not made by individuals but family was involved. As mentioned by Waddington and Sabates-Wheeler (2003) migration decisions are not made by isolated individual actors but within larger units of interrelated people, typically families.

Watershed development in Malegaon Pathar did help people from Malegaon Pathar in terms of increasing water availability in the village. This helped them to cultivate onion crop which was financially beneficial for farmers. However, in Pimpri, watershed development did not result in enough benefits. Moreover, the soil and water conservation of watershed development did not result in creating other sustainable livelihood opportunities in villages. This gets reflected in continued movement of people in search of employment or higher wages. Hence, as we prepare for climate change adaption all watershed development projects should look at the variety of livelihood options that now open up because of the in flow of cash and enhanced land productivity.

Farm based, non-timber forest products, non-farm activities and even the service sector provide livelihood opportunities. Skills development of the rural youth for creating and beautifying their own living space will encourage local employment and will plug the cash leaks.

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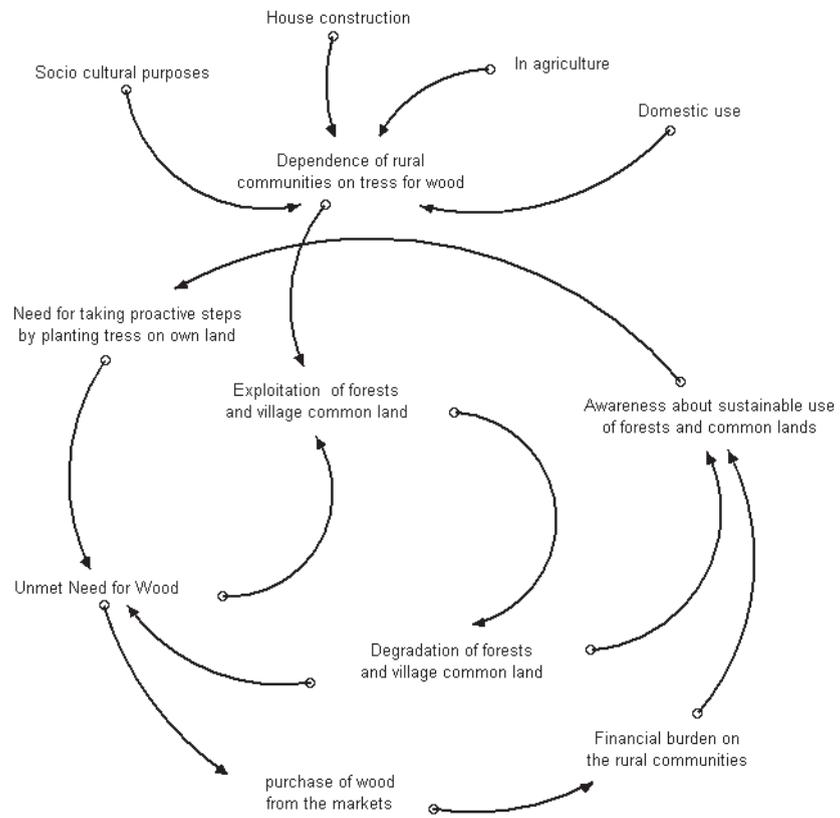
Last but not the least, I sincere thanks to all the respondents from Malegaon Pathar and Pimpri villages, who shared their experiences, spend time with us, and for their hospitality and support.

### References

1. (UNDP), (2009). *Human Development Report*. New York: Palgrave Macmillan.
2. (WOTR), (2009). *Feasibility Study Report*. Pune: Watershed Organization Trust.
3. Bartel, A.P. (1979). The Migration Decision: What Role Does Job Mobility Play? *American Economic Review*, 775-786.
4. Bharat R. Sharma, J.S. (2005). *Watershed Management Challenges: Improving productivity, Resources and Livelihoods*. International Water Management Institute.
5. De Haan A., B. Rugaly (2002). Introduction: Migrant workers and their role in rural change. *Journal of Development Studies*, 1-14.
6. Hiremath, B. (2007). The Changing Faces of Rural Livelihoods in India. *National Civil Society Conference*.
7. Hugh Waddington, R. Sabates-Wheeler. (2003). How Does Poverty Affects Migration Decison- A Review of Literature. Development Research Centre on Migration, Globalisation and Poverty.
8. Tunali, I. (2000). Rationality of Migration. *International Economic Review*, 893-920.
9. Konseiga, A. (2005). *Household Migration*

- Decisions as a Survival Strategy: The Case of Burkina Faso*. Institute for study of labor (IZA).
10. Lee, E. (1966). A Theory of Migration. *Demography*, 3 (1), 47-57.
  11. Martin Bell, G.W. (2000). Comparing Temporary Mobility with Permanent Migration. *Tourism Geographies*, 97-107.
  12. Lucas R.E. (1997). *Handbook of Population and Family Economics*. Elsevier Science Publishing.
  13. Ratna, R.V. (2004). Participatory Watershed Development in India: Can it sustain rural livelihoods. *Development and Change*, 297-326.
  14. Scoones, I. (1998). Sustainable Rural Livelihood: A Framework for Analysis. *Institute of Development Studies Working Paper (72)*. Brighton: IDS, University of Sussex.
  15. Sen, B. (2003). Drivers of Escape and Descent: CHanging Household Fortunes in Rural Bangladesh. *World Development*, 513-534.
  16. Todaro, M. (1970). A Model of Labor Migration and Urban Unemployment in Less Developed Countries. *African Economic Review*, 138-148.
  17. United, N. (n.d.). *UN Demographic Multilingual Dictionary*. Retrieved August 27, 2010, from Demopaedia: [http://en-ii.demopaedia.org/wiki/Seasonal\\_move](http://en-ii.demopaedia.org/wiki/Seasonal_move)
  18. Waddington, C. (2003). Livelihood Outcomes of Migration of Poor Peopl. Development Research Centre on Migration, Globalisation and Poverty.







# Protect Trees: Understand the Villager's Need for Wood

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## Abstract

Forests play a significant role in the life of rural communities. Wood, having versatile uses, is one of the major products derived from forests. However, unchecked exploitation of wood has created its shortage. As a result, communities procure it from the market, thus adding to their financial burden. In this context, the present study tries to identify the various purposes for which wood is used in Wankute and Kohane villages of Ahmednagar district and the approximate quantification of wood for these purposes. The study is qualitative in nature and data were collected using in-depth interviews, key informant interviews and group discussions. The samples have been selected using a combination of purposive sampling and simple random sampling. The data revealed that the various purposes for using wood in the village could be classified in four categories, namely, for domestic use, in agriculture, for house construction and socio-cultural purposes. However, the prime use is for domestic purpose. There is a realisation among the community that they need to take proactive measures to ensure sustainable supply of wood for future generations. The study findings could be primarily used for identifying trees, suitable for plantation during afforestation activities and for finding suitable non-renewable sources for the communities.

The relevance of the study in the context of climate change is that trees are carbon sinks. Watershed development and aforestations promotes carbon sinks and contirbutes to mitigation. But the carbon sinks will be conserved only if the wood needs of the local community are met.

## Preamble

Forests play an integral role in the maintaining the health of the ecosystem and also have cultural significance for many rural communities. They are repositories of genetic diversity, and supply a wide range of ecosystem services thus helping maintain ecological balance (Prime Minister's Council of Climate Change).

International Food Policy Institute (IFPRI) defines ecosystem services as the services that an ecosystem provides to humans. These can be broken down by their function and include: the provision of food, water, timber, fiber and other resources; the regulation of floods, disease, wastes, and water

quality; the support of cultural practices, including recreation, religion, and art; and the maintenance of biological processes through such phenomena as soil formation, photosynthesis, nutrient cycling, and so on ([www.ifpri.org](http://www.ifpri.org)).

India has more than 70 million hectares area under forest cover. It is one of the 17 megadiverse countries with 4 global biodiversity hotspots. It has 7% of the world biodiversity and supports 16 major forest types (Ministry of Environment and Forest, 2010). Forests meet nearly 40% of the energy needs of the country overall and over 80% of those in rural areas, and are the backbone of forest-based communities in terms of livelihood and sustenance (Prime Minister's Council of Climate Change).



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However, globally, as well as in India, forests are facing problems of degradation and deforestation. Climate change, one of the most severe challenges confronting us today, is intimately intertwined with the forests. This is because forests have regulated the climate, rain, ground water and soil of the earth over millennia ([www. base.d-p-h.info](http://www.base.d-p-h.info)).

The world's forests and forest soils currently store more than one trillion tons of carbon in the form of biomass and soil carbon – twice the amount found floating free in the atmosphere ([www. base.d-p-h.info](http://www.base.d-p-h.info)). They constitute one of the most effective carbon-sinks (Prime Minister's Council of Climate Change). However The Energy and Resource Institute (TERI, 2009) states that presently, deforestation is the single largest source with 17% of the global green house gas emissions responsible for the climate change. It further states that in India, there is a substantial gap in the demand and supply of major forest products. This leads to the vicious circle where unsustainable exploitation of forests contributes to their degradation, which, in turn, reduces the supply of products and services. For fuelwood there is a gap of 110MT (million tons) between the demand and sustainable supply whereas in the case of fodder (green and dry), this gap is of 853 MT.

Based on future climate projections, it is estimated that under two different scenarios (A2 and B2), 77% and 68% of the forest areas in the country are likely to experience shift in the forest types, by the end of the century. This will result in changes in forest produce, and in turn, livelihoods based on those products. The associated biodiversity is also likely to be adversely impacted (Prime Minister's Council of Climate Change). (Annual mean surface temperature rise by the end of century, ranging from 3 to 5° C under A2 scenario and 2.5 to 4° C under B2 scenario of IPCC).

Government of India's National Action Plan for Climate Change (NAPCC) is an ambitious attempt to simultaneously promote our development objectives and yield co-benefits of addressing climate change objectives of adaptation and mitigation effectively. NAPCC tries to act on several fronts in a focused manner simultaneously. National Mission for a 'Green India', one of the eight missions of NAPCC, targets at having 33% of the geographical cover under forest and tress cover. This will be taken up on degraded land through direct action by communities (Prime Minister's Council of Climate Change).

In the above context, the present formative research study tries to estimate the household wood consumption for various purposes in two villages of Sangamer taluka, Ahmednagar district.

The scale of present study is relatively small with data collected from two villages. However, data collected by further amplifying the study in more number of villages, can feed into some of the broader issues addressed in the NAPCC and also in effective planning of some components of watershed development afforestation.

## Introduction

Significance of wood throughout the history of human civilization is undisputable and it still continues to be so. Humans have been using wood for meeting the requirements of daily life; as a source of energy, for making tools, for constructing houses and so on even today. In the present context, wood plays a significant role in day to day activities of the village communities.

Globally as well as in India, the chief use of wood is for fuel ([www.earthtrends.wri.org](http://www.earthtrends.wri.org) and Indian Institute for Forest Management). Latest figures from National Family Health Survey indicate that 75.6% households in rural Maharashtra use wood for cooking (IIPS, 2008). Traditionally forests have been the chief source of wood for rural communities. There has been dependence on forests for collection of fuelwood, logging, non-timber forest products, grazing, fodder etc. (Bhat *et al.*, 2001). This dependence over a period of time has resulted in forests getting disturbed significantly and degraded (Bhat *et al.*, 2001 and [www. planningcommission. gov.in](http://www.planningcommission.gov.in)). The shrinking natural resource base, rapidly increasing human and livestock population, and poverty are all responsible for the tremendous degradation and pressure on exiting forest resources (Forest Survey of India, 2009 and Indian Institute for Forest Management). This pressure can be judged by the fact that India has only 2% of the world forest area but is faced with the demands of 16% of world's human population (The Energy and Resource Institute, 2009). This report further states that unsustainable exploitation of forest resources has resulted in its degradation estimated at 40% for the decades of 1987-2007.

There is now a shortage of wood available from forest for various purposes due the degradation of forests. As a result, rural communities in India have shifted to collecting fuel wood from village common land, personal land and from trees outside forest planted during social forestry and afforestation programmes. (Klaas van't Veld *et al.*, 2006 and Pande, 2002). This could be an alarming situation. Pande (2002) mentions that forests in the vicinity of the villages continue to degrade due to excessive removal of fuelwood for trade in urban markets in addition to self-consumption, and grazing.

Keeping this background in mind, the present study attempted at estimating the domestic wood consumption of wood in Wankute and Kohane villages of Ahmednagar district, Maharashtra. The specific objectives of the study were to identify the various purposes for which wood was used in these villages and the approximate quantification for these uses.

The findings of the study will have programmatic implications in terms of the type of tree species and the number of trees to be planted during the afforestation activity and in introduction of alternate sources of energy. It also has research implications where studies could be conducted to estimate the emission of green house gases based on wood consumption, impact evaluation studies after introducing alternate energy sources, change in tree cover, change in emissions, etc. Finally, the study may also have policy implications related to the National Missions committed by the government of India under the National Action Plan for Climate Change.

## Methodology

The study was conducted between June to October 2010 in Wankute and Kohane villages of Sangamner and Akole taluka respectively of Ahmednagar district. Watershed development has been carried out in both of these villages.

The total geographical area of Wankute village is 1486.63 hectare (ha) out of which 488.69 ha is forest area. There are 280 households in Wankute village. The total area of Kohane village is 492.13 ha. out of which 98.73 ha is forest area. There are 157 households in the village.

The study was qualitative in nature and data were collected through In-Depth Interviews (IDI), Key Informant Interviews (KII) and group discussions, Semi structured interview guides were used. In all, eight IDIs, one group discussion and two KIIs were conducted in each village.

Issues discussed in IDI included fuel wood consumption and wood requirement for making furniture for household, wood consumption for agriculture use and agricultural equipments. Wood consumption at community level such as for cultural and religious functions were discussed during group discussions. Since household members found it difficult to quantify the wood consumption for domestic use like house construction, domestic furniture etc., this information was collected from carpenters and timber mart owners during the KII. The sample was selected using purposive sampling method. Purposive sampling has been defined as a

method in which the individual units are selected by some purposive method (stats.oecd.org). For IDIs, a combination of purposive and simple random sampling (lottery method) was used for selecting the respondents.

In Wankute village, available information revealed that one third of the households cultivated tomato as the principal crop which required lot of wood for supporting tomato creepers/plants. Hence it was decided to select the sample from this group. An exhaustive list of these households was prepared which formed the sampling frame. From these households, eight households were then selected using lottery method. Kohane village comprises of homogeneous community with all the households belonging to Schedule Tribe (Mahadev Koli and Thakar). A total of eight households were selected using simple random sampling method. All the households in the village were classified in four economic categories<sup>1</sup> by the villagers themselves as per WOTR WASUNDHARA guidelines. Two households each were selected from these four categories.

In both villages, there were eight participants in the group discussion. In Wankute, the discussion was held at the village *chawdi* (a common place for villagers to come together and chat) whereas in Kohane, it was held in the Gram Panchayat office. The discussions lasted for one hour in both villages. The participants were informed about the purpose of study and timings of the discussions. Oral consent was taken from all the respondents of IDIs, group discussions and KIIs. They had the choice of withdrawing their participation at any point they wanted to. All the interviews and discussions were voice recorded with the prior permission of the participants and they were facilitated by researcher having strong understanding of the ground situation. All the data were transcribed in local language and then translated into English for analysis. The data were thematically analysed.

## Findings

The present study provided the data about wood consumption in Wankute and Kohane villages. The findings of this study cannot be generalized outside the study context. However, these findings are

1 The economic categories are based on wealth ranking tool developed by WOTR under WASUNDHARA approach wherein the villagers categories the households in four segments – Very poor, poor, medium, and well off. This activity is carried out in the *gram sabha*. The purpose of this classification is to have judicious distribution of the benefits of WSD programme to whole community.

important as they give a glimpse of the challenges that all the watershed programs should address for meeting the wood availability of the community and at the same time ensuring the sustainability of green cover of the village. Data elicited from both the villages revealed that wood is used primarily for four main purposes. These have been described below.

### Energy source for cooking and heating water

In both the villages, the data regarding fuel wood use for domestic purposes were collected from women members of the household. IDI with women respondents in both villages revealed that tree species used as fuel for cooking and heating water were *Neem*, *Babhul*, *Subabhul*, *Umber* and bushes like *Jali* and *Gandhari (tantani)*. One of the respondent during the IDI in Kohane village mentioned “*Bhariv lakud sahasa bhetat nahi, fandya ani kandya bhetatat*” (They get twigs of trees and bushes easily as compared to big branches to be used as fuelwood). Women reported variations in fuel wood use in different seasons. On an average per day, 11-15 kg of wood was used during monsoon and winter season and up to 10 kg during summer months. However, during festival period, women reported increase in wood consumption by about 3-5 kg on account of visitors and increase in quantity of food prepared. Thus during monsoon and winter seasons, on an average, one ton of wood is used as fuel. During the summer season this quantity is half ton of wood.

In both villages, women during IDI reported collecting fuel wood in summer months as surplus stock for the forthcoming monsoon period. On an average, about one ton of wood was stored for monsoon period per household. The frequency for collecting fuel wood was reported to be twice or thrice a week. If this stock was insufficient then they had to buy wood from market for about ₹3/kg.

When asked about the actions they would take to ensure sustainable wood availability in future, women and male members of the household expressed their willingness to plant tree species such as *Subabhul*, *Shewri*, *Jambhul*, *Chich*, *Gulmohor* and *Neem* on their farm bunds and uncultivable lands. The respondents in Wankute village were in favour of planting trees on farms bunds rather than on uncultivable land. However, they were also aware that trees planted on farm bunds blocked the sunshine which reduced crop production.

According to women in Wankute village, they had to travel about 2 km per day for fuel wood collection whereas this distance for women in

Kohane village was 3 to 5 km.

### For agriculture

Information on wood used for farming and making agriculture tools was collected through IDIs and KIIs. During IDI, male respondents in Wankute village revealed that tomato crop required the most amount of wood throughout its cropping duration. One third of the farmers in Wankute cultivate tomato. Wood required was in two forms namely *Daam*<sup>2</sup> and *Sticks*<sup>3</sup>. Wood from *Neem Babhul*, *Subabhul* and *Bamboo* trees was used as *Daam* whereas *Karvi* was used as *Sticks*. Wood of *Neem Babhul*, *Subabhul* trees was obtained from own farms whereas *Bamboo* was purchased from market. The market rate for *Daam* was about ₹15-20/piece and ₹5-7/piece for *sticks*.

The tomato plants need a supportive structure during its life cycle. Many parallel trenches are dug up in the field, in which tomato plants are grown. Since tomato plants grow like creepers, they require support for growing. For this purpose, a structure made up of wood, wire and ropes is required. While planting tomato in the trenches, a distance of two feet is kept between two plants. Two main poles at the ends of each trench are fixed, referred to as *Daam*. A piece of wire joins the two *Daam* and it is about five feet above ground. Each tomato plant is tied to this wire with the help of a rope. As the tomato plants grow, the wire to which they are tied are unable to hold on their weight. Hence, to support the wire, wooden sticks are used. There are many such sticks used on a single trench.

The respondents further reported that they required 125-150 *Daam* and 800-1000 *Sticks* for one acre of land. Usually the *Daam* was 6 feet in length and 6 inches in thickness. *Stick* was about 6 feet in length and 2 inches in thickness. The life of *Daam* and *Sticks* was reported to be about two to three years. About 25%-40% of *Daam* and *Sticks* were replaced each year because of insect infestation.

In village Wankute, where one third of the households (83) cultivate tomato crop, villagers have to spend money ranging between ₹11,00,000-₹15,00,000 per acre over a period of five years for purchasing wood.

In Kohane, all the households cultivated paddy using traditional farming methods. As a part of

- 2 *Daam* refers to the thick wood used as supporting poles at two ends of the trench. There are many such trenches in a single farm.
- 3 *Sticks* refer to the wood sticks that act as support for the wire connecting the two *Daam*.

field preparation for seed sowing, tiny branches and residues of trees and bushes were burnt. Respondents reported using tiny branches of two trees for preparing half acre of land in this way.

During IDI in Wankute village, it was mentioned that agricultural tools like *Nangar*, *Pabhar*, *Kulav*, *Farat*, *Joo* and *Kolpe* were made using wood. To make these tools, wood from trees like *Babhul*, *Neem* and *Bor* were used. While in Kohane, these tools were prepared from wood of *Sadada*, *Bhuskut*, *Hirad*, *Baya*, *Saag*, *Ashind*, *Waras*, *Bel* and *Babhul* trees.

The KII conducted in both the villages revealed that the wood required for making these tools differed as per the individual tool requirement. It varied from 6 to 8 feet in length and 3 to 9 inches in thickness. The market cost of the wood required for making one tool ranged between ₹200-600. However, the respondents drew attention to the fact that wood availability from forest was restricted and the quantity available from the farmer's field was insufficient. Hence farmers had to depend on the market for purchasing the wood.

In Wankute, there was a general opinion among participants of group discussion that the present wood availability as compared to ten years ago was insufficient. As a result, farmers had resorted to using metal tools for farming. According to them "*Lokhandi awjare lakdi awjara sarkhe super nastat. Lakdashivay awjare changli hot nahi*" (iron tools were not efficient and effective for farming as compared to wooden tools). At the same time, wooden tools required regular maintenance thus increasing wood usage. Comparatively, iron tools last longer. In Kohane, farmers preferred using wooden tools as compared to the iron tools.

### House construction

During the IDI in Wankute, respondents informed that usually the village houses had two rooms of sizes varying between 300 to 800 square feet (sq. ft.). During the IDIs in Kohane, it was reported that the village houses generally had one big room with a partition whereas few houses had two rooms. The house size varied between 300 to 500 sq.ft. In Wankute, *Neem Suru Bakan*, *Sadada Aaina*, *Badad* and *Babhul* were used for house construction. In Kohane *Jambhal*, *Hirad*, *Mango*, *Karap*, *Saag*, *Bhuskut*, *Bamboo* and *Bhendi* were mainly used for construction of house as reported in IDI.

In both the villages it was reported that the respondent's houses were constructed many years back and they had used wood from their own field or from the forests at that time. It was reported that the houses constructed recently were built

using wood from old houses and some quantity as purchased from market if needed. During Group Discussion in Kohane village participants told "*Lakud nahi mhanun steel vaparto, lakud milatch nahi*" (They do not get wood as a result of which they have to use steel).

The carpenter in Wankute during KII informed that for constructing a house of 375 sq.ft., the wood required was 100 sq.ft. He also added that the repair of houses depends on the type of wood used for construction. He further explained that *Saag* wood lasts up to hundred years whereas houses constructed with other type of wood required maintenance after about 10-15 years. The timber merchant reported the cost of teak wood to be ranging from ₹900 to 1500/sq.ft. The cost of other wood was ₹350/sq.ft.

### Socio-cultural purposes

In both the villages, data from the group discussions revealed that the ceremonies and festivals that require wood in large quantity were *Holi*, marriage, cremation and *dashkriya*. *Holi* required 200-500 kg of wood for burning, however, this quantity varied every year as per wood availability. For cremation, 400 to 450 kg of wood was required. For *dashkriya* function (held ten days after cremation) wood was again required for preparing food for the villagers and guests from other villages. In both villages *samudayik vivah* (community marriages) take place which again required large quantity of wood. For one such function, about one ton of wood was required. In village Kohane, it was mentioned that purchasing wood for cremation was not affordable and hence each household of the village contributed wood in small quantity for this purpose. For cremation purpose in Kohane village, wood from *Sadala*, *Hirad*, *Sayar*, *Ashind*, *Alive*, *Bondara*, *Bhuskut*, *Payar* and *Tambat* were used. In Wankute, villagers preferred purchasing wood for cremation from market.

### Religious beliefs associated with trees

During IDIs in both villages respondents revealed that some tree species were not chopped for any purpose because of the religious beliefs associated with them. These trees were *Wad*, *Pimpal*, *Kawath*, *Umber*, *Bel*, *Apta* and *Maharukh*. However, some parts of these trees like their leaves and fruits were used while performing religious functions. Religious prohibitions regarding chopping of a particular tree species differed from one family to another within the same village. When asked about the reason for planning these species when there was no economic benefit from these trees, people opined that these trees provide shade, fruits, green

cover and aesthetic beauty to the village. During the IDIs in both villages, respondents told that they did not cut tree species such as *Neem* and *Saag* which were prohibited as per law.

In order to ensure sustainable wood availability, respondents were of the opinion that they will have to plant more trees because access to forest for wood was restricted. This plantation will have to be done on their uncultivable land and farm bunds. According to participants of Group Discussion at Kohane village "*lakdachi tanchai talnyasathi jungle jopasle pahije*" (They will have to conserve the remaining forests in order to avoid wood shortage). Whereas respondents of Group Discussion in Wankute village acknowledged the fact that "*zad todnyavar bandi aali mhanun zade distat nahi tar raan kale zale aste*" (ban on cutting trees has helped in preserving the trees. In its absence all the forests would have been devoid of trees).

However, it was also mentioned during IDI in both villages that for ensuring survival of some of the plantations like *Saag*, it was preferable that they be planted in the forest area where their protection was ensured.

## Discussion

The interactions with villagers from Wankute and Kohane revealed information about the various purposes for which wood was used in these villages and the approximate quantity required for some of these purposes.

Pandey (2002) in his review of fuel wood studies done in India in two decades of 1980-90 found that high reliability cannot be placed on data collection mostly based on questionnaires. This methodological issue in this study was addressed as it used qualitative methodology. However, the wood usage for various purposes has been reported in approximations.

An analysis of the wood usage between these two villages demands a conscientious analysis of the geographical and cultural milieu that differentiates them. Kohane village is predominantly tribal with 90% of the population belonging to Mahadev koli tribe whereas majority of the population in Wankute village belongs to the caste community Maratha (Detailed Project Report of Kohane and Wankute villages, 2010). Indian castes are generally characterised by their arrangement in certain hierarchical order, they generally have hereditary occupation and a certain traditional behaviour pattern. They are endogamous groups restricted to certain limited areas (Karve, 1961). Tribes, on the

other hand are generally characterised by closeness to natural resources, close attachment to ancestral territory, kinship as an instrument of social bond and lack of hierarchy among men and groups ([www.sociologyguide.com](http://www.sociologyguide.com) and [www.saching.com](http://www.saching.com)). This closeness to nature by the tribal community of Kohane is demonstrated by their preferred inclination towards using wooden implements as against the metallic implements for agricultural operations. Secondly, while responding to the challenge due to wood scarcity, the community from Kohane preferred doing the plantations in forest where they believe that there were greater chances of survival. However, Wankute village was in favour of planting in farm land and in forests. They have also resorted to using metallic implements as a result of wood scarcity. The strong kinship bond in Kohane is reflected in the wood contribution each household made for burning the pyre whereas households in Wankute purchased wood from market.

Interactions with members from these two villages revealed that the primary use of the wood as a bio fuel in both villages was for domestic purposes, mainly for preparing food and heating water. A report by Antonio Lacayo states that households are the biggest energy consuming sector in rural India and wood fuel and crop residues meet about 90% of this need (Lacayo, 2006). Most of this fuel wood in both villages was collected from common land and uncultivable land. Pande (2002) in his review of fuel wood studies found similarly that lot of fuel wood was produced from trees outside forests that were planted during social forestry and afforestation programme. However, this trend may be detrimental for the success of afforestation activity carried out under the watershed development programme implemented in both of these villages. Dangwar (2009) points out that sustainability measures taken during watershed development programme will be severely challenged unless cooking fuel requirements are adequately met.

In Wankute, about one thirds of the farmers cultivate tomato crop which needed lots of wood for staking. The stakes needed replacement 3-4 years thus increasing their usage further. Farmers either lopped trees for this purpose or purchased from market. Lopping trees for stakes affects tree growth and slows the rate of soil-conservation and water retention ([www.indiaenvironmentportal.org.in](http://www.indiaenvironmentportal.org.in)). The same report states that in tomato growing areas of Ahmednagar district, *karvi* trees take the brunt of the demand for stakes. Use of wood from *karvi* tree as sticks has also been reported by the respondents from Wankute.

The availability of wood for construction of households was also becoming scarce as in the

case of availability for fuel wood and making farm implements. As a result the community had to resort to purchasing from the market. A study by Lalisa Duguma et al related to wood consumption for house construction in central highland Ethiopia found that there was a 60% shortage of wood as against the demand (Lalisa, 2010). To overcome this shortage, the study suggested four options namely use of abandoned lands for tree growing, promotion of agroforestry technologies on private lands and degraded lands, establishment of community silvopasture and shift to the use of alternative local materials.

Overall, it is evident that in both villages, for practically all purposes there was wood scarcity and so the villagers had no option other than purchasing wood from the market. This had led to an increase in financial burden of the households. Villagers felt that the current market rates gave an indication of future rates which will not be affordable for them. Villagers had realised that wood was a not an infinite resource and they have to actively take steps to ensure its sustainable supply. According to them, now there is a need of planting trees on their farm bunds and private uncultivable lands.

## Conclusion

Past experiences in India have shown that Joint Forest Management (JFM) programme has been effective in providing fuel wood and wood for other purposes. Agro forestry practices also could be an effective solution in this regard ([www.manage.gov.in](http://www.manage.gov.in) & [www.ias.in](http://www.ias.in)). Use of renewable energy sources such as solar cooking devices, smokeless chullah, hot water chullah and bio gas could lessen the demand of wood for domestic purposes. Moreover, these alternate energy sources and stoves reduce carbon emissions and contribute to climate change mitigations. Conserving the carbon sinks (the trees) by a proper planning of saplings should be planted during watershed development (according to the wood needs of the community) will maintain the carbon sinks and will also bring in cash returns through savings. Most importantly, effective community involvement needs to be ensured and their socio cultural values need to be given due appreciation.

## Annexure

**Table 1:** List of trees with name in Marathi language and their English equivalent names and scientific names:

| Sr.No. | Marathi Name     | Common English Name            | Scientific Name                |
|--------|------------------|--------------------------------|--------------------------------|
| 1      | Kadunimb         | Neem                           | <i>Azadirachata indica</i>     |
| 2      | Nili gulmohar    | Jacaranda                      | <i>Jacaranda mimosaeifolia</i> |
| 3      | Gulmohar         | Royal poinciana/Peacock Flower | <i>Delonix regia</i> Rafin     |
| 4      | Babhul           | Black catechu                  | <i>Acacia arabica</i>          |
| 5      | Bel leaves fruit | golden apple/stone apple       | <i>Aegle marmelos</i> Correa   |
| 6      | Umber            | Ficus glomerata                | <i>Butea monosperma</i> Kuntze |
| 7      | Pimpal           | Pipal                          | <i>Ficus religiosa</i> Linn.   |
| 8      | Shevari          | Red Silk Cotton                | <i>Bombax Malabaricum</i>      |
| 9      | Sag              | Teak                           | <i>Tectona grandis</i> Linn.   |
| 10     | Gandhari         | Lantana                        | <i>Lantana camara</i>          |
| 11     | Vad              | Banyan                         | <i>Ficus benghalensis</i>      |
| 12     | Subabhul         | Lead Tree                      | <i>Leucaena leucocephala</i>   |
| 13     | Bamboo           | Bamboo                         | <i>Bambusa dendrocalmus</i>    |
| 14     | Jambhul          | Jambhul tree                   | <i>Syzigium cumini</i>         |

**Table 2:** List of fruit trees with name in Marathi language and their English equivalent names and scientific names:

| Sr.No. | Marathi Name | Common English Name | Scientific Name                |
|--------|--------------|---------------------|--------------------------------|
| 1      | Amba         | Mango Tree          | <i>Mangifera indica</i>        |
| 2      | Chinch       | Tamarind tree       | <i>Tamarindus indica</i>       |
| 3      | Bor          | Jujube              | <i>Zizyphus jujube</i>         |
| 4      | Avala        | Indian Gooseberry   | <i>Emblica officinalis</i>     |
| 5      | Sitaphal     | Custard Apple       | <i>Annona squamosa</i>         |
| 6      | Kavatha      | Wood Apple          | <i>Feronia limonia</i> Swingle |
| 7      | Jambhul      | Jambhul tree        | <i>Syzigium cumini</i>         |

**Table 3:** List of agriculture tools with name in Marathi language and their English equivalent names:

| Sr.No. | Marathi Name | Common English Name |
|--------|--------------|---------------------|
| 1      | Nangar       | Plough              |
| 2      | Pabhar       | Seed drill          |
| 3      | Kulav        | Harrow              |
| 4      | Farat        | Harrow              |
| 5      | Joo          | Yoke                |
| 6      | Kolpe        | Slit hoe            |

### Acknowledgements

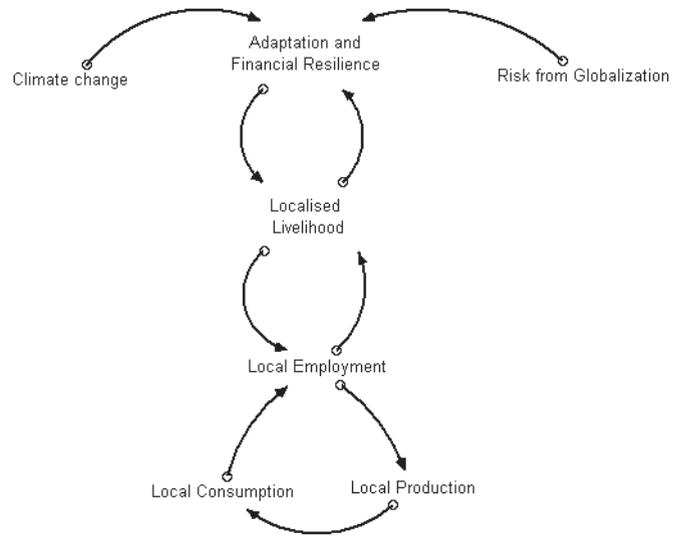
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### References

- Pandey, D. 2002. "Fuelwood studies in India: Myth and Reality". Available at [www.cifor.cgiar.org](http://www.cifor.cgiar.org). Accessed on 9 November 2010.
- Detailed Project Report of Kohane Village. 2010. Watershed Organisation Trust. Pune.
- Detailed Project Report of Wankute Village. 2010. Watershed Organisation Trust. Pune.
- <http://www.sociologyguide.com/tribal-society/characteristics.php>. Accessed on 24 November 2010.
- <http://www.saching.com/Articles/Tribal-Population-in-India-Important-Characteristics-of-Indian-Tribes-1130.html>. Accessed on 24 November 2010.
- Karve, I. 1991 (reprint). *Hindu Society: An Interpretation*. Deccan College. Pune.
- Lacayo, A. 2006. Off-grid Energy in Rural India: Policy Recommendations for Effective UN Projects. Available at [www.princeton.edu/~mauzeral/wws402d\\_s06/Lacayo.pdf](http://www.princeton.edu/~mauzeral/wws402d_s06/Lacayo.pdf). Accessed on 17 November 2010.
- Dangwar, S., Agarwal, S. 2009. "Addressing Household Energy Needs the Clean Fuel Way: A Case Study of Narlewadi". Watershed Organisation Trust. Pune.
- <http://www.indiaenvironmentportal.org.in/node/12204>. Accessed on 18 November 2010.
- Duguma, L., Hager, H. 2010. "Consumption and species preference for house construction wood in central highlands of Ethiopia – implications for enhancing tree growing". Available on <http://www.springerlink.com/content/8513632211860753/>. Accessed on 18 November 2010.
- [www.manage.gov.in/managelib/extdig/Untitled-1.pdf](http://www.manage.gov.in/managelib/extdig/Untitled-1.pdf). Accessed on 19 November 2010.
- [www.ias.ac.in/currsci/feb252007/455.pdf](http://www.ias.ac.in/currsci/feb252007/455.pdf). Accessed on 26 November 2010
- [http://earthtrends.wri.org/features/view\\_feature.php?theme=9&fid=3](http://earthtrends.wri.org/features/view_feature.php?theme=9&fid=3). Accessed on 10 December 2010
- International Institute for Population Sciences (IIPS) and Macro International. 2008. *National Family Health Survey (NFHS-3), India, 2005-06: Maharashtra*. Mumbai: IIPS.
- Indian Institute of Forest Management, National Forest Policy Review. Available at <http://www.docstoc.com/docs/31147037/NATIONAL-FOREST-POLICY-REVIEW-INDIA>. Accessed on 13 December 2010.
- Bhat, D. M et.al, 200. Formation and recovery of secondary forests in India: A particular reference to Western Ghats in South India. *Journal of Tropical Science*. Available at [www.cifor.cgiar.org](http://www.cifor.cgiar.org). Accessed on 13 December 2010
- [http://planningcommission.gov.in/reports/articles/ncsxn/ar\\_forestry1.htm](http://planningcommission.gov.in/reports/articles/ncsxn/ar_forestry1.htm)
- Forest Survey of India. 2009. State of Forest Report: India. Available at [http://www.fsi.nic.in/sfr\\_2009.htm](http://www.fsi.nic.in/sfr_2009.htm). Accessed on 13 December 2010.
- The Energy and Resource Institute. 2009. Is India ready to implement REDD Plus: A preliminary assessment. Available at [www.teriin.org/events/CoP15/Forests.pdf](http://www.teriin.org/events/CoP15/Forests.pdf). Accessed on 13 December 2010.
- Klaas van't Veld et. al. 2006. India's firewood crisis re-examined. Available at <http://ideas.repec.org/p/rff/dpaper/dp-06-25.html>. Accessed on 17 November 2010.
- Prime Minister's Council of Climate Change, Government of India, 'National Action Plan on Climate Change'. Available at [http://pmindia.nic.in/climate\\_change.htm](http://pmindia.nic.in/climate_change.htm). Accessed on 16 December 2010.
- Ministry of Environment and Forests, Government of India, India's Forest and REDD+. Available at [moef.nic.in/downloads/public-information/REDD-report.pdf](http://moef.nic.in/downloads/public-information/REDD-report.pdf). Accessed on 16 December 2010.
- <http://base.d-p-h.info/en/fiches/dph/fiche-dph-8613.html>

- 
24. The Energy and Resource Institute. 2009. Is India ready to implement REDD Plus: A preliminary assessment. Available at [www.teriin.org/events/CoP15/Forests.pdf](http://www.teriin.org/events/CoP15/Forests.pdf). Accessed on 13 December 2010.
  25. <http://www.ifpri.org/book-775/ourwork/researcharea/climate-change/terms-definitions>. Accessed on 23 December 2010.







# Estimating Local Money Multiplier of Rural Enterprises of a tribal village in Akole, Ahmednagar District

Mihir Mathur

## Abstract

This study estimates the local money multiplier<sup>1</sup> of rural enterprises, in order to build local financial resilience<sup>2</sup> through livelihoods, in the context of climate change adaptation and risks of globalization<sup>3</sup>.

The study results are based on quantitative data analysis. The research was conducted using interview schedules, with all rural enterprises and active Self Help Groups (henceforth referred to as SHGs) in the villages. Local money multiplier scores were calculated for each enterprise using the data collected.

Local money flow for most of the enterprises is very low. It indicates poor financial resilience of local livelihoods and high economic vulnerability<sup>4</sup> in context of climate change and risks from globalization.

While expenditure data was collected with relative ease, the survey faced difficulty in eliciting the details of the income from respondents. Therefore, the survey tends to overestimate the score, albeit by an insignificant amount. Respondents found it difficult to recollect their entire income details due to their diverse occupations.

This study seeks to establish a methodology on how to estimate money flow of enterprises in Indian rural dynamics. It would be useful for designing livelihoods and for measuring economic/financial resilience.

The study aims to enhance the awareness of the local community on how money flow works and its possible impacts on their local economy. This could provoke behavioral changes within the community and lead to increased production and consumption of localized products and services. This paper could be relevant to development agencies, implementation agencies, communities and policy makers.

**Key Words:** *Climate Change, Adaptation, Rural Economics, Livelihood, Local Money Flow, Globalization.*

- 1 Local Money refers to the money circulating within the boundaries of micro watershed in which this village community is embedded. Multiplier herein refers to (Keynesian economic theory) a factor that quantifies the change in local money flow as compared to the injection of capital deposits or investments which originally fueled the growth
- 2 Financial Resilience refers to the ability of the community/household to withstand and recover from economic shocks without lowering their adaptive capacity
- 3 Risks from Globalisation is referred to as the degree of exposure and sensitivity towards availability and prices of non local goods and services
- 4 Economic Vulnerability refers to the community's sensitivity towards price fluctuations of goods and services along with poor financial resilience



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He has previously worked in retail banking, stock markets and commodity markets.

## Introduction

### *Climate Change:*

Earth's Climate has always been in a state of flux, and would continue to change. However, it is the rate of change that poses the challenge for human adaptation towards changing climate patterns. Recent variations in weather being witnessed, with respect to rising temperatures, droughts and irregular rainfall patterns are mainly attributable to anthropogenic activities. Globally eleven of the twelve years between 1995 and 2006 rank amongst the warmest on record, and since 1970, there has been an observed increase in severity, length and scope of dry periods and droughts. Moreover during the last century, the average surface temperature of the Earth has increased by approximately 0.71° C (IPCC 2007). The atmospheric CO<sub>2</sub> level has increased rapidly during Industrialization (1850-2009), from 280 parts per million in 1850 to 387.4 parts per million in 2009<sup>5</sup>. Green House Gas emissions attributable to human activities are one of the primary reasons for this increase in CO<sub>2</sub> levels. Climate Change will affect all five capitalise namely human capital, natural capital, social capital, physical capital and financial capital. Since all of these will be adversely affected by climate change, it calls for adaptation and mitigation strategies.

### *Climate Change and Globalization*

Climate Change will affect most geographical regions of the world. At the same time, some places would be impacted by the dual risk of Climate Change and Globalization. In order to increase their adaptive capacity<sup>6</sup> towards this "double exposure"<sup>7</sup>, there would be a need for indicators which will help assess the Economic vulnerability. Measuring local money flow of enterprises, businesses and activity centers would serve as an indicator to ascertain the strength of local economy. It would also help to estimate how much money flows out of the community and the impact of this outflow on local economy. Development, when seen from the business as usual lens, seeks to enhance the standard of living of people, in a particular community or geographical area. However this development appears to increase the exposure of village towards the vagaries of globalization. As development takes place, there is a rise in the

income levels of the community which leads to more spending and accumulation of assets. Though some spending is done locally i.e. within the village most of it flows out of the village. The money flowing out of the village does not provide any monetary benefit to the villagers; on the contrary it creates a financial leakage in the local economy. In order to plug these leaks and make the village more self sufficient, we first need to have some indicator which will reflect the health of the local economy. One way of doing this is by measuring the local money flow of the village. Money flow plays a vital role in wealth creation of a region. The strength of an economy depends on its money flow and how much is available within its boundary. Thus, it becomes imperative to measure local money flow at every level of economic activity. The greater the local money flow, the better the health of the local economy. If substantial amount of consumables are manufactured locally and services are provided within the village, it would help reduce the risks towards macroeconomic oscillations<sup>8</sup> and help counter the risks of inflationary cycles<sup>9</sup>. The study seeks to establish a methodology for estimating money flow of enterprises in rural dynamics in order to ascertain the strength of local economy and estimate financial leakages it would also make the local community aware of the potential impacts that local money flow can have on their local economy. The findings and recommendations should feed in to identifying and designing potential livelihood opportunities.

### **Theoretical Framework**

The study measures money flow for the first three rounds of monetary transactions. We have limited the scope of transactions to the first three rounds since they cover approx 85% of the total spending done. Also, since it follows an exponential decline, the amounts spent keeps on decreasing as the rounds progress, making the later transactions relatively less significant.

To understand better, let us take a case of two communities and track their money flow.

As seen in the example shown in the table, Case 1 has got 75% non local spending creating a big hole in the economy. On the other hand, Case II has got 25% of leakages which result into relatively higher money retention. Not just retention, but also higher transactions and therefore greater wealth creation.

5 <http://www.esrl.noaa.gov/gmd/ccgg/trends/index.html#global>, accessed on 22-10-2010

6 Adaptive Capacity herein refers to the potential or capability of a system to adapt to (to alter to better suit) climatic and economic stimuli or their effects or impacts (IPCC, Working Group II: Impacts, Adaptation and Vulnerability)

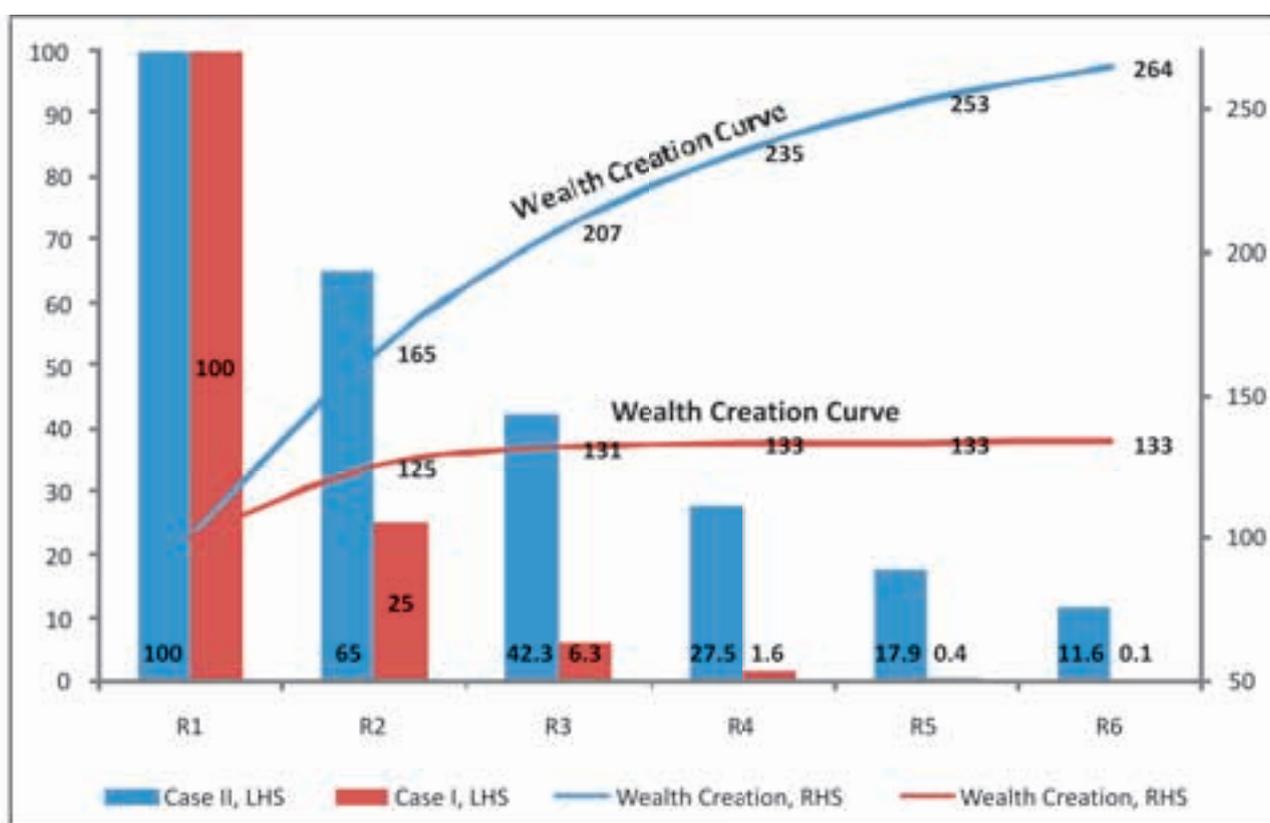
7 Exposed towards impacts of Climate Change and risks of Globalization

8 Boom Bust Cycles; Economic Growth and Contraction in a relatively short period of time

9 Rise and fall in prices of goods and services in a economy at certain time durations

**Table 1:** Example: Local Money Multiplier

| Rounds | All figures in Rs.         | Case I: 75% Leakages<br>Grow More |           | Case II: 25% Leakages<br>Save More |           |
|--------|----------------------------|-----------------------------------|-----------|------------------------------------|-----------|
|        |                            | Local                             | Non Local | Local                              | Non Local |
| R1     | Inflow (Income)            | 100                               | 0         | 100                                | 0         |
| R2     | Spending from Income       | 25                                | 75        | 75                                 | 25        |
| R3     | Spending from Local Income | 6.3                               | 18.8      | 56.3                               | 18.8      |
| R4     | Spending from Local Income | 1.6                               | 4.7       | 42.2                               | 14.1      |
| R5     | Spending from Local Income | 0.4                               | 1.2       | 31.6                               | 10.5      |
| R6     | Spending from Local Income | 0.1                               | 0.3       | 23.7                               | 7.9       |



**Figure 1:** Graph depicting the Local Money Flow and Cumulative Wealth Creation curve

**Case I: Grow More (75% non local spending)**

Measuring the money flow in the first three rounds shows us that an inflow of ₹100 is generating local value to the tune of ₹131.3 (100+25+6.3). Thus an inflow of ₹100 is creating wealth of ₹131, implying that every ₹1 flowing into Grow More would result into economic activity of ₹1.31.

**Case II: Save More (25% non local spending)**

In this case the initial 3 rounds show us that an inflow of ₹100 is generating local value to the tune of ₹231.3 (100+75+56.3). Thus an inflow of ₹100 is creating wealth of ₹231, implying that every ₹1 flowing into Save More would result into economic activity of ₹2.31.

## Process Flow

The study can be carried out in two ways. We can choose to start with the activity centers of the village and then go to the households or start with the households and then move to the activity centers. Let us understand the two methods with the help of an example and pictorial representation.

### Path A

#### Round 1

This round should seem to be the easiest of the all, since here the total income of a business/enterprise is estimated. This is a sum of local and non local income both.

#### Round 2

In this round, the local spending of the business/enterprise is estimated. Here, non local spending is not added since it does not contribute in the

local money supply but creates leakages. Collecting information of sources of spending is also equally important while gathering this data.

#### Round 3

In this round, we track how the locally spend money of the businesses is re-spent by their employees/suppliers locally and non-locally. Hence, it gives us the local and non local re-spending of the business/enterprise.

### Path B

#### Round 1

In this round, the total income of a household is estimated. This is a sum of local and non local income, both. One may face difficulty while trying to elicit income data from households. This could be because people are reluctant to disclose their income details, or because they find it difficult to recollect their income sources since they don't

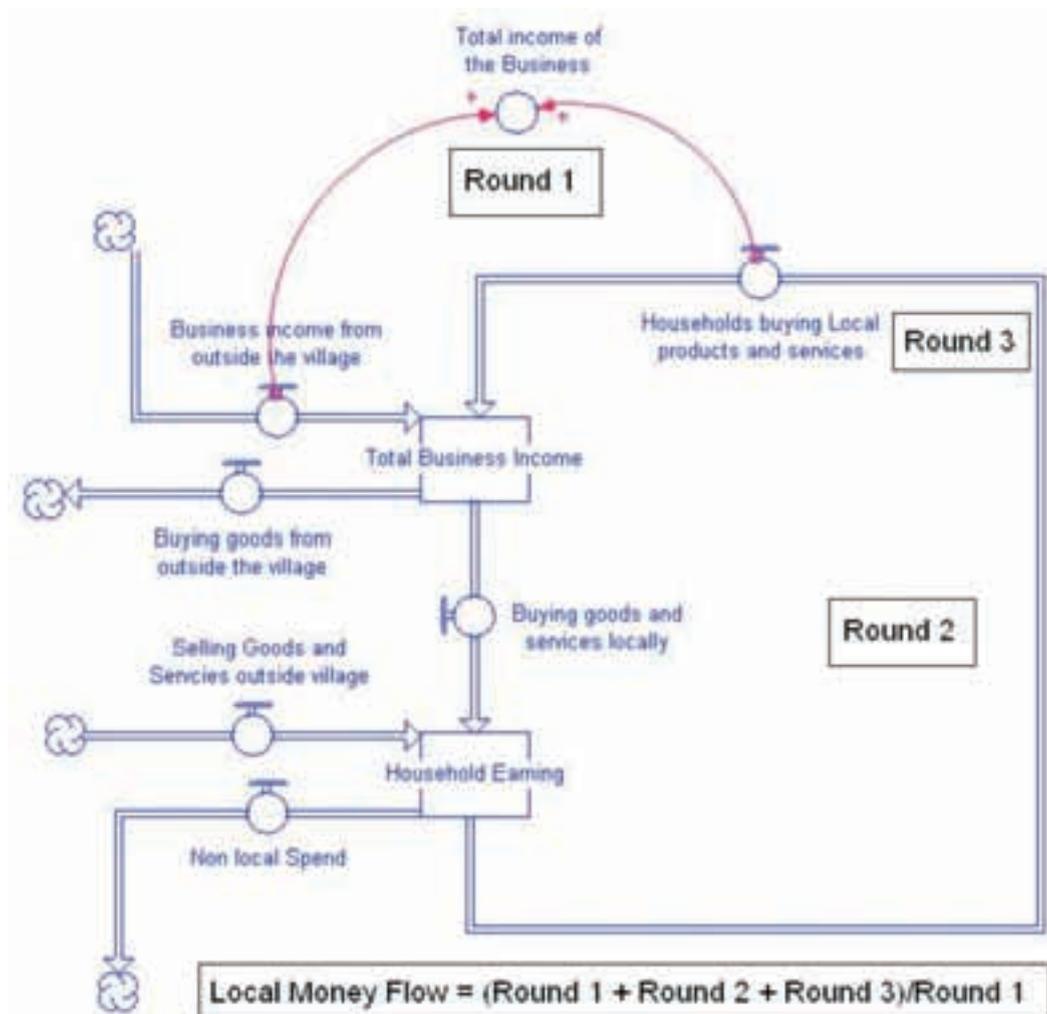


Figure 2: Path A Pictorial Representation of Process Flow.

maintain accounts like organizations. Whatever the case may be, try your best to elicit this information without offending your respondent.

**Round 2**

In this round, the total spending of the household is estimated. Both local and non local spending is collected along with the source where the money is being spent. It could be for buying goods or services. However, for calculating local money flow the non local spending is not taken into account.

**Round 3**

In this round, we track how the locally spent money by the households is re-spent by the business/enterprise locally and non-locally. Hence, it gives us the local and non local re-spending of the household.

**Research Methodology**

**Study Area**

The study area was within the geographical boundaries of Shiswad village located in Akole block of Ahmednagar district of Maharashtra. The village is spread across 621.88 ha, situated on latitude 19° 27' N and longitude 73° 49' E having a population of 761 consisting of 132 households.

**Sampling and Data Collection**

The study was designed keeping in mind that measuring local money flow of the shops/businesses/enterprises would be good enough to understand the strength of the local economy and their drivers. The village consisted of 5 shops out

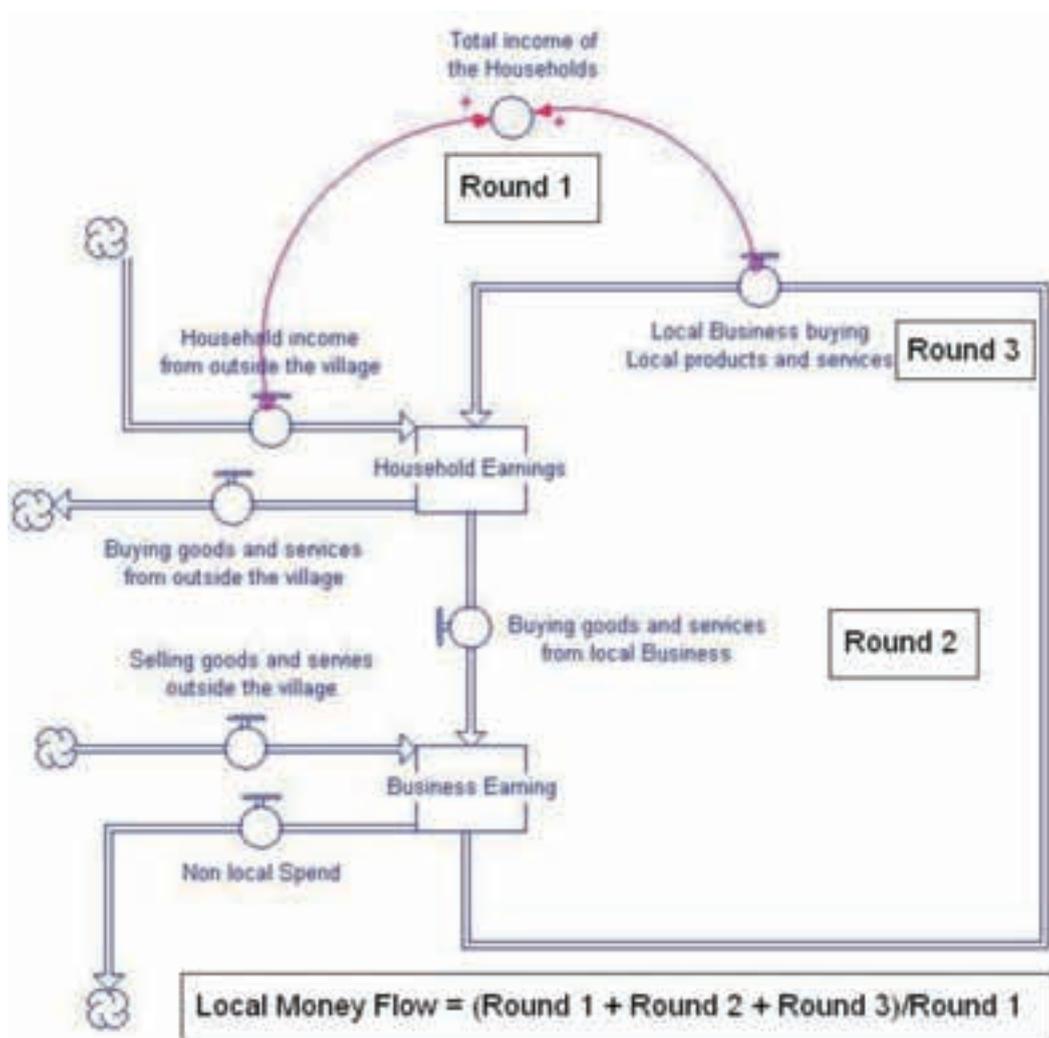


Figure 3: Path B Pictorial Representation of Process Flow.

of which 4 were interviewed, 5 business enterprises all of which were interviewed, and 4 Self Help Groups (SHGs) out of which 2 were active and were interviewed. We started by first interviewing shops/businesses/enterprises and SHGs. There were some shops whose business were seasonal and are open for 6 months in a year. Some shops had just started and were having low turnovers, while some were able to generate good business income. In order to calculate the Round 3 scores, we interviewed 14 households who were employed by the local business. At places where the actual employees were not available, we substituted them with representative samples (laborers etc.) All the income and spending were categorized in their respective local and non local categories. Local being money spent within the community within the watershed boundaries of the village and non local being money spent outside the community outside the watershed boundaries of the village.

Agriculture was also seen as a main source of occupation/business. But, it was found that the village had more of subsistence farming, i.e. the agriculture produce was only good enough for the farmers own family and seldom used to yield any income. Thus, agriculture did not strongly qualify as a business/enterprise while conducting the research.

The data collection was carried out using interview schedules with the sample selected. Majority of the interviews lasted for more than an hour and were conducted by more than one interviewer. Data was

collected using interview schedules and where eliciting information was difficult certain probing was also done. Since, we had a substantially large team of interviewers, business and household interviews were done simultaneously by different teams.

### Data Representation, Analysis and Findings

The case given in Table 2 is of a Shop owner who derives majority of his income from selling grocery at his shop. Additionally agriculture contributes 15-18% of his total income via sale of agriculture produce.

#### Round 1

The yearly income comes close to ₹1,22,220 with majority of non local income coming from sale of agriculture produce. While interviewing the shop owner, the income details were taken on a weekly basis which was then extrapolated<sup>11</sup> to annual income. The respondent gave a weekly average income data of ₹1800-2000. This figure was divided into ₹560 non local income and the remaining as local income, as per the information collected from the respondent. Agriculture produce yielded an annual income of ₹18,100.

#### Round 2

The spending shown above is with respect to agriculture and shop expenditure. The local spending of ₹3,520 is a summation of ₹3000 being spent on **Labor** used for agriculture and ₹520 spent

**Table 2:** Sample Case Study: Local Grocery Shop

| Household/Enterprise Name   | Interviewee             | Occupation           | Landholding | Family Size: |
|---|-------------------------|----------------------|-------------|--------------|
| Dhondibha Mahaji Kondar <sup>10</sup>                             | Dhondibha Mahaji Kondar | Shop and Agriculture | 2.8 Ha      | 9 Members    |
| <b>R1 - Income Details</b>  |                         | <b>Yearly</b>        |             |              |
| Local income  |                         | 75,000               |             |              |
| Non Local   |                         | 47,220               |             |              |
| <b>Gross Total Income</b>   |                         | <b>1,22,220</b>      |             |              |
| <b>R2 - Spending Details</b>                                      |                         |                      |             |              |
| <b>Local (On Labor, Jeep etc.)</b>                                |                         | <b>3,520</b>         |             |              |
| Non Local   |                         | 93,580               |             |              |
| <b>Total Expenses</b>   |                         | <b>97,100</b>        |             |              |
| <b>R3 - Re spending Details</b>                                   |                         |                      |             |              |
| <b>Local (On Shops, Jeep etc.)</b>                                |                         | <b>740</b>           |             |              |
| Non Local   |                         | 2780                 |             |              |
| <b>Total Exps</b>   |                         | <b>3520</b>          |             |              |
| <b>Local Money Multiplier</b><br><b>(R1+R2 Local+R3 Local)/R1</b> |                         | <b>1.035</b>         |             |              |

on local **Jeep** conveyance. All the spending done for running the shop is non local and is mainly comprised of Grocery bought from near by market place called Rajur.

**Round 3**

**Part I**

Round 3 is an estimation of the amount being re-spent locally by the **Laborers** and **Jeep** owner. Table 3 shows us the spending pattern of the Jeep owner. It can be inferred from the below information that out of the total spending only 4% is spent locally while 96% is spent non locally. Taking this information, we can estimate that ₹520 being earned by the Jeep owner via local spending of the Shop owner would result into ₹20 (4% local spending) being re-spent within the village by the Jeep owner.

**Part II**

₹3000 is being locally spent on labor for agriculture. Table 4 shows the spending pattern of labourers of Shiswad village. Most of the households are involved in labor activity since farming does not yield any surplus income because of low cultivable land area.

The local spending done by labourers comes close to 24%, implying that the Rs. 3000 being spent by the Shop owner on laborers would result into ₹720 being re spent locally. Thus the total for Round 3 comes to ₹740 (₹720+₹20).

Hence, the local money multiplier for the Shop:  

$$\frac{122220+3520+740}{122220} = 1.035$$

**Table 3:** Round 3 Score: Respending of Jeep Owner

| Household/Enterprise Name     | Interviewee     | Occupation        | Landholding | Family Size |
|-------------------------------|-----------------|-------------------|-------------|-------------|
| Dhansukh Varjai <sup>11</sup> | Dhansukh Varjai | Jeep, Agriculture | 0.8         | -           |
| <b>Spending Details</b>       |                 |                   |             |             |
| Local                         | 9,930           |                   |             |             |
| Non Local                     | 2,45,720        |                   |             |             |
| <b>Total Expenses</b>         | <b>2,55,650</b> |                   |             |             |

**Table 4:** Round 3 Score: Respending of Labourers

| Household/Enterprise Name | Interviewee    | Occupation | Landholding | Family Size |
|---------------------------|----------------|------------|-------------|-------------|
| Maheshrao Kale            | Maheshrao Kale | Labor      | 0.3         | 4           |
| <b>Spending Details</b>   |                |            |             |             |
| Local                     | 5,085          |            |             |             |
| Non Local                 | 16,250         |            |             |             |
| <b>Total Expenses</b>     | <b>21,335</b>  |            |             |             |

| Household/Enterprise Name | Interviewee   | Occupation | Landholding | Family Size |
|---------------------------|---------------|------------|-------------|-------------|
| Sukha Pore                | Sukha Pore    | Labor      | 4           | 7           |
| <b>Spending Details</b>   |               |            |             |             |
| Local                     | 8,200         |            |             |             |
| Non Local                 | 24,100        |            |             |             |
| <b>Total Expenses</b>     | <b>32,300</b> |            |             |             |

10 Name changed to protect respondent's identity.

11 Use of Linear extrapolation has been done and does not factor in seasonal changes or boom bust cycles. It should be read with a note of caution since linear extrapolation does not account for external factors and variability which can influence the outcome.

### Limitations faced during Data Collection

Our survey faced difficulty in eliciting the income details from our respondents. The income data collected seems to be on a lower side thereby reducing the Round 1 figure. While the expense data was relatively easy to collect, it resulted into a higher Round 2 and Round 3 as compared to Round 1. Once the Round 1 score is low, without changing the Round 2 and Round 3, it results into a higher multiplier since Round 1 forms the denominator.

Eg:  $R1 = ₹100$ ,  $R2 = ₹50$  and  $R3 = ₹40$ . Multiplier:  $(100+50+40)/100=1.9$ . Now, if we lower the R1 score to say ₹70 the resultant multiplier would be  $(70+50+40)/70= 2.28$ . Hence, due to lower R1 i.e. income data, our survey tends to overestimate money multiplier. We find it difficult to assign a correction factor, since the deviation in R1 figure is difficult to estimate.

### Results and Findings

The survey results showed us that the village enterprises have got a very low local multiplier score. The score derived out of the research stands in the range of 1-1.2 for businesses/enterprises, while for one of the active Self Help Group it stood at 1.6. We say that the score is very low, since the lowest possible multiplier of an economy could be 1 and the highest being 3. Based on the survey results, it seems that the enterprises have got very high financial leakages, more than 85%. Implying that out of every rupee earned, less than 15 paise stays in the village and the rest flows out as non local spending. There is an urgent need to increase the local money flow and plug the leaks.

### Assumptions

The village has 135 households comprising of different land holding categories and occupations. We were successful in collecting data from most of the enterprises and shops, and 14 households which adequately represents the re-spending done in Round 3.

Also, the information we gathered from the respondents showed us that each of them had kept laborers on their agricultural field totaling 30 man days in a year. Based on the household surveys done, we found that most of the household, even those who were keeping laborers on their field, were themselves involved in labor activities. Here we are assuming that since farming was not yielding any surplus income they would be moving towards labor as a supplementary source of income. Hence, the information collected from 14 households form

a representative sample of the labor category and thus suffices to calculate the Round 3 score of enterprises/businesses/agriculturist having employees who also work as labor.

### Discussion

There were drivers and laggards in the local economy of Shiswad. Out of the sample surveyed we were able to interpret some of the findings.

#### Drivers

1. Out of the total sample surveyed SHGs reportedly had the highest money multiplier score. This was primarily on account of higher R2 score due to internal lending. A higher R2 would help to increase the final score; however, if R2 score is high primarily due to higher lending it has serious risks. Excessive lending without being backed by increased productivity could lead to creation of bubble. This would imply higher defaults on loan repayments and could eventually lead to economic crises. Thus, while on the one hand SHGs have got high money multiplier score, it needs to be interpreted with caution, due to the hidden perils of excessive lending and potential of bubble creation.
5. A Photo shop located in the village also had higher money multiplier score. This was primarily due to higher profit margins and local recruitment.

#### Laggards

1. Local transporters were the laggards of local money multiplier and drivers of financial leakages.
  - a) One, because they act as a medium for the local population to travel to nearby market which also leads to unplanned, impulsive and possible non productive spending done at point of sale.
  - c) Two, because their Capital Investment in the business was high and completely non local.
  - d) Three, the business also has revenue expenditure which is done on fuel and vehicle maintenance. They are also Non local. Loan repayment (EMI) is a recurring expenditure and is substantially non local. The money multiplier reported by surveying one of the Jeep owners comes to 1, implying 100% financial leakage.
2. Grocery stores located in the village were, to our surprise, not helping the local economy. Primarily since their suppliers were non local. All the products being sold at their shop were brought from non local markets. Also, their business has low profit margins, implying

lower money retention in form of profit. This in turn weakens the money multiplier score.

## Conclusion

High sensitivity<sup>12</sup> alongwith high exposure<sup>13</sup> results into high vulnerability<sup>14</sup> which in turn reduces the adaptive capacity of the local community. Businesses, Enterprises and Households of Shiswad have got high exposure towards non local goods and services, which also makes them more sensitive towards macro economic upheavals like inflation and recession. Hence, the community appears to be highly vulnerable to the risks of Globalization in context of climate change. In lieu of this high vulnerability, appropriate interventions need to be designed to improve resilience against Macro Economic Oscillations and Climate Change. These interventions would result into plugging the leakages and increasing the money inflow i.e. Income.

In order to improve the local money flow of the sample surveyed, there is a need to design sustainable livelihoods in order to plug these leaks. This can happen at the village level as well as at the Cluster level i.e in a group of villages. Since the resource diversity is limited at the village level, it would be very difficult to design livelihoods catering to the requirements of the villagers. Hence, a cluster approach might be a better strategy as it will give us the benefit of resource diversity as well as the desired scale of operations to make businesses/livelihoods viable. Since the study has been initiated at Shiswad village, Akole taluka, it would be a prudent practice to conduct similar studies in neighboring villages if we are to design cluster based livelihoods to plug the leakages.

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## References

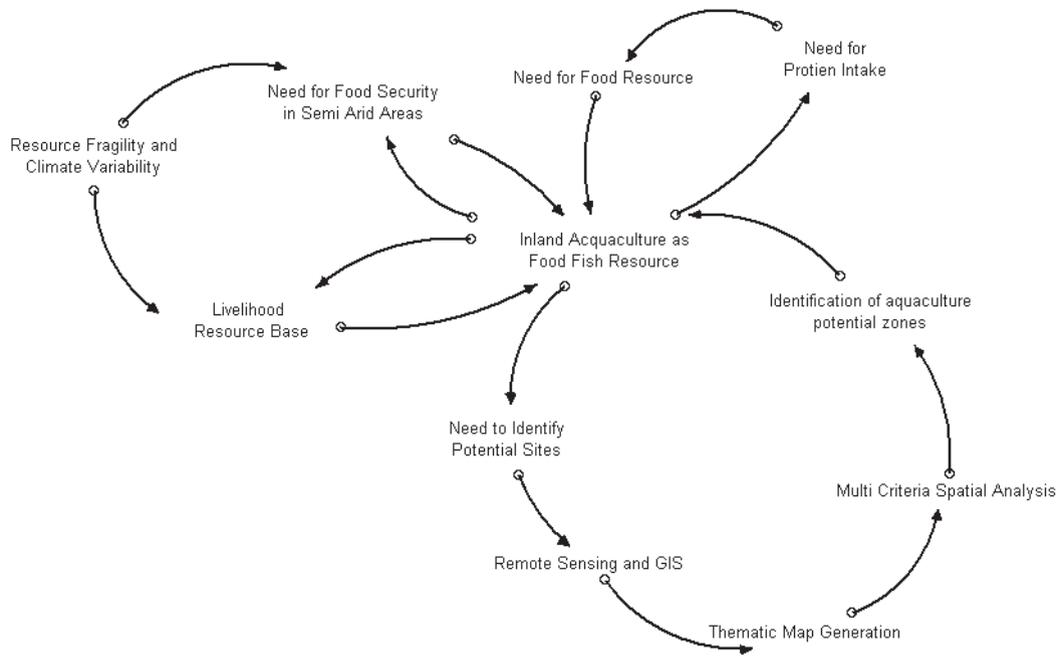
1. Boyle, D. (2009). *Localism – Unravelling the Suppliant State*. London: New Economics Foundation.
2. Justin Sacks, N. (December 2002). *The Money Trail*. London: New Economics Foundation and The Countryside Agency.
3. Lewis, B.W. (2002). *Plugging The Leaks*. London: New Economics Foundation.
4. Adger, W.N., S. Agrawala, M.M.Q. Mirza, C. Conde, K. O'Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi, 2007: Assessment of adaptation practices, options, constraints and capacity. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 717-743.12. Affects the magnitude and/or rate of a climate related perturbation or stress, UNDP 2005.

12. Affects the magnitude and/or rate of a climate related perturbation or stress, UNDP 2005.

13. Degree of climate stress upon a particular unit of analysis; it may be represented as either long-term changes in climate conditions, or by changes in climate variability, including the magnitude and frequency of extreme events, IPCC 2001.

14. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity, IPCC TAR 2001.







# Potential Sites Selection for Inland Aquaculture in Semi-arid Region

Pradnya Ghag and Prashant Kadgi

## Abstract

The demand for food security in semi-arid regions feeds a continual need to generate more food resources and to locate the sites where it can be done. Aquaculture, being one such approach towards food security, requires careful selection of sites for pond construction. The main intent of the present study is to highlight the role of RS (Remote Sensing) and GIS (Geographic Information System) in identifying potential sites for inland aquaculture in the Sangamner taluka of Maharashtra, western India. Remote sensing data and available attribute data collected from field have been used to generate thematic layers for: water availability, soil, slope, drainage, road and land use/land cover using GIS software. All these thematic layers have been assigned the weights according to their relative influence on pond construction. Finally, all thematic layers have been integrated in a GIS environment to generate an inland aquaculture potential map. Thus, four aquaculture potential zones have been identified, viz. "high potential" (6% of study area), "fair potential" (27%), "marginal potential" (41%) and "low potential" (26%). The study thus demonstrates that RS and GIS are very useful tools for delineating aquaculture potential zones in a semi-arid area, especially in data-scarce conditions.

**Keywords:** *Inland Aquaculture, Remote sensing, GIS, Semi-arid region.*

## Introduction

Remote sensing is the science and art of collecting data by technical means on an object on or near the earth's surface and interpreting the same to provide useful information (Burrough, 1986). GPS uses the satellites in space to find the position anywhere on the earth. Both of these technologies provides data which can be used in geographical information system (GIS), which is a powerful tool for collecting, storing, organizing, retrieving, transforming and displaying data from the real world for a set of particular purposes (Burrough, 1986). GIS is a decision support system, which involves the integration of specially referenced data in a problem solving environment (Cowen, 1988).

GIS has been taken up for aquaculture rather slowly, but its use has been investigated and actively promoted over the last ten years. The scale of investigation can vary greatly and GIS models can be based on very large or very small areas, with appropriately different spatial resolutions used for different purposes. Several regional investigations of aquaculture potential have been made, particularly for Africa and Latin America, using relatively simple environmental and resource availability models. A number of national or state level investigations have been conducted successfully, based on a wide range of data on environment, infrastructure, resource availability and socio-economic (Ross L.). Such studies are now being greatly facilitated by the rapidly increasing varieties and resolutions



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of digital, basic data that are becoming available. These meso-scale models are particularly useful for guiding national plans, for consideration of food security issues and for investigation of conflict and trade-off between different economic activities.

Population growth is accompanied by increasing demand for food fish, with direct human consumption of fish reaching an estimated 103 million tons in 2003 (*World Fish Center*). Fish is the main source of animal protein for a billion people worldwide. As well as providing a valuable protein complement to the starchy diet common among the global poor, fish is an important source of essential vitamins and fatty acids (*Chilima D.*). Fishing is frequently integral to mixed livelihood strategies, in which people take advantage of seasonal stock availability or resort to fishing when other forms of food production and income generation fall short. Fishing often is related to extreme poverty and may serve as a vital safety net for people with limited livelihood alternatives and extreme vulnerability to changes in their environment.

Whilst planning is often cited as a priority for aquaculture development, identification of sustainable aquaculture sites is a complex spatial problem requiring in depth knowledge of the inland water environment as well as an understanding of numerous social and civil factors. Poor site selection can result in stressed ecosystems, stressed culture species, decreased production, inferior economic performance, displeased neighbours and a disgruntled public. The first step for scientific and sustainable development of pond aquaculture is better site selection followed by improved culture management.

## Methodology

### Study Area

The study area consisted semi arid region of Maharashtra, as the objective was to see how efficiently GIS and RS will be helpful to located potential sites for aquaculture in such region. Thirteen villages (Wankute, Bhojdari, Pemrewadi,

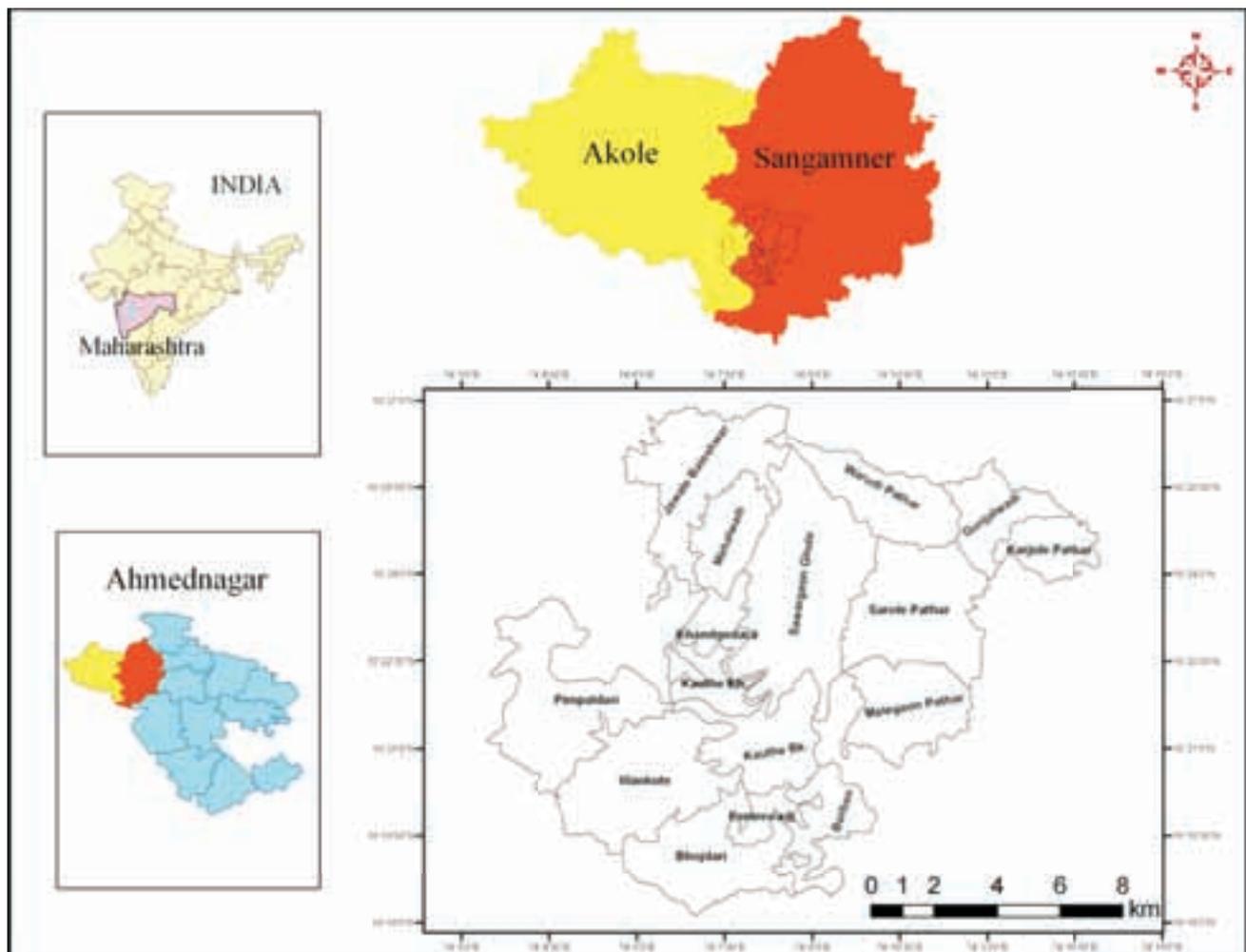


Figure 1: Location map of the study area.

Borban, Kauthe Budruk, Kauthe Khurda, Gunjalwadi, Warudi Pathar, Sarole Pathar, Malegaon Pathar, Mahalwadi, Sawargaon Ghule and Jawale Baleshwar) of Sangamner taluka and one village (Pimpaldari) of Akole taluka of Ahmednagar district, located in the western part of Maharashtra state, India, were used as study area to demonstrate the capabilities of integrated RS and GIS techniques in selecting potential zones for inland aquaculture (Figure 1). Geographically, the study area is located between 19° 23'-19° 21' N latitude and 74° 03'-74° 12' E longitude, with total geographical area 13961.78 ha. The drainage network<sup>1</sup> of the study area is mainly controlled by the principal river Mula. Climatologically, the study area falls in semi-arid zone of Maharashtra, with annual rainfall of 399.48 mm for last 24 years (1981-2004) (*Feasibility Study Report, WOTR*). Physiographically, the study area has undulating terrain. Vegetation cover mostly includes agriculture and shrubs along with deciduous forest.

### Preparation of thematic layers

In order to demarcate the potential zones for inland aquaculture in the study area, a multi-parametric data set comprising satellite data and other attribute data collected from field; including Survey of India (SOI) topographic sheets were used. In the present study, six themes were evaluated on the raster GIS platform: (i) Waterbodies (WB); (ii) Soil Texture (ST); (iii) Slope (SL); (iv) Land Use Land Cover (LULC); (v) Drainage Lines (DL); (vi) Roads (R). The IRS-P6 LISS IV (5m) and Cartosat 1A Stereo (2.5m) data were collected from the National Remote Sensing Agency (NRSA), Hyderabad. The LISS IV data was used for preparation of thematic layer of LULC. Cartosat 1A stereo data was used for preparation of proximity to waterbodies and road layers. Further, using the Cartosat 1A DEM (Digital Elevation Model) of the study area, a slope map was prepared using IDRISI software. Digital cadastral maps procured from Maharashtra Remote Sensing Application Centre (MRSAC) were used to join soil data gat number wise to get soil map for study area. The procedures followed for the preparation of each thematic layer are presented below.

**Proximity to Waterbodies:** In the present study, the proximity to Waterbodies map was prepared by digitizing all wells, streams, rivers from satellite imagery in QGIS (Quantum GIS) software-free lance software. The thematic layer of Waterbodies was prepared by considering the pond construction

site *vs* distance from the water body. Although there is no yardstick as to what extent the aquaculture pond should be constructed from the immediate water body, three buffer zones with radii 100m, 200m and 300m were chosen.

**Soil Texture:** The soil map was prepared by joining the soil data collected from each gat number of the study area to cadastral map. The thematic layer of soil texture for the study area reveals twenty soil classes which are clay (c), clay loam (cl), gravel clay loam (gcl), gravel loam (gl), gravel sand (gs), gravel sand clay (gcl), gravel sand clay loam (gscl), gravel silt clay loam (gsicl), gravel silt loam (gsil), gravel sandy loam (gsl), loam (l), loamy sand (ls), silt (si), sandy clay (sc), sandy clay loam (scl), silty clay (sic), silty clay loam (sicl), silty loam (sil), sandy loam (sl) and rocky (r). The majority of the study area is dominated by silty clay loam, clay loam and silty loam while other soil types cover relatively small areas.

**Slope:** The thematic layer of slope was generated from the DEM of the study area, from which, slope in percentage was obtained. The entire range of slope varies between 0 and 30%, but most of the area has a slope less than 6%.

**Land use/land cover:** The land use/land cover classification of the study area was performed using satellite imagery. IRS-P6 LISS IV data at 5m resolution spatial resolution were used for preparation of the land use/land cover thematic map. The raw satellite images were digitally processed in the series of image processing operations: geometric rectification, image enhancement, image interpretation and multispectral classification. Further, unsupervised image classification was carried out to classify land use classes. A LULC thematic map was distinguished into nine different classes: (i) Cropland; (ii) Agricultural fallow; (iii) Scrub land; (iv) Dense forest; (v) Sparse forest; (vi) Barren/Unused; (vii) Rocky barren; (viii) Settlement and (ix) Waterbodies.

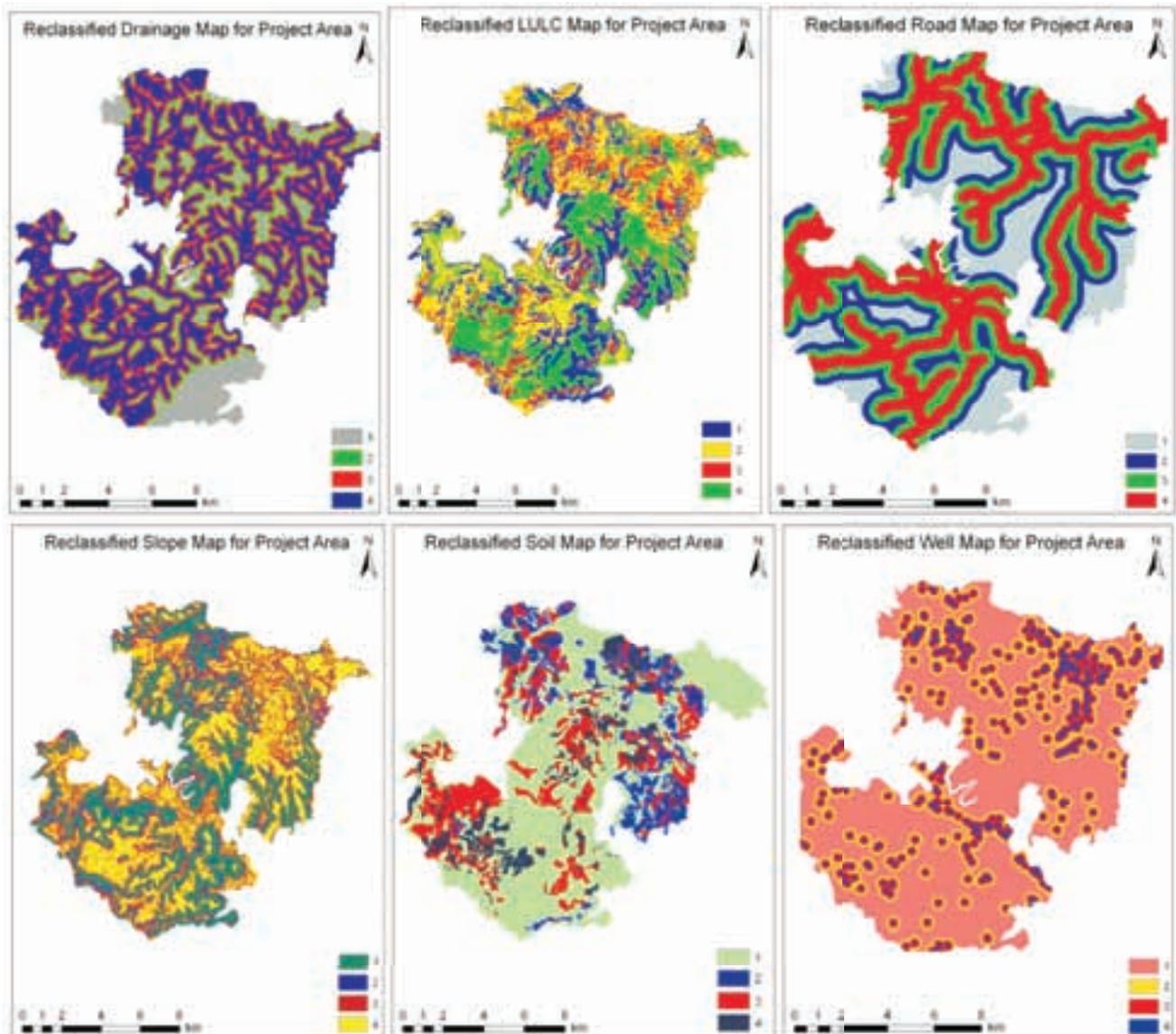
**Proximity to Drainage Lines:** The drainage network of the study area was digitized from SOI toposheets and updated with Cartosat 1A satellite imagery data. Although there is no yardstick as to what extent the aquaculture pond should be constructed from the immediate drainage line, three buffer zones with radii 50m, 100m and 150m were chosen.

**Proximity to Roads:** All sort of possible roads of study area were digitized from Cartosat 1A satellite imagery data. The thematic layer of waterbodies was prepared by considering the aquaculture pond construction site *vs* distance from the roads. Although there is no yardstick as to what extent the aquaculture practice should be carried from the

<sup>1</sup> In geomorphology, a *drainage network* is the pattern formed by the streams, rivers and lakes in a particular drainage basin.

**Table 1:** Site suitability and score to different parameters for development of aquaculture.

| Sr. No. | Parameters                     | Suitability rating and score |                     |                            |   |
|---------|--------------------------------|------------------------------|---------------------|----------------------------|---|
|         |                                | High Potential (4)           | Fair potential (3)  | Marginal potential (2)     | Low potential (1)                       |
| 1       | Proximity to waterbodies (m)   | < 100                        | 100-200             | 200-300                    | >300                                    |
| 2       | Soil texture (clay content)    | c, cl, sc, sic, sicl         | scl, l, sil         | gsl, gcl, gsc, gscl, gsicl | sl, si, ls, gs, gl, gsil,r              |
| 3       | Slope (%)                      | <5                           | 5-15                | 15-25                      | >25                                     |
| 4       | Land use land cover types      | Agricultural fallow land     | Barren/ Unused land | Cropland, Waterbodies      | Forest, Settlement, Roads, Rocky Barren |
| 5       | Proximity to Drainage line (m) | <50                          | 50-75               | 75-100                     | >100                                    |
| 6       | Proximity to Roads (m)         | <250                         | 250-500             | 500-750                    | >750                                    |

**Figure 2:** Reclassified Maps of Study Area. (4 = high potential; 3 = fair potential; 2 = marginal potential; 1 = low potential).

immediate road, three buffer zones with radii 250m, 500m and 750m were chosen.

Thus the six thematic layers were prepared and further used for reclassification processes which were based on suitability rating.

#### Site suitability evaluation for Aquaculture pond

Weightings and suitability rating were based on the level of importance of a factor that influences aquaculture. The interpretation of suitability classes for each factor was classified on the scale 4 to 1 as follows: High Potential (4) provides a situation in which minimum time or investment is required in order to develop fish farming. Fair Potential (3) requires a modest time and investment. Marginal potential (2) requires significant interventions before fish farming operation can be conducted. Low potential (1) requires a time or cost or both that is too great to be worthwhile for fish farming. (Table 1).

**Proximity to waterbodies:** Surface waterbodies and wells indicate the availability of water. A water body itself is assigned the highest rating followed by a 100 m buffer zone, 200m buffer zone and 300m buffer zone. The distance of 100m is taken as buffer because the area is semi-arid and water available in waterbodies is not sufficient enough to be transported over large distances. The buffer zone of 100m being high potential (4) and buffer zone more than 300m being low potential (1).

**Soil texture:** Soils used to construct ponds must contain sufficient clay to hold water (Davis J.). Because it is possible to line ponds with clay or an impermeable layer, this is an added expense that usually can be avoided. The soil texture class were divided and given weights depending on the clay content. Thus the clay itself and the soil texture with of more than 40% clay content were high potential (4) and the soil texture with less than 20% clay content were low potential (1).

**Slope:** Flat land requires moving less dirt when building a series of ponds than does in hilly land (Davis J.). Thus the slope less than 5% is high potential (4) and slope greater than 25% is low potential (1).

**Land use land cover:** Clear and potential lands are more suitable than rocky and constrained lands (roads, settlements etc.). Hence agricultural fallow land was high potential (4) and forest, roads, and rocky barren were under low potential (1).

**Proximity to drainage line:** Some drainage pattern is desirable for draining water from the ponds

(Davis J.). Pumping water out of the ponds is possible but expensive. The site selected should have adequate drainage so water will not flood a neighbor's land or levees should not block any drainage from adjoining land. A drainage line itself is assigned the highest rating followed by a 50 m buffer zone, 75 m buffer zone and 100 m buffer zone. The buffer zone of 50 m being high potential (4) and buffer zone more than 100 m being low potential (1).

**Proximity to roads:** Accessibility is the important aspect which must be considered particularly in remote areas (Davis J.). A road was assigned 250 m buffer zone, 500m buffer zone and 750m buffer zone. The buffer zone of 250m being high potential (4) and buffer zone more than 750 m being low potential (1).

Parameters for site suitability were selected from land characteristics and rating rules used for assessing watershed pond for aquaculture development (Xuan N.C.)

#### Integration of thematic layers

All the six thematic layers (PW, ST, SL, LULC, PD, and PR) were resampled to cell size of IRS P6 LISS-IV image at 5 m resolution. Then these layers were reclassified according to weights assigned to respective class in each layer. The reclassified layers were extracted with respect to the boundary of project area. Image integration was done using image calculator in IDRISI software.

#### Result

##### *Aquaculture potential zone map*

Integration of six standardized thematic layers resulted in a final aquaculture potential map. The integrated layer has an index value ranging from 18 to 72. This range of values was divided into four equal classes: 18-31.5, 31.5-45, 45-58.5 and 58.5-72. These ranges of values revealed four distinct aquaculture potential zones representing potential for aquaculture in study area of: "high potential" (58.5-72), "fair potential" (45-58.5), "marginal potential" (31.5-45), "low potential" (18-31.5). Thus, the entire study area was qualitatively divided into four aquaculture potential zones; Figure 3 shows the aquaculture potential map of project area. The area covered by the "high potential" aquaculture potential zone is 793.65 ha (6%), by "potential" aquaculture potential zone is 3608.68 ha (27%), by "marginal potential" aquaculture potential zone is 5540.12 ha (41%), by "low potential" aquaculture potential zone is 3483.44 ha (26%). The village wise area distribution for potential aquaculture is given in Table 2. These prospective aquaculture zones

Table 2: Village wise potential area distribution for Aquaculture.

| Sr. No. | Village Name     | Area (ha)     |                    |           |                |
|---------|------------------|---------------|--------------------|-----------|----------------|
|         |                  | Low potential | Marginal Potential | Potential | High Potential |
| 1       | Warudi Pathar    | 101.85        | 188.25             | 391.49    | 173.28         |
| 2       | Wankute          | 411.4         | 477.26             | 458.3     | 155.46         |
| 3       | Jawale Baleshwar | 384.1         | 496.31             | 349.67    | 110.39         |
| 4       | Sawargaon Ghule  | 729.11        | 781.44             | 475.53    | 92.79          |
| 5       | Sarole Pathar    | 197.64        | 689.3              | 426.89    | 84.21          |
| 6       | Pimpaldari       | 165.13        | 656.28             | 375.82    | 52.24          |
| 7       | Mahalwadi        | 155.04        | 176.6              | 204.91    | 48.4           |
| 8       | Pemrewadi        | 37.67         | 67.12              | 104.39    | 20.5           |
| 9       | Kauthe Bk.       | 292.88        | 302.64             | 242.99    | 19.97          |
| 10      | Kauthe Kh.       | 7.21          | 134.04             | 127.89    | 18.87          |
| 11      | Borban           | 372.8         | 138.24             | 57.34     | 5.87           |
| 12      | Bhojdari         | 367.9         | 634.54             | 78.94     | 4.82           |
| 13      | Malegaon Pathar  | 199.66        | 498.65             | 165.72    | 3.38           |
| 14      | Gunjalwadi       | 43.84         | 291.21             | 145.66    | 3.26           |

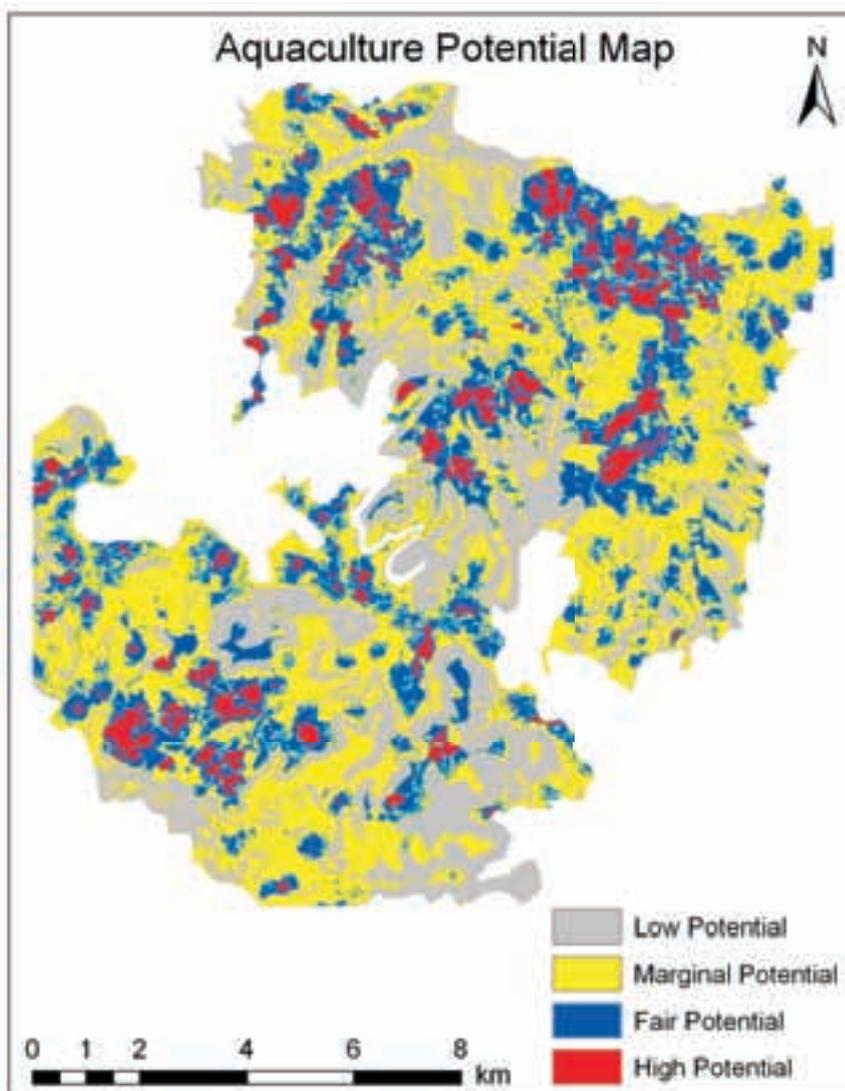


Figure 3: Aquaculture potential zone map

can form a basis for the detailed fish farming investigations required for well and sustainable establishing aquaculture.

### Conclusions

The south western part, north eastern and some patches of north western parts of the study area fall in the "high potential" aquaculture potential zone, which is approx. 6% of total study area. The northern part and some part of south western fall under "potential" aquaculture potential zone, which is approx. 27% of total study area. However, "marginal and low potential" potential zones cover up the most of the part i.e. 41% and 26 % of study area respectively. This shows that nearly 30% of study area is potential for aquaculture. The Table 2 shows Warudi Pathar has largest area under high potential zone for aquaculture followed by Wankute and Jawale Baleshwar.

Overall, the results of this study demonstrated that the integrated RS and GIS based approach is a useful tool for assessing aquaculture potential zone, based on which potential locations for aquaculture development could be done and gives the better scope for intervening aquaculture as food security option in semi-arid area.

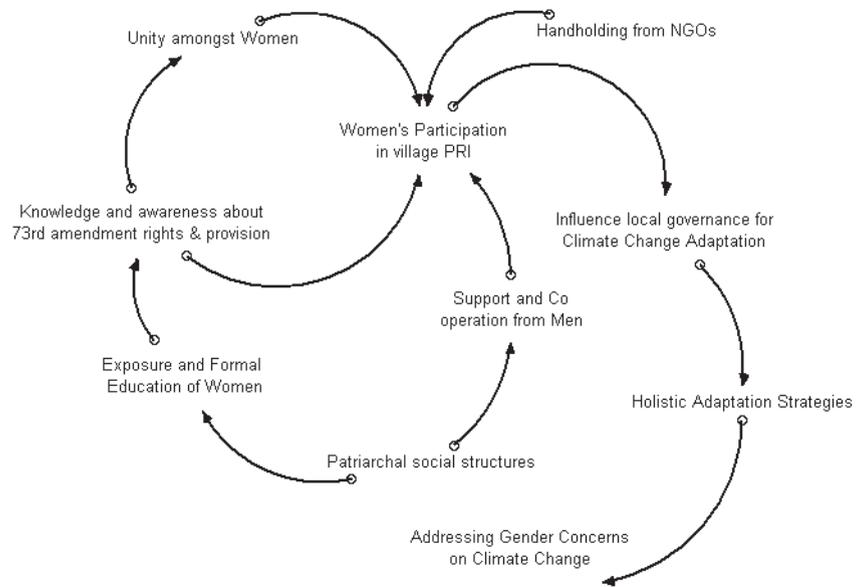
### Acknowledgements

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### References

1. Boyd, C.E., and C.S. Tucker, 1992. Water quality and pond soil analyses for aquaculture. Alabama Agricultural Experimental Station, Auburn University, AL, 183 p.
2. Chilima, D.M., *Fish and Human Nutrition*. World Fish Center, Zambia.
3. Davis, J., 1990 Red Drum: Site Selection and Pond Construction. Southern Regional Aquaculture Center, Publ. no. 321.
4. Eastman, J.R., 2003 *IDRISI Kilimanjaro: Guide to GIS and Image Processing*. Clark Laboratories, Clark University, Worcester, USA.
5. Gupta, K., Deelstra, J., 1997. Remote Sensing and Geographic Information Systems for Design and Operation of Water Resources Systems. IAHS Publ. no. 242 pp.
6. Jha, M.K. and Peiffer, S., 2006 *Application of Remote Sensing and GIS Technologies in Groundwater Hydrology: Past, Present and Future*. BayCEER, Bayreuth, Germany.
7. Kapetsky, J.M. and Nath, S.S. 1997. A strategic assessment of the potential for freshwater fish farming in Latin America. *COPESCAL Technical Paper*, No. 10. Rome, FAO. 128 pp.
8. Karthik, M., Suri, J., 2004. Brackish water aquaculture site selection in Palghar Taluka, Thane district of Maharashtra, India, using the techniques of remote sensing and geographical information system. *Aquacultural Engineering* 32 (2005) 285–302, India.
9. *Maharashtra Remote Sensing Application Center (MRSAC)*, Maharashtra, India.
10. *National Remote Sensing Agency (NRSA)*, Hyderabad, India.
11. Nath, S.S., J.P. Bolte, L.G. Ross, and J. Aguilar-Manjarrez, 2000. Application of geographic information system (GIS) for spatial decision support in aquaculture. *Aquacultural Engineering* 23: 233-278.
12. *Survey of India (SOI)*, Pune, Maharashtra, India.
13. Yi, Y., Giap, D., 2003. Application of GIS and Remote Sensing for Assessing Watershed Ponds for Aquaculture Development in Thai Nguyen, Vietnam. Map Asia, Vietnam.







# Women in Panchayat Raj Institutions (PRIs): Development Preferences, Desired Role, and Constraints

Lalita Joshi and Thomas Palghadmal

## Abstract

Strengthening women's participation in political sphere is a critical step towards empowerment of women. In India, the 73rd Amendment Act passed in 1993, provided legitimate space for women to enter the local level political institutions known as Panchayat Raj Institutions (PRIs). The objective of the present study on women in PRIs is to examine four aspects: the role played by women in village PRIs, constraints faced by them in playing the role, development preferences of women in the village, and whether women member's of PRIs are able to address those preferences.

This paper is based on the study of two villages, one tribal and the other non-tribal, both, belonging to a group Gram Panchayat, in Ahmednagar district, Maharashtra. This qualitative study had a purposive sample. Data reveal that women members have not utilised the platform of PRIs for playing an effective role and have not addressed their development preference. However, it needs to be mentioned that women have recognised the restrictive role played by patriarchal structures and despite its towering presence have displayed the potential and willingness for participation in local governance. It is felt that the key impediments are complete absence of training inputs, capacity building efforts, and handholding in the context of Panchayat Raj and its related aspects and in the context of climate change adaptation will women be a resource untapped.

## Preamble

Regarding *women's participation in political sphere* various factors such as patriarchal nature of Indian society, the caste, class and education, the level of empowerment of women play a critical role. With a view to empower women, in recent times, the *73rd Amendment* to the Indian constitution has promoted women's participation in Panchayat Raj Institutions (PRIs). As this paper focuses on participation of women in village level PRIs, clarification about the context in which study is located as well as some of the terms used is given below.

During the pre-independence period political participation of women could be seen in the

social reform movement and later during the independence struggle. After independence Articles 325 and 326 of the Constitution of India guaranteed political equality – equal right to participation in political activities and right to vote respectively. While the latter has been accessed, exercised and enjoyed by a large number of women, the former is still a distant dream (Mohan, unpublished). India adopted the parliamentary form of democracy after attaining independence, in which the government functions at the central and state level. At the state level, there is a three tier system of local government known as *Panchayat Raj Institutions* (PRIs) operating in the rural areas. The three tiers of this system include *Zilla Parishad* at the district level, *Panchayat Samiti* at the block



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level, and *Gram Panchayat* at the village level (Mohan, unpublished). The PRIs received legal status when the 73rd Amendment Act came in to existence in 1993. This Amendment is a significant milestone from women's point of view as they were provided with 1/3rd reservations in all local government bodies of PRIs. Because of reservations, women have now become more visible in the PRIs. The village level PRIs include: the Gram Panchayat, the Gram Sabha, and the Gram Sabha Sub-committees.

According to Human Development Report, *participation* means that "people are closely involved in the economic, social, cultural and political process that affects their lives". "Participation is a development approach, which recognizes the need to involve disadvantaged segments of the population in the design and implementation of policies concerning their wellbeing. The strengthening of women's participation in all spheres of life has become a major issue in the development discourse. Socio-economic development cannot be fully achieved without the active participation of women at the decision making level in society" (Rahman Khan, 2006).

To quote from Rahman Khan (2006) *Empowerment* is a process, though the result of the process may also be termed empowerment. But more specifically, the outcome of empowerment of women should manifest itself as a redistribution of power between individuals, genders, groups, classes, castes, races, ethnic groups or nations. Empowerment means the transformation of structures of subordination, through radical changes in law, property rights, control over women's labour and bodies, and the institutions that reinforce and perpetuate male domination. The 1990's have seen increasing recognition of the centrality of women's empowerment to the success of development programmes. Women's empowerment has five components: women's sense of self-worth; their right to have and to determine choices; their right to have access to opportunities and resources; their right to have the power to control their own lives, both within and outside the home; and their ability to influence the direction of social change to create a more just social and economic order, nationally and internationally.

*Patriarchy* is defined as a social structural phenomenon in which males have the privilege of dominance over females, both visibly and subliminally. This phenomenon is manifested in the values, attitudes, customs, expectations, and institutions of the society, and it is maintained through the process of socialization (encyclopedia.com). It oppresses and subordinates women in both the private and the public sphere (Bhasin,

1986). In India now although women have been increasingly working in the public sphere to earn their livelihood, politics is still viewed as a male-dominated public activity (Rahman Khan, 2006).

The study is placed in the project context of Watershed Organisation Trust (WOTR), a NGO undertaking holistic and integrated village development activities on *watershed* lines to reduce poverty. Women are considered as equal partners with one focus being women's self help groups (SHGs). Hence, it was explored whether any supportive role was played by SHGs in bettering the performance of women in PRIs and if not it could have programmatic implications for devising a strategy. The geographical area from where the sample for the study is selected has an additional feature, as the project for "developing strategies for adapting to the *climate change*" is being initiated in 25 villages.

Climate change is experienced in various forms such as rising temperatures, change in the rainfall patterns, water scarcity, and increased frequency of extreme events like floods and droughts that human beings are left with no other option than to take cognizance and respond to it.

There is now convincing scientific evidence that human activity is altering the global climate. Though the uncertainty remains about the timing and impact of climate change, it is already clear that there are risks of significant adverse consequences (Meadowcroft, 2009). Climate change is considered to be one of the major threats to sustainable development and livelihoods because of its effects on environment, health, infrastructure, settlements, agriculture, food security, and access to water (Robledo, Blaser, *et al.* 2008). Climate change is a critical issue in the context of rural livelihoods given its direct dependence on natural resources. Hence, climate change and its impact, is an important development issue. With regard to the spectrum of challenges climate change bring in, women form one of the most vulnerable category and also a group that holds some solutions.

However, it is possible to protect our societies and economies from climate change impacts to some extent – for example, by providing better information, improved planning and more climate-resilient crops and infrastructure (Stern, 2006). In facing the challenges of climate change the governance institutions, right from the grassroots level, i.e. local village level, have pivotal a role to play so that people can be equipped to adapt to it. For climate change adaptation it is vital to integrate a gender perspective given the important role women play in supporting households and communities to mitigate and adapt during the periods and events

of extreme weather stresses. Integrated watershed development approach has potential to act as one of the key strategies for climate change adaptation if appropriate changes are made by anticipating the possible future risks related to climate change. Integrated watershed development approach with its main focus on regeneration of natural resources in a sustainable manner provides an opportunity to incorporate climate change concerns. The two pillars of watershed development that contribute to climate change adaptation are: 1. appropriate structures 2. good institutions and inclusiveness of all and involvement of people.

The study tries to assess the effectiveness of women's participation in village level PRIs and other village level committees such as the Samyukta Mahila committees (which have representatives from all the self help groups in the village), formed during the watershed development programme. Thus, in the project context of climate change, knowledge about status of women's political participation could have significant programmatic implications in terms of devising a strategy for bettering the participation of women in PRIs to address the concerns related to climate change.

## Introduction

In the development of villages, PRIs have a large role to play and women being one of the key stakeholders in PRIs, their ability to participate becomes crucial for their own empowerment. In the process of women's empowerment two milestones are considered as significant. The first is passing of 73rd Amendment Act reserving 33% seats for women in local self government; while the other is organising women in self help groups (SHGs) around micro finance (Randive, 2009; Singh, 2009).

Various studies in India have reviewed the political participation of women at local and national level, which bring forth both existing positives as well as shortcomings. At the outset, it should be mentioned that studies demonstrating effective role played by women representatives in local governance are exceptional cases and is not the general trend observed (Behar, 2002; Deshpande and D'Souza, 2009; IDRC, 2008; MoPR, 2008; Kaul and Sahni, 2009; Panday, 2008; Satpathy, accessed from internet).

Studies have shown that presence of women members in local self governance has made a difference to prioritization of women's needs (EKATRA, 2003; MoPR, 2008; Satpathy, accessed from internet). Others have pointed out that emergence of women's leadership is closely linked to the existence of informal women's groups, collectives, and NGOs. These women in PRIs indicated a high

potential for motivation and effective participation given adequate training and support (ISST, 2005; EKATRA, 2003). "Nationally and internationally greater female representation has been credited to the initiation of party quotas and reserved seats" (Waring, 2010). In India, although a huge representation of women is seen in PRIs, women members are not active, not treated with respect, act as 'proxy' members of their men folk, and do not exert influence (Deshpande and D'Souza, 2009; Kaul and Sahni, 2009; IDRC, 2008; Panday, 2008, Vissandjee, et. al. 2005; Bari, 2005).

Despite the political aid and opportunity provided to women for political participation they still play a dormant role; hence it is significant to unearth its reasons (Kaul and Sahni, 2009; IDRC, 2008; Panday, 2008, Vissandjee, et al. 2005; Bari, 2005).

Keeping the above background in mind, this study analyses the role played by women in villages PRIs and the constraints faced by them. It also examines development preferences of women, and if they are able to address those preferences.

## Research Methodology

The study was conducted in two villages of Sangamner and Akole blocks of Ahmednagar district in Maharashtra, where watershed development projects were implemented in the decades of 1990s and 2000s. Now, recently, a project on "climate change adaptation" has been initiated in 25 villages in both the blocks.

The sample was selected by employing "purposive sampling" method. Purposive sampling is defined as selecting the sample on the basis of knowledge of a population, its elements, and purpose of the study (Babbie, 2005). The selection criteria were as follows: Two villages – one tribal, the other non-tribal – that were part of a watershed development programme that was completed at least two years prior to this study, and were part of a group Gram Panchayat, were selected. This time span helped in identifying women with sufficient experience in participating in bodies such as SHGs, SMS (Samyukta Mahila Samiti – a representative body of all SHGs in villages where WOTR has implemented watershed projects) and PRIs. All current female members of PRIs and SMS were selected as respondents.

The selected villages were Purushwadi in Akole block which has 100% tribal population and is a smaller village in a group Gram Panchayat, while Bhojdari in Sangamner block mainly has non-tribal population having a heterogeneous caste composition and is a larger village in another group Gram Panchayat. Both villages have a

female Sarpanch. Unlike Bhojdari, Purushwadi is represented by a Sarpanch belonging to the larger neighbouring village of Wanjulshet which is part of the group Gram Panchayat.

In both villages, a preliminary visit was conducted for identifying the sample. Project staff as well as leaders within the village were consulted for identification of key informants and respondents for in-depth interviews. Women having experience and knowledge about needs, preferences, and role that women played in PRIs and SHGs were selected as key informants. Women who acted as change agents in the village and displayed leadership qualities were selected for in-depth interviews.

The study was conducted from June to October 2010. Data was collected through in-depth interviews, key informant interviews, and group interviews. In both villages, two key informant interviews and two in-depth interviews, each, were conducted, thus making a total of eight interviews (four key informants and four in-depth). All women members of PRIs and SMS, except for those already covered under individual interviews were requested to participate in group interviews.

Before starting data collection, written consent of all participants was taken on a separate form with the choice to opt out of the study at any stage of data collection.

All interviews were transcribed and then translated from Marathi to English and were coded. The code list was guided by the thematic research questions, which were rooted in the study objectives.

## Findings

The findings of the study which are based on the experiences and perceptions of the respondents are presented below.

### Development Preferences of Women

In both the villages, some of the development priorities mentioned by the respondents were similar whereas few differed. Similar development priorities include women's employment, public transport, provision of health services, provision of clean cooking fuel, and toilets. In Bhojdari additional priorities mentioned were access to schemes for single women, drinking water to all, dairy facility for milk collection, education and drainage. Prohibition of liquor, facility of flour mill, starting business related to livestock rearing, electricity and community hall for women were other preferences mentioned in Purushwadi.

### Reasons for the stated development preferences:

In both the villages, respondents mentioned similar reasons for the development preferences that they had. *Need for employment within village* for women was greatly felt as its absence pushes women to work outside the village. Respondents expressed, *"there is no employment opportunity available in the village. Hence, we have to leave our children behind and go outside for work"*.

*Lack of public transport* was seen as an impediment to mobility, access to markets, health services during critical times, and education, specifically in Bhojdari women told that, *"there is a trend of discontinuing girls' education after tenth standard"*.

*Lack of toilets* results in filthy village leading to spread of diseases and it's an issue of dignity for women.

Programme-related bans and departmental prohibitions have been imposed on the traditional sources of fuel wood. At the same time, inadequate quotas of kerosene and health issues derived from the conventional way of cooking have resulted in the need for an *alternative source of clean cooking fuel*. In Bhojdari although few households have cooking gas, access to it is riddled with various problems like lack of official connection, having to buy from black market at high costs, long waiting period, lack of a system of delivery etc.

Due to *insufficient milk storage capacities*, Bhojdari is unable to make full use of its ample fodder availability.

The woman Sarpanch of Bhojdari opined that single women, mainly widows and deserted women, were the most vulnerable, requiring support to *access schemes*.

In both the villages for majority of respondents' highest priorities was *"employment within the village for women"* and *"public transport"*.

### Ability to Address Development Preferences and Constraints Faced

In Bhojdari majority women were of the opinion that they would address development preferences of women in a better manner than men. The reasons given were: *qualities and strengths possessed by women* such as sacrifice, patience, a habit of saving money, and the nature of giving priority to children, husband and family over themselves. Another explanation offered was *women work more than men do*; they go outside for work in more numbers than men, and men only talk but do not act. They also reported that, *"in case the husband is alcoholic,*

*the woman then single-handedly runs the family". Almost all respondents from Purushwadi and some from Bhojdari opined that, "if women come together they can address women's development preferences; however they require support and cooperation of men".*

The constraints, according to them were: lack of education and exposure to outside world, pressure from men, inability to speak up, meagre time and finances (they have to remain absent and forego day's wages to attend any meeting), lack of unity amongst themselves, lack of awareness about the schemes due to lack of information and lack of support from men, because of which, they opined that men are in a better position to solve the problems. Some of them pointed that, *"women have to listen to men as the family head. They have to take permission from the men in the family even for going outside the house"*. A respondent playing a key role in SHG stated that, *"despite her experience and her initiative she is not given chance to become the Gram Panchayat member due to village politics and hence is not able to address the concerns of women"*. The main difficulty expressed by majority of them was, *"women in the village are still tied up with children and hearth and at the most they work on the farms. No one gives them information also"*.

#### **Village PRIs: Role Played by Women and Constraints Faced**

**Gram Panchayat:** For majority of respondents in Bhojdari responsibilities of the Gram Panchayat were solving problems related to employment, roads, water, electricity, sanitation, toilets, ensuring that village is free from open defecation, and construction of farm ponds. A respondent from Bhojdari opined that, *"it is appropriate to give reservation to women, but she was quick to add that as women have inadequate information and no training they are not able to take advantage of it"*. In Purushwadi, the responsibilities stated were disseminating information related to schemes, conducting Gram Panchayat meetings, and enabling women the access to schemes. All respondents reported that they are not aware about the 73<sup>rd</sup> amendment and the rights and provisions given by it.

In both villages, women contributed substantially in cleanliness campaign and there were no complaints about public distribution system (PDS) or ration shop.

In Bhojdari, many respondents outlined the women Sarpanch's importance in completing a road project. The woman Sarpanch informed that she formed 12-

13 SHGs of women from BPL category. Other works completed by Gram Panchayat were construction of dispensary, allotting toilets and houses. Women reported that they participated in sanitation, education, health, water supply, forest protection committees' meetings. They have raised the issue of prohibiting liquor in Gram Panchayat and Gram Sabha as well, which resulted in substantial decline in liquor consumption. Women took initiative in making the village free from open defecation. One respondent believed that women draw psychological support for expressing themselves from the fact that the Sarpanch is female. Others stated that even prior to her election; women had started visiting the Gram Panchayat office during the implementation of the watershed development project in their village.

Respondents in Purushwadi reported that, a woman Gram Panchayat member attends Gram Panchayat meeting, but as she does not share information in the village, they do not know what happens in the Gram Panchayat and what her contribution is. A respondent stated that, *"since 2009 the Gram Sevak is a woman, but she has not spoken to women so far. Even though we have a woman Sarpanch, she has not visited our village since she was elected one year back. Many villagers do not know who the Sarpanch is and her husband works on her behalf"*. They opined that the Gram Panchayat had not done any work, except for provision of drinking water and that too it was many years back when the Sarpanch belonged to their village. Women took initiative whenever maintenance issues related to the drinking water infrastructure had surfaced.

**Gram Sabha and Women's Gram Sabhas:** In Bhojdari, almost everyone stated that women rarely attend Gram Sabhas due to various factors such as unsuitable timing, pressure of finishing household chores, and going out for work. Women holding some designations attend Gram Sabhas as it is expected of them. Thus, women told that, *"they are not part of the decision making process, as they do not express their views and men also do not let them talk and give importance to women's views"*.

In Purushwadi women unanimously reported that they do not attend Gram Sabhas. They further added that, *"men also attend rarely as the meetings are held in Wanjulshet (bigger village in group Gram Panchayat) and no one is informed about the date and timing"*. When women do attend Gram Sabhas it is for personal reasons such as signature of Gram Sevak or obtaining certificate or if they have applied for housing. Therefore, women are unaware about discussions that take place in Gram Sabhas. Women had requested the woman Gram Sevak to conduct a Gram Sabha in Purushwadi after every two months, but the request was not

granted. So, women reported that, *“presence of woman Gram Sevak does not have much use for increasing women’s participation”*.

Women were unable to tell what the functions of Gram Sabha were. Almost all respondents informed that women’s Gram Sabhas were not held.

**Sub-committees:** Women on the education committee in Bhojdari considered themselves to be responsible for the cleanliness of toilets, the performance of teachers in terms of attendance and punctuality, providing solutions to all school related problems and to monitor the timely availability of sports and exercise equipment. The education committee has a right to raise the issue in the Gram Sabha if teachers are not punctual. It was stated that when there is absenteeism in the school, women members go and meet parents to motivate them to send their children to school. They have also taken an initiative in repairing the toilets in the school. In Purushwadi women did not participate in the meetings of sub-committees. The respondents stated that *“due to lack of awareness about the sub-committee meetings, women members do not attend them”*.

**Interaction with Government Officials:** In Purushwadi women seldom interact with the government officials; whenever they face any difficulty they approach the Talathi at the Panchayat Samiti (block level) office and for obtaining certificates they interact with Gram Sevak at Gram Panchayat office. In Bhojdari, half of the respondents stated that mainly men interact with government officials. The remaining half opined that women interact freely. This was so as large number of men work outside the village, and women visit Gram Panchayat office for paying taxes and for obtaining certificates. The woman Sarpanch of Bhojdari was the only one to state that the relationship with the government officials is good and women share their problems.

**Trainings and Exposure Visit:** In both villages many training programmes for SHGs were conducted, however, not a single training or exposure visit was organised on issues related to Panchayat raj.

**Level of Satisfaction about Issues Handled by PRIs:** In both villages there was unanimity of opinion amongst respondents that they are dissatisfied with the PRIs as the development preferences of women remain unaddressed. A respondent thought that, *“we are not satisfied because Gram Panchayat has not implemented any scheme for women”*. In Purushwadi they emphasized it in the context of their village being smaller entity in the group Gram Panchayat and apathy shown towards them by the larger village and the woman Gram Sevak as well.

## Watershed Development and SHGs as Enabling Factors

In both villages, women felt that implementation of watershed development project motivated women to come out into the public sphere. In both villages, women’s presence was mainly felt during the implementation of watershed programme. It was opined that, *“formation of SHGs give women a platform to come together for the first time to discuss various issues, present their views, and also to start livelihood activities”*. Although the efforts made to generate employment and to provide clean cooking fuel by starting cooking gas agency in Bhojdari and livelihood activities of vermicomposting and nursery in Purushwadi were short-lived, it gave women confidence. SHGs gave them exposure and information through trainings, study tours and led to cooperation amongst women. The respondents in Bhojdari stated that *“the qualities of sacrifice and patience enable them to face criticism and bring endurance”*. For one of the respondents, self initiative helps her to express views.

**Support Required for Addressing Women’s Development Preferences:** In Bhojdari, support is required for activating non-functional SHGs by involving young, vocal, and educated women. It was emphasized by all that, *“support and cooperation of men is a must otherwise women will not be able to work. Even if men do not support it will do, but at least they should not put obstacles, which demoralises women”*. In Purushwadi, need for training, information dissemination, exposure to outside world, support and cooperation from government officials for accessing schemes was stressed. During the group interview it was stated that, *“due to extreme poverty women are dependent on daily wages and no woman can devote time for development work. Hence, there is a requirement for an outsider/woman who can visit the village to guide, facilitate, and give information”*. *“There is urgency for unity amongst women”* this opinion was stressed by majority of the respondents.

## Discussion

Data reveal that development preferences shared by women in both villages are largely influenced by gender roles. This is reflected in other studies as well (EKATRA, 2003; MoPR, 2008). However, the topmost preferences stated as provision of “employment for women within the village” and “public transport” is indicative of the change in women’s viewpoint. Here it should be recognised that these two preferences are not seen in isolation, but their linkages with other village development issues have been noticed by the respondents. This

change can be attributed to increased expectation from women to contribute towards family earning even by working outside the village if required, which is the case with majority households in both villages given their impoverished state. Thus, despite limited exposure to outside world and contradicting gender roles they are expected to perform, women consider mobility (transport facility) and employment as the topmost priorities. It was noted that the woman Sarpanch of Bhojdari recognised a need for supporting the single women.

Majority women reported they do not have any information or knowledge about the 73rd amendment and the rights and provisions it offers. Although women are aware about Gram Panchayat's functions their participation as representatives in the PRIs is insignificant and women members have not been able to address their development preferences in a satisfactory manner. As a result they do not form part of the governance process of decision making and participation in various stages of the development activity (awareness building, planning, implementation, monitoring/supervision, auditing). Although tribal as well as non-tribal village was studied, the difference observed between two villages regarding the role played by women in addressing their development preferences is minimal. The non-tribal village, Bhojdari is slightly better because it is the larger village in the group Gram Panchayat, whereas the tribal village, Purushwadi being a smaller village, has accorded indifferent treatment by larger village. Slightly better exposure and domination of a Maratha community, which is considered as powerful landowning community, do not have any crucial implication in terms of political participation.

In both villages, women identified a patriarchal social structure, absence of unity amongst women, and absolute lack of training, capacity building efforts regarding the Panchayat raj system and the 73rd amendment as being the biggest impediments. This reiterates the findings in various national and international studies that women face several social, cultural, and religious challenges hindering their political participation and the Panchayats mirrors gendered social realities. They reveal that though the quotas ensure seats for women in local politics, they fail to ensure exercise of power by the women. (Bari, 2005; Beall, 2007; Deshpande and D'Souza, 2009; IDRC, 2006; IDRC, 2008; Kaul and Sahni, 2009; Panday, 2008; Vissandjee, *et al.* 2005).

The data reveal that although development efforts like watershed development programmes and formation of SHGs have many enabling implications for women, they are inadequate to empower women and to qualitatively enhance women's political participation. Other studies (Sangameshwaran,

2006; Seeley *et al.*, 2000) echo similar findings that contribution of SHGs is limited to household food security or incomes by providing women with funds for household consumption and investment in income-generating initiatives. However, it is to be recognised that watershed programmes or SHGs have other objectives and participation of women in local self governance is not their focus. But the contribution of such programmes needs to be acknowledged as they not only give women a platform to come forward in public sphere, but also offer handholding due to which women get exposure, gain confidence, get inspired for political participation, and feel enabled to articulate their problems.

Thus, it is found that women members of PRIs are still on the margins and have not earned any significant place. Hence, it is critical that women reach a level of empowerment that allows them to exercise their rights provided by the 73rd amendment and to participate actively in PRIs. It is evident that there is an urgent need for uniting women, imparting training and capacity building efforts related to various aspects of village PRIs and also provide handholding support on a long term basis till women gain confidence and get empowered. This need is the all the more urgent as we gear up to climate change adaptation, when all human resources are required to contribute their bit and from the perspective of their needs.

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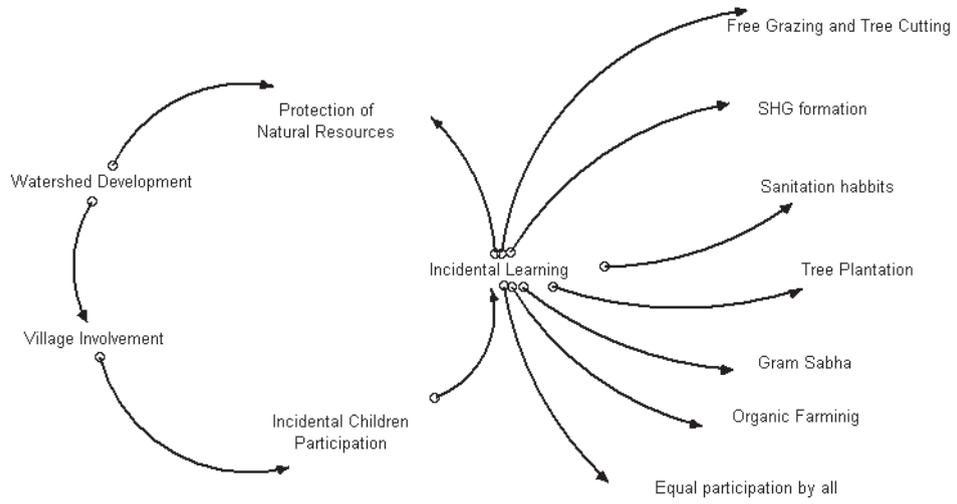
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### References

1. Babbie, E. (2005): *The Basics of Social Research*. Thomson Wadsworth. U.S.A. <http://books.google.co.in/books> dated 21-10-2010. 11.50 am
2. Bari, F. (2005): *Women's Political Participation: Issues and Challenges* (draft paper). Bangkok.

- United Nations; Division for the Advancement of Women (DAW). <http://www.un.org/womenwatch> dated 7-10-2010. 11.50 am
3. Beall, J. (21 March 2007): Decentralization, Women's Rights and Development. Development Studies Institute. London School of Economics and Political Science. <http://www.idrc.ca> dated 11-10-2010. 11.30 am
  4. Behar, A. and Y., Kumar (2002): Decentralisation in Madhya Pradesh, India: from Panchayati Raj to Gram Swaraj (1995-2001). Working Paper 170. Overseas Development Institute. London (1-98).
  5. Bhasin, K. and Nighat, Said Khan (1986): Some questions on Feminism and its relevance in South Asia. Kali for Women. New Delhi. Pp. 1-22.
  6. EKATRA: Society for Development Alternatives for Women (2003): "Women's Experience in Local Self Government" in Women and Governance: Reimagining the State. New Delhi. pp 28-38.
  7. Despande, R. and M., D'Souza (2009): Panchayat Raj on the Ground: Issues in Village-Level Panchayat Raj Operations. Watershed Organisation Trust (WOTR), Pune.
  8. Guidelines on Women's Empowerment. United Nations Population Information Network <http://www.un.org/popin/unfpa/taskforce/guide/iatfwemp.gdl.html> dated 9-11-2010. 3.50 pm
  9. International Research Development Centre (IDRC) and Unnati (2008): Making Space: An Enquiry into Women's Participation in Local Politics in Rajasthan.
  10. Institute of Social Studies Trust (ISST) (2005): Women in Leadership Positions: A Scoping Paper. New Delhi. 1-50.
  11. Kaul, S. and S., Sahni (2009): "Study on the Participation of Women in Panchayati Raj Institution". in Stud Home Comm Sci, 3(1): 29-38.
  12. Meadowcroft James (2009): Climate change Governance. Background Paper to the 2010 World Development Report. The World Bank.
  13. Ministry of Panchayati Raj (MoPR) (2008): Study on Elected Women Representatives in Panchayat Raj Institutions. Government of India. New Delhi.
  14. Mohan, S., and R., Manorama *et al.* (Unpublished): Women and Political Participation in India. International Women's Rights Action Watch Asia Pacific (IWRAP Asia Pacific). Malaysia. <http://www.iwraw-ap.org> dated 9-11-2010. 4.23 pm
  15. Panday, P.K. (2008): "Representation without Participation: Quotas for Women in Bangladesh" in International Political Science Review. Sage Publications. Vol. 29, No. 4, pp. 489-512
  16. Rahman Khan, M. and F., ARA (January-March, 2006): Women, Participation and Empowerment in Local Government. Bangladesh Union Parishad Perspective. Asian Affairs. Vol. 29, No. 1: 73-00, CDRB Publication. <http://www.cdrb.org/journal> dated 9-11-2010. 3.25 pm
  17. Randive, J.D. (2009): Women in Self Help Groups and Panchayati Raj Institutions: Suggesting Synergistic Linkages. [www.cwds.ac.in/OCpaper](http://www.cwds.ac.in/OCpaper) dated 10-5-2010. 10.44 am
  18. Robledo C., Blaser J., *et al.* (2008): Climate Change and Governance in the Forest Sector: An Overview of the Issues on forests and Climate Change with Specific Consideration of Sector Governance, tenure and Access for Local Stakeholders. Right and Resources Initiative. Washington DC.
  19. Sangameshwaran, P. (May 27, 2006): "Equity in Watershed Development: A Case Study in Western Maharashtra" in Economic and Political Weekly. 2157-2165.
  20. Satapathy, S. (year not mentioned): Women's Empowerment and Panchayati Raj: A Case Study from Orissa (India). [www.onlinewomeninpolitics.org/india/satapathy](http://www.onlinewomeninpolitics.org/india/satapathy) dated 28-5-2010. 3.10 pm
  21. Seeley, J., and M., Batra, *et al.* (2000): Women's Participation in Watershed Development in India. Gatekeeper Series 92. International Institute for Environment and Development. Sustainable Agriculture and Rural Livelihoods Programme. London.
  22. Singh, A.P. (March 7, 2009): "Women's Participation at Grassroot Level: An Analysis" in Mainstream. Vol XLVII No 12.
  23. Stern N. (2006) (Pre-publication edition): The Economics of Climate Change: The Stern Review. Cambridge University Press. UK. <http://webarchive.nationalarchives.gov.uk>
  24. Vissandjee, B., and A., Apale, *et al.* (2 November 2005): "Empowerment Beyond Numbers: Substantiating Women's Political Participation" in Journal of International Women's Studies. Vol. 7. Pp. 123-141. <http://www.bridgew.edu>. Dated 7-11-2010. 4.50 pm.
  25. Waring, M. (2010): Women's Political Participation. Department for International Development (DFID) and the International Development Research Centre (IDRC). <http://www.encyclopedia.com/topic/Patriarchy.aspx>. dated 3-3-2011. 10 am
  27. Website of the National Democratic Institute (NDI) [http://www.ndi.org/content/womens\\_programs/](http://www.ndi.org/content/womens_programs/) dated 8-11-2010. 3.35 pm





# Incidental learning in school going children during the Watershed Development Process in Two villages of Maharashtra

Ratna Yashwante and Shalini Narnaware

## Abstract

The present study attempts to document incidental learning in children in the particular set up of a watershed development project. Data for the study was collected from two villages – Naralewadi and Wankute where the watershed development project had been completed two to three years prior to the study. The participants of the study were the children of the age group 12 to 16 years. The tools used were the narrative research method through drawing and story writing by children and also through group discussions, in-depth and key informant interviews. The findings reveal that the stories and drawings speak about the changes that occurred during the interventional stages of watershed development. In both the villages children mentioned about the full involvement of their parents. They have noted the changes in the social fabric, as well as the physical impacts and the benefits – social and financial – of the various activities implemented. They were observant too of the adherence to the norms that were enforced and their direct benefits.

This study has surfaced what the children have absorbed through incidental learning. Hence consciously promoting the involvement of children in all the processes will further enhance their understanding of the development process which in turn will ensure sustainability of the regenerated natural resources.

## Preamble

Social mobilization takes place during various stages in the implementation of watershed development. The involvement of all groups within the village is sought in the process and the active participation of the community is considered very important for sustainability. With the participation of adults in the various activities, children are also present from time to time together with their parents. At times, the school takes advantage of the project and uses it as an opportunity to teach children about the environment. While the adults are the key stake holders in the project, children are generally not included or involved.

## Incidental learning

Incidental learning describes the process in which a child gains knowledge from interactions with its environment. This learning process lacks formal structure or objectives and is guided by real-world experiences. Through incidental learning, children learn fundamental skills that they will use throughout life.

This method of learning promotes enjoyment and engagement while learning. The rigid structure of a school classroom is replaced with a flexible environment in which children are allowed to explore. A child's natural inclination towards making observations, completing tasks and solving



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problems allows him to unknowingly acquire knowledge.

A child's acquisition of incidental knowledge begins at birth. Children learn language, numeracy, social and scientific skills before they begin kindergarten. Daily play and conversation contribute to the development of this knowledge. At school age, knowledge expands through natural inquisition and increased comprehension of the diverse activities the child takes part in.

Incidental learning occurs most frequently outside of school, and parents play a large role in shaping learning. Young children imitate the language and behaviors of their parents from infancy throughout adolescence. Parents can influence a child's learning through modeling positive behaviors and engaging children in social conversations.

## Introduction

Apart from formal education children do learn through observing others' behavior, attitudes, and outcomes of those behaviors. According to the *Social Learning Theory* by Bandura "Most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action. Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences."

During the process of watershed development (WSD), by merely accompanying their parents, children in the villages observe and absorb many things. Through such incidental learning, they learn to conserve, enhance and regenerate natural resources. It is the children who will play an important role in protecting the regenerated watershed when they take over as adults. They are the future of our society. Hence when they learn about conservation and protection of the natural resources and understand about adapting to weather variation, they will have grasped the reasons and will take the necessary action when they grow up.

The **objective of this study** was to understand incidental learning in children that occurred while implementing watershed development project.

## Methodology

Data was collected through **narrative research** method by asking children to write stories and draw a picture of watershed development activities.

Additionally data was collected through focus group discussions, key informant interviews and in-depth interviews.

**Clendenin and Connelly** define Narrative Inquiry as a method that uses the following field texts as data sources: stories, autobiography, journals, field notes, letters, conversations, interviews, family stories, photos (and other artifacts), and life experience. Narrative inquiry is a way of understanding experience. It is collaboration between the researcher and the participants, over time, in a place or series of places, and in social interaction milieus. An inquirer enters this matrix in the midst and progresses in this same spirit, concluding the inquiry still in the midst of living and telling, reliving and retelling, the stories of the experience that make up people's lives, both individual and social. Simply stated... narrative inquiry is stories lived and told. Story collecting as a form of narrative inquiry allows the research participants to put the data into their own words and reveal the latent "why" behind their assertions.

## Study site

The identified and selected villages were the recently completed WSD projects during the last two to three years. These villages were Narlewadi from Ambad Taluka of Jalna district and Wankute from Sangamner taluka of Ahmednagar district. Narlewadi is a hamlet with only 35 households. The duration of watershed development project in the village was about four and a half years. Wankute village has 253 households in the main village and two hamlets. The village is politically dynamic. The watershed work started in 1998 and was completed by 2007 as it was stopped in between due to insufficient funds.

## Sampling

The criteria for selecting the sample were to identify and select those children who were present in the village during the watershed development period and that they necessarily were in the age group of 12 to 16 years at the time of the study. These children were 8 to 12 years of age at the time of project implementation. This age group would be able to remember the incidents that happened around them. Ten children from Narlewadi village and 57 from the Wankute village participated in story writing and drawing activity. Two in-depth interviews with the children and two key informant interviews with parents were conducted in Narlewadi, while in Wankute two focus group discussions were conducted with girls and boys separately.

## Scheme of Analysis

A content analysis of all drawing and stories was done to understand their incidental learning. The pictures drawn by children were matched with the key issues of the project as identified by the project staff. For the stories too, the key issues were identified and counted in the same way. For the qualitative data the analysis was done manually on the basis of the objectives defined. The transcribed and translated data was used for analysis. A list of key issues related to the watershed development process was prepared and the data findings were matched with it.

## Watershed development activities implemented in the villages during project period

The implementation of watershed development included various components. This was taken up with the support of an implementing agency that accompanied the villagers for the duration of 4-5 years of the project period. The key issues identified in this study are the *village institutions* which consisted of the gram sabha (general body meeting of the village), village development committee, and self help groups (SHGs). The *implementation activities* were exposure visit, shramdan (local contribution), tree plantation, continuous contour trenches, and check dams. The *disciplines to be followed* were ban on free grazing, ban on tree cutting, equal participation by women, participation by all classes and communities and finally *other village development activities* such as solar lamp installation, drinking water systems and distribution, biogas, vermi compost, toilet and bathroom construction, drip irrigation, horticulture, kitchen garden etc.

In village **Naralewadi** the watershed project started in 2005 and was completed in 2008. Initially the people were not cooperative. There was a misunderstanding that the organization wanted to acquire their lands. This was clarified by the teacher who acted as a mediator between the organization and the villagers. The teacher took the initiative right from beginning and until the completion of the project. He involved all the children in the different activities. Children were taken to Gunjalwadi village in Sangamner taluka of Ahmednagar district, to see the work undertaken by the school and the plantation. The Naralewadi school has decided that every year children would be taken on an educational tour to understand biodiversity and nature and the environment. This helps to develop a love and understanding of nature and stimulates creativity in children. During the watershed development activities children were attending village meetings with their parents.

Committees were formed during the process for monitoring the work and for other developmental activities. Children heard about the committees and their role during the village meetings. As required of the village, the NGO helped the women's SHGs by financially supporting (through soft loans) the flour mill, pulses mill and a chaff cutter. The developmental activities such as provision of solar lamps, drinking water taps, biogas, vermi composting, toilets, bathrooms, drip irrigation, horticulture, kitchen gardens were promoted.

As part of project activities, Independence Day was celebrated. Essay writing and drawing competitions, distribution of books and news articles on environment, were some of the activities conducted during project period.

In **Wankute** village watershed work had taken longer duration than the Naralewadi. Initially people were not ready for shramdan. The NGO staff sought help of the school. The teachers motivated the children to do shramdan on weeding and mulching. Observing this, the adults joined in the work. Children did "Shivar pheri" (a march through the village to make all aware about watershed development). The exposure visits helped motivate the people. A play ground was prepared for children at school. The farming equipments were provided as part of the project activities as also low cost solar lamps, and vermi compost pits. Toilets and bathrooms were promoted in the village. Hot water chulla helped in making hot water available for bathing, while the cooking is simultaneously done. The pipeline in the village provided water close to the household after common water tank for village was constructed during the project period. A common hall, the "Mahila Sabhagriha" was constructed in Wankute. Now, space was available for women to conduct meetings. For each home, saplings were distributed to the children to nurture them. For the two hamlets that are on the hill top, the water problem was solved by digging a well with people's contribution (shramdan). All the groups in the village participated in the project implementation.

## Findings from Drawings and Stories

The activities were conducted in both the villages where ten children from Narlewadi village and 57 from the Wankute village participated. The drawings prominently show the various implementing activities (tree plantation, shramdan, check dams, CCTs, WAT, drip irrigation). Children have shown the infrastructure development in the village in their drawings such as bio- gas, toilets, solar lamps and flourmill. Children from Wankute have also depicted similar pictures and have included the women's hall and farm ponds.

All the children from Naralewadi have mentioned the flourmill as well as bicycles in their stories. Majority of the children from the Wankute have mentioned about the gramsabha in their stories and the various watershed treatments. Some have mentioned about SHGs.

The “Mahila Sabhagriha” constructed in Wankute has been mentioned by children as an important place. Water availability has been captured in the stories of both villages. The internal road constructed in Wankute is also reflected in the stories.

## Discussion

### *Naralewadi*

Children have understood how the frequent village meetings (which had not occurred prior to project implementation) have resulted in people coming together to work for the village. They stated that both men and women participated equally. The importance of tree plantation and its nurturing by observing adults was informed by teacher in the school is a learning. The event of exposure visits of adults to nearby treated watershed villages occurred for the first time in their life and that the adults had benefitted was reflected in stories by children. Children must have heard the adults talking about the exposure visits.

Children have mentioned that due to watershed development self help groups of men and women have been formed in Naralewadi. They stated that there were ten women in each group. They learned that women come together for SHG meetings and to save money. They are aware that women took loans at an interest of two percent per month. They think that their mothers took loans from SHGs for running the house, to purchase seeds and fertilizers. Some of the children have also attended the SHG meetings. Children have stated that SHGs have helped women to express their views, because of which they can now speak in gramsabhas.

The infrastructure interventions have an impact on children’s lives. They have shared about solar lamp, which lightens the darkness and that they are able to study at night. The flour mill is another important benefit that the children see. All the children seem happy that there is a flour mill in their village, since before this their parents had to go four km away to nearby village Jamkhed for grinding grain. In the stories and discussions, the children have related how toilets and bathrooms were constructed during project and open defecation stopped. This has led to cleanliness in the village. Today, all people of the village use toilets. Children expressed that every village should have biogas plants as these lessen the physical stress on women who spend much

time collecting firewood and have trouble cooking in smokey kitchens.

Because of watershed activities the ground water level has increased and now it is available in wells even during the summer. Children shared that earlier only cotton was cultivated in the field. Now because of the availability of water horticulture is being taken up. Due to drip irrigation there were changes in crops. Sweet lime is now being cultivated as a cash crop in the farm. The children observed the benefit of organic farming and stated that by the use of vermi compost in farms agricultural production is better than when chemical fertilizers are used. The message of tree plantation has been well absorbed by the children. All drawings show plantations prominently.

The bicycles were provided to school children in the village as the secondary school is far from the village. That owning a bicycle gives children great joy was communicated during the group discussions.

As stated by the teacher of the village, in the pre-watershed period, people migrated for livelihood to nearby villages with their families. This greatly affected the education of the children. But with watershed development, people have livelihood opportunities within the village and children are able to attend school regularly. They were also able to learn by observing the watershed development process.

### *Wankute*

The stories of Wankute tell of the frequent village meetings conducted for watershed works were at night, where both men and women equally participated. Children could not attend these. The decisions taken in such meetings were for the village e.g. construction of common well. Children shared that their parents and relatives participated in the field work, tree plantation, formation of CCTs and check dams were for water conservation. The importance of plantation was explained to villagers by the NGO staff in village meetings and children heard about it. The ban on tree cutting and free grazing as integral components of the watershed development also surfaced through the stories and group discussions.

SHGs concept emerged due to watershed work and the space is made available for the women’s SHG meetings which conveyed to them that the SHGs in village are a significant factor in women’s life. A 14 year girl from village Wankute said “*Women started working outside our village since watershed development was started. Before this they were restricted to cooking and child rearing. Women gain knowledge through exposure to the outside world. Now they have*

formed SHGs and save money, thus they are developing themselves." The children expressed that loans are required in the rainy season when there is less income.

Regarding infrastructure development children learned that by construction of dams the water level in the wells has increased and water is available in the drinking water tank. The construction of common water tank which supplies water near the household through the pipeline is considered an innovation according to children. An internal road in the village had been constructed. People have taken efforts to maintain village cleanliness by forming a drainage system and the disposal of solid waste. They have understood the importance of village cleanliness.

Their recollections regarding agriculture were similar to that of Narlewadi, except that earlier only wheat, bajara and chana were cultivated in Wankute, but now with availability of water cash crops like onion, potato, tomato, garlic etc. are grown in the farms.

Children had expressed that they considered it their responsibility to transmit this information to the next generation. "We are children now, will grow up as adults and will teach the younger ones about water conservation, plantation and importance of ban on grazing" said children in group discussions at Wankute.

All villagers of Naralewadi participated in the watershed development activities. Village Wankute is large, politically dynamic and their participation was less as compared to Naralewadi. Yet, the learning by children in both villages is the same.

It was the demand of the children that they participate in the watershed development activities for plantation, village cleanliness, watering the plants, taking care of the plants. The parents expressed that they would like that the older children who are in high school, could assist with the writing required for maintenance of records, SHG accounts, attendance record of people working on project site. This is possible because the older children know how to read and write. Teachers suggested organizing competitions like essay writing, drawing on the subject of watershed, as well as study tour of children to treated watershed villages are helpful. They also suggested that the high school children could participate in village surveys and can be given books, stationary and any educational material in return.

## Conclusion

Children have imbibed a lot of knowledge while the watershed development project was implemented in the villages, although no serious effort was made in that direction, as has been observed in this study. Hence, when conscious efforts are made to involve children in the various processes, they will understand the purpose of the interventions and the benefits. They will grow within a child friendly watershed development project. They will learn negotiation skills and to weigh the benefits of maintaining their natural resources and of working together for the same. Thus they will be more effective leaders. As watershed development is being implemented throughout the country and when adaptive capability is provoked, it is a golden opportunity for the next generation to be groomed for conserving and protecting of natural resources. Hence, if the education department encourages active participation of children, we will be ensured of an informed Gen-next that will take care of the resources for their coming generations.

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## References

1. Informal and Incidental Learning by Victoria J. Marsick, Karen E. Watkin
2. In praise of incidental learning Lessons from Some Empirical Findings On Language Acquisition, Warwick B. Elle
3. Learning theory', *the encyclopedia of informal education*. Smith, M.K. (1999) Social Skills: Promoting Positive Behavior, Academic Success, and School Safety, National Association of School Psychologists, 4340 East West Highway, Suite 402, Bethesda, MD.
4. Social Learning Theory – Bandura, A. (1977). New York: General Learning Press.
5. The Narrative Method of Inquiry, Second candidacy essay by Richard Giovannoli, M.A.
6. A story about Narrative Research, chapter Four – University of Pretoria
7. Babbie, E. (2005): The Basics of Social Research. Thomson Wadsworth. U.S.A. <http://books.google.co.in>.

8. Indian Journal of Social Science Researches, Vol. 7(1), March, 2010, pp 77-82
9. Feasibility Study Report, Wankute and Naralewadi Villages. 1995. Watershed Organisation Trust, Ahmednagar.

# Epilogue

## **Gleanings, More Questions and More Studies Required**

This set of studies emerged as an attempt to understand the rural communities of Ahmednagar district, as we initiate the project on Climate Change Adaptation. As I go through this collection I know that we are not even scratching the surface. There are thematic gaps, gaps of components within these, as well as gaps of depth. There is a vast area that requires study. Two points strike me. Firstly, the rural community is struggling with the here and now, fighting the battles of inclement weather, of market forces, and the cost of living. The situation forces them to see their future only in survival terms. They can barely think of climate “change” preparedness. Secondly, in attempting to better understand their (and our) situation, one necessarily needs to look at it with its linkages and complexity and that too in a continuously changing context. As the human mind attempts to comprehend it, the world out there is complex and continuously changing. We can only be very humble and sensitive. We need to work together with our rural counterparts, for together we are affected; for on them depends the clean air, food and water security for our expanding urban sector; for on them too depends the natural resources... We need one another. We need to progress together.

The findings of these studies have been heard of before. Yet they throw new meaning when looked at in the light of climate change (adaptation and mitigation) and looked at together with their interlinkages, the unintended effects (positive and negative) and also our mal-adaptative quick-fixes. The studies bring to fore the current context and its impacts. They make us realize that “Action Research” is what is called for as we adapt to climate change. Action Research when done together with the rural communities will make them and thus us ‘adapt-able’.

Reading these studies surfaces a lot more of questions, thoughts and reflections.

In rural areas, as land becomes more productive through watershed development, it gets divided within the family. The overall benefits are tremendously reduced as small landholdings are unviable when cultivated by nuclear households. Local weather variations, market fluctuations add to the uncertainty of income from agriculture. Hence, there is a need for farmers to plan and work together towards “win-win” and “safe-fail” solutions. Can an answer lie in contemporizing the traditional (now forgotten) “SAWAD” and other traditional systems, but with appropriate methodologies? Identification of traditional practices, and studies and experimentation in this area is required. Sparking renewal and innovations of the traditional practices by the local communities will foster ownership and will also trigger the creativity required for continuous adaptation.

What people consider essential are food and water security and cash income. In their desperate need for hard cash, farmers do not seem to have analysed sufficiently the fluctuating market prices and the crop damage (due to pests and soil quality depletion). Their need for hard cash leads them to focus on mono-cultivation, high investment farming year after year, on their small patches of land. Since this is an agrarian economy and as watershed development has re-captured the degraded lands, should we not promote agriculture to first meet the village and cluster level food security ie a local market and later the external market? This will address local food security, promote diversification of crops, bring in cash income and also reduce the carbon footprint (contribution to mitigation) by reducing transport.

Work (facilitation) definitely needs to be done to help the villages, as a group, to reflect on the current practices they follow and how they manage their resources (land, water, fuel, livestock, human, implements, draught power, energy, etc) and the connections of one to the others. This calls for identifying the various and viable livelihood possibilities for an optimum population. Contemporizing traditional systems with appropriate practices, adopting relevant

technologies and meeting the local service needs from within will bring in ownership. Conserving the natural resources will maintain in the fore the requirements of the great grand children. And the aspirations of the rural GenPresent (youth) will be found within.

All human resources within, particularly those otherwise considered unimportant, have much to contribute. The perceptions of both women and men are important as each contributes to constructing the whole. Beginning from their circle of influence and desires, and provided with the necessary skills women will willingly take up those developmental components that directly affect their

lives. As children absorb the processes taking place, we are ensuring that the benefits of the investments (funds and human resources) continue to be harvested long after project period. Our children will be adapt-able.

As we work out our former President APJ Kalam's PURA within the climate change context, we go back to realizing the dream, "Gram Swaraj" of Mahatma Gandhi, the Father of Our Nation.

**Marcella D'Souza**  
*Executive Director – WOTR*

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## Watershed Organization Trust (WOTR)

The Watershed Organization Trust (WOTR) is a not-for-profit NGO founded in 1993. Its operations presently span five Indian states – Maharashtra, Andhra Pradesh, Madhya Pradesh, Rajasthan and Jharkhand.

WOTR's mandate is reflected in its vision *“communities, especially the poor within, are empowered and secure their livelihood and well being in sustainable ecosystem.”*

Since its inception WOTR has been working in resource-fragile semi-arid rain-fed regions through participatory watershed development. Now, WOTR has moved from *“regenerating the degraded lands through in-situ harvesting of rainwater”* to a holistic integrated and systemic ecosystems based model of community development that aims to address climate variation and climate change.

WOTR mobilises the communities to tap into their capacities to help them move on the path of equitable sustainable development – and along the way – reduce poverty, through regenerating the eco-space and watersheds they live in. It helps the rural communities in resource fragile rain-fed and drought-prone regions, to organise themselves, to respond to, emerging climate variations while enhancing their adaptive capacities, to address the climate change.



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