

DROUGHT: a litmus test for Watershed Development

Does Watershed Development drought proof local economies?

Narratives from the Summer of 2013

Acknowledgements

The WOTR team expresses its gratitude to its Regional Resource Centres of Aurangabad, Dhule and Sangamner for their support. We are extremely grateful to the communities of Kachner, Kasarwadi, Bhojdari, Jambhuldara, Pimpaldari, Kalamb, Malegaon Pathar, Khandgedhara, Sattechiwadi Kumbharwadi, Mhasrul, and Malkheda for sharing with us their experiences and concerns.



Editorial Team: Radha Kunke, Radhika Murthy, Marcella D'Souza

Experiences of villagers as told by WOTR Team: Radha Kunke, Radhika Murthy, Himanshu Khole, Harshal Khade

March 2014

ISBN: 978-81-86748-39-8

Contents

Preface

The drought of 2012-2013	1
Ground Zero: WSD tales – from the People – Watershed, a solution to Drought	3
Young & Old Watersheds	4, 5, 7, 10, 14, 17
Watersheds in Transition	19, 20
Watersheds in Danger	22, 23, 25
Learnings from the Ground: The need for Water Management	28, 30
Going Beyond Watershed Development: Technology for efficiency	32
Water Budgeting & Crop-planning – a way forward.....	34
Integrating WSD and Agri-practices into National Schemes – The PPCP Model	38
Moving towards Climate Change Adaptation.....	45

Preface

Droughts are difficult to see. Unlike earthquakes and tsunamis where thousands come running to help, and funds pour in from all quarters, drought is rarely seen as an emergency. They are an emergency and effect man and animal alike.

The **2013 drought in Maharashtra** came about after the region received lower rainfall during the monsoon season June to September 2012. It is considered as the region's worst drought in 40 years. The worst-hit areas in Maharashtra are Solapur, Ahmednagar, Sangli, Pune, Satara, Beed and Nashik. Residents of Latur, Osmanabad, Nanded, Aurangabad, Jalna, Jalgaon and Dhule districts are also affected by this famine.

The drought in Maharashtra gripped bit by bit every day leaving villages thirsting for water and just plain hungry for food. People who could migrate, men and anyone with the ability to scrape a living left, leaving those behind who cannot afford to leave: leaving the young, old, and the disabled behind and the women in the families looking after them. The burden of survival falling squarely on them.

This is an account of how Watershed Organisation Trust (WOTR)'s approach of Ecosystem Based Integrated Watershed Development was tested against climate variability. Watersheds and their perception by the effected communities were covered and the results are documented here.

The stories we bring are people's direct experiences and in their voice. It strongly suggests that drought can be faced and in most cases beaten. Indeed, in the words of our visionary Fr Hermann Bacher, **“Without Watershed Development there is no solution to Drought”**.

The Drought of 2012-2013

The drought of 2012-2013 was expected equally by the meteorologists who had scientific forecasting data and by the people who have an innate sensing, being closely connected to land, sky and seasons. The Indian meteorological department (IMD) predicted that the second half of the 2012-2013 monsoons would be deficient due to El Nino conditions... and the people in the villages were preparing by planning their crops and caching fodder.

Fourteen districts in Marathwada, Khandesh and southern Maharashtra were declared drought-hit. More than 11,000 villages were hit by water crisis and 3,905 villages suffered more than 50 per cent crop loss.

Unlike in 1972, the current drought was characterised by a severe drinking water crisis, both for humans and cattle.

The Drought 2012-2013 saw:

- 2,136 tankers delivering water to 1,663 villages and 4,490 hamlets every day.
- 553 fodder camps set up for 45,200 cattle, which cost about Rs 749.29 crores.

Maharashtra is a pioneer in watershed development. With 43000 micro watersheds treated, Maharashtra has conserved, regenerated and managed its water resources in 12.5 million hectares (ha) of the state's 24.1 million ha. Marathwada, which was the worst drought affected region, has undergone 42 percent development work. According to the state's agriculture commissioner Umkant Dangat, Rs 60,000 crore has been spent on the watershed development in the past 10 years. Watershed development demands an integrated approach based on geo-hydrological characteristics of the watershed. It requires multiple treatments including contour and compartment bunding, creation of vegetation to conserve moisture and construction of water-harvesting structures in the right sequence from ridge to valley in a time-bound manner.

But Watershed Development is not only about soil and water conservation works. It is also about people and the communities living in them. According to expert opinion the good practices of WSD require some key attributes:

- Capacity-building of village functionaries, barefoot technologists and the community itself. This is best carried out through civil society organisations who work with communities on the ground.
- The gram sabha (village assembly) has the power to constitute the Village Watershed Committees



Ganpat Hande, Bhojdari village started preparing for drought from January onwards... "We knew the drought is coming... and our animals would suffer. So I began collecting fodder. I use it for my own animals, and for whoever needs it in the village and surrounding villages".

- Agriculture development, land development, and livelihood-activities are integrated with the watershed treatments
- Monitoring & evaluation is carried out with the involvement of the community and shared with them.

The Indo-German Watershed Development programme (IGWDP), Maharashtra, made the first attempt to involve people in decision-making. It introduced innovative mechanisms to ensure sustained community participation and transparency. It was implemented entirely through NGOs in coordination with gram sabhas. A village watershed committee, selected by the gram sabha, was in-charge of implementation and control of funds. A fund was created for maintenance of structures.

The IGWDP began to show success and in 1998, the government of India introduced capacity building for watershed development under the Drought Prone Area Programme (DRAP) on similar lines. NGOs were roped in as implementing agencies under the supervision of District Rural Development Agencies (DRDAs).

WOTR took the people's participation further and developed a set of guidelines called the Wasundhara Approach. It introduced the process of village envisioning by the community and enlarged the scope of Village Watershed Committees to Village Development Committees (VDC). The second innovation introduced was of Wealth Ranking which made it mandatory that a proportionate representation of all economic sections in the village were included into the local institutions, with a special focus on gender.

The impact of Watershed Development has been tremendous at the ground level inspite of being allocated only Rs.12,000 per hectare as compared to Rs. 3.5 lakhs per hectare for surface irrigation from dams (that has the limited potential to irrigate 27% of the agricultural area). This has been especially evident in the drought of 2012-2013, where WOTR's watershed-treated villages showed far greater resilience than non-watershed treated villages. In many instances the watershed-villages not only had enough water for themselves, but also had enough to provide water to other villages.

We present here a collection of stories, about experiences straight from the watershed villages, along with interesting insights into how these communities "manage" water beyond the project period. Here, we also share WOTR's response on the field, while it may not address the water-agriculture livestock complexity in its entirety, the presentation offers a more adaptive and sustainable process that builds resilience.

The stories we bring are people's direct experiences and in their voice. It strongly suggests that drought can be faced and in most cases beaten.

Recent & Earlier Treated Watershed Villages: As Strong As Ever

The dramatic impacts of Watershed Development are best seen in the first 3 years – when water tables rise visibly and water is available throughout the year. These changes help people bring more land under cultivation, diversify their crops and crop yields, resulting in sharp rise in their incomes. The social impacts of collective decision making, the increased capacities to envision the development plans for all sections in the village, bring about cohesion in the villages hitherto not experienced. The capacity to link to other government programmes and schemes and leverage funds, bring about visible changes – better infrastructure, installation and better access to facilities, leading to an overall improvement in quality of life. These changes have been regularly documented in WOTR's Watershed Voices.

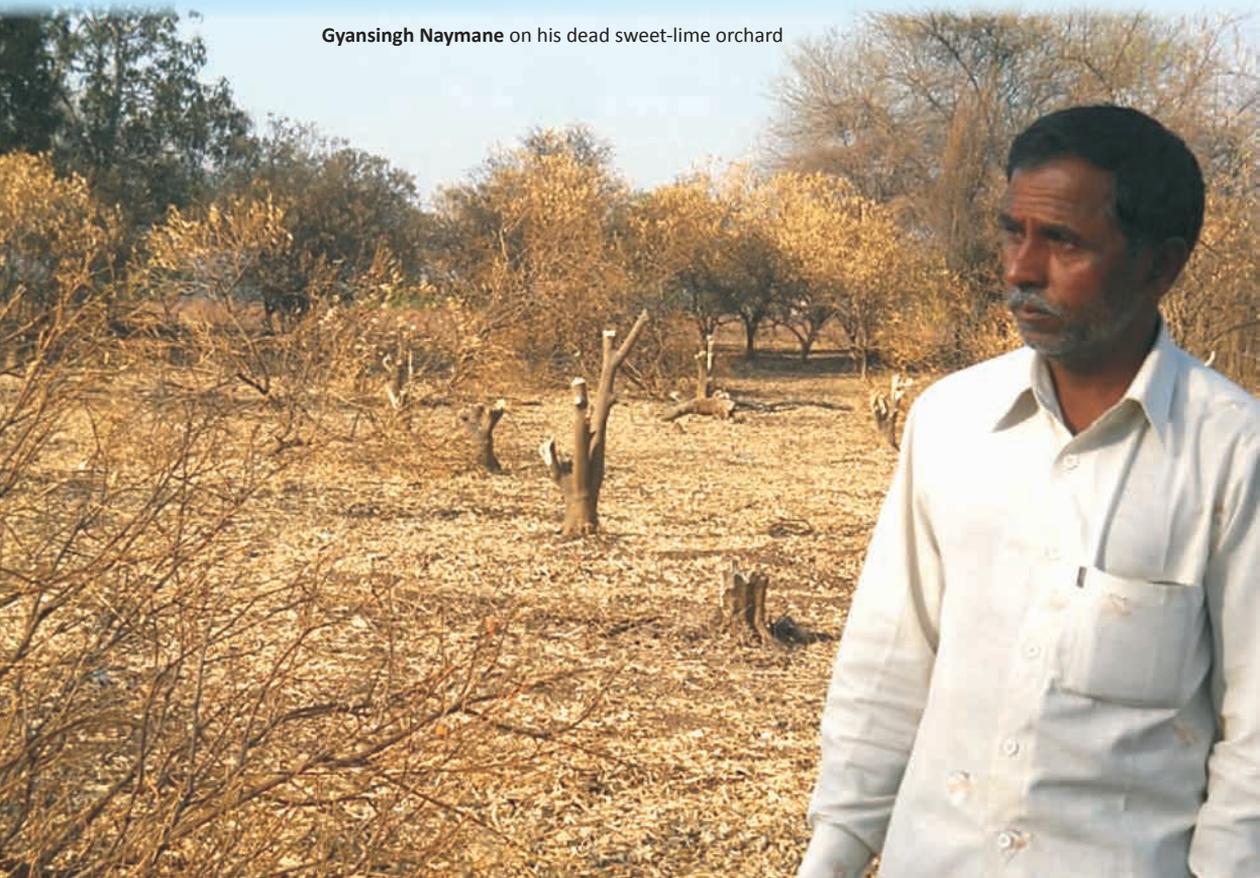
But how does all this hold up in a Drought scenario? Do watershed treated villages experience drought differently? Most definitely YES. The stories of the young (recently revived) watershed-villages of Kachner Tanda and Kasarvadi located in the heart of drought-hit Marathwada, make a strong case for Watershed Development as building resilience to drought. The old (earlier treated) watershed-villages of Bhojdari, Jambuldhara, Kalamb and Pimpaldari clearly point to the lasting impact of watershed development completed over a decade ago.

Kachner faces down the 2012-2013 Drought! (Aurangabad district)

Kachner is one of the few villages in the heart of the drought-land of Marathwada region, Maharashtra that has water for its people, cattle, and plants. But neighbouring villages of Adul and Jodwadi, a few kilometers away, are dealing with the death of their sweet-lime orchards, dying because of the lack of water. The freshly-bleeding stumps of Shaikh Akhtar's orchards and the JCB engaged to dig out the dead roots has its own story to tell. "I have lost 2000 trees this year", he laments, "there is simply not enough water to save them!" Akhtar of Adul village, however, is one of the richer farmers, and can perhaps take this hit. Not so Gyansingh Naymane of Jodwadi village who has lost 500 trees. "We looked after them like our own children and it breaks my heart to see them dying bit by bit. But what can we do? Our well has just enough water for us... and we are saving up all we can for the coming month", he says with tears in eyes as he watches his young sons chop down the dead trees with fruits still hanging on them. "I have invested Rs. 75,000 a year on them; the work had just about begun to give returns..." he said, wondering how he is going to recover from a loss he can barely withstand.

"The 2012-2013 drought is far more severe than the one of 1972. Then we had no food, but had plenty of water... but now we have food but no water!" say the elders of all the villages recalling grim times past.

Gyansingh Naymane on his dead sweet-lime orchard



Kachner, however, seems to be a contradiction amidst the harsh drought all around. “We pump up around 15,000 litres of water from this well and supply water to the whole village”, says Narayan Eknath Chauhan. “This well fills up 20-25 feet overnight. We can fill a 10-litre pot in 2 minutes flat, the rate at which water flows into well”, he proudly shares. He goes to the trouble of climbing down the well with a 10-litres-*handa* to prove his point, times himself when he starts filling the pot, and calls out triumphantly “2 minutes and full!” This is not the only well that has water. There are at least 4 wells which we counted that had anywhere between 10 to 20 feet of water.



Kachner Tanda has water in its wells and handpumps in the heart of drought – May 2013.

So, what is the secret of Kachner that it can survive a drought more severe than the one of 1972? Its people attribute this good fortune to the *panlot karyakram* (watershed development work) that the village had recently taken up. “We have worked on 1671 hectares around our hills”, says Pandit Babu Chauhan, the ex-sarpanch, “it is simple really... we followed a ridge to valley approach and built a variety of structures that slowed and stopped the water. This recharged our groundwater. 2012-2013 was a bad year all around. We have had only 262 mm of rain, or else you would have seen our wells overflowing”.

“*Water gives life*” might be an oft-used phrase it could almost be a cliché, but it couldn’t be truer than it is for Kachner. The village has seen its agricultural productivity more than double. Wheat production has gone up from 421 quintals to 1284 quintals. “We used to get 7-8 quintals of cotton normally. However, last year I harvested 13 quintals”, says Narayan Chauhan “because of the increase of water in our wells, we can grow not only rabi crops (sorghum, wheat) but also vegetables. We have grown cluster beans, brinjals, ladies fingers, methi on our plots which we have sold in the neighbouring villages”, says Kavita Jadhav, an SHG member.



Watershed development is not only about implementing a technical solution. There is much that goes behind the farm bunds, gully-plugs and the contour trenches. If that was all, a whole lot of places would be tanker-free like Kachner. “It works only when people come together. It is not always easy”, says Kalpana Mohite, WOTR-staff, “In Kachner too we had our share of difficulties, especially when people encountered our wealth-ranking

condition which employs differential contribution and benefits. Conflicts broke out. But once people saw the merits of the strategies, things began to fall into place”.

Kachner is an agglomeration of 6 hamlets, 45 kms from Aurangabad city, located in Aurangabad District of the Marathwada region of Maharashtra where Watershed Organisation Trust (WOTR) and its sister organisation Sanjeevani Institute for Education & Development (SIED) has undertaken a Watershed Development program supported by Karl Kubal Stiftung and the BMZ. Kachner stands as a shining example of how the good practices of Watershed Development and water management can actually withstand the impacts of drought.



Kasarwadi: a calm Eye in the Midst of the Drought Storm (Jalna district)

Kasarwadi's story can best be told by the village of Bantaakli, just 2 kms away. Bantaakli struggles for water. The 2012 -2013 drought was extremely harsh. Bantaakli waits in the sweltering heat for the 12,000-litre water tanker that labours to the village twice a day – once for the other side of the settlement and once for this side. The driver of the tanker brings the water from 15 kms away, usually in the middle of the night. As he starts towards the village, he rings up one of the villagers informing them that he is on his way. The whole village of Bantaakli then gets into action. Every type of container is carried to the 70-foot deep well – pots, buckets, cans, drums. And everyone – the young, the old, the strong, the disabled - all rush to “catch a place” at the edge of well. The tanker arrives and releases the water into the well. The 20-30 minutes that this takes is painful. There is an unspoken understanding among the people – that all will wait until the water is all in the well. And then the chaos begins.

Raghunath Deulkar, Gram Panchayat member of Bantakaali says “The drought this is far more severe than that of 1972”. He goes on to share his and his people's angst of the last 7 months. They have been getting tankers since October 2012. And the chaos and confusion and stress has been on since then. “Look at Kasarwadi”, he says, “just

Bantaakli village, 2013



2 kms away, and they have all the water they need. They have taken up watershed development in the village, built bunds and check-dams. Water seeps underground and fills their wells. What we need desperately is a Watershed Development program too. Even if it doesn't benefit us immediately, at the least the next generation will not suffer like us".

And it couldn't be truer. Kasarwadi does have water. Their animals are still in the village unlike Bantaakli's, where they have been sent off to fodder camps. Saumitrabai Shingade of Kasarwadi says, "We have plenty of water. We have been able to grow a variety of crops. And the SHG has given us loans to set up a variety of livelihood activities". Vishambhar Kharat, says, "We got only 200 mm of rainfall last year. Yet every drop went into the ground. Our jowar (sorghum) crops grew 7 feet tall". It is all because of the variety of measures we took motivated by WOTR. It is they who taught us how it could be done.

Bhimrao Nemane has a pomegranate orchard that gets irrigated by the water from his well. Bhimrao has started using drip irrigation, reducing his water and energy consumption by 50%. "The drip is very useful. It uses much less water. This means even in scarce conditions, my plants still can get water."



There is a family of 17 members – parents, brothers and their spouses, their children. It is a very big family even by rural standards. They all live together on their farm. They get their water from their well. “Our well gives us enough water to grow vegetables, cereals and fruits. It is also enough for our animals”, he says, pointing to the 4 cows/bulls resting under the shade of the tree. “And these days, during the difficult drought conditions, many families from around come to take water from us.”



Lessons in Water Management: Bhojdari (Sangamner block, Ahmednagar district)

Bhojdari with its rolling hills is a picture postcard watershed. But life here is hard because the land is hard. Literally.



Bhojdari resident, Vikas Amruta Hande relates, “In our village the soil depth is very little – in the best parts of the village it is about 50 cms, but in most of the village it is just 25 cms, after that one hits black, impervious rock. Even after drilling, no water is struck. And in any case, only families with someone working and earning good money in Mumbai can spend to drill a borewell. Most farmers here cannot afford this.”

Of the 40 borewells in the village, only 3-4 hold water as of today. Even if it does, there is water only enough for drinking and household use. That is why people here have learnt



lessons of water management along with watershed development. Bhojdari even has a new water management methodology developed by the villagers themselves.

Bhojdari has a population of about 1500 in all the small settlements of the village and more than 500 small and large livestock. In 2012, even though water was scarce, they did not need to bring a tanker to the village. In 2013 again the the rain was less. Although water has not flowed out even once from the community well outlet, the water holds its level just below the outlet.

Tukaram Vithoba Hande recalls how soil and water would flow off in the heavy rains before the watershed development program set foot in their village in 1996. But now, watershed treatments make the rain water seep into the earth, holding on to the precious resources of soil and water.

The WSD program rejuvenated the entire ecosystem. The saplings planted on the slopes have now become trees. The hills that once were bare now are forested with trees of *Gliricidia*, teak, halda, ghaavda, neem and other wild varieties. A lot of birds and even some wild animals like hyena, wolves, jackals, monkeys etc. can be sighted occasionally. The revived jungle has also brought the peacock here, which was never seen in this area before.

Earlier people had to cut down green branches and dry them to be used as firewood. But now the dried twigs of the planted trees provide firewood to the household. Many farmers also use branches from these trees to make farm implements. The Village Development Committee had collaborated with the forest department and carried out watershed development treatments on forest lands too. A Joint Forest Management Committee has been set up which looks after the forest.

About 4 months earlier (in December 2012) the village foresaw that the coming year would be a tough one to live through. Vikas Hande and some other farmers started formulating a water management strategy in discussion with the Sarpanch, Gramsevak and other Panchayat officials. They had observed that water from the village community lake seeped into the wells along the canal below it. So they proposed that the water that gets stored in the community well below the lake would be let into a drinking water tank. Once this tank is filled up, the remaining water could be released into the lake again and it would thus seep right back into the community well. By doing this, the valuable water conserved through watershed development would keep circulating and stored in the wells again and again.

When everybody was in agreement, the Gram Panchyat authorised this system. The Gram Panchayat also appointed a person responsible for switching on the motor when the electricity came on to fill the tank and also to switch it off the motor when the water level in the wells go low.

What is most remarkable is not this simple, ingenious system, but the sensible, farsighted decision making of the village, in the face of scarcity.

With daily utilisation, the water in the wells began gradually reducing. The village then decided to supply water every alternate day. According to their calculations, the well had sufficient water to quench the thirst of the village until the end of May, by which time they hoped the rains would come.

Water management was not only at a community level. It was at the individual level too. Vikas Hande, for example, made a rule for his personal well too. When the water level drops to about 4 paras (23 feet) he stops using it for irrigation, even though his crops get damaged by this. The remaining water serves as drinking water, not only for his family and livestock, but also for neighbouring families and their animals too. He shared the water with many families last year. Even during the 2012 drought- due to this water management strategy water was available in the lake, community well and in all of the four wells below the canal. Hence he did not need to give water to other farmers.

What Bhojdari clearly shows is that while WSD can set the foundations of water availability, and ensure that ground water gets recharged, finally it is the people themselves who have to manage this precious resource. The hard work of water and natural resource management through watershed development, backed by participatory decision making has had its rewards. Even in this drought, Bhojdari remains a picture postcard watershed.

Post Script: Taking advantage of the drought, WOTR initiated water budgeting and the use of micro-irrigation in Bhojdari. The people were well motivated. They wholeheartedly agreed. They wanted to learn to use water even more judiciously!

Jambhuldara: Still Going Strong (district Ahmednagar)

Jambuldara, Flashback



Jambhuldhara – The Past

The rains have come and gone. Diwali has come and gone. The bajra has been grown and harvested. It is time to leave the village. Families pack the little grain they have, to last them till they find work. Father, mother and children, will all work as labourers in Narayangaon, Junnar, Autur, Ahmednagar and other faraway cities. The hills are bare without trees, the fields are bare without crops and the village is bare without people.

Ganpat Uma Gavde, a resident of Jambuldara has many more such memories from the past.

Women walking in the morning 4 kms one way to Chaas village and trudging back in the evening with heavy headloads of firewood... the village spring from which water flows ever so slowly, almost reduced to a trickle... Scorching summers when villagers fill water at the spring with a small cup...

The Jambuldara micro-watershed is a Thakar adivasi settlement in the Pimpaldari range of hills. Years earlier, under a government program, 3 cement bunds were built on the

slope of the main canal. These structures stored water. The water from the first 2 bunds, allowed some farmers to grow cash crops like tomato, vaal and ghevda (are indigenous varieties of lentils). Water stored in the third bund is used for drinking water, to wash clothes and for their animals.

Jambuldara, Present Day

The fields are no longer barren after Diwali. There is enough water for a second crop. Farmers grow bajra, tomato, vaal and other crops in the rabi (winter) season.

The village is no longer empty. Families stay home. Farmers take 2 crops and if the monsoon has been very good, a third one in summer. The few families who migrate, it's only to earn extra money. The hills are no longer bare. The saplings planted during the Watershed Development Program by WOTR have grown into trees. Dry branches from these trees make for enough firewood. A lot of grass also grows on the hill sides providing fodder for animals.

Even in the terrible drought of 2012, the third bund is full of water. The villagers are confident that this water will not run out till the next monsoon.

The people recount that it was because of the Watershed Development treatment carried out in the surrounding hills that the wells are not dry. A community well was built on the trickle of a stream under the Program. The watershed treatments not only rejuvenated the stream but also filled the wells with precious water. New wells are also being dug. At the moment there are 11 wells in the village. Even in this drought year, 8 of these wells still contain some water.



Deputy Sarpanch Madhukar Baburao Kadali told us that at present, Jambuldara is home to about 125 people about 125 domestic animals too. Though farmers have not been able to cultivate a fodder crop this summer due to scarcity of water, arrangements have been made to ensure drinking water for all, till the coming monsoon. If the rains are delayed, then there might be a drinking water problem, but only at the end of June.

The Jambuldara of yesteryears had no water, no firewood and no fodder. Summer here was always the season of hunger and thirst. Watershed development has not only been successful in stopping runaway water but also reversed the inevitable summer migration, reduced the drudgery of collecting wood for women and removed the struggle for finding water. In Jambuldara, history has changed its course.



Pimpaldari – Blessed with Water and Careful, but, for how long! (Ahmednagar district)

Pimpaldari is rich in water sources. Situated near the Mula river, Pimpladari, has never needed a tanker water for domestic consumption nor even for agriculture. The village is still unreceptive to the “digging borewell mania” of the surrounding villages. Through the water distribution system (*Nal-Jal Yojana*) individual household connections receive water from a well near river. In the hilly region around Pimpaldhari are the villages of Jambhuldara, Wangdari, Gurukul, Khandobachi Wadi. Watershed development work has already been done in these villages making water table rise in the wells of Pimpaldari too. That is why even in this drought year, many farmers irrigate their farms, lifting water daily for 2 hours, from wells or from the deeper part of river (*doh*).

Chandrakala Hausiram Randhe, the village sarpanch said, “This year we have not allowed water from the river to be lifted. This year, drawing water from the river on a rotation basis has been banned” We depend on wells for drinking water and for irrigation. The watershed development project in neighbouring Jambhuldara, Wangdari, Gurukul, Khandobachiwadi had many physical structures built- CCTs, VAT, check dams, earthen gully plug. The soil and water conservation work (SWC) has increased the amount of water that flows into the well like a stream. All this raises the water level in wells”. She added, “A new well has been dug downstream, below the percolation tank to provide drinking water through distribution systems to Jambhuldara, Wangdari and Khandobachiwadi”. She believes that this was possible only because of watershed development. She further adds, “All this has made the drinking water project successful in the village, if not water tankers would be needed for all these settlements and women would have to walk long distances to fetch water!” However, Chandrakala also added, “Since last few years water level in the river has been on steadily declining, because of which the percolation into the drinking water well is a mere trickle. We did solve this problem a few months ago by making a narrow channel from river to the well. Therefore, there is sufficient water available in the well”.

Bharati Prakash Gampale relates that on the other bank of the river some farmers of neighbouring Chaas had installed a motor pump for extraction of water from deep parts of the river (*doh*). This caused the slowing down of recharge to the well. When the women noticed this, some protested by marching through the village on to the Gram Panchayat to object to this. When the Sarpanch saw this, he demanded that the farmers of Chaas remove the motors immediately, which they had to do. Once again the water level rose.

Bharati recalls the difficult days for women. There was a well in the village where women used to go to fill their vessels. However one day a woman fell into the well. It was then that the whole village insisted in getting tap connections to their homes. And today she boasts that 40 households are individually connected to the drinking water supply system. The burden of women is reduced. However in 2012, due to the low rainfall,

water was provided on alternate days in 2013. Every family gets approximately 10 *handas* of water – the household requirement for two days.

For agriculture, she says that 8-10 farmers in the village get water for 2 hours water each day using a motor pump. This helps them grow tomato, sugarcane, marigold, pomegranate and fodder crops. Besides, farmers are using drip irrigation for save water. Besides, farmers give water to neighbouring farmers if they require. And so we do not need to dig borewells, not yet. Recently she observed a JCB being used on one of the hillsides in the village to create a farm land of about 25 acres. The pomegranate plantation is irrigated with drip. In future the need of irrigation water will increase sharply. However, Bharati senses that some villagers will begin to dig borewells. Would the water be available for all then? She said it would be difficult to predict if water would still be available once farmers dig borewells. She dreads this day!

Editor: Bharati Gampali (*sarpanch*) makes an important observation: when sufficient water is available for all households, water is shared and drip used, then there is no need for wells.

Watersheds in Transition

While watershed development has proven to raise the water tables of the area with dramatic increase agriculture outputs, it has also brought about many changes within families and the village – politically, socially, and culturally.

During a project period, money flows into the village through labor on watershed works and in the post project period, because of the impacts – improved agriculture, allied and other income generating activities.

Prior to watershed development the agricultural systems of the villages were relatively simple, with farmers cultivating a single rainfed crop a year. There were little or no agriculture allied activities. However, watershed development brings in a lot of change - increased availability of water, subsequent rise in the area under cultivation and increase in the number of cropping seasons - all these have benefitted the farmers economically. Agriculture, allied business such as dairy, has sprouted. These have made the system relatively complex. The benefits, with the resulting complexity brings in its share of problems.

Kalamb: No more walking miles each day for one load of fire wood and two pots of water

“Watershed development was first started in our village in 1997-98. But we couldn’t fulfil the *shramdaan* (voluntary labour) condition, so the project was stopped. 10 years later, we all realised the importance of this work. We redoubled our efforts and the program was restarted”, recalls Subhash Landge, the Deputy Sarpanch and President of the Village Watershed Committee. “Earlier the wells dried up and we needed tankers from December itself. But in 2013, even with the harsh drought, we did not need tankers, even in May....” But Mr. Landge’s last few words were drowned in the sound of a 7000 litre tanker that trudged passed us on the road as we entered Kalamb village!

A little further, we saw a woman pushing along a bicycle fitted with large drums – the kind used to store water. It looked like Kalamb had a serious drinking water problem. There was a dramatic pause while we all looked at the tanker and then at Mr. Landge. Mr. Landge burst out laughing and said he could explain. He reiterated that there was sufficient water in the village community wells and borewells. But to stop wastage of drinking water, the Panchayat had stopped distributing water through the pipeline to ensure the judicious use of water this summer. Every family fills up water from the community well according to its need.

Well, that explained the woman with the bicycle, but what about the tanker? He said you must speak to Sakhubai about this. Still skeptical, especially feeling the relentless sun beating down on our heads we met the President of the Samyukta Mahila Samiti – Sakhubai Jadhav. “It belongs to me”, she said, “and was being sent out to one of the



neighboring settlements, which have a serious water problem. The water in the tanker would address their need". A lot of families from this settlement had left their homes this summer in search of drinking water and wages. Sakhubai thought that this terrible drought, Kalamb would have had to face the same situation, but for the watershed development work carried out in the last few years!

Mr. Landge recounts the project experience. It was based on the ridge-to-valley approach, stone, mud and cement bunds have been constructed on the hills around the village. These bunds now stop soil that earlier would flow away as the rain fell. Mango orchards planted under the program have started bearing fruit. 70% of the plantation on the hills is growing well. The village has a forest again! Every year, there is a public auction of forest produce in the village and the fund collected from this is used for community development work.

Prior to watershed development, the people couldn't even get a rabi harvest as there was no irrigation. But now some farmers even have water to spare for a fodder crop, after harvesting wheat and onion. So, thanks to this program, the village is self-sufficient in terms of water and fodder, even in this terrible drought year.

Self Help Groups of women had been set up in the project. Through their savings, the women bought gas cylinders, water tanks, etc. to reduce the drudgery in their lives. No more walking miles for one load of firewood and 2 pots of water daily! The water collected in the household tank lasts for 8 days. Moreover, women have also started petty businesses of their own – renting out pandals, running flour mills and goat rearing, which have supplemented their income.

The happy picture has attracted outsiders to the village. Large tracts of farmland have been bought in Kalamb. Long pipelines have been laid that bring water to these fields from the Mula River to irrigate their pomegranate orchards and tomato farms. Large ponds have been dug to store water.

Editor's reflection: Kalamb's story is not over yet. In the face of economic progress, villagers need to be alert enough to utilise their precious water resources sustainably.

Watersheds in Danger

The first thing the farmers do after Watershed Development brings water into the village is to get more land under cultivation and diversify the crops grown. Often farmers convulsively shift to water-intensive cash crops of onion and tomatoes. This has to be viewed against the backdrop of historical poverty and lack of options. The growth spurts do change the village leading them into hitherto unknown economic prosperity, setting them into cycles of more growth and more crop-productivity. But these cycles can lead these watershed treated villages into unperceived dangerous grounds.

The villages of Malegaon Pathar and Khandgedara tell the story of unbalanced growth necessitating self-awareness among the villagers and a mindset change.

For a good night's sleep: Malegaon Pathar

Maruti Wagh often doesn't get a good night's sleep. He can't... being the caretaker of a precious resource – the water supply of Malegaon Pathar and the neighbouring settlements – Gadewadi and Dhadwadwadi. This water comes from 2 borewells – one in the village and the other about 1.5 km away. It is Wagh's responsibility to switch on the borewell motors as soon as the electricity comes on. The borewell water fills up the community wells and tanks. From here, the water is distributed through pipelines to all the different areas of the village. "The electricity supply is highly irregular. The borewell water flow also stop off and on. I have to run around a lot. Sometimes even in the middle of night, you will find me going out of the village to start or stop the borewell," he laments. He tries his best to ensure that the water reaches all the different taps in the village equally. But people keep complaining, especially families with more members and those who use more water.

But for most part, this system is functioning well. The water supply alternates - Malegaon Pathar gets water one day and Gadewadi the next. There are separate pipelines for different areas of the village. Some families use their own borewell water source. Some farmers irrigate their pomegranate orchards and fodder crops using their own borewells. The borewells also feed 2 tanks built for giving drinking water to domestic animals.

But not all villagers realise that utilising borewell water for all their needs is unsustainable. After watershed development was implemented, the water level in village wells had risen. There was a ban on borewells, however, after the project, since the ban was not enforced strictly, and many farmers invested in their own borewells. Now wells have started drying. Water is used to irrigate fields and the little water for drinking is available in summer from the community borewell.

Dhadwadwadi, on the pathar (grassland) benefits more from watershed development. The wells in the valley below Dhadwadwadi, about half a kilometre away, still have water. The watershed treatments in the surrounding hills and canals halt rainwater which seeps into the wells. The Dhadwadwadi villagers have constructed a road for big vehicles to reach this well by blowing up the hillsides. The community well has been deepened. Seeing the spring feeding this well even in summer is a sight for sorely thirsty eyes! The villagers swear that another old well nearby has the same water level throughout the year!

The old display boards still stand in Malegaon Pathar, explaining the Watershed Development Project completed many years ago. People say that the old program had much more watershed work compared to the new Climate Change Adaptation program. They also feel the new program is too slow to show its effects. But the Wasundhara Sevak (village promoter) – Vitthal Jadhav says that this is because a lot of watershed work has already been done in the village. Besides, adaptation to Climate Change is about creating a culture for change, making people change their behaviour, a considerably slower process.

Editor's reflection: The main discovery during the 2012-2013 drought, is that Malegaon Pathar and its 2 settlements are tanker free. Watershed Development has a lot of impact in Malegaon Pathar and its surroundings. However, the people have to stop their excessive extractions of borewell water and allow the earth's water reserves to be restored. Borewell water unfortunately, will not last forever and without its proper management, Maruti Wagh will soon be out of a job. Without water, no one will get a good night's sleep.

Wake Up, Khandgedhara!! (Sangamner, block Ahmednagar)

Despite the monsoon's dismal performance in 2012, there seems to be no dearth of drinking water in Khandgedhara. Farmers here have taken cash crops. They grew tomato and onion in both the kharif and rabi season. Some also cultivated flowers, sugarcane and fodder crops!

The secret of all this apparent wealth is the water in the borewells. The understanding of farmers is to earn while staying in the village, it is important to store as much water as possible. That is why they spend a large part of their earnings from cash crops on borewells, farm ponds, pipelines, electricity connections and motors. Since a few years, there has been an increasing move towards hiring JCBs, digging the hillsides and preparing new land for cultivation, so as to earn more money. The obvious reason is the increasing demand for water. But meeting this need has become a challenge due to the current trend of uncertain, scanty rainfall in the region. Water in sub-surface wells is insufficient to cope with this demand and the cost of digging one are is high.

So to capture a good source of water, the rage to dig borewells has caught this village in a whirl. The Panchayat is not yet aware of the downside, hence has not yet put restrictions in place.



Interestingly, no one knows exactly how many borewells there are in the village. People only give us estimates. Some say 5-10, some 60-70. The reason for this discrepancy is that some people only count those borewells which have struck water, while others also count the failed attempts. Besides, farmers are neither keen to divulge details of how many times they have attempted, or how much they have spent in digging borewells, nor how many of those times people have actually struck water. They are reluctant to divulge details, just in case the source of funds will be asked. Some fear that based on this information they will be labelled as 'well off' and will not be able to avail of the benefits of government schemes.

There is a milk dairy in the village as many farmers have milch cattle. Those who have bore wells with less water grow fodder. During the monsoons and in winter, farmers who have borewells with plenty of water, extract it filling up their surface storage ponds (also erroneously called farm ponds). The JCBs are also used to dig up the hillsides to create new huge storage ponds.

Some of these projects have also received financial support from an agricultural department scheme. One farmer has filled up his farm pond with borewell water for his tomato crop. Another farmer has got a pipeline laid right upto the river, about 4 km way to fill up his farm pond with river water. The rest of the farmers watch these models keenly. They are also preparing to choose one of these models by next year and fill up their own farm ponds. Farmers here are spending lakhs of rupees every year on various methods of storing more and more water for irrigation.



The village elders recall that some years back, a pond was constructed by the government on the main canal of the village and the water level in the wells on the canal had begun to increase. But with the rise in demand for water for irrigation, farmers got borewells dug in the area around the same canal. These borewells sucked water from all other wells, which started drying up much sooner each year. Water from one borewell flowed into the newly dug ones, making many borewells defunct too.

Irregular electricity supply in Khandgedara, as in most places in rural India, causes hindrances in collecting water. But when the electricity does come, farmers start up the motors fitted on the borewells and pump their wells and the village tank with this water.

Seeing the Watershed Development impacts evident in Sarole Pathar, Bhojdari and Wankute villages, attempts had been made to start this program in Khandgedara too. The village elders remember inviting Father Bacher, the pioneer of watershed development in Maharashtra and co-founder of WOTR, to the village on his birthday. But WOTR's non-negotiable condition of shramdaan (voluntary labour) was not fulfilled in time and the program did not take off.

About 3 years back, WOTR's Climate Change Adaptation program was started in the village. Watershed Development does form an important part of this program. But again, scanty rain over the past consecutive years has resulted in WATs and bunds not having sufficient water to store. Borewell water being extensively lifted to meet the water requirement for irrigation is making it difficult for villagers to assess the real effectiveness of the watershed development.

However, in the Climate Change Adaptation program, farmers have begun realising the importance of drip irrigation and hence have started using these water saving methods for all types of crops and horticulture. But their overall attitude is that with the water thus saved, they can increase the area under cultivation.

Villagers have their hopes pinned on Watershed Development. They say that the positive impacts of the program will be evident when the village gets adequate rain. But the question is if and when such 'adequate rain' will come (given the current climate variability this part of India is facing), whether it will ever be able to fill up the groundwater aquifers that are being sucked dry by borewell after borewell and fulfill the ever-increasing greed for water.

Khandgedara's current situation is like precariously balanced deck of cards. The situation here is a fast changing lifestyle built upon a cash crop focused agriculture, which, in turn depends on excessive extraction of limited groundwater resources. If Khandgedara doesn't wake up from this unsustainable dream, the deck of cards could be blown away by the next whiff of a drought.

Learnings from the Ground: The Desperate need for Water Management

The Complexity of the 2013 Drought

The 1972 drought was a natural calamity. Whereas while the 2013 drought is partly due to low rainfall, it seems that it is more a man-made one. On the one hand the growing urban settlements demand for more water and at times for luxury needs. On the other hand, all community farmers prefer cash drawing water-intensive mono-cropping patterns; they follow low investment inappropriate water-management practices and water is diverted to non-priority uses. There is a notable absence of long-term management plans for water use.

While watershed development has proved to enhance the water table 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. During the project period, money comes into the village because of labour availability. Money begins to flow in the post project period because of the benefits of the impacts – improved agriculture, allied and other income generating activities. Simpler farming decisions move into complex situations. Single crops a year with no agriculture and/or allied activities move into increased areas under cultivation, and multiple cropping seasons. Allied businesses like dairy come into being. Subsistence farming gives way to

The Olympic-sized farm pond at Wankute that is filled with water from 5 wells regularly to irrigate the water-intensive onion and tomato crops of one large farmer.



commercial agriculture bringing market forces into play. All these move the farmers into systems that are much more complex. This complexity brings with it a host of problems for the farmers.

The Drought of 2013 needs to be seen against the backdrop of such complexity of inter-related policies, farming decisions, water-management and distribution, and volatile decision-driving market forces. Of special note is the ironic fact that the drought-prone districts of Maharashtra (Solapur, Pune, Ahmednagar, Sangli, Satara, Osmanabad, Beed, Latur, Nashik, Jalna, Parbhani and Aurangabad) grow over 79% of the sugar produced by the State. Sugarcane cultivation, a water-intensive crop which ideally requires 1600-2000mm of water, went up from 1,67,000 hectares in 1970-71 to 10,22,000 hectares in 2011-12 in Maharashtra and 70% of the irrigation water available in the state goes into sugarcane cultivation¹. Besides, Maharashtra with 208 factories, it has the highest number of sugar factories in the country - sugar factories that require an average 100,000 litres of water per day to operate.

Maharashtra is also a leading state in onion production – once again a water-intensive crop. Out of total annual production of about 60 lakh tonnes of country, about 16 lakh tonnes are produced in Maharashtra alone. Nasik, Ahmednagar, Pune and Satara are the major onion producing districts. Lasalgaon market of Nasik is considered to be Asia's biggest onion market where about 2.5 lakh tonnes of onion are handled annually.

Sugarcane and onions are but a few examples of agricultural decisions that directly affect water. Add to it the indiscriminate spudding of massive inappropriately designed farm ponds (actually surface storage tanks) that are filled with excessive ground-water withdrawals. A different picture starts emerging.

The complexity is difficult to analyse and visualize in all its dimensions. With the weather playing truant and being erratic and extreme, the complexity increases a hundred-fold. The years between 2009-2013 has seen much weather erraticism, with many of the regions receiving all of the annual rainfall in just a few days with long spells of dry-weather which has made agriculture a truly big gamble. It has affected the big and small farmers equally, leaving them highly vulnerable, raising serious concerns for the future.

The stories of Satechiwadi and Kumbharwadi are about addressing this complexity. Villages that see their vulnerability and that are making attempts to enhance their resilience.

1 Source: <http://www.thehindu.com/news/national/other-states/maharashtra-drought-manmade-analysis/article4577079.ece>

Sattechiwadi – preparing for extreme Weather variability

“Drought gets work done in Sattechiwadi,” quips Vaman Jadhav, one of the village elders in this Thakar adivasi settlement. Jadhav backs up his statement by narrating the history of drought relief in his village. In the 1972 drought, work was begun to make a lake on the main canal of the village. But once the drought was over, it took 10 years to finish this work and the lake was finally ready only in 1983. Even the road connecting Sattechiwadi to the Pune Nashik highway was completed under the Drought Relief program. But this is still a mud road and access to and from the village is still not smooth. The 2012-2013 drought brought borewells and rainwater ditches to Sattechiwadi.

The main hotbed of activity in Sattechiwadi is a stream. Sitaram Kale, a resident, told us that a gabion structure has been built on this stream. The agriculture department had also constructed an earthen gully plug on the same stream. The Sangamner Sugar factory has built a cement bund on the same stream. The villagers have dug 5 wells and the community well is also on this same stream. During the drought on 2012-2013, the Panchayat Samiti has got 12 borewells and 4 rainwater ditches dug again in this stream, under the Groundwater recharge scheme to recharge the community well.

The main stream and the lake on the border of the village form the Sattechiwadi watershed. Watershed Development has been quite a success here. Villagers had accepted all the conditions of the program – 10% shramdaan (voluntary labour for tribal communities), charai bandi and kurhad bandi (ban on grazing and tree felling). The program solved the water problem of the village. Due to watershed treatments, water started flowing slowly through the village streams and got stored in the lake. Villagers claim that this lake never goes dry, even in summer. Today about 40 families in the village get water for their kharif and rabi crops from this lake and water is even let out as drinking water to many villages, lower down in the valley. The water from the village community well is let into a drinking water tank on a hill where it is made potable. This water then is supplied through community taps constructed at 5 stand posts in the hamlet. 2 large tanks have been constructed for drinking water for domestic animals and for cleaning purposes.

Water levels in the wells have increased and farmers now cultivate cash crops like tomato, onion, val (beans) and wheat along with the traditional bajra. This has greatly improved their income. The hills surrounding the village are full of grown trees, that were planted as saplings under the program. Women in the village organized themselves into Self Help Groups. Some of them even started a successful petty business of making Patravali (disposable plates made of leaves). The village youth set up a local band group that plays at functions and earns good money. Many families started rearing backyard poultry. Toilets were built for all the families and open air defecation is a thing of the past. Women were given health care training and the community health has improved remarkably.



But Sattechiwadi has not escaped the impacts of climate change. The years prior to the drought has seen very scanty rainfall and the village even had to order tanker water for 2 and half months. Water scarcity has come back to haunt the summers. Trees are not getting new buds in the summers. Only Neem trees look green. Obviously, agriculture is not possible without water for irrigation. Without labour in the village, migration has also started again. But during the 2012-2013 drought, inspite of less rain, the community well has enough water. The 'groundwater recharge scheme' has been implemented by the Panchayat Samiti with an aim of increasing water levels even more.

The reality of climate change, poses problems for Sattechiwadi, inspite of the success with watershed development. Vaman Jadhav wisely says, "Without a big threat of disaster, people do not wake up." But Climate Change is a very gradual disaster that can catch communities unawares by slowly changing climate picture. A region takes this change as natural, like rainfall. Coping with climate change involves building resilience through preventive measures like Water Budgeting and Alternate Livelihoods. Sattechiwadi prepares to wake up and get to work before the drought strikes.

Going beyond Watershed Development: Technology for efficiency

While WOTR's strength is its extensive experience on-field and its systemic and participatory approach to ecosystems management, watershed and community based development in rural areas, it has been ensuring that the ground-level implementation is backed by a well-developed technology support. WOTR uses the support of Geographical Information System (GIS) and Remote Sensing (RS).

WOTR has developed an Integrated Geographic Information and Decision Support System (I-GIDSS) for project planning, implementation, management, monitoring and evaluation. This platform enables updation of watershed related activities, as well as household level details on a map. Geo-referenced details embedded into layered web-enabled maps help bring accuracy, transparency, and accountability at all levels besides speeding up on-ground implementation and administrative processes.

Comprehensive databases have been developed along various parameters for all our project villages under our Climate Change Adaptation (CCA) project being implemented in 65 villages of Maharashtra, Madhya Pradesh and Andhra Pradesh covering an area of 40,724 hectares, directly benefitting 63,922 people from 11,979 households.

The major components that the system delivers are as follows:

1. GIS based Net Plan (Watershed Plan) – survey number wise

A GIS based Net-plan system provides the facility to integrate attributes with geo-referenced cadastral maps right to the plot level. This serves majorly in database querying detailed information like slope, erosion status, present land-use, land classification, proposed land-use, physical grouping of plots according to implementation phases, etc.

GIS based household analysis

This system links socio-economic baseline and Net Plan databases containing attributed details of each. Linked with *gat* (survey) numbers from the Government land records (7/12; 8A extracts), it resolves information gaps and makes all information available in a single layer. Being mapped, it enables the user to access various themes on cadastral maps and to analyse socio-economic data right from the family to cluster level.

1. Impact Assessment of watershed development

Impact assessment studies involve assessing changes in “Pre” and “Post” Watershed Development of land use, vegetative cover, agricultural patterns, crop variations, water spread areas, etc. Multi-temporal satellite images help in visualizing and analyzing such scenarios over time.

2. Season-wise plot-level crop monitoring using Global Positioning System (GPS)

This system has been developed to enable plot-wise identification of crops over different cropping seasons in a given village. Using this system, the user can get information about changing cropping patterns, types, modes and sources of irrigation, crop production, fertiliser use, etc. This system enables the user to access various themes and spatial distribution of parameters on a cadastral map.

3. Land Ownership Mapping using GPS

As the government records (7/12) are not updated on maps, it is very difficult to trace and understand ownership of land. The Land Ownership Mapping system uses GPS along with physical verification to map plot level land ownership. This process involves consultation with resource persons and group discussions in the village.

Beside these, GIS/RS technologies are also being used to give individual crop advisories to farmers every season, as well as in research work for biodiversity, water budgeting etc.

Water Budgeting & Crop-planning – a way forward

Kumbharwadi – Managing Water through a Crisis & Preparing for Climate Change

Kumbharwadi resident Raosaheb Dada Pavde's well is 35 feet deep. If the monsoons have done their bit, it has around 30 feet of water, which he uses for irrigating his fields. But this year, rains were much less and Raosaheb had to order tanker water to keep his pomegranate saplings alive. "I was taken aback when I saw that even with a 12000-litre capacity tanker pouring water into it, the water level in the well rose only by 9-10 inches! If this was the case, how much water is there in a 30-foot deep well?! And how much water are we extracting for irrigation every year?!" says he. He resolved that he would use his well water better, in such a way that the water would last him all through the year. That was not all. He shared this insight and learning with other farmers in the village.



Raosaheb Pavade cleans the filters of his drip irrigation system

Kumbharwadi is situated in a remote area, 38 kms from the takuka headquarters of Sangamner and is 83 kms from the district headquarters of Ahmednagar, Maharashtra.

In 1998, this village, a remote, drought prone village in the rain shadow region of Maharashtra, was a picture of despair. Depleted of the natural resources necessary for eking out a living, Kumbharwadi struggled under the burden of scarce drinking water, low agricultural productivity, and few livelihood opportunities.

WOTR started Watershed Development activities in 1998 with 4 objectives: strengthening the local resource base - primary resources of land and water; improving the impoverished situation through efficient water and land management; establishing convergence among Government programs and departments and the community; bringing about equitable and gendered participation within the village community at every stage - planning, implementation, supervision, monitoring, maintenance and evaluation of the project.

Soil & water conservation measures were taken up. Village Watershed Committees were set up. So were Women's Self-Help Groups which were federated at the village level – the Samyukt Mahila Samiti. Linkages were built with different government line departments and various schemes accessed.

The impact of all the work was nothing less than dramatic. The village went from a desperate no-options village to one that began thriving. Water tables rose in wells. People who migrated returned. Lands that lay fallow were brought under cultivation, and the village began to prosper. A village that grew only bajra (pearl millet), and jowar (sorghum), have now also begun growing onion, tomato, wheat, maize, vegetables, soybean, groundnut, fodder crops, and horticulture.

Bringing water through good practices of watershed development was one thing. But managing what one has been able to garner through such good practices was quite another. The Watershed Development project in Kumbharwadi had certainly recharged its groundwater and filled the village wells and check dams. But were the people of the village doing what needed to ensure that the precious resource is not frittered away? Kumbharwadi was taking a right path to its development.

“Right after the kharif harvest, we guessed that the coming summer would be difficult... that after satisfying our drinking water needs, water will only be enough for fodder and horticulture crops,” Bhagwat Gagre, Jal Sevak and Secretary of the Committee told us. “Based on this calculation, we discussed the issue in the Gram Sabha (general village assembly) and passed a resolution that this year water guzzling crops like tomato, onion and vegetables will not be grown in the rabi season.”

Kumbharwadi – resilient in Drought



Gagre says that if the villages took up Water Budgeting earlier, they may not have needed water tankers today. “But we are what we are... and only the financial burden and the visual of tankers in the village every day can starkly bring home that we have to do something more”. With rainfall reducing every passing year, it is very important that farmers understand how crucial it is to conserve every drop of rainwater and learn to use and manage it properly. Without Water Management, they will have to face consecutive years of acute water scarcity.

WOTR has been integrating Climate Change Adaptation measures in its project villages. Kumbharwadi is one such village. Some new concepts were brought to Kumbharwadi too - water management, water budgeting, organic farming and alternate livelihoods. But most importantly, the program brought the village together to discuss their Climate Change issues – the new devil on the block - and started dialoguing and engaging the village to come up with possible solutions.

The exposure visit to Kadavanchi village in Jalna district proved inspirational. Kadavanchi was a prosperous water rich village post-watershed development work. But Kumbharwadi saw the dangers in the path that Kadavanchi had taken – indiscriminate extraction of groundwater through massive farm ponds (actually storage tanks). Kumbharwadi farmers came back with the resolve to manage their water better. They decided to take up individual and village-level water conservation measures. Farmers decided to install drip irrigation systems in their farms especially for their tomatoes. In spite of the formidable cost, the farmers realised that this one-time lump sum investment would result in long term conservation of water, time and effort. The drip system had also the potential to increase the productivity of their crops simply by ensuring efficient and optimal water use.

The abysmally low rains (284mm) in 2012 meant that farmers who had not installed the drip could not irrigate their fields by the usual flood irrigation method. The drip system shielded the tomato crop from the ill effects of water shortage. Other farmers have also realised the importance of drip irrigation, seeing their tomato yields.

Raosahab felt that all farmers should understand the need of the times and should start using better irrigation methods. In his opinion the best irrigation method is drip irrigation.

Bhagwat Gagre took a different path. He decided to change what he grew. He shifted from tomatoes to pomegranates. He wanted a crop that will need less water and which does not have a very volatile market price. He saw that the tomato crop requires a lot of water. He observed that pomegranates, if grown on a drip system, can save water and give more income. It's a simple calculation really he says, “8000 saplings of tomato are planted in one acre with one dripper at each plant; whereas, 400 pomegranate saplings are planted in one acre. The drip required for every sapling of pomegranate is much less as compared to tomato. So, water for irrigation can be better managed by saving it, drop by drop”. Gagre has also shared this information with other members of the Water Management Committee. “Pomegranate plants flower thrice a year. The fruits can be harvested in whichever season there is ample water. This is especially useful in these times of uncertain rainfall,” he says with the confidence that springs from a considered decision.

Farmers have also started using organic methods. With 50% contribution from WOTR, 25 vermi-compost beds have been erected for this. The vermi-wash from these will be used as a pesticide on the pomegranate crop. Organic, locally-made, inexpensive solutions made from leaves and cattle manure like Dashparni Ark, Jivamrut slurry, Neem leaves and oil cakes are also being used by the farmers.

Participatory development work has become a way of life for the people of Kumbharwadi. The gathering June clouds is not just an indication of the coming monsoon... but the storm of climate change... and Kumbharwadi is not any more merely focussed on development and growth... it is also gearing up to build its resilience in face of impending climate change.

Integrating WSD and Agri-practices into National Schemes – PPCP Model

NREGA allows strategic partnership in the implementation between government, NGOs, Corporate sector, and PRIs. Availing this opportunity, a distinctive “Public-Private-Civil Society Partnership” (PPCP) initiative was taken for implementing Maharashtra Rural Employment Guarantee Scheme (MREGS) in two talukas of Jalna district. The MREGS includes the 100 days work that comes in from the MGNREGS with an additional 200 days provided by Maharashtra state. The project is guided by a tripartite agreement made between GoM–ITC–Watershed Organisation Trust (WOTR), Ahmednagar and its’ sister organization Sanjeevani Institute for Empowerment and Development (SIED).

This collaborative project is not merely aimed at routine implementation of the project but to develop the human potential to manage and maintain local resources. WOTR-SIED has the key role of capacity building of PRIs and thus to facilitate planning and implementation of MREGS in Bhokardan (24 villages) and Jaffrabad (21 villages) blocks of Jalna district. The approach adopted by WOTR-SIED in this project is unique in the sense that an integrated / comprehensive village development plan is prepared and implemented on watershed lines in which emphasis is put upon management of natural resources. It also means achieving the dual objectives of providing employment and facilitating sustainable development. Success of this experience shows how the funds available for employment generation can be utilised for integrated watershed development in participatory way.

Key additions of PPCP project to MREGS

- Awareness building regarding watershed development approach
- Shramdaan as pre-condition for selection of the village
- Assets creation by undertaking only works related to watershed development
- Participatory planning

Enabling factors

- Qualified selection of project villages
- Raising awareness on the watershed approach and reaching this to the people
- Winning trust and cooperation of bureaucracy
- Utilising advantages offered by PPCP model such as Project Monitoring Committee (PMC) for prompt sanctioning and execution
- Conducting Shramdaan and its impact
- Ensuring quality of work
- Assuring that transparency is built in MGNREGS/MREGS

Key Impacts

- Increased Water Availability
- Soil and nutrient conservation
- Increased capacity to counter drought
- Quality and transparency in work
- Off season employment availability
- Opportunity to earn more than usual income

The results and outcome of the intervention has been heartening. The PPCP model is being extended to 14 drought-affected districts in Maharashtra.

The case of Mhasrul, Bokardhan, and Jaffrabad: a model for change

The one-of-its-kind experiment of Watershed Development work through MGNERGA undertaken since 2008 is showing good results. In May 2011, with the help of the Agriculture Department, WOTR conducted large scale mobilisation among farmers in Bokardan and Jaffrabad talukas of Jalna district, Maharashtra to take this further. It was decided to start Farmer Field Schools (FFS) to guide farmers mainly for their cotton crop, right from preparing the land for sowing to harvesting the crop and even, where possible, to market their produce.

FFS is an effort toward bringing new technological advances in organic and sustainable agricultural practices at the village level, right in their farms. It aims at achieving maximum yield at the least cost to farmers, while also keeping in mind the long term sustainability and the soil health.

What is unique about FFS is that it brings government technical experts at block level, a corporate funding agency, together with an NGO to work directly with the farming community. This initiative is facilitated by WOTR in its PPCP initiative. Capacity building, community awareness and mobilisation and management are funded by ITC Ltd. Resource persons and experts from places like Krishi Vigyan Kendra, Kharpudi, Jalna (KVK) and Badnapur University Agriculture Research Centre, also lend their valuable inputs.

The farmers have responded whole heartedly and their active participation in the process has worked out to their benefit. These sessions encouraged the farmers to such an extent that they not only followed all the instructions diligently but also developed an insatiable appetite for more information and knowledge. Like school children learning the alphabet, they assembled every week to learn the basics of agriculture, have their doubts resolved and even brought the insects and pests collected from their farms to the 'classroom' to discuss whether it was beneficial or harmful to the crop and what suitable action was required.

Now, along with the wage-employment guarantee, soil and water conservation and the resulting positive impacts of Participatory Watershed Development taken up through MGNREGA, the community has been able to increase the productivity of their agricultural land, significantly reduce their expenditure on chemical fertilizers and increase income from agriculture because of FFS.

Farmer Field Schools

In May 2011, as a step to SWC work through MGNERGA, WOTR and the Taluka Agriculture Department organised an Agriculture Rally (Krushi Dhindi) through many villages giving farmers information about the preparation for the coming kharif crop. WOTR and ITC team members at this time came up with the concept of Farmer Field Schools (FFS) in this area. The KVK, Jalna was contacted to liaison with resource persons and the programme began.

The farmers collected in groups once a week and were guided by various experts on different subjects- preparation of the land, sowing of seeds, spacing of the crop, kinds of pests, the correct time and amount of fertilizers and pesticides to be used, weeding etc. They were also taken on exposure and training visits to KVK Jalna and to see the work of other group farming endeavour.

WOTR's role was to bring together all the different agencies- technical experts from the government as well as from universities and research institutes, private sector entrepreneurs in the agriculture technology (Jain irrigation for micro-irrigation) and financial institutions like NABARD and other banks.

Farmers' Clubs (FCs)

The Farmers' Club (FC) initiative under Public-Private-Civil Society (PPCP) - is a joint initiative of the Jalna district administration, ITC Limited and WOTR for effective implementation and value addition in MGNREGS project interventions. Since 2008 the project is being implemented in 40 villages of Bhokardan and Jaffrabad Taluka of Jalna district within the watershed development approach.

The Farmers' Club is funded by NABARD have the main objective of bringing about "Development through Credit", technology transfer and capacity building. FCs are grass-root level informal groups of farmers in villages. The need for promoting this concept was felt by WOTR, since its unique initiative of implementing MGNREGA through watershed approach has altered the situation in the area. Various project measures have enhanced water availability and triggered a change in cropping pattern. WOTR had long realized that it was time to go beyond soil and water conservation measures for sustainable agriculture productivity in the project villages.

So far formation of 9 Farmers' Clubs have been facilitated by WOTR and funded by NABARD in the 40 project villages in Bhokardan and Jafrabad blocks. 19 more FCs will be formed in the coming year. All the 9 clubs, which have been formed this year, have undergone Basic Level Orientation Training. Farmers have been explained the need of availing credit and timely repayment to keep the development process going. Some

FCs have gone on exposure visits, while some have initiated activities such as animal vaccination camps and Farmer Field School (FFS) trainings. Some Farmers' Clubs have made bulk purchases of fertilizers and are soon planning to buy seeds collectively too. Experience sharing workshops are also a very important component of this program.

WOTR motivates FC members to identify credit and non-credit needs (training, socio-economic, village infrastructure, efficient water use etc.), prepare a plan of action and accordingly arrange for expert talks, counselling, need-based activities, etc. with the help of Government departments and other concerned agencies. Banks and NABARD are looking at the FCs as business facilitators and business correspondents. The PPCP initiative provides an enabling environment for these clubs to assume these roles effectively and has widened its base by availing funds from NABARD for this activity.

Impact of the Program: Vox Populi

“This year, the rainfall was much less than expected. We thought we will have a really bad crop. But to our surprise, the crop was as much as last year’s, when we had actually had a good rain. We are not sure, but we think it is because of organic fertilizers and farming methods. Something gets retained in the soil and the yield is good.”

– **Ramesh Dabke**, Farmer – Malkheda, Bokardan

“Without soil testing... our situation was like... as if, one is suffering from TB but taking medicine for some other illness. The illness never got cured. In spite of being a farmer for so long, I didn’t know what to do to increase the productivity of my land, which fertilizer and how much to use... The trainings about farm bunding, drip irrigation etc. were also really useful.”

– **Narayan Namdev Ghodke**, ex-Sarpanch – Malkheda, Bokardan

“Using organic fertilisers like Dashparni Ark, Nimboli Ark and organic compost material in my field greatly reduced my expenditure on fertilisers. Also, earlier my total yield of cotton was 8 quintals but now I have a bonus crop.

FFS has really been an eye opener, a turning point in my life. On our visit to KVK, Jalna, we were explained the entire process from sowing to the marketing of cotton. I realised the importance of soil and water conservation, group farming and technological advances in agriculture. Government officials had never come to our village before. The banks which never even allowed us inside their offices are now ready to give us loans for drip irrigation. FFS has shown us the way ahead.”

– **Kadoba Narayan Lahane**, Lead Farmer – Mhasrul, Jaffrabad

“This was the first time we conducted FFS through WOTR. Farmers here had no idea at all about scientific farming till now. Most of them haven’t even been to school. But after this training, they can confidently explain even all the technical things to any visitor. Another thing, their expenditure on the cotton crop used to go upto ’15-16,000 per acre. Now it is reduced to ’7-8,000 per acre.

WOTR’s role in all this is very important in bringing together all the various agencies- technical experts, private funding, banks etc. They really made a special effort to collect all the information about the programme and also brought in additional experts for specific topics.”

– **Kunal Chinchole**, Agriculture Assistant – Mhasrul, Jaffrabad

“The situation today is such- too much competition in other fields and less yield in agriculture. So the youth today is drawn more and more to the cities or turn to addiction in frustration. It is the dream of our group of 10-12 farmers to set an example and guide other young farmers in our area.

Guided by FFS, we now harvest 3 crops from our lands. Experts from WOTR gave us excellent guidance for our ginger crop and our yield has increased from 60-70 quintals per acre to 100-150 quintals! In the ginger market, the traders used to give us very less. We toiled and they earned the profits. Now, our training is oriented toward getting maximum profit for farmers. We also have a dream to set up a processing unit, possibly with the help of NABARD and export our products.”

– **Madhukar Mirje**, Farmer and Wasundhara Sevak – Malkheda, Bokardan

“Earlier this was a drought-prone area. The fertilizers would get washed away with the soil. Now because of compartment bunding, it remains in the field. We also have water in our wells. We have realised that using chemical fertilisers will degrade the fertility of our land and are moving to organic farming. We learnt about drip irrigation in FFS. With that, even after the cotton crop, there is enough water left for the animals and our yield has increased from 9-10 quintals per acre to 20-25 quintals per acre. Earlier, I didn’t have enough money to visit my daughter in her boarding school every month. Now we can.”

– **Narayan Bhika Ghodke**, Farmer and Rozgaar Sevak – Malkheda, Bokardan

“Every Tuesday at 9 in the morning, we had our FFS classes. There, we were taught all the basics, just like we are taught the alphabet in school! We had no idea of a bed, drip irrigation was... Now we are working on setting up a processing plant for our turmeric crop.

I would like to tell the young generation even with only 2 acres of land one can earn more than from a job. But they have to use this new technology in organic farming and try to set up an ancillary agro- business. Then their progress is in their own hands.”

– **Samadhan Bhika Raut**, Farmer – Malkheda, Bokardan

Conclusion

Through the Farmer Field Schools (FFS), farmers now have an effective platform which they can now use to avail information about relevant schemes and also for the overall development of their villages. FFS also has a very strong social impact by being open to all levels of farmers and bringing them together as a group with common concerns. The farmers have now realised the potential of coming together as a group. One can also see a gradual change in the attitude of young farmers. The trend of rising disinterest in agriculture has been replaced with greater enthusiasm and dreams for the future.

FCs are emerging as an interface between farmers and banks, easing the necessary credit supply. It has provided a platform for dialogue with experts to get technological inputs to increase agricultural productivity and thereby income of the farmers.

It has widened the horizons of the farmers through exposure and trainings. Now farmers are thinking about setting up of agro-processing units to reap greater benefits of the increased production post-watershed development. Apart from Kolegaon, villages such as Malkheda, Tapobhumi in the project area are also planning to set up such agro processing units and even forming their own companies. Farmers' clubs are encouraging introduction of horticultural crops and group marketing of the produce. This has the potential to totally change the face of project villages in near future.

For the PPCP initiative by WOTR and the ITC, the formation of Farmers' Clubs and their progress right upto farmers registering their own companies is a huge leap forward. The PPCP journey that began with providing employment for the wage seekers, now has reached a level where former wage seekers are emerging as rural entrepreneurs. There is still long way to go. However, the achievements so far are encouraging indeed.

Moving towards Climate Change Adaptation

WOTR historically has worked with an Ecosystem perspective – aware of the increasing fragility of ecosystems and strengthening these through various people-centric, participatory interventions. WOTR has been in the forefront of mobilizing vulnerable communities in semi-arid and resource fragile regions to help themselves out of poverty by harvesting rainwater wherever it falls and regenerating the ecosystems they live in along watershed lines.

Since 2008 WOTR has been reorienting, re-organising and equipping itself in respect to strategy, approach, focus, interventions and measurable indicators in order to specifically address the challenges (and opportunities) posed by climate change to vulnerable rural communities. Towards this WOTR has introduced new ways of looking at traditional/ convention development interventions, and introduced new interventions for bringing Adaptation into the focus-forefront, as follows:

Since ecosystems and communities are interlinked, WOTR has adopted a cluster based approach in which regenerated and sustainably managed ecosystems provide the bedrock onto which all other interventions are anchored.

Rethinking conventional development and introducing new approaches like Systems Thinking and Complexity and developing new strategies to incorporate these.

WOTR's interventions in the past have been geared towards technical engineering solutions overlaid by social engineering concepts enshrined in the Wasundhara Approach. These have a few key assumptions:

- that Ecosystems may be degraded but are essentially stable;
- that economic, social, environmental, and climatic contexts are stable;
- that the future will likely look like the past and with key interventions in identified areas, and will logically bring about betterment of conditions.

These assumptions meant that project design, management, and monitoring were essentially based on project activities that are replicable and scalable.

In the Climate Change context some of these assumptions change:

- that ecosystems can be protected. But is this enough to address the problem?
- that climatic conditions are going to become highly erratic and unstable and will affect the resource base;
- that the alterations in velocity of change will mean that long-term, replicable, scalable *activities alone* may not be enough and will become highly difficult to monitor, measure, and evaluate;

- that the context itself has moved into realms of Complexity and will require adaptation responses that are flexible, and dynamic which go beyond complicated, reductionist, and linear to complex, holistic, systemic respectively.

Developing new Tools and Frameworks while adapting existing ones.

Keeping the above Complexity and its ramifications in mind, WOTR is moving from Activity based Project Design & Management to Framework based Project Design, Management, and Monitoring & Evaluation. We think a Systems Based Framework Approach based on principles other than just activities and coming from an understanding of causal structures that will not fail and has not failed in the past will be is more likely to work times of uncertainty.

This also takes into consideration that people, organisations, and institutions are mired in hard-to-break habits which prevent adaptive actions from happening as rapidly as it could or is required. Project Designs based on Framework Approach consider these internal (organizational) as well as external (contextual) inertias.

WOTR is also in the process of developing new Tools and Frameworks for Project Design, and Monitoring & Evaluation. These tools and frameworks observe and where possible measure direction and pace of impacts that are “**indication**” based rather than only “indicator” based, especially of impacts that may not be visible in the short-term but will emerge in the long-term. Some of these Tools are also for filtering livelihoods that helps ensure that livelihoods being promoted are climate resilient and adaptation compliant.

Redesigning and adapting Research Methods and taking up new researches at the ground to assess climate related impacts.

WOTR has a strong history of Action Research and Applied Research that contributes to situation analysis, project planning and impact assessment. People, their perceptions, and experiences have always been central to our researches.

In the Climate Change context WOTR moves several steps further where the researcher is not a disinterested, unbiased observer, but a keenly interested party who is directly experiencing the consequences and impacts of change. Essentially it has meant that members of local communities become researchers observing, measuring, and assessing for themselves not only problems but also the improvements that a project brings about.

Analytically it has meant that WOTR’s researches go beyond Correlations to causality. In other words, researches are not only statistical but are based on causal relationships.

Developing new interventions and redesigning existing ones to include Climate perspectives

To this extent, WOTR has been redesigning its existing interventions and bringing in new methodologies and interventions: Ecosystems Management, Biodiversity, Water Budgeting, Agro-meteorology, and linking all of these to agriculture as well as other non-agricultural livelihoods. The essential focus now includes, besides conventional

development and growth, building an adaptive community that is resilient to climatic, economic, environmental shocks and is able to cope with these.

Developing new Training programs and redesigning existing ones

Since these are new areas of thinking and approaches, our own field and research teams have undergone a series of trainings over the last 3 years. Similar capacity building sessions have also been carried out with key people from the local communities.

TECHNICAL AND PARTICIPATORY PLANNING TOOL KITS FOR BUILDING RESILIENCE

WOTR is also in the process of releasing training modules designed to impart nuances of implications of Climate Change, vulnerability assessment, and project planning, implementation, and monitoring, that will be made available for other implementers and development practitioners.

- **Community Driven Vulnerability Assessment – Programme Designer (CoDrIVE-PD)** has been applied in various districts and states. This tool book helps in integrating vulnerability to climate change concerns as perceived by the community, into the development plan. Based on the findings, and Adaptation Plan may be developed.
- **CoDrIVE- Livelihoods Assessment** is a tool kit that engages the local community. It helps participants understand the money flows in and out of a village (LM3). It also assesses the vulnerability of proposed livelihood activities to climate change. When the suggested changes are followed in the proposed livelihoods, they become more climate resilient.
- **CoDrIVE- Health Assessment** – that observes the impacts of climate change on health is in the final stage of testing.
- **CoDrIVE- Visual Integrator** is a tool that helps the community prepare a visual 3D GIS based plan that helps the people communicate within themselves and with planners the development needs of their village. It has been tested in various sites and is found very useful by the local communities.
- Manual for implementing the **People’s Biodiversity Register (PBR)**.
- Manual of implementing a **Children’s Biodiversity Register (CBR)**.
- **Work-book for Disaster Risk Reduction (DRR) at village level.** This tool helps the community to understand the risks (from climate and otherwise) and how to communicate with the local authorities in case of need. Is in the process of development.
- **Water Budgeting and Crop Planning.**

About WOTR

Established in 1993, the Watershed Organisation Trust (WOTR) has, over the years entered diverse sectors and grown institutionally and geographically. Headquartered in Pune, Maharashtra, WOTR has a physical presence in 6 states. WOTR was initiated to support the large scale multi-actor, multi-level, multi-sectoral, community led watershed development program for poverty reduction – the Indo-German Watershed Development Programme (IGWDP). It was launched in Maharashtra, India, by Fr. Hermann Bacher, cofounder and Chairman of WOTR, and Crispino Lobo, co-founder and Managing Trustee.

Over these twenty years WOTR has amplified into different thematic areas and augmented its competencies, in the areas of Watershed/ Ecosystems Development and Natural Resource Management, Climate Change Adaptation, Integrated Water Resources Management, Sustainable Adaptive Agriculture and Food Security, Rural Livelihoods, Health, Sanitation, Hygiene, Nutrition, Gender, Inclusion (equity) and Women's Empowerment, Renewable Energy, Capacity Building and Training, Institutional and Systems Development, Knowledge Management-Action Research, Development Communication and Policy Dialogue.

Since its inception, WOTR has carried out development work in over 1,751 villages in six states – Maharashtra, Andhra Pradesh, Madhya Pradesh, Rajasthan, Jharkhand and Odisha. It has organized watershed development activities in 1,266 villages covering an area of 716,636 hectares with an impact over 1,000,000 people. Its involvement in over 6,037 women's Self Help Groups (SHGs), micro-finance, trainings and other initiatives have benefitted over 79,850 women. Similarly, over 235,180 people from 27 states in India and from 62 countries have participated in WOTR's Training and Capacity Building programs. WOTR has also provided support to projects in Somaliland, Kenya, Tanzania and Malawi.



Watershed Organisation Trust (WOTR)

'The Forum', 2nd Floor, S.No. 63/2B, Padmavati Corner,
Pune Satara Road, Parvati, Pune 411009, India.
Phone: +91-20-24226211 • Fax: +91-20-24213530
Email: info@wotr.org • Website: www.wotr.org