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Community-based Adaptation to Extreme Climate Events in Maharashtra

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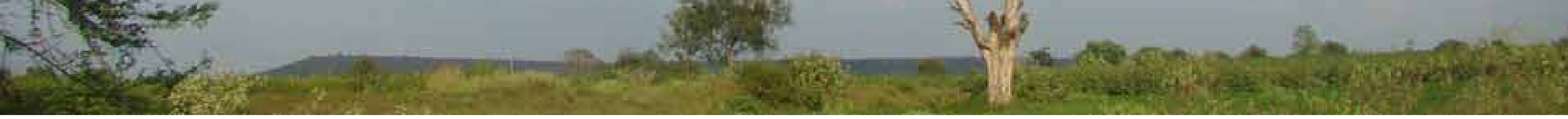

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Trond Vedeld, Guro Aandahl, Line Barkved, Ulka Kelkar, Karianne de Bruin, Prutha Lanjekar

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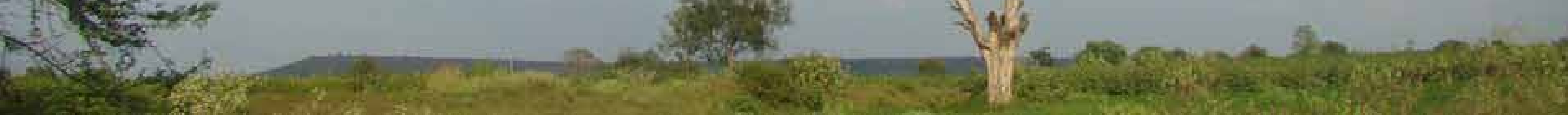

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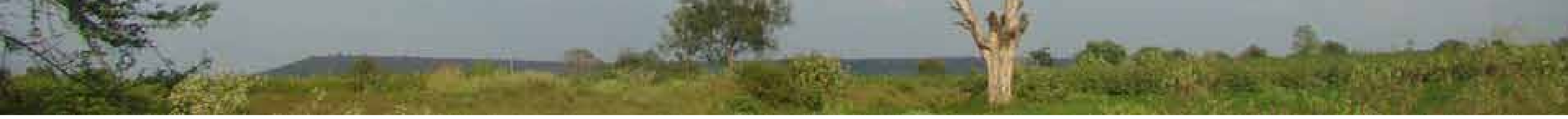

Preface

The manifestation of climate change in the form of extreme weather events is not a new challenge to India. On the contrary, high climate variability and drought have always been endemic to the monsoon belt. Hence, local societies have evolved over time to adopt many ingenious mechanisms to tackle drought risks. Maharashtra is, in this regard, a forerunner in drought risk management in India. The 2012 drought in Maharashtra did not lead to the massive hardships that were seen in the drought of 1972, or earlier, even though crop and income losses of 50% and more were reported among many farmers.

This booklet is based on outcomes from a two-year Indo-Norwegian research and capacity development project titled, 'Extreme Risks, Vulnerabilities and Community-Based Adaptation in India (EVA)'. The findings draw upon empirical data from rural communities in Jalna District in the dryland region of Marathwada of Maharashtra. The booklet provides assessments of impacts and vulnerabilities to extreme risks of agriculture and water resources and insights into how rural communities have been able to withstand and respond to the recent drought and changes in monsoon patterns. It explains how the government and non-governmental agencies at state and district levels have responded and enabled or constrained community-level initiatives.

The booklet outlines research approaches utilized to study Community-based Adaptation (CBA). It draws some early lessons about potential avenues for local adaptation strategies to future climate extremes and what considerations and challenges these raise for coordination and convergence in the governance system at local and state levels. The booklet is intended for development practitioners, researchers, and policy-makers interested in climate change and rural development challenges in Maharashtra.

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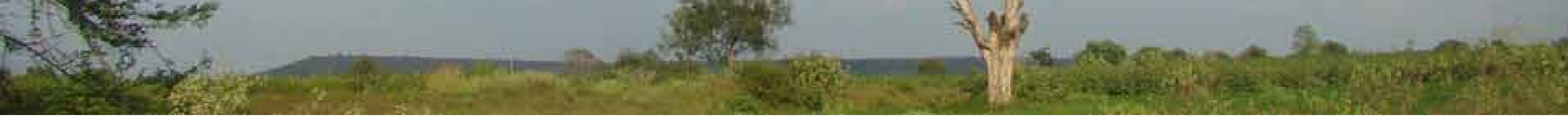
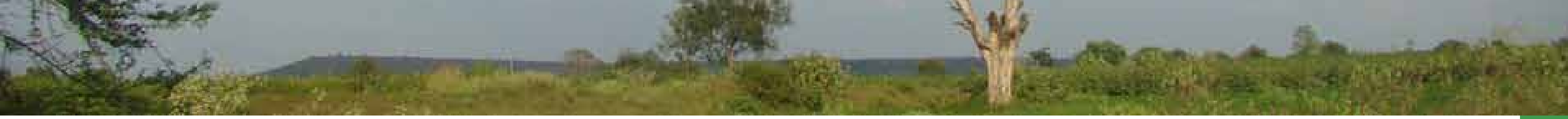


Acknowledgements

The EVA team expresses its gratitude to the Royal Norwegian Embassy in India and to the Government of Maharashtra for their support. We sincerely thank district-level and block-level officials of various departments who generously shared their knowledge and time with us. We are extremely grateful to officials of the Krishi Vigyan Kendra, Kharpudi for their time and cooperation in facilitating our consultations in Jalna. Our utmost appreciation is to the communities of Asarkheda, Nivdunga, Dongaon, Kadegaon, Malegaon, Warudi, Palaskheda Pimple, Thote Pimpalgaon, and Barav Pimpalgaon, who welcomed us and shared their concerns and aspirations with us.



1. Introduction

The Marathwada region is just coming out of the worst drought in 40 years. Our research in Jalna District has provided an opportunity to explore the impacts of climate change and extreme weather on water and agricultural resources and the responses at community and district levels. While a drought of the magnitude observed in 2012 will always bring hardship to local people, it also exposes systemic and institutional strengths and weaknesses, and thus offers opportunities to think afresh and initiate change. The recent launch of the Adaptation Fund in Maharashtra within the framework of the government's new climate change policy makes the lessons on community-level adaptation approaches, presented in this booklet, particularly relevant.

Based on local interviews and perceptions from field work in Jalna, we find that in response to the 2012 drought, the district and state government initiated a set of appropriate emergency and more long-term measures to provide drinking water, fodder camps, crop-loss compensation, watershed development, and local employment. However, the scope and outreach of the relief was not adequate to meet local demands given the magnitude of impacts. The measures pursued were sometimes unevenly distributed. The emergency programmes also carried heavy costs on the part of the government. Our research suggests that improved community resilience and transformation towards sustainable rural development require continuous efforts by the government and non-government actors. There has to be a shift in the focus from relief to long-term Community-based Adaptation (CBA). This has implications for policies on agriculture, watershed development, disaster risk management, and climate change adaptation. The findings underscore the policies of the Government of Maharashtra for strengthening capacity; coordination, and convergence of policies, schemes, and actors; and increasing the capacity for early response and long-term resilience at village and block levels. While recognized in various policies, the operationalization of policies in effective governance requires greater transfer of powers and resources through decentralization and devolution to the Gram Panchayats. It also presupposes a more systematic engagement by government officials with local people, community groups, NGOs and the private sector, and stronger cooperation across sector silos and the public–private divide.

This booklet introduces the reader to the objectives and activities of the project 'Extreme Risks, Vulnerabilities, and Community-based Adaptation in India (EVA)'(Figure 1.1). This is a two-year pilot project under an Indo-Norwegian collaborative programme funded by the Norwegian Embassy, New Delhi. The EVA project aims to (*i*) understand the enabling and constraining conditions for CBA to climate change and extreme events; and (*ii*) develop pilot approaches to research on and capacity-building for CBA. The booklet outlines the historic rainfall data and present trends and actual and potential impact of drought and rainfall variability on agriculture, water, and watershed resources. It examines CBA to drought farming, non-farming, and off-farm activities, and how the government has responded with various relief efforts to the drought and monsoon failure in 2012. It also reviews how the policy and governance system works to coordinate with

state and local governments, NGOs, and private actors for a more long-term community-based adaptation and drought risk management. The booklet is not however an exhaustive inventory of answers to the challenges of CBA in India.

The EVA project is based on a mixed-method approach. It combines an analysis of climate risks with participatory assessments of human and natural vulnerability. It uses multi-criteria analysis to rank and prioritize adaptation options and combines a livelihoods framework with institutional and governance analysis of adaptive responses and opportunities at local and district levels. The project involves extensive field work at village and district levels, semi-structured interviews, household surveys, policy and institutional analysis, and participatory workshops. Field work has been carried out in nine villages in three blocks in the District of Jalna, which was severely affected by the 2012 drought. A cluster of three villages was surveyed in each block — Badnapur, Bhokardan, and Jafrabad.[1] The project has involved extensive dialogue with communities, decision-makers, and professionals at local and district levels with a key aim of *understanding local perspectives on adaptation*.

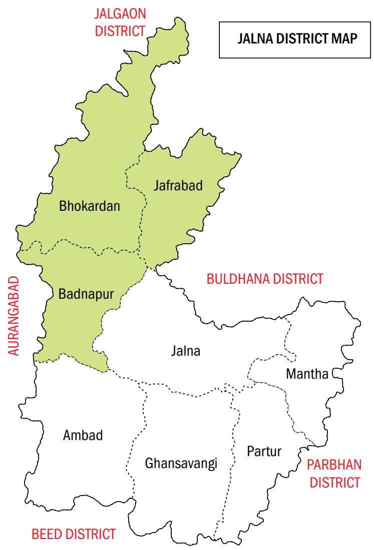
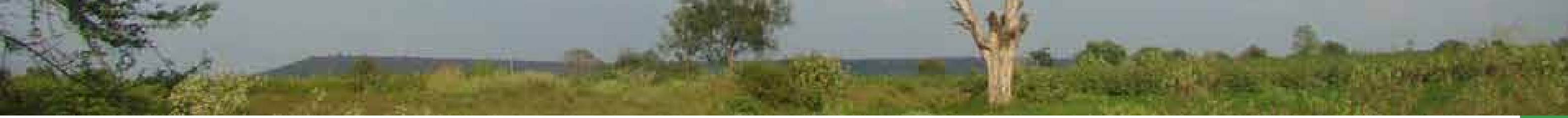


FIGURE 1.1 Map of Jalna District, Maharashtra, highlighting the case study villages of EVA project

The booklet outlines a selected set of locally prioritized adaptation options. It suggests various drought risk management measures that might be considered related to local farming and watershed development, water resources, climate services, and improved policy and institutional coordination. A community-based approach to adaptation needs to address dilemmas of promoting policies and programmes towards water-intensive cash crop systems for large- and medium-scale farmers versus more integrated watershed development/dryland farming for small-scale farmers versus employment or education for the landless. More innovative climate and weather forecasting services have a key role to play for all types of farmers.

PHOTO CREDIT: Divya Mohan

1 The nine villages chosen in the three blocks of Jalna are Asarkheda, Nivdunga, Dongaon, Kadegaon, Malegaon, Warudi, Palaskheda Pimple, Thote Pimpalgaon, and Barav Pimpalgaon



2. Jalna: Climate, Water, and Agriculture

2.1 Erratic monsoon and droughts

Jalna district in Marathwada has a semi-arid climate with an average annual rainfall of 729.7 mm, and an average monsoon from June to September with rainfall of 606.4 mm. Marathwada is characterized as a 'frequently drought prone area', where drought[2] can be expected every 6 to 10 years (Shewale and Kumar 2005). During the years 1875–2004, it has experienced drought 18 times, including the two years of successive drought in 1984 and 1985.

Rainfall data for Jalna shows great year-to-year variability (Figure 2.1).[3] The 30-year period from the early 1940s had few droughts including the extreme drought of 1972, during which time the state Employment Guarantee Scheme — a precursor to the National Rural Employment Guarantee Scheme — was introduced as a drought response measure. In recent years, however, there has been a drastic decline in rainfall, culminating in the extreme drought of 2012 (Figure 2.2).

Rainfall recorded at the Krishi Vigyan Kendra (KVK), Kharpudi, located near Jalna city, also shows a declining trend during the last two to three decades (Figure 2.3). In 2012, the station recorded barely 200 mm of rainfall. Furthermore, data from the Badnapur Research Station in Jalna shows that during the period of 1984–2010, rainfall in June has tended to decrease (Figure 2.4), while September rainfall has increased over

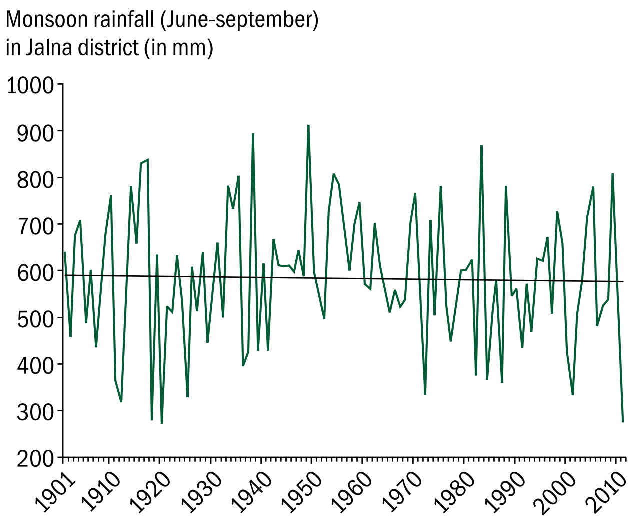


FIGURE 2.1 Historical trends in monsoon (June–September) rainfall over Jalna district (1901–2012)
Source: For 2004–2012, IMD data recorded for Jalna district

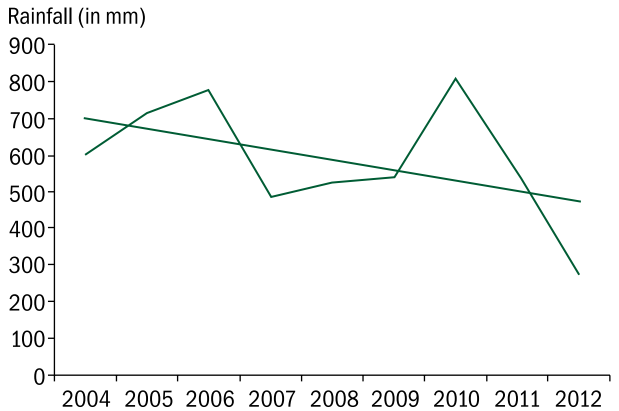


FIGURE 2.2 Recent trend in monsoon (June–September) rainfall over Jalna district (2004–2012)
Source: IMD data recorded for Jalna district (www.imd.gov.in)

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2 The IMD defines drought in any area when the rainfall deficiency in that area is 26 per cent or more of its long-term normal/average.

3 1901-2002: District data computed from CRU 0.5° x 0.5° gridded dataset (India Water Portal, Tyndall Centre for Climate Change Research, and Mitchell and Jones (2005)

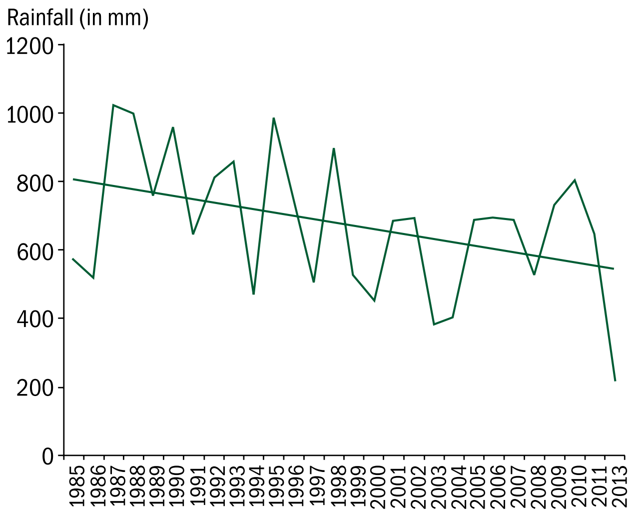


FIGURE 2.3 **Trend in rainfall recorded at KVK Kharpudi, Jalna (1985–2012)**
Source: KVK Kharpudi, Jalna

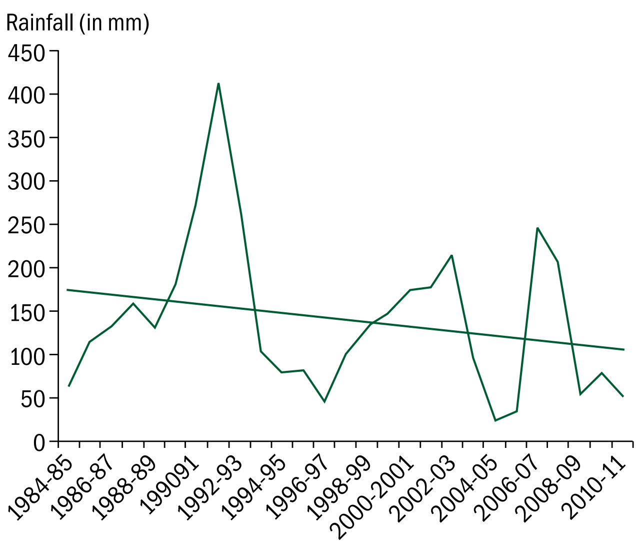


FIGURE 2.4 **June rainfall recorded at Badnapur Research Station, Jalna (1984–2010)**
Source: Badnapur Research Station, Jalna

the same period (Figure 2.5). This has important implications for farmers in terms of sowing dates and irrigation.

Local perceptions of recent climate trends among farmers and officials in Jalna are that temperature has increased, rainfall has been decreasing, the onset of the monsoon has become delayed and erratic, and the number of rainy days has decreased. Though there is insufficient data to analyse long-term trends in climate, it is clear that there are changes in the distribution of rainfall, both year-to-year and during the season, in Jalna.

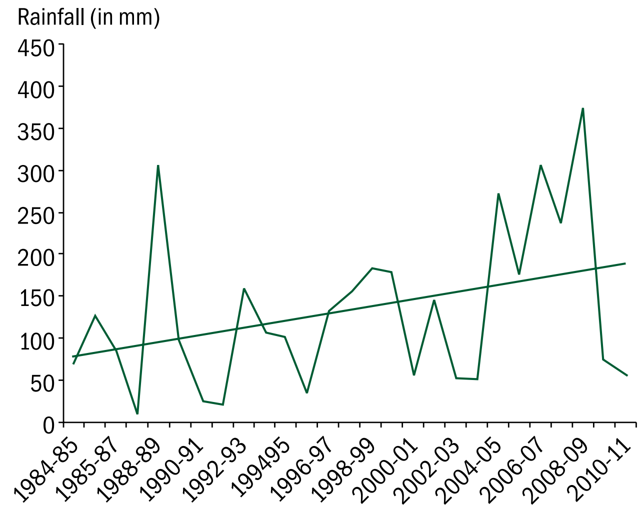


FIGURE 2.5 **September rainfall recorded at Badnapur Research Station, Jalna (1984–2010)**
Source: Badnapur Research Station, Jalna

The 2012 drought has been stated to be the worst drought in the region since 1972. In terms of spatial distribution, rainfall in the region was uneven throughout the (failing) monsoon season. Jalna District was one of the most severely affected in the state in terms of rainfall deficit, receiving only 25–50 per cent of its normal rainfall between June and October, according to Department of Agriculture, Maharashtra State. An analysis of the droughts in 1972 and 2012 was conducted by the South Asia Network on Dams, Rivers and People (SANDRP). This study analysed rainfall figures and monthly rainfall patterns in the two drought years — for 1901–2002, district data computed from CRU 0.5° x 0.5° gridded dataset (India Water Portal, Tyndall Centre for Climate Change Research, and Mitchell and Jones, 2005) — with respect to the normal rainfall pattern in 17 drought-affected districts in the State of Maharashtra. The study concluded that from a meteorological point of view, the drought in 2012 was *not* more severe than the one in 1972. They noted however that in terms of hydrology it might have proven to be worse for some districts. Data for Jalna District (Table 2.1) shows that the total amount of rainfall is more or less the same for the two drought years — about 50 per cent of normal average, but with some variance in monthly distribution. June is an important month in terms of agriculture and cropping decisions, so the low rainfall in June 2012 gave a particularly bad onset of the season.

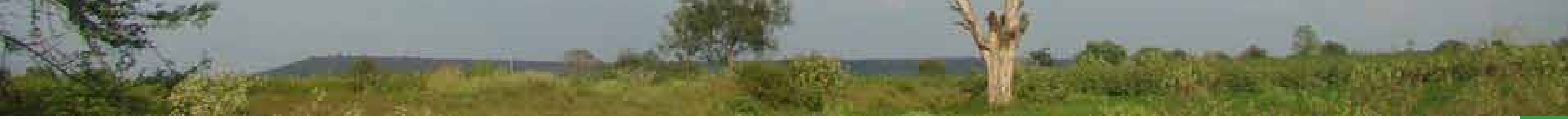


TABLE 2.1 Rainfall in Jalna District for the period June–October in 1972 and 2012 and normal average

Rainfall (mm)	June	July	August	September	October	Total
Normal	1 38.9	171.8	166.7	156.7	54	688.1
1972	105.5	54.8	73.3	102.2	0.61	336.4
2012	43.4	95.2	62.7	78.4	44.3	324

Source: Rainfall data, 1972. Available at http://indiawaterportal.org/met_data/
Normal and 2012 rainfall data. Available at http://www.mahaagri.gov.in/rainfall/index.asp as compiled by SANDRP (http://sandrp.wordpress.com/2013/03/30/how-is-2012-13-maharashtra-drought-worse-than-the-one-in-1972/)

In most cases, the drivers of droughts are context-specific, often inter-linked and act over different time scales. Moreover, how a drought is experienced and how it will impact locally is both contextual, and also personal (see Chapter 3 for relationships between climate change and extreme drought).

2.2 Geohydrology and impacts on watershed development potential

Geohydrology is critical for managing scarce water resources in a drought situation. Jalna District is underlain by basaltic lava flows and alluvium. The basaltic lava flows is part of the Deccan Traps, which occupy about 98 per cent of the districts area. The main rivers flowing through Jalna District are the Godavari and its tributaries, Purna and Dudhana. Yet, in many of the villages in the district, groundwater is the main source of water, and groundwater has special significance for agricultural development and irrigation in the district. In the Deccan Traps, occurrence of groundwater is controlled by the highly variable water-bearing properties of the different flow units, which usually have poor to moderate permeability depending on the presence of primary and secondary fractures and porosity. The formation is thick and comprises scores of lava flows of 5–25 metres of individual thickness. Each flow comprises a lower zone of hard and massive basalt, which has primary (inherent) porosity and permeability close to none, and an upper zone of vesicular basalt, i.e., basalt-containing cavities, also with limited primary porosity (CGWB, 2010). Typically, hard rock areas such as the basaltic rocks, are considered limited in their groundwater potentials and heterogeneous in occurrence, which poses some challenges both for groundwater utilization and management in the region. Yet, there are also nuances in this picture. Weathering, joints, and fractures 'impose' secondary (induced) porosity and permeability to the formation and these zones form potential aquifers. Hence, hard rock aquifers are confined mostly to the weathered residuum, fracture and fissure section generally up to the depth of about 60 metre. Furthermore, it is mainly in the lower ground that a deep weathering profile of the Deccan Traps Basalt is preserved, that can form a continuous perennial (lasting) groundwater body of significant storage. In the recharge zone infiltration capacity is fairly good, but storage is generally low. Hence, wells tend to dry out (Figure 2.6).

Typical for the Deccan Traps and the Jalna District are shallow aquifers that show erratic variations in the ability to store and transmit groundwater within small distances. Hence, as a consequence, local variations in well water yield across small distances can be seen, which lead to localized impacts and variations of drought events on the groundwater resources (Figure 2.7). Areas of Jalna District where weathered jointed and fractured zones in the Deccan Traps are 20–40 metre thick, aquifers have considerable groundwater potential and wells located in such areas can yield about 100–250 m^3/day according to CGWB (2010). For small-scale farmers, the most dominant and feasible mode of shallow groundwater extraction is through dug wells of 10–15 metre depth and 5–8 metre diameter. For areas with low altitudes specifically, 15–25 metre thick weathered, fractured, and vesicular zones are chosen (CGWB, 2010). The deeper aquifers are tapped by bore wells

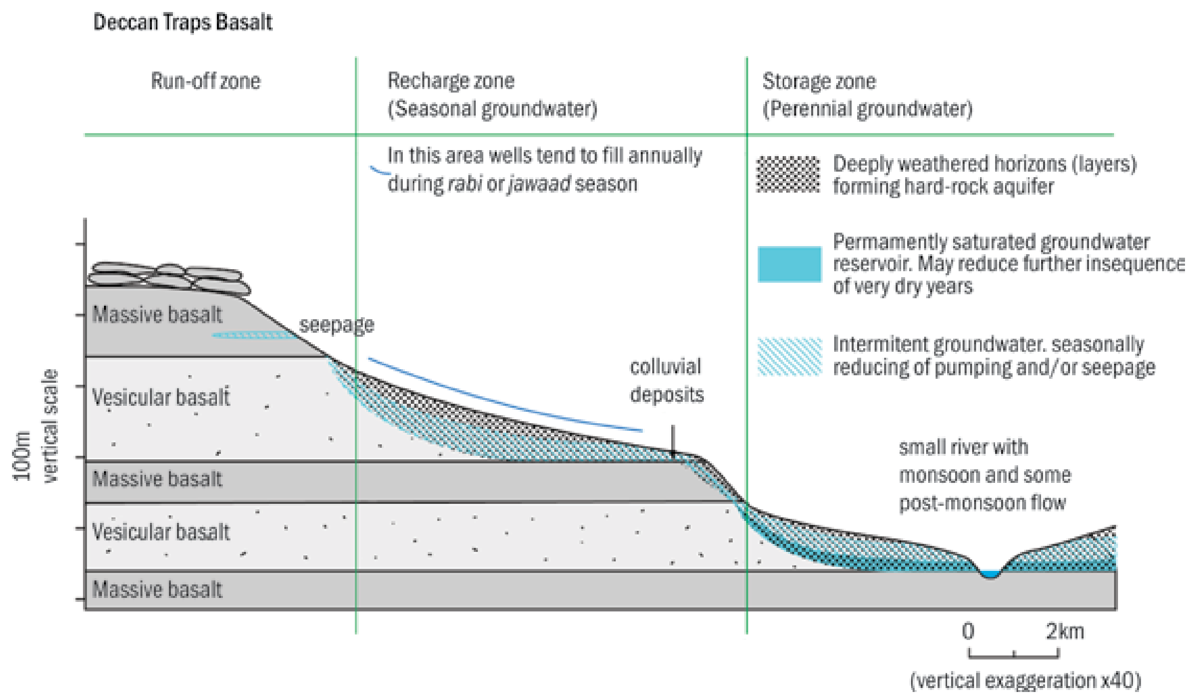


FIGURE 2.6 **Typical hydrogeological cross-section of a Deccan Trap Basalt micro-watershed**
Source: Modified from Forster et al. (2007)

up to 200 m below ground level and under favourable conditions bore wells can yield 2–18 litre per second or 7.2–70 m^3/hour (CGWB, 2010). However, some challenges with use of bore wells in the area are also mentioned like difficulties in exploration and assessment of the resource, risk of not encountering an adequate groundwater supply (Limaye 2011), and potential risk of rapid depletion (Foster, 2007). Hence, deep bore wells may potentially yield limited relief in the region in the context of future droughts.

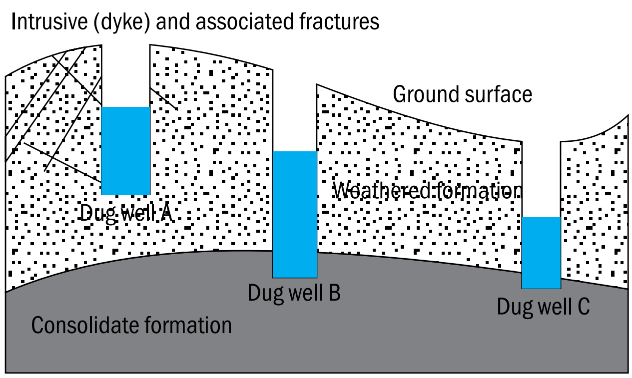
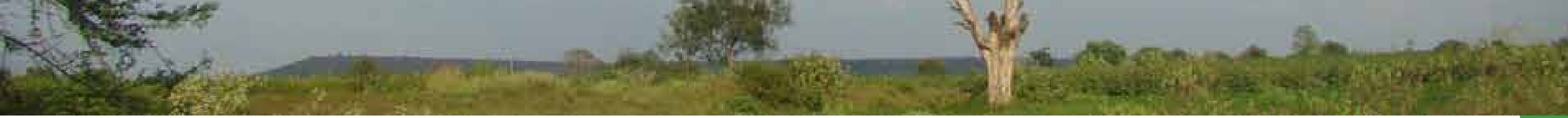


FIGURE 2.7 **Dug wells in unconfined hard rock aquifers**
Source: Based on Maitra (2011)
Note: Depending on where — and in which material — the wells are located, they will have different potential and yield. Well C is likely to yield more water than wells B and A as it is located in a depression and taps greater thickness of weathered zone. Dug well A is also likely to yield substantial quantity of water due to tapping of the fractures even though it is situated at a higher elevation.

The present stage of groundwater development in Jalna District is reported at about 43 per cent (CGWB, 2010), which is at the lower end in comparison to other regions. Hence, scope for some further groundwater development is seen in the district. However, there are also variations in different stages of groundwater development within the district; it varies from 27 per cent in Ghansawangi to 59 per cent in Badnapur (CGWB, 2010). In 2010, the Central Ground Water Board (CGWB) reported that major parts of Jalna District were showing falling groundwater level trends in northern, southern, and eastern parts of the district, comprising almost entire areas of Bhokardan, Jafrabad, Ambad, and Partur, and major parts of Jalna block in central part of the district (CGWB, 2010). Thus, they urged that future water conservation and artificial recharge structures should be prioritized in these areas. However, none of the blocks in the Jalna District are reported as over-exploited in terms of groundwater resources (Agriculture Contingency Plan for District Jalna, 2011).

In hard rock aquifers, such as the Deccan Traps, groundwater rarely occurs across the



topographical water divides, and the water table tends to follow the topography, and each basin or sub-basin can be treated as a separate hydrogeological unit for planning (Limaye, 2011). Three of the villages — Asarkheda, Kadegaon, and Thote Pimpalgaon — that are a part of this study have implemented an integrated watershed development programme following the 'ridge to valley' principle for area and drainage line treatments.

Watershed structures in the Jalna District are typically check dams, percolation tanks, and farm ponds, in addition to the many private dug wells for irrigation. In 2008, there were about 49,774 open dug wells in Jalna District (Agriculture Contingency Plan for District Jalna, 2011). For water supply and potentially large-scale farms, bore wells may be constructed, but preferably only after a hydrogeological survey (CGWB, 2010). It has been suggested that bore wells are mainly to be used for drinking water supply, and not for irrigation (Foster et al. 2007).

Important functions of watershed structures are to recharge groundwater aquifers and/or facilitate water for drinking and irrigation. In addition to the many irrigation wells in the district, we found that farms ponds are a particular important asset for the farmers as a facility for storage of water. The stored water can be used for irrigation in times of no or low rainfall (Photo 2.1). Farm ponds help recharge groundwater locally in cases where they are constructed without plastic line so that water percolates into the ground. In the Jalna district, our impression is that the ponds are mainly built with plastic linen and used for irrigation directly. The farm ponds depended on getting the water from somewhere, and they are filled with rainwater directly and/or water from nearby wells or rivers/*nalas*. During field work in September 2012, we did experience that some farmers did not finalize the construction of farm pond as "there was no water anyway". For groundwater recharge purposes, percolation tanks are built rather than farm ponds. Percolation tanks are larger-scale structures build upstream in a micro-watershed with the purpose of capturing rainwater that can percolate down and recharge the groundwater aquifers (Photo 2.2). During extremely dry weather, it may be that water does not reach the aquifers as the various layers also need to be saturated for the water to reach the groundwater aquifer. On a positive note, in Deccan Traps, water can travel along the fractures in the hard rock, thus there may be local areas where the water will travel faster to fill the aquifers.

Photo credit: Line Barkved

PHOTO 2.1 Dug wells for irrigation is a common feature in the Jalna District

Note: During the 2012 drought, most of them had very little water even during the monsoon season. These are photos from wells located in the lower parts of Warudi (Badnapur) taken in September 2012.

Photo credit: Line Barkved

PHOTO 2.2 Farm pond

Note: Farm ponds are important for farmers as a mean of storing water for irrigation. To protect the water from evaporating the farmers put a layer of oil on top of the water.

In terms of spatial variances, farmers, for instance in the Badnaphur block, report that wells close to the seasonal river Lahuki, which was completely dry during the monsoon of 2012, are filling up faster than wells further away from the river bank at some higher altitudes where wells drain quicker. Farmers also related the differences in dug well capacities and impacts of drought to the texture and quality of the soil in the lower and upper parts of their village, respectively. This is related to the characteristics of the Deccan Traps where shallow aquifers will be influenced by the topography of the area, and weathered material tends to be transported downwards by gravity and water (Figure 2.6), which leaves thicker layers of weathered materials and soil closer to the rivers and in valley bottoms.

A critical constraint in the functioning of the watershed development structures in the Jalna villages is siltation and lack of proper maintenance.

Changing precipitation patterns, together with increased evapotranspiration linked to increased temperatures, can affect groundwater recharge rates and the depth of groundwater. Deeper aquifers respond to droughts and climate fluctuations more slowly than surface storages. Hence, aquifers can act as a resilient buffer during dry spells and drought, especially if they have a large storage capacity. However, as noted for the Jalna District, the hydrogeological structures are somewhat complicated at the Deccan Traps, and hard basalt rock makes it difficult to filter or store water.

Jalna District and the Marathwada region received significantly less rainfall than normal in 2012. As a result, reservoirs did not get the expected volume of water, and consequently groundwater recharge became a problem. From preliminary analysis of well data from Groundwater Surveys and Development Agency GSDA, Jalna (Figure 2.8), we see that the distance down to the water level in the wells of the three study blocks Bhokardan, Jafrabad and Badnapur increased between 3.7 and 4 metres in October 2012, compared to the five-year average (2007–2011) for October.

In particular for shallow groundwater aquifers and dug wells, like those in Jalna District, the effects of droughts on water and agricultural resources will be observed by people in short-time frames, due to the aquifers being highly sensitive to rainfall changes. So, when severe drought conditions appear in the region, the scarcity of water both for drinking water and cultivation quickly become acute (Government of Maharashtra, 2004). Hence, effects on hydrology from the combination of climate

PHOTO 2.3 Percolation tank for rainwater harvesting
Note: Percolation tanks are one of the most prevalent structures in India to recharge groundwater reservoirs or local aquifers both in alluvial and hard rock formations. Efficacy and feasibility of the tanks are better where rocks are highly fractured and weathered.

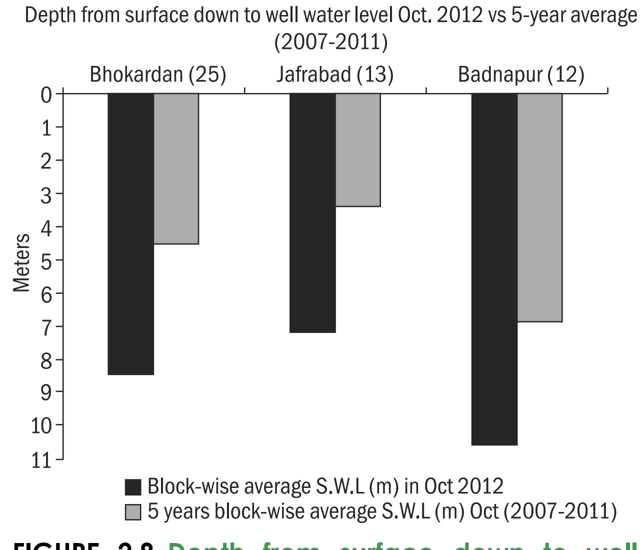


FIGURE 2.8 Depth from surface down to well water level in October 2012 versus the five-year October average (2007–2011)
Note: Depth from the surface down to the well water level (i.e., static water levels) in October 2012 compared to the five-year October average (2007–2011) in the GSDA observation wells for our three case study blocks in Jalna District. The increase in distance — the difference between the light grey and grey columns — varies between 3.7 and 4 metres. Numbers in brackets are observation wells included in each block

change/extreme weather and land-use need to be assessed as background for proper adaptation and management of groundwater resources.

2.3 Farming system, cropping pattern, and soils

Jalna District falls in the agro-climatic zone known as the Central Maharashtra plateau. Most farmers in the district are small or very small-scale farmers (81%), with a few medium-scale (18%), as is evident from the distribution of land holdings and type of farmers (Table 2.2). There are only 3,000 large-scale farmers in the district (1–2%). The land-use pattern of Jalna district shows that net sown area constitutes 77 per cent of the total geographical area of the district, indicating the overwhelming importance of agriculture to the district's economy. However, only 13 per cent of the area is irrigated and 42 per cent has undergone substantive watershed development (DSAO 2012), which indicates the climate sensitivity of agricultural livelihoods. Low access to irrigation, combined with drought proneness, falling groundwater levels, and uneconomic land holding size, reflect the vulnerability of the region to climate change. The principal crops of this area are cotton in the *kharif* (monsoon) season; sorghum (jowar) in the *rabi* (winter) season, and perennial orchards of sweet lime (mausumbi). The other important crops include maize, pearl millet (bajra), soybean, green gram, wheat, and vegetables. Jalna city is also a major hub for seed companies who engage in contract farming with small farmers for cotton seeds and vegetable seeds.

Due to the small landholding sizes of household, agricultural labour is an important source of income, particularly in the post-*kharif* season. Non-agricultural wage labour is also an important income-earning strategy, particularly for villages that are close to the highway connecting Jalna city, Aurangabad, and the Maharashtra Industrial Development Corporation estate in Shendra. There is also seasonal migration for work in sugarcane factories in other parts of Maharashtra.

Dairy farming is an important source of livelihood in a few villages such as Warudi, where a private milk collection centre was set up three years ago. However, in other villages, it has dwindled due to fodder scarcity and the closure of the Jalna District Milk Cooperative Society in 1998.

The household survey revealed that most households have enough food stocks to survive a drought year. However, most farmers are price-takers with hardly any opportunities for value addition or storage, that can help them enhance their incomes and savings in good years (see Chapter 5).

Most of the land has shallow soils, with only 13 per cent having deep black soils, reflecting great variation in soil quality and depth from one village to another. Such differences lead to localized variations in the impacts of the drought. The soils of the district are derived from the basalt, and the thickness of the soil cover is less in northern and western region where ground elevations are higher. Black soil is transported from higher to lower elevations through gravity and water. Soils in central, southern, and eastern regions of Jalna District — near the banks of the rivers Godavari and Dudhana — are thicker, black, and rich in nutrients. See Table 2.3 for details on the soil cover in the EVA study areas.

TABLE 2.2 Distribution of land holding and area of Jalna District

Type	No of land holders	Total Area (ha)
Large-scale farmers (above 10 ha)	3,000	4,40,000
Medium-scale farmers (4–10 ha)	37,000	24,00,000
Small-scale farmer (2–4 ha)	71,000	19,30,000
Very small (1–2 ha)	98,211	14,50,000

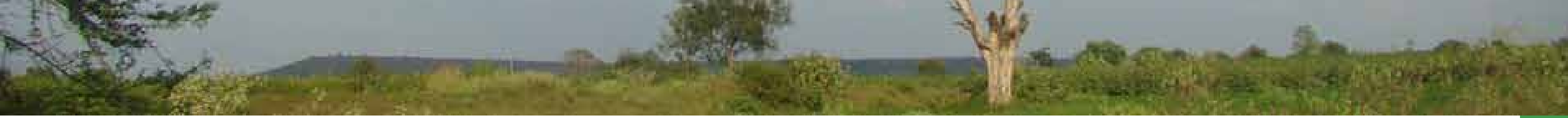
Source: Jalna, DSAO (2012)

TABLE 2.3 Block-wise status of predominant soil-cover in the EVA study areas

Block	Texture	Predominant soil cover
Badhnapur	Medium to deep	clay, clay loam, and silty
Jafrabad	Shallow to medium	loamy and loam-to-clay
Bhokardan	Deep	clay


PHOTO CREDIT: Line Barkved


PHOTO CREDIT: Ulka Kelkar



3. Climate Change and Extreme Drought in Jalna

3.1 What is a drought?

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) defines drought as "A period of abnormally dry weather long enough to cause a serious hydrological imbalance." In India, the India Meteorological Department defines a meteorological drought in any area when the rainfall deficiency in that area is 26 per cent or more of its long-term average.

But, there can be other types of drought as well. Shortage of rainfall during the growing season can cause an agricultural drought, while reduced runoff and percolation can create a hydrological drought.

Further, according to the IPCC, climate change can lead to "changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events" (IPCC 2012).

Moreover, even if some changes in climate are not extreme in themselves, their combination could result in extreme events. For example, droughts may be caused by the combination of higher temperatures, more frequent dry days, increased evaporation, and reduced soil moisture.

3.2 Drought and climate change in Jalna

The normal annual rainfall in Marathwada is low, and it is characterized as a frequently drought-prone area. In Jalna, in particular, there has been a drastic decline in rainfall in the last few years, culminating in the extreme drought of 2012. Moreover, according to data recorded at

PHOTO 3.1 Communities forced to depend mainly on tankers for supply of drinking water during 2012 drought (Malegaon Village, Jalna)

the Badnapur Research Station, June rainfall has declined while September–October rainfall has increased over the period from 1984–85 to 2010–11. This has important implications for farmers in terms of sowing dates and irrigation.

Given the past history of drought in Maharashtra, farmers and rural households resort to a number of coping options, such as modifying cropping practices, borrowing, selling livestock, and migrating to towns in search for wage labour. But, these efforts may not be adequate to deal with consecutive years of severe drought. In fact, by eroding their assets and disrupting social networks, some of these coping measures may even *increase* the vulnerability of farmers over time.

Climate change is expected to bring an *increase in rainfall* in Jalna. However, an increase in average rainfall may be accompanied by large variations from year to year and within a season. More uncertain and erratic rainfall could have important impacts on water resources and agricultural livelihoods in Jalna.

The proportion of rainfall from extreme rainfall events is also likely to increase. However, much of this excess rainfall may be lost to runoff and many not help recharge groundwater aquifers. Moreover, it may worsen existing problems of soil erosion. Unless this rainfall is stored for irrigation and drinking water, climate change could pose an added stress on farmers in Jalna, who are already dealing with falling groundwater levels, rising input prices, poor soil fertility, and changing market prices.

Farmers and policy-makers in Jalna need to prepare for the projected increase in temperature and rainfall, and the increase in uncertainty and variability that climate change will bring. Although there is very little past data on extreme events such as the severe droughts of 1972 and 2012 — since they are rare occurrences — it is possible that the increase in averages and variability due to climate change will cause such extreme events to occur more frequently than in the past.

Discussion of the projected climate changes with farmers from nine villages in Jalna led to a better understanding of the potential impacts of climate change on agriculture and water resources, and the need for preparing for such impacts (Photos 3.2 and 3.3 and Table 3.1).

FIGURE 3.1 What-if scenarios by village communities in terms of climate change impacts on water and agriculture

Scenario 1: Increase in temperature	• Increased irrigation requirement for kharif crop • Decrease in rabi crop yield • Introduction of new pests or increased pest attacks • Adverse impact on orchards • Scarcity of fodder and water for livestock and fall in milk production • Decrease in comfort level and impact on health of labourers
Scenario 2: Increase in rainfall intensity	• Soil erosion • High runoff • Increased damage by pests • Crop failure of fall in agricultural production • Adverse impact on health
Scenario 3: Increase in drought frequency	• Decrease in food production • Reduction savings • Increased need for borrowing/loans • Unemployment • Reduction farming activities and income

PHOTO 3.2 Discussion on climate change scenarios in Asarkheda village, February 2013

PHOTO 3.3 Identification of adaptation options in Kadegaon village, February 2013

PHOTO 3.4 Villagers carrying water tankers to meet their water demand

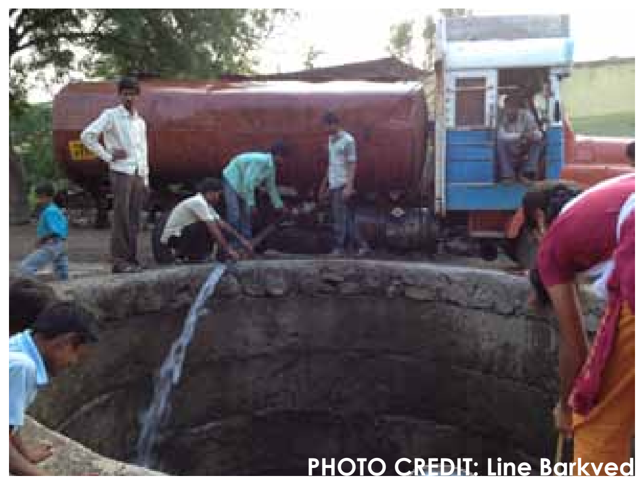
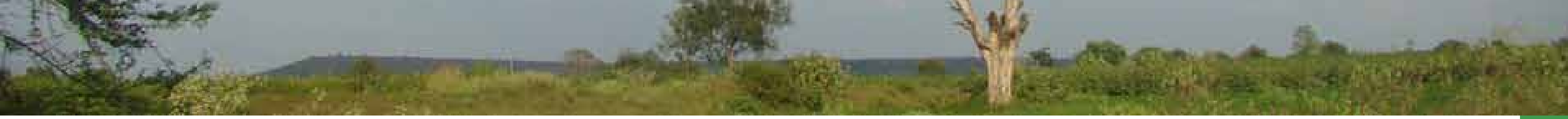


PHOTO 3.5 Tankers being used to refill water in wells

PHOTO 3.6 Farmer in Pimpalgaon Barav village showing the normal height of cotton



4. Community-based Adaptation

4.1 What is Community-based Adaptation?

The EVA project studies the enabling conditions for and barriers to Community-based Adaptation (CBA) to climate change. CBA is a climate-change concept that has emerged within the community of development practitioners — multilateral donor agencies and various forms of civil-society development actors. Since 2005, an annual international conference on CBA has brought together "stakeholders from donor agencies to local NGOs to share their projects and experiences" with CBA (Reid et al. 2010).

These conferences tend to refer to CBA mostly as NGO-driven development activities and projects that use a participatory framework working with local people. The activities engage local people and groups or organizations in planning for the future and in prioritizing between different development paths and elements. The IPCC's *Special Report on Extreme Events* (SREX) (IPCC 2012) highlights the importance of CBA responses as a key approach for local adaptation, in addition to integrating information about changing climate risks into disaster planning and scenario assessments of the future. They describe CBA as responses to climate change:

> [that] provide increased participation by locals and recognition of the local context and the access to adaptation resources and promote adaptive capacity within communities. A critical factor in community-based actions is that community members are empowered to take control of the processes involved. (IPCC 2012: 300)

The core element of CBA is to increase the resilience of the world's poorest communities to the impacts of climate change. Although the actual activities may look very much like regular community development projects — and it is difficult to identify the additional 'adaptation' components — there is a difference, as CBA attempts to incorporate the potential impact of climate change on local livelihoods and vulnerability. One way of engaging in CBA, with an explicit climate change component, is to integrate information on long-term predictions from climate change models into local and community-level planning (Reid et al. 2010).

Increasing amounts of donor funding is now available for climate change adaptation, with the development of the Adaptation Fund under the Kyoto Protocol and the Small Grants Programme fund for CBA projects under the Global Environment Facility (GEF).[4] Several approaches, techniques, and toolkits are emerging for vulnerability analysis and building of local adaptive capacity within a CBA framework, targeted at development practitioners who are designing projects. Large-scale CBA initiatives are now being designed under the GEF (AusAID and Small Grants Programme),[5] UNEP (Global

4 The total grant amount for Community-Based Adaptation under the Small Grants Programme since 1992 amounts to 13 million USD. See, https://sgp.undp.org/index.php?option=com_areaofwork&view=summary&Itemid=177

5 https://sgp.undp.org/index.php?option=com_areaofwork&view=summary&Itemid=177

Partnership on CBA), IDRC Canada, and DFID (Reid et al. 2010). In India, the National Bank for Agriculture and Rural Development (NABARD) is the National Implementing Entity of the Adaptation Fund under the Kyoto Protocol (see https://www.nabard.org/english/CCA3.aspx). However, information on this has not yet percolated down to the district level (interview with Jalna District Branch Manager of NABARD, 19 October 2013).

4.2 From field of practice to field of research

A key message of the CBA community is that communities need to be in the driving seat of development planning. Methodologically, CBA projects use the whole Participatory Rural Appraisal toolbox (Kanji and Greenwood 2001), as well as stakeholder forums and dialogues. The annual conferences have had the aim of translating CBA activities into improved policies and scaling up CBA initiatives. Initially, they had to convince development practitioners that vulnerability to climatic variability was the entry point to building adaptive capacity. This was achieved largely in the first conference (Reid et al. 2010). Later conferences have focused more on distinguishing community-based 'Adaptation' from community-based 'Development', and the ways to scale up and make relevant individual interventions, and also to integrate climate science into CBA whilst maintaining a community-driven process. The earlier conferences were dominated by sharing of practitioners' lessons and they were largely confined to the experiences from the NGO community. However, the fifth conference, in 2011, attracted a larger number of academic participants, and CBA as a field of practice moved into a more analytical phase.[6]

The EVA project places itself in the analytical phase of CBA, by investigating the conditions for its success. Furthermore, we adopt a broad definition of CBA. By 'community-based' we mean adaptation in the form of local-level and village-community-driven responses to climatic conditions that may be exacerbated with climate change. These responses may arise 'from below', i.e., at the initiative of local individuals or collectives, 'from above', i.e., from the local, district or state government, or 'from outside', i.e., from non-governmental organizations. CBA covers *planned* adaptation based on deliberate policy decisions as well as *spontaneous* adaptation.[7] Crucially, an analysis of conditions for successful CBA needs to consider the interaction and coordination between initiatives from below, above, and outside, and also between planned and spontaneous adaptation. A key feature of the EVA project is the focus on the governance of climate change adaptation, and how state, local government, NGOs, community-based organizations, and private actors interact and coordinate policies and actions on the ground. In this regard, community-based organizations may be local Self Help Groups (SHGs), Watershed Development Committees (WDCs), User Groups, Farmer Groups or more spontaneously established or informal groups or networks.

The term 'community' is often used without further discussion and conceptual clarification, as seen for example in the introduction to and abstracts presented in the report from the fourth CBA conference (Reid et al. 2010). It is important to acknowledge the heterogeneity within local village communities, which are often divided socially, politically, and economically between groups based on ethnicity, caste or clan (see, e.g., Platteau 2002). Any planning process for adaptation at the local level should start with "the identification of the differentiated social impacts of climate change based on gender, age, disability, ethnicity, geographical location, livelihood, and migrant status" (IPCC 2012: 298), as well as a consideration of the causal factors behind differential vulnerability.

The EVA project has analysed the differential vulnerability to climate change in Jalna by using a livelihoods framework. These frameworks are

6 http://www.scidev.net/en/news/science-is-key-to-community-based-adaptation-.html

7 The IPCC Fourth Assessment report defines 'autonomous' or 'spontaneous' adaptation as "Adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market of welfare changes in human systems." http://www.ipcc.ch/pdf/glossary/ar4-wg2.pdf7

based on the assumption that poverty reduction is achieved through increasing the assets of the poor or enabling existing assets that are idle or under-employed to be used productively (Ellis 2000). A livelihoods framework draws attention to the actual lives of rural people, acknowledging and analysing how for example economic multi-activity and dependence on natural resources conditions the scope for community-based adaptation to climate change. The assets that people draw on to build a livelihood and their access to these assets are structured by policies, organizations and relationships between individuals, social groups and organizations (Rakodi 2002).

This livelihoods framework helps us analyse social relations, processes, and institutions that create patterns of vulnerability and act as enabling conditions and structural constraints to climate change adaptation and improved living conditions (Beall 2006).

We see that the CBA in Jalna District is conditioned by community-level factors, such as the degree of heterogeneity, level of trust and cohesiveness (social capital), knowledge and awareness (human capital), and capacity to act (human and economic capital), as well as factors *external* to the village, such as the capacity and efficiency of the block and district-level government, the existence and accessibility of NGOs, the relevance and appropriateness of existing policies, and market relations. Chapter 5 will briefly discuss how these factors condition the scope for CBA in Jalna.

PHOTO 4.1 **Interaction with communities in Jalna to understand their vulnerabilities**

5. People and Livelihoods: Vulnerability

5.1 High dependence on agriculture: Cotton

Most rural households in the nine EVA case villages of Jalna depend mainly on farming for their livelihoods; cotton being the main cash crop. At the same time, local farmers as well as landless farmers, expressed concerns about declining agricultural production and agriculture becoming less profitable. The unreliable monsoon and more erratic rainfall was part of their explanation. Findings from the Focus Group Discussions and semi-structured interviews show that even though new cultivars, hybrid crops, and increased water availability had increased productivity in agriculture over the years, the scope for increasing the overall profit margins of the farmers had not improved significantly. A reason for this is that input prices had also risen, while output prices had not compensated for this increase. The farmers also highlighted the higher costs-of-living; their children required education, and many consumer goods such as fridges, fans, two-wheelers, and mobile phones had become necessities. The well-off households in the villages all had family members engaged in other businesses; for example, having licences for trading in agricultural implements, running small factories, or local teashops. Old family wealth also contributed to the security and a broader base of livelihoods for large/medium farmers who may rent out tractors, bulls, flour mills or other inherited equipment. In some villages, the leading families had moved with their nuclear family to nearby small towns, where they have their business. They however often retain some informal and formal leadership positions in the village; for example, heading the Cooperative Credit Society, engaging in village politics and

PHOTO CREDIT: Guro Aandahl

PHOTO 5.1 **High dependence on cotton farming in Jalna**

panchayat elections, or otherwise being a link to outside institutions.

5.2 Diverse cropping patterns

Agriculture in all the nine EVA case villages are dominated by cotton cultivation in combination with a mix of maize, *bajra*, *tur*, and soybean grown in the *kharif* season, and *jowar* (sorhum) and to some degree wheat grown in the *rabi* season. Cotton is the main cash crop being frequently irrigated by dug wells or less frequently drip irrigation.[8] Cotton is grown by a majority of farmers, often intercropped with *tur*. Maize and *jowar* are food crops which are also grown for fodder, and especially in the case of failed crops. In a good year, medium farm households (two hectares and above) are self-sufficient in *bajra*, *tur*, groundnut, and wheat production for home consumption. There are however important differences between the three clusters of villages in the three blocks. The livelihoods of the Badnapur Block villages are more diverse than those in Bhokardan and Jaffrabad Blocks, reflecting differences in both local resources and closeness to the Jalna city markets. Soil and water conditions allow for higher productivity agriculture and the plantation of sweet orange orchards. Larger areas of Badnapur have deep black cotton soil with higher moisture retention capacity, and the Purna river allows for more irrigation on nearby lands (see Chapter 2). Furthermore, Badnapur is more industrialized with employment opportunities for skilled and unskilled workers in the local industrial cluster — MIDC Shendra.

A recent innovation in cultivation in villages of all three blocks is to undertake contract farming for cultivation of seeds used by seed companies. This requires some investment capacity, such as for drip irrigation, and is more widespread among larger/medium-scale farmers. Nevertheless, small and marginal farmers can also engage in this activity as the size of the seed plots is small — 0.5–1 acre. The ability to invest in seed plots is promoted through availability of subsidized credit under a government scheme. The seed plots give potentially good profits, however, the pollination work is labour intensive and the risk of crop failure is borne entirely by the farmers, according to our informants. Farmers were not directly assisted by the seed companies during the drought.

5.3 Dug wells, watershed development, and extreme drought

While the number and use of open dug wells for irrigation was very low in the 1970s — informants remember their village had less than 10 open wells 40 years ago — each village now has more than 100 wells, and the number is increasing. Construction of private wells is an approved activity under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGS) scheme. In Jalna, the open dug wells work as a form of rainwater harvesting; they are recharged each monsoon by seepage from surrounding soil and do not tap into a deep groundwater basin (see Chapter 2).

PHOTO 5.2 **Picture of dug wells, close to empty in Warudi and Kadegaon in September 2012**

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8 According to the DSAO, Jalna (2012), at the district level, *jowar* is grown on more than 70 per cent of the arable *rabi* land, while cotton is grown on more than 50 per cent of the arable *kharif* land

The potential for open well irrigation is greatly augmented with watershed development interventions, which is the main policy promoted by the district agricultural office, along with schemes to promote agricultural growth and productivity increase. But, funding for schemes is limited. Watershed development covers 42 per cent of the arable area. A thumb rule for this is that if watershed development is carried out on 4 hectares, it provides water for two seasonal crops on 1 hectare (Purandare 2013). For example, our survey shows that well-construction in Asarkheda first started in the year 2000 after the implementation of a major watershed development programme. According to a local NGO professional, this village, located at a high elevation and with shallow soils, only had rainfed *kharif* cultivation before the watershed development made irrigated *rabi* cropping possible. However, only 3 out of the 9 villages have been exposed to ridge-to-valley or more substantive watershed development programmes. Moreover, while watershed development and open wells have clearly increased the productivity and profitability of farming in Jalna during normal-to-low rainfall years, most of wells in all nine villages — even in the relatively well-endowed Badnapur villages — dried up or were close to drying up early in the *kharif* season of 2012 (see Chapter 2 for further details).

Consequently, even elaborate enhancement of soil and water conservation through watershed development might prove to be insufficient for irrigation (and water supply) under a scenario of increased frequency of extreme drought and more erratic rainfall.

5.4 High 'natural' variation within and between villages

Natural endowments, such as soil cover, soil quality, geo-hydrological conditions, and topography, are all factors of importance to water resources management and agriculture and the potentials for new watershed development. The availability and accessibility of these natural resources vary *within* individual village territories and across social groups; the individual households often have land plots that are located both downstream and upstream in the micro-watershed (in part to reduce risks). There are also large intra-village variations between zones of good, medium, and low-quality agricultural land. However, differential vulnerability to droughts is determined by a *combination of natural* and *social factors*. While the social factor of size of landholding is an important determinant of household vulnerability, the size-factor must be seen in combination with the quality of the land owned. For example, good quality, deep, black cotton soil near village drainage lines is more valuable in production terms and may make a household more resilient to droughts, than owning 10 acres of shallow, rocky, or high-level land. It is important to keep this in mind when analysing household vulnerability using data on landholding *size* only.

5.5 Participatory mapping: Useful method

Participatory mapping of water resources and drought-risk zones in the EVA case villages revealed high micro-scale spatial variations in vulnerability due to soil quality, soil depth, and access to irrigation. Our mapping exercise usefully demonstrated the severe impacts of the 2012 drought on e.g. vegetation and water availability in wells. It also helped understand how farmers perceive drought and drought risk in connection to their land and livelihoods. In Warudi village, for instance, villagers mapped arable areas which were always able to produce a *rabi* crop on the soil moisture left from the monsoon rain, but which did not yield in the 2012 season. Participatory mapping was also used to initiate discussion about the planning of adaptation options at the village scale. For example, Warudi participants pointed out the importance of a percolation tank that would help raise water levels.

The maps and the discussion during the making of the map also clearly showed that many watershed structures such as check-dams and percolation tanks have very *localized* effects in the villages. The geo-hydrological conditions of Jalna are formed by basaltic rock with dispersed and shallow aquifers that do not permit substantial recharge of a common groundwater aquifer underlying the whole village land (see Chapter

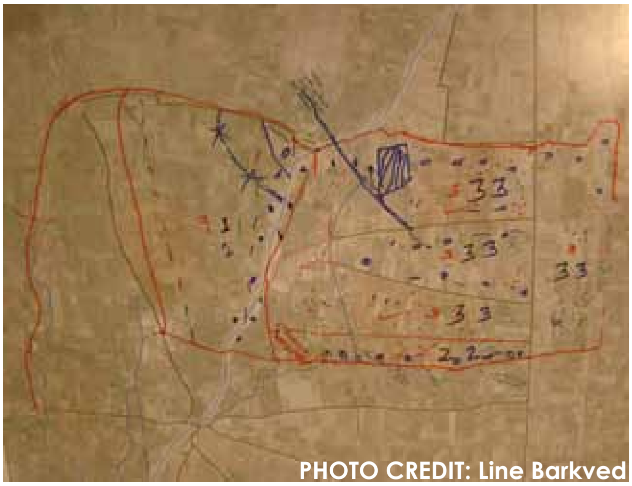


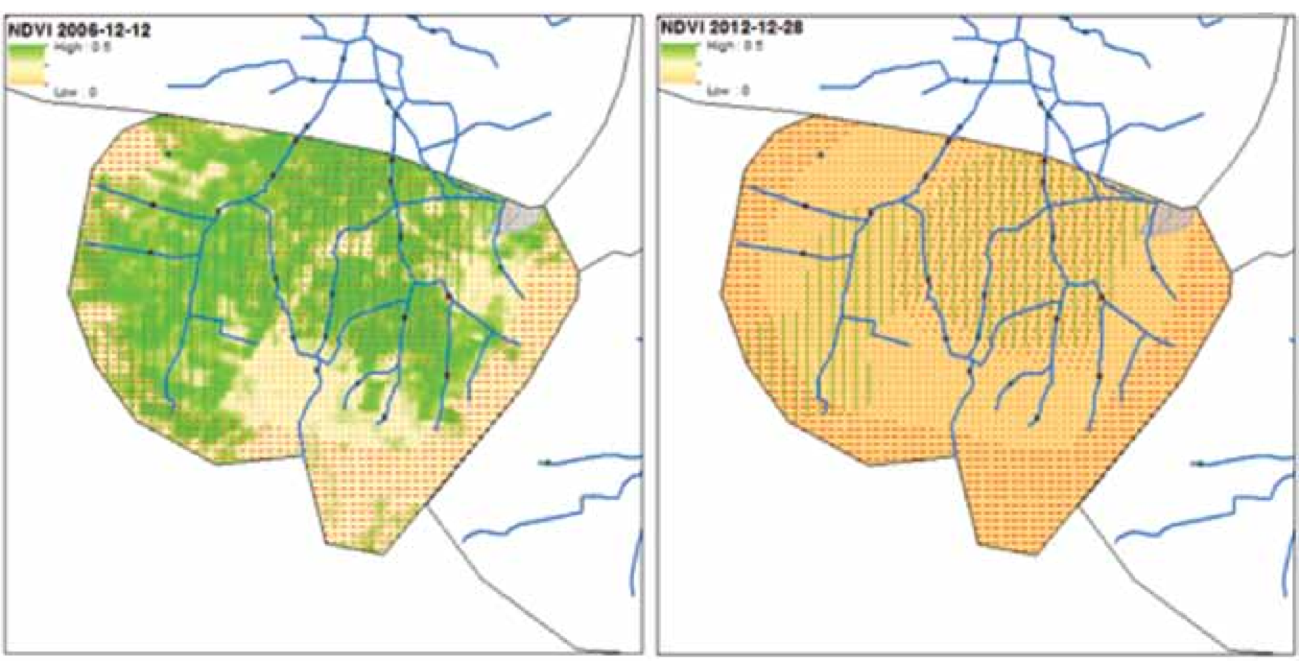
PHOTO CREDIT: Line Barkved

PHOTO 5.3 Participatory map of Warudi village
Note: This map shows lands with good soil (marked 1) that were unable to grow a rabi crop after the 2012 monsoon

2). A check dam on a village drainage line (*nala*) is therefore mainly recharging the open, dug wells of surrounding land. This natural feature has implications for the scope of community-level governance of watershed resources, as these are not necessarily regarded as common resources shared by all inhabitants of the village.

The maps produced through participatory mapping were also overlaid with remote sensing NDVI data[9] of different years that can be used to study the status of the vegetation cover. The approach provided the possibility to combine different types of data to increase the understanding of impacts and vulnerabilities. These remote-sensing images showed that December vegetation cover — showing *rabi* crop extension — was drastically reduced during the drought of 2012, as compared to the same season in 2006, a year that saw good rainfall.

The overlays also showed a very good fit between the zones identified as most drought sensitive because of soil conditions and topography and the remote sensing images of vegetation cover. Map 5.1 compares vegetation cover in Asarkheda village after a good monsoon in 2006 with that after the failed monsoon of 2012. In 2012, there was too little soil moisture for the *rabi* crop, even in areas with good dense soil. By digitizing the participatory maps, we were able to see interesting links among the villages of



(a) December 2006 (b) December 2012

MAP 5.1 Comparison of vegetation cover in Asarkheda village in (a) December 2006 and (b) December 2012

9 Normalized Difference Vegetation Index (NDVI) is a simple graphical indicator used to analyse remote sensing measurements to assess presence of live green vegetation (biomass)

the same block. In Jaffrabad for example, water from Dongaon village drains off to Asarkheda village, but the management of the watershed development interventions is at a village level, with no institutional meeting point for discussion of linkages between villages located in the same micro-watershed.

5.6 Seasonality and the Faustian bargains of labour migration

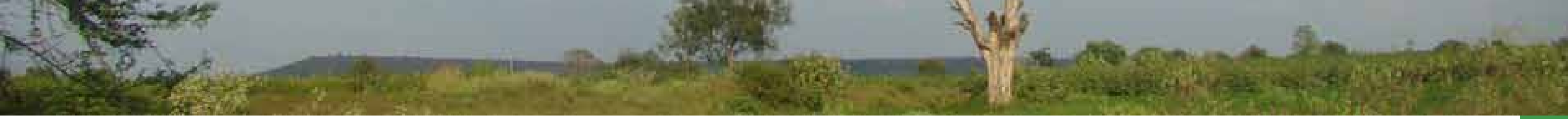
Most small and marginal farmers combine work on their own farm with wage work, mostly as farm labour on other farms in the village. In the summer season, there is hardly any farm labour work available in the village, which is an important source of income in the village for the landless people. However, this work is not available on a permanent basis. Mostly work is available in the sowing season of June–July, and in the harvest season of September–January. *Rabi* cultivation is not as large as *kharif*, so there is not much farm labour work available in *rabi* and in the summer season. In the drought years, the demand for alternatives to farm labour increases and wages and working conditions worsen.

The daily wage rate for farm labour in the villages were said to be about Rs 100. As per the FGD with landless migrating labourers, this is less than the wages for sugarcane cutting in the sugarcane-growing districts of Maharashtra, which is Rs 190/ton — a weight that an able-bodied labourer can pick in a day. The daily wage of MGNREGS work was also less than the wages for the sugar factories. In some villages, landless families or families with marginal, less-productive holdings therefore often preferred seasonal migration to nearby towns from November to May, rather than employment with the MGNREGS.

Migration raises dilemmas for individual households in the face of drought or other threats. For example, some villages had a well-established pattern of migration for sugarcane-cutting, with a local labour contractor who negotiated the wages and settled contracts for the migrants every season. Even then, the living conditions of migrant sugarcane labourers are poor with no provision of shelter and sanitation. Seasonal migration might have negative impacts on the education of children, and thus reproduce poverty. Sugar factories offer so-called sugar

PHOTO CREDIT: Ulka Kelkar

PHOTO 5.4 Participatory mapping in Asarkheda village



schools for the children of labourers, but the teaching is of poor quality with only one teacher for all classes. As the families move several times between different sugar factories, the children must change schools frequently. A couple of informants from migrating, landless families also explained how it is difficult to keep their children in these sugar schools as the children are tempted by the fast cash earned by working in the fields. Hence, migration involves trade-offs between pursuing a particular livelihood activity, with potential detrimental impacts on the future sustainability and upward mobility of household members (Ellis 2000). Poor households can thus get 'trapped' in such 'Faustian bargains', i.e., they chose migration to secure short-term living while suspending the future (Wood 2003).

5.7 Differentiation based on caste and gender

A large majority of the population in the EVA case villages belong to the Maratha caste, which traditionally lives off farming. The fraction of landless labouring households is low in the villages; in most villages, around 5–10 per cent of the population. Most of the landless households are Dalits, or in some villages, Muslims or Notified Tribes. While not all Dalit households are landless, their holdings are generally small or marginal in size, around 2–3 acres. Often living in separate hamlets or in the outskirts of the main village, many Dalit informants complained about being excluded from the main village affairs, from local groups and of not being informed about available schemes and policies. The difference in external institutional connections is quite clearly illustrated when comparing institutional diagrams drawn by landless labourers (all illiterate and all Dalits) and small-and medium farmers (Marathas) (see Figure 5.2).

While the farmers would list a large set of institutions with which they were associated or linked, and grade them according to the degree of importance, the landless, illiterate labourers struggled to think of important institutions other than the Sarpanch and the labour contractor. They also needed greater encouragement and guidance to contribute information. Such differences in capacity and access to local institutions need to be considered, as holding consultations about various forms of interventions which may fall under the heading of Community-Based Adaptation. For example, some of the components of ridge-to-valley watershed development may come at a cost to certain sections of the village community, such as the

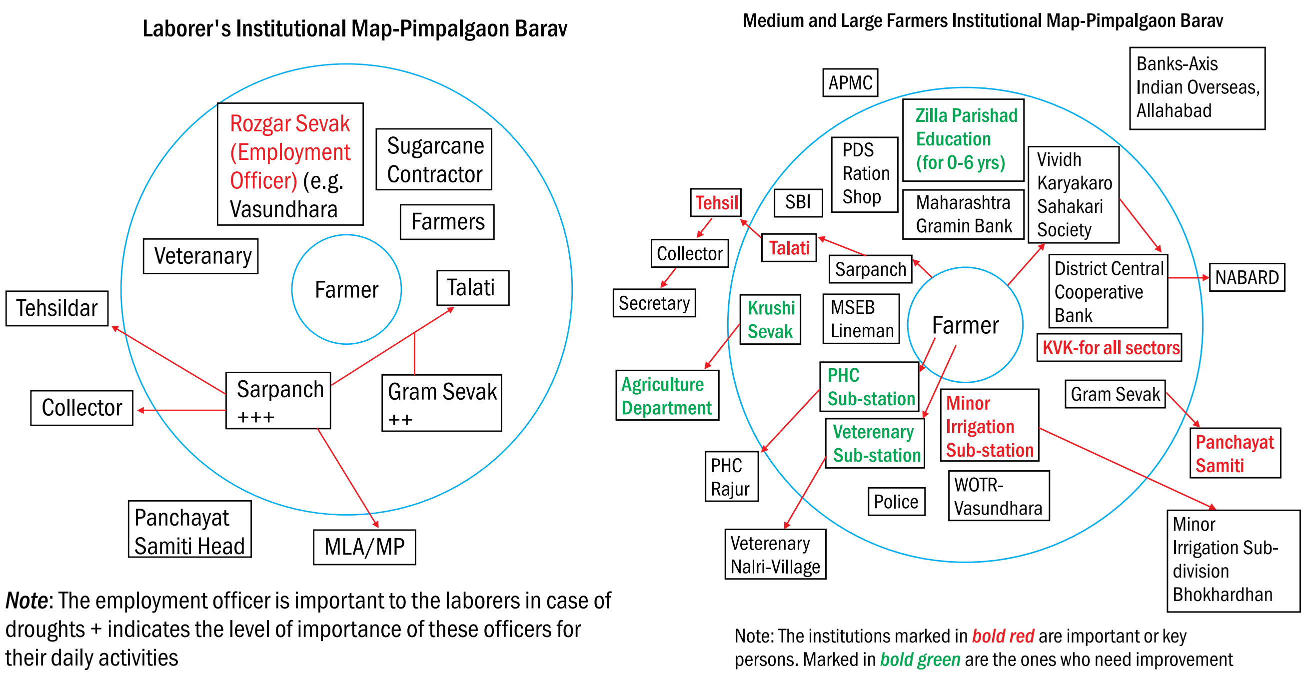


FIGURE 5.2 Institutional mapping in villages

PHOTO 5.5: Focused Group Discussion with Women to understand differential vulnerabilities (Malegaon Village, Jalna)

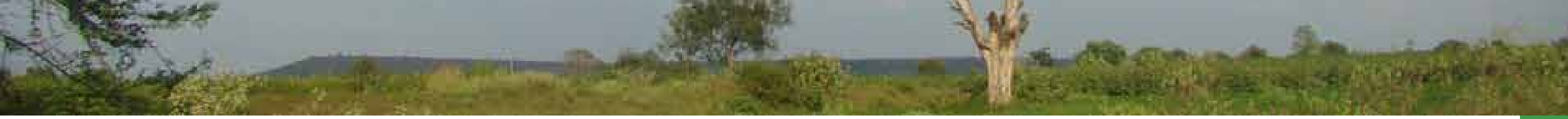
minority population of livestock-herding castes in Jalna. For example, in case of a ban on grazing or zero-grazing in common pasture lands. These communities are often socially and politically marginalized, practice semi-nomadism, and reside outside the main village settlements. In Asarkheda, a ban on grazing was not enforced for lack of alternative livelihoods for livestock herders (AFPRO 2008).

Gender is also a critical factor contributing to differential vulnerability and differential capacity for exercising voice and being heard. The village communities of Jalna are male-dominated and patriarchal in their decision-making structure. For example, the female Sarpanches who were elected on a women's quota seat in the villages, except for one, were not functional Sarpanches. They only acted in a ceremonial way by signing papers. The actual work of the Sarpanch was done by their husbands, who were also introduced to the EVA team as Sarpanches of the village. We also found that decisions to join women's SHGs were often taken by husbands. The role of women in public discussions was therefore limited. On the other hand, women work as farmers and farm labourers, following a gendered division of labour. Operations involving machinery were often reserved for men such as spraying of pesticides and ploughing, while operations involving tedious handwork, as required for weeding or pollination, were largely for women. Some farm operations, such as harvesting, were carried out by women and men together.

Decisions on the running of the farm were often discussed irrespective of gender within the family. However, very few women take part in trainings provided in the KVK. There were practical constraints on women's travel arising due to the demands of household care work and partly also due to social norms restricting women from travelling outside of the village alone.

5.8 Implications of village social differentiation for CBA

CBA aims at improved resilience for the most vulnerable and the poorest at the village level, and uses participatory approaches for local project development (Reid et al. 2010). The



EVA project used different participatory tools for village consultations. Participatory Rural Appraisal (PRA) activities tend to be public group exercises. To this end, it is important to be aware that there are informal, tacit rules governing what is said in public and private domains, and to consider critically whose voices are heard (see Mosse 1994 for useful reflections on PRA). While project planners and researchers *may actively ask for* all stakeholders' viewpoints and interests during stakeholder consultations and village discussions in a project planning phase, the views of the most marginalized (and possibly climate-vulnerable) *may not necessarily be voiced* in all types of forums. Our experience is that the PRA tools were useful for quickly gaining a broad understanding of village issues, but as a method, it is limited in its ability to secure the voices of all sections of the village population. In particular, women rarely spoke in plenary session, and they often left quite early into the group exercises. Hence, we decided to combine the PRA group exercises with semi-structured individual interviews and household surveys within the confines of private homes, especially within Dalit hamlets, in order to gather broader and deeper sets of data and triangulate information gathered.

6. Village-level Responses to 2012 Drought

6.1 Farmers response to water scarcity

The EVA project happened to coincide with the worst drought year in Maharashtra for 40 years (2012–13). In the recollection of our village informants, the drought of 1970–1973 is the only preceding drought of significant severity.[10] All Focus Group participants agreed that during the 1970–73 drought years, villagers had water for drinking and domestic purposes but they experienced acute shortage of water for agricultural purposes. As a result of this, people had severe shortage of food. This was before the great expansion of dug wells for irrigation, which happened over the course of the 1980s, and thus made villages less vulnerable to erratic rainfall and 'normal' drought.

But, 2012 was an extreme drought. The hardship and economic losses to the villagers in our survey area were dramatic and widespread with more than a 50 per cent drop in income and more than 50 per cent crop losses among many farmers (from 2011 crop season compared to 2012). At the local level, the Gram Panchayats in all the nine villages early on in August 2012, organized meetings and mobilized people to attract the attention of the government and external actors in terms of water tankers, new water supply schemes, and assistance in renovating old watershed development schemes or providing support for new schemes. Frequent local meetings were held, declarations agreed upon, and the Sarpanches would mobilize politico-administrative channels in order to gain support from various external institutions and schemes (through the block level administration, political parties, and NGOs). Some Sarpanches would engage to ensure water saving and more equal distribution of water. As the water level in farmers' wells started dropping quickly (or they remained empty), the farmers reacted by saving water or prioritizing water to seed plots of cotton and other high-value crops. This came at the expense of reduced water available for the *rabi* crops (sorghum); in fact most farmers' wells went dry prior to the planting of *rabi* crops. Sorghum planted for *rabi* was typically utilized for fodder only. The local drip irrigation systems were helpful especially for the sweet lime and seed farmers, but this was mostly among the medium- or large-scale farmers. More than 100,000 hectare of sweet lime orchards were severely affected across Jalna District.

In order to meet local demands, the state and district government engaged in both short-term relief measures and long-term drought risk management. The focus of attention by the government was first on responding to water scarcity in terms of drinking water, water and fodder for animals, and water for crops; the main source of irrigation water being shallow wells (see Chapters 2 and 6). Others such as NGOs, private sector, and political parties were also engaged in the provision of tankers or local village plastic tanks. The government mobilized several schemes to meet new and old demands of specific villages for more permanent water supply schemes. Both farmers and extension workers focused on the need for 'new' water

10 Focus Group Discussions and semi-structured interviews during September 2012 and February, July, and October 2013.

saving technologies as critical for meeting future climate variability. There were however diverse views on what would be appropriate technologies as well as on the levels of government subsidies, outreach of various government schemes (e.g., for drip irrigation, farm ponds, shade nets, and poly houses), and general risks and uncertainty perceived in agriculture.

6.2 Cattle camps

According to the government and NGO officials, cattle fodder camps were organized jointly between the government and NGOs which had important impacts at the district level. However, these camps were not easily accessible for the nine villages in our survey, and were not much utilized by the local farmers in these villages. Moreover, livestock or dairy farming is not widely practiced, except in a couple of the villages.

6.3 Employment Guarantee Scheme

Maharashtra has had a permanent employment guarantee for rural labour since 1973, which aimed at providing employment and securing purchasing power in drought years and during lean seasons in agriculture. The MGNREGS is modelled on Maharasthra's success with the Employment Guarantee Scheme. In most of the villages covered in this survey, informants highlighted the importance of the scheme for labourers. However, the MGNREGS was not able to provide timely and sufficient employment in the villages during the drought of 2012–13. Many families and individuals chose to work in nearby or distant cities or continue their practice to migrate for sugarcane-cutting. Some important constraints in the operation of MGNREGS in the Jalna villages are as follows: (*i*) The procedure for planning is cumbersome. The work to be undertaken needs to be first identified in the village which then receives technical appraisal and sanction by the Block Development Officer. This takes usually much longer than the 15 days stipulated according to regulations. The Village Employment Officer — *rozgar sevak*, a position under the Panchayat — is usually not able to provide employment on time. (*ii*) The payment for MGNREGS work undertaken is often late, and although payment delays have come down from 9 months to 2–4 months after execution of the work, this is much later than payment received from private employers in, for instance, sugarcane-cutting. (*iii*) There is tension in the implementation of MGNREGS between the aim of providing manual employment and of creating good-quality lasting structures such as check-dams and wells. The use of machinery is said to improve quality of work and be less costly, but is discouraged by MGNREGS guidelines, but preferred by village communities and agricultural officials. (*iv*) Finally, the actual work identified is often not well-coordinated with other watershed development efforts. Hence, there is scope for improving the functioning and coordination of MGNREGS.

6.4 Watershed development activities

An interview with the DSAO in October 2013 reveals that while these short-term relief measures would address immediate needs, a more long-term strategy of the district government is towards supporting increased agricultural growth and productivity, as well as income and promotion of watershed development for improvements in food grains, oil seeds, and cash crops. This reflects a shift in the policy of the Government of Maharashtra (GOM) from the 1990s onwards towards an emphasis on improved conditions for rainfed farming. Under this policy, several watershed development programmes have been implemented with financial support from international donors and through public–private NGO/CSO partnerships. Since watershed development is implemented by a lot of government departments and agencies such as agriculture, micro-irrigation, forestry, and rural development, coordination and convergence is a huge issue. Lately, MGNREGS under the Rural Development Department has been provided the largest government funding and capacity to promote watershed development through labour schemes. This is perceived to raise issues with the other sector departments in terms of power and capacity to manage this important sector. For example, the Government of Maharashtra has recently set up a separate sub-division under the Micro-Irrigation Department in Jalna to promote a scheme for water-conservation structures, specifically percolation tanks and Kolhapur Type Weirs (K T Weirs). The main goal of these structures is to help manage the groundwater aquifer and avoid the groundwater table from sinking. The lack of funding is, however, a huge constraint in the implementation of the planned schemes in an appropriate manner, i.e. through a ridge-to-valley approach (interview with key official in Micro Irrigation, October 2013).

The lack of coordination of watershed development programmes is observed in the villages and confirmed by our interviews with government officials of different sector departments. The different programmes tend to be implemented village-wise and are not well-coordinated between villages and micro-watersheds. There are many larger and smaller watershed development programmes often with limited coordination among government agencies and NGOs in planning and implementation. In Bhokardan, for example, two neighbouring villages are under different watershed development programmes, while the third village has not yet received any support for systematic watershed development. One is the Indo-German Watershed Development Programme implemented in Thote Pimpalgaon village of Bhokardan block in association with the Aurangabad-based NGO Dilasa (Photo 6.1). The other is the Vasundhara Programme in Pimpalgaon Barav, undertaken as a public–private–civil society collaboration between the MGNREGS programme of the Government of Maharashtra, the India Tobacco Company, and the NGO Watershed Development Trust (WOTR). These projects do not have any formal,

PHOTO CREDIT: Ulka Kelkar

PHOTO 6.1 **Check dam in Palaskheda Pimple village, October 2013**

institutional mechanisms for communication and sharing of technological and management issues and experiences between villages.

In 2012, the government initiated restoration and desilting of many watershed structures, rivers, and dams on an ad hoc basis and post crisis (interview head of Micro-Irrigation Department, Jalna District). New structures such as farm ponds, *nala* bunding, and contour trenches were also supported, as shown in Photos 6.2 and 6.3.[11] This reflects that many of these structures over time had been mismanaged and silted up. This will reduce risks in the future. Overall, only 42 per cent of the arable area of Marathwada has been covered by an extensive watershed development, and, the structures in the villages typically suffered from lack of maintenance. Attention was accorded to the significant decline of the ground water table in the past drought years, by more than 3 metres as compared to the average table (Purandare 2013). The challenge is to ensure that watershed structures are maintained also in normal rainfall years and that the resources enhanced by these structures are equitably shared.

6.5 Community-based groups and SHGs

We found few obvious success stories in the organization of watershed development committees, user groups, and SHGs in the study villages. Many of the village-wide watershed development committees were non-functioning or functioned more on an ad hoc basis or through the initiatives of the Sarpanches. Non-functioning watershed development committees and user groups might be one reason why village watershed development structures often lacked systematic maintenance.

Women's SHGs for micro-credit and micro-entrepreneurship generally seemed to have low membership, even if they were promoted by several government agencies and NGOs. According to the branch manager of Bank of Maharashra, the success varied between groups and villages. For example, in Asarkheda, his bank had created 20 SHGs out of which 6 SHGs had taken up loans of up to Rs 600,000 (Interview, September 2012). SHGs were less widespread among Dalit and landless households, who were the poorest households of the village. The groups in operation were restricted to monthly monetary savings, and the few attempts at creating small-scale businesses like candle-making and *papad*-making had mostly failed because there was no market for the products. Given a perceived lack of credit availability in rural areas, this was an important source of much-needed cash for the rural households. However, we observed that their usefulness in a drought year was low, at times counterproductive, as the households were not able to save the required amount and outstanding loans/credit could not be paid. It will be interesting to follow the effects of the State Rural Livelihood Mission as it is implemented in Jalna, which may provide new impetus to the SHGs. Bhokardan Block is one of 10 pilot blocks under this mission, and new women SHGs federated into larger village- and block-level networks is in the process of being set up in Palaskheda Pimple. Our informants were, despite weaknesses, hopeful that reinforced outside support would help them sustain and improve their SHGs.

6.6 Role of leadership and key individuals

Another important finding from the EVA-project is that successful 'community-based' or village-level governance — including adaptation to drought — depends on the skills and connections of key individual leaders. Often these village leaders hold the Sarpanch position, but not always. The role of local leaders is important both for creating necessary support among a significant majority of the villagers to invest in measures to improve drought resilience, and also in attracting outside resources or programmes to the village; e.g., funding for schemes, sanctions for MGNREGS projects, and approval of applications for relief measures.

[10] This information was revealed during interview with Agriculture Officer, Badnapur Taluka, Jalna District.

6.7 Farm-level responses

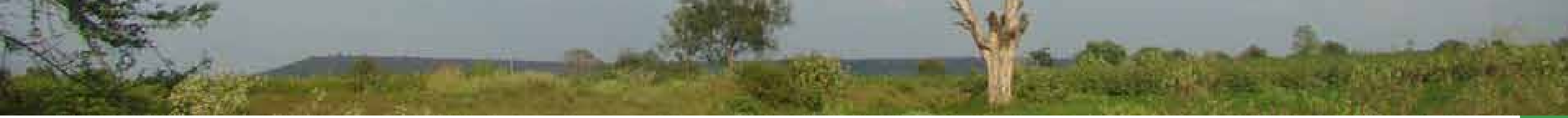
The international climate adaptation literature suggests that the changing of cropping pattern is one of the preferred options to cope with erratic rainfall and climate variations (FAO 2011; Lasco et al. 2011). Drought-resilient crop varieties and new cultivars will significantly reduce the losses occurring after a failed monsoon. However, it is a clear finding of the EVA project that farmers' choice of cropping patterns is not based mainly on considerations of the crops' sensitivity to irrigation or drought. Their choice of crop is based on market and income considerations mainly. No respondents in our sample survey of nine villages reported that they planned to change from, for instance, cotton cultivation to a less drought-sensitive crop. Previously, farmers in Jalna used to cultivate more of food grains such as wheat, *bajra*. They also grew sugarcane and horticultural crops. But with increasing rates for cotton, the farmers shifted to cotton, thereby disregarding the fact that cotton is a water-intensive crop, albeit less water demanding than sugarcane. Recently, the farmers had also started growing soybean owing to encouragement from government agencies. Regarding crop contingency planning, agricultural officials referred to the fact that sugacane had become much less grown in the district over the last years, while they also expressed general concern about the spread of water-intensive cropping systems such as cotton and more recently sweet lime and horticulture crops. Extension workers however suggested that making farmers change cropping patterns was not easy or even a preferred strategy. In this regard, both farmers and extension workers focused on the need for water-saving technologies as critical measures for meeting future climate variability. e.g. drip irrigation, farm ponds, check dams, deeper wells, shade nets, and poly houses. A critical concern in this regard among farmers was the high investment costs, compared to risks and uncertainty in agriculture, and, thus, the level of subsidy and outreach of the government schemes. For example, several farmers expressed interest in the use of shade nets, which had been implemented on a pilot basis in Bhokardan. However, small-scale farmers insisted that this option was practical only for large-scale farmers as it involved high capital investment and risks too.[12]

Increased interest among farmers in the utilization of agro-meteorological services provided by various agencies such as the Indian Meteorological Service, Krishi Vigyan Kendras (KVK), agriculture department, and private mobile service providers was also observed. Information on weather forecasts and market prices were provided through SMS to the farmers or farmers' groups who subscribed to this service or were part of a scheme. However, the weather forecasts provided through these services were not always available or reliable. Local farmers would often combine weather forecast information with local knowledge and signs of changes in the weather. An important task for science in the near future is to improve the reliability of weather and monsoon forecasting useful to farmers.

6.8 Success villages: Lessons to learn?

There are a few villages in Jalna that managed to continue cultivation through both *kharif* and *rabi* seasons of the 2012–13 drought year. These success villages, for example Kadvanchi and Shivni, caught the interest of media as well as development practitioners engaged in relief operations. Representatives from Kadvanchi and Shivni were invited to the EVA block-level workshop in July to share their experiences with drought-hit villages. There is an interesting combination of social and natural factors behind the resilience of these villages to drought. One important factor seems to be a high level of village commitment to and participation in the maintenance of watershed structures. There are indications that both village leadership and the motivation and inspiration installed in the community by Shri Vijay Anna Borade of KVK, Jalna, were an important factor behind the community commitment. Hence, village

[12] During a discussion in cluster workshop in October 2013.



leadership and organization matter. However, natural factors also seem to have played a role. For example, Kadvanchi village is a land of deep cotton soil with higher water-retention capacity than Asarkheda which has been under the same Watershed Development Programme. The reasons behind the success of such model villages of Maharashtra deserve further investigation, as does a further study of the extent to which the lessons from such model villages can be extended to other villages of Maharashtra. In this regard, success at the local level in attracting agricultural and watershed development activities in the village depends a lot on how leaders are able to connect to and mobilize the support of outside government and private institutions. This means that government policy and governance for promoting CBA is critical.

PHOTO 6.2 **Contour Trenching carried out in Kandari, Jalna, in June 2013**

PHOTO 6.3 **Community Nala Bund, Badnapur, Jalna, constructed in June 2013**

PHOTO 6.4 **Farm pond constructed**

7. India's Evolving Policy Response to Drought

7.1 Drought policies have old roots

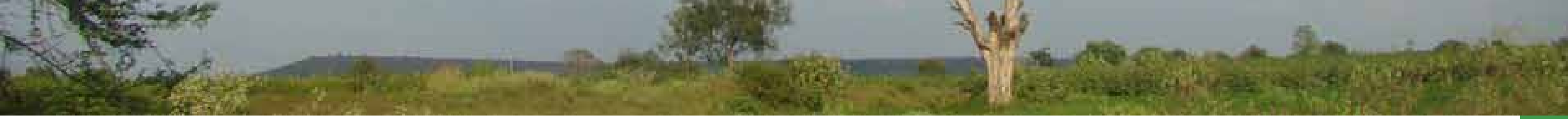
The Indian government's policies on watershed development and dryland farming have long been based on principles of participation and community-based approaches. This is one reason why EVA starts from the recognition that CBA to climate change is not a new idea and approach to rural development and governance in India. Nor is the manifestation of climate change in the form of climatic events such as droughts and erratic rainfall pattern a new form of challenge in the sub-continent. In fact in reality it is quite the contrary. Climatic variations and extreme weather events, such as severe droughts, are endemic to a monsoon climate like India's, and the country has an evolving set of governmental policies and responses to drought at both state and national levels, which will be highlighted here. The terrible suffering and losses of human life of the colonial era spurred famine prevention efforts by the British government, which was improved further after Independence. With the development of a public distribution system of subsidized food and improved programmes for provision of public works such as drought relief, the impact of such calamities can be ameliorated (Dreze 1994; Attwood 2007).

Despite their imperfections, these and other policies are mitigating the effects of price shocks and income failures during droughts (Dreze 1994; Attwood 2007). Improved market connections through railroads and roads and governmental systems for famine relief — in particular food-for-work programmes — have reduced the devastating effects of droughts (Attwood 2007). Furthermore, irrigation systems and watershed development have improved dryland farming systems' ability to withstand failing monsoons. Ninety years ago, the drylands of Maharashtra was a famine belt. During the severe droughts of the last decade of the 19th century, excess mortality was estimated at 19 million deaths, and the worst affected districts are estimated to have lost 10 per cent of their population (Davis 2001). In comparison, the severe drought that hit Maharashtra from 1970 to 1973 caused almost no measurable demographic effects, no increases in mortality rates, and no migration to other states (Dreze 1994). However, the sufferings of the people of Maharashtra during 1970–73, as described in first-hand accounts from observers and actors, were much higher than the impacts of the drought in 2012–13.

7.2 Climate-policy making as a learning process

Drought policies have been developed in response to the actual drought episodes. The drought of 1985–88,[13] for example, made scholars and activists highlight the need for a long-term drought-proofing approach, rather than a short-term crisis approach based on relief (see, for example, Hanumantha Rao et al. 1988, Chen 1991, Drèze, and Sen 1989). Furthermore, the scholars of the 1980s highlighted the fact that seasonal variation in agriculture and allied

[13] A severe drought of different duration in different parts of semi-arid western India.



employment opportunities is just as important as the occasional drought year for the large share of the rural population who depend on agricultural labour for their livelihoods, and recommended that public works should therefore be made available on a permanent basis in the lean seasons (Chen 1991, Drèze and Sen 1989). These recommendations, based on careful empirical studies of drought impacts, were incorporated in policy.

The establishment of the National Watershed Development Mission in 1990, and, 15 years later, the MGNREGS in 2005, are results of an on-going public debate about and increased political recognition of the needs identified by scholars such as Jean Drèze and C Hanumantha Rao. Dr Hanumantha Rao, author of *Unstable Agriculture and Droughts* (1988), which recommended cooperative solutions and people's participation in ecological restoration, headed the committee to reformulate the national watershed development guidelines. The MGNREGS was formulated in large parts by a committee of experts and social activists with Aruna Roy and Jean Drèze as key members — they are now members of its governing body, the Central Employment Guarantee Council.[14] In 2011, the Ministry of Rural Development launched the National Rural Livelihood Mission (NRLM), restructuring the rural self-employment support programme Swarnajayanti Gram Swarojgar Yojna that had been in operation for more than 20 years. The aim is to create sustainable livelihoods for the rural poor through the mobilization and federation of SHGs, development of physical infrastructure, and training and support for diversification of livelihood portfolios in partnership with other government programmes, NGOs and community-based organizations (www.ajeevika.gov.in). Climate change resilient livelihoods and adaptation is one of the fundamental aims of the NRLM, which is to be implemented in collaboration with the MGNREGS and other major programmes for rural development.

While the focus of Maharashtra's agricultural policy in the 1980s was on programmes for agriculture extension and inputs, crop schemes for food grains, cotton, sugarcane development and plant protection, as well as schemes for small and marginal farmers, the next decade shifted policy emphasis to the rainfed cropping systems in the state through technological and agricultural research and extension tailored to rainfed conditions (Government of Maharashra, undated).

Moreover, both the Government of Maharashtra and the Government of India have made several attempts to bring forward an overall or better coordinated drought risk management strategy. At the national level, there is the National Action Plan on Climate Change (released in 2008) which has instituted eight National Missions to further climate change adaptation, mitigation, energy efficiency, and natural resources conservation (with sustainable agriculture and integrated water resources management). A multi-stakeholder Advisory Council on Climate Change has been vested with the Prime Minister. Moreover, reflecting on the work carried out by the Ministry of Agriculture and Cooperation, a *Crisis Management Plan for Drought* (2012) was issued by the Government of India, with many critical elements for the management of a drought. There is also the *Contingency and Compensatory Agriculture Plans for Droughts and Floods in India* (2012) published by the Planning Commission. The Government of Maharashtra has summarized experiences from past droughts, especially the 2002–04 droughts, and compiled these in several policy-oriented memorandums to the government.

7.3 Community-based principles accepted

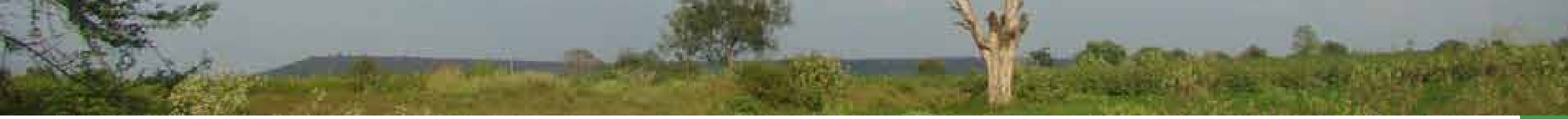
With the participatory turn in governance that started in the late 1980s, the Indian government has adopted decentralized, community-based, and participatory principles for rural development and natural resource management (Aandahl 2010), as seen for example in the management

[14] http://www.thehindu.com/news/national/article99500.ece

innovations of Participatory Irrigation Management and Joint Forest Management, and in the 73rd and 74th Amendments to the Indian Constitution in 1993 and 1994 initiating wide-reaching reforms and widened powers for the three-tier Panchayati Raj Institutions at the district, block, and village levels.

At the same time, in 1994, the guidelines for watershed development were reformulated which laid emphasis on the importance of participation following the recommendations from a committee headed by the renowned Dr C Hanumantha Rao. Many of the rainwater harvesting elements of watershed development, such as contour bunding and check dams, were instituted and recommended for drought mitigation also in the 1970s (see, e.g., Subramanian 1975). However, the structures suffered from lack of maintenance and poor management, and policy-makers realized the importance of people's participation in watershed development. The 1994 guidelines marked "the beginning of a new era in public-sector rural development programmes", from now, the prescription was "a 'bottom–up' planning approach, working where possible through NGOs, and with community participation as a central principle" (Farrington et al 1999: 8). The common guidelines for watershed development in India have since been revised several times; always maintaining this policy of promoting participation, community groups, and community-based approaches.

However, a review of empirical evidence suggests that reality often does not reflect the rhetoric of participatory watershed development (Vedeld 2005). There is considerable variation on the ground regarding the real devolution of responsibility for resource management and there is rarely a genuine shift in authority to local people (Shackleton et al. 2002). The relative strength of different types of local organizations in watershed development seems to vary a lot from one context to another, depending on many factors, also prior capacity among different organizations and civil society in the area of concern (Prakash and Selle 2003). Also, there is little firm evidence in the literature that confirms one of the local organizations being *per se* more efficient and effective than the other in planning and implementation of watershed development, i.e., government agencies versus NGOs or private actors (Vedeld 2005). Evidence suggests that each of the organizational actors involved in watershed development is likely to operate most efficiently with support and cooperation from the others, i.e., when there is synergy in roles and cooperative relationships (Kerr 2002, Evans 1996). An important question is to what extent climate change and 'global warming' will require a radically new approach to rural development and drought mitigation.



8. Government and Governance Responses

8.1 Extensive government drought relief system

Based on interviews with local, district-, and state-level decision-makers and practitioners, some of the challenges to the multi-level governance of drought risks and adaptation with a focus on the role of the district and village communities were explored. The interviews were complemented by reviews of government institutions and programmes and coordination mechanisms. Local household surveys and participatory workshops were also undertaken for the survey in order to understand community perspectives on governance and government responses.

The analysis shows that the government — along with coordination by the District Collector — embarked upon a wide range of measures to address the immediate impacts of the drought as the monsoon was delayed and water scarcity became a concern in most villages. The Government of Maharashtra, with support of the central government, has an elaborate government structure and substantive programmes for drought relief for implementation in drought struck districts. This reflects the historic experience of the Maharashtra government with a set of droughts, among which the 2002–04 resulted in a more advanced strategy and plan for addressing drought in drought-prone areas.

As the impact of the drought evolved in the fall of 2012, the state and district government engaged in both short-term relief measures to address drinking water and fodder scarcity and more long-term drought risk management. More than 500 tankers were provided by the government in Jalna District to villages and hamlets over a few months (Purandare 2013), and all nine villages were served almost on a daily basis. NGOs, private sector, and political parties also engaged in provision of tankers or local village plastic tanks. Cattle fodder camps were organized jointly by the government and NGOs, and were vital for survival of livestock in many villages. The government mobilized schemes to meet demand of specific villages for more permanent water supply schemes. Both during and post-drought, the government engaged in de-silting of water reservoirs and local watershed check-dams and smaller streams, reflecting that many of these structures over time had been mismanaged and silted up.[15] In late 2012 and early 2013, the Government of Maharashtra, with support of the central government, embarked upon a major rescue package for the sweet lime orchards, which had important impacts in terms of saving a large share of the trees; for example, in the villages of Badnapur. Regarding crop contingency planning, agricultural officials mentioned that though sugarcane was grown much lesser in the district over the last years, but it was of concern that there was an increase in the farming of water-intensive cropping systems such as cotton, and lately, sweet lime and horticulture crops. Drought risk management became a key concern of the extension and research system

[15] At the district level, a plan for utilizing Jayakwadi Reservoir as a permanent water supply for Jalna city was set in operation; the city having been dependent on tanker-fed water for many years.

(including with the local KVK); a key focus being on issues water resources governance and watershed development, reflecting that only 42 per cent of the arable area in Jalna has been covered by extensive watershed development (according to the DSAO Office). Crop compensation losses schemes were also launched on a large scale. While farmers greatly appreciated these schemes, due to many having production losses of more than 50 per cent against normal years, they also complained about the way crop losses were estimated, low maximum compensation (per hectare) and late payments.

8.2 Imperfections in the government and governance system

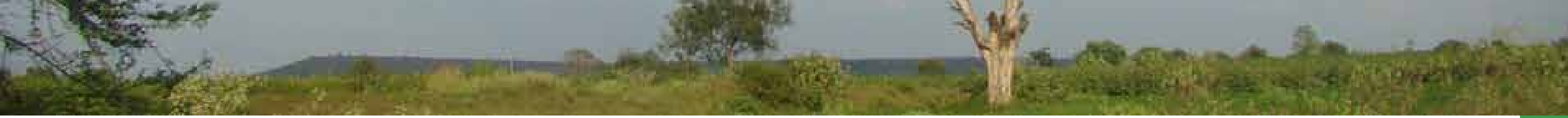
Despite substantial efforts by the government, our analysis reveals that there were many imperfections in the governance relief response system compared to local demands, which are also not surprising given the severity of the 2012 drought and the scale of impacts. For example, there were problems in terms of outreach to diverse social groups and villages and timeliness in support (e.g., late payment for MGNREGS labour and delayed efforts to rescue sweet lime orchards). Moreover, the extensive emergency system in Maharashtra comes with a substantial financial and administrative burden on the government. The total expenditures of the Government of Maharashtra to the drought damages and relief in 2012 are likely to amount to more than the total annual allocation to agriculture, irrigation, and rural development combined (see estimates for 2002–04 drought, World Bank 2008). While relief measures should be strengthened and will remain an important element of drought risk management, it is critical for the government to continue strengthen the long-term climate resilience of rural communities by addressing vulnerability and adaptation related to management of agriculture, water resources, and rural livelihoods.

To this end, there are also gaps or ambiguities between government policy implementation for long-term risk reduction and local demands and needs for development support. Governance challenges to this end relate to, for example, policy orientation (such as towards costly irrigation technology and water intensive crops for large/medium scale farmers versus integrated watershed development, and dryland agriculture for small-scale farmers); limited financial and institutional capacity at local levels; problems in effective coordination of policies and programmes (especially at block and village level) and lack of convergence between emergency efforts; drought risk reduction and more long-term development programmes. Of critical importance for long-term drought risk management with individual villages, is the scale of support and organization of watershed development; government support now being concentrated under the MGNREGS (not Department of Agriculture).

In particular for the landless, poor, and marginal farmers, the immediate impacts as well as the long-term consequences of present climate variability and future climate change will be challenging. Consequently, the building of climate resilience of vulnerable households and communities through specific adaptation measurers are required to address drought and related climate risks. The great diversity in local geographic and natural resource endowments — even from one village and block to another — for example in relation to access to water and good soil means that impacts and opportunities for adaptation will vary greatly between micro-watershed, villages and social groups. Drought risk management needs to be tailored to local context, perspectives, and capacities. This raises particular challenges for governance and adaptation policy implementation.

8.3 The need for decentralized capacity and devolution

International literature on adaptation/ governance and decentralization, suggests that the following types of institutional reforms represent an 'enabling' framework against which governance of drought risk at district level and below can be assessed (Bicknell et al. 2010, Adger et al. 2009, Peters 2008, Sorensen and Torfing 2009, Ribot 2010, Manor 2011):



- Decentralize and devolve key functions and resources of the public sector to the district-, block-, and village-level governments in response to local needs and address vulnerability and inequality (through *vertical coordination* and integration)
- Delegate public authority to civil society and private market actors with the potential of strengthening networks of local actors (including through Public Private Partnerships (PPP)) and/or enhancement of local self-governance, including the provision of political and legal support of local groups and capacity for autonomous adaptation with critical watershed development committees, user groups for check dams, farmer groups and SHGs (for *horizontal coordination*)
- Deconcentrate public authority and tasks to district- and block-level state bodies

In Jalna District, we found mechanisms for vertical coordination and integration and attempts at horizontal coordination of actors from the district government, civil society and the private sector. However, there are certain key areas that can be improved. Specifically, we ask if the arrangements of governance at the district, state, and panchayat levels and below are in place, functional, flexible, responsive, and adequately resourced with financial and technical capacities to withstand and recover from drought and adjust resilience over time.

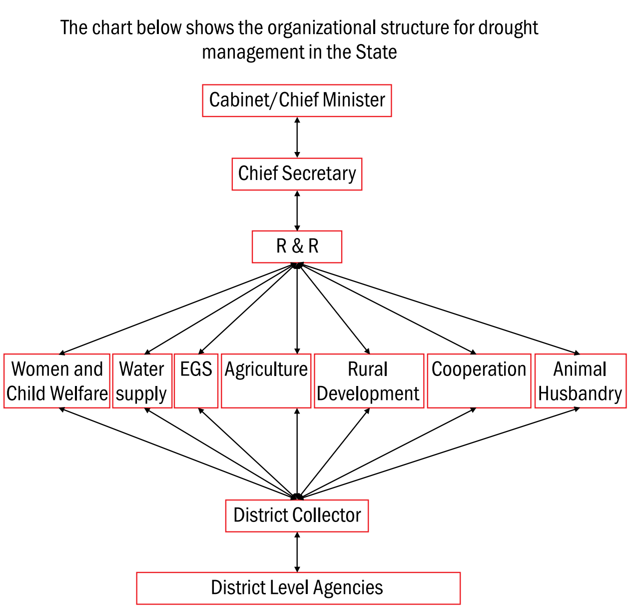


FIGURE 8.1 **The centrality of the District Collector in coordinating sector programmes**
Source: Government of Maharashtra (undated)

Obviously, the choices of governance structures and related policies raise issues about the state and local government capacity to respond in an effective, unbiased, and participatory manner in service delivery. Our findings suggest that, while the government might have done many of the right things in meeting the drought crisis, the scale of the different schemes and the outreach and coordination (across sectors and with NGOs and the private sector) was not adequate to meet local demands (according to our interviews with several local professionals).

The regional state administration, represented by the District Collector, is in this regard the 'strong" steering and coordination level within the Government of Maharashtra where other important decision-making centers with relevance to adaptation and drought risk management are situated, such as agriculture, water resources, watershed development, and disaster risk management (Figure 8.1). Coordination is much weaker at the block and village levels. The district, obviously, exist within a multi-level structure. The district administration and services are instructed from regional and state levels through policies and programmes and the state apparatus reaches right down to the village level (e.g., through Gram Sevaks and agricultural assistants). To this end, there are parallel state and local government structures from the district to the village level. Moreover, the central government provides guiding policies and schemes for direct district and local investments. Adaptation and drought risk management, in addition to being dealt with multi-level, needs to be considered as multi-sectoral and territorial in character.[16]

[16] In India there is basically a five-tier government structure, characterized by fairly strong federal and state-level structures with strong deconcentrated administration and services at the regional and district levels coordinated by the Regional and District Commissioners, respectively. There is a three tier decentralized structure with a relatively autonomous district level (Zilla Panchayat) which is fairly strong, while the block level and village panchayat levels are much weaker in terms of powers, staff, and resources.

The 'place bound" character of adaptation and drought risk management suggests that high capacity to withstand and respond to drought is required at the local and community levels. Local capacity would bargain for relatively fast and adequate responses in an evolving emergency situation, as well as in relation to adjustments to future extreme events. Given the strong capacity of the district for coordination within the present structure, it is assumed that the District Collector needs to bring coherence to the integration of agendas that may not always have been well enough integrated, i.e., drought risk management, adaptation, and (sector) development. This level also has such a mandate in the policy. However, on the ground, one would expect the Village Panchayat and Gram Sabha to play an increasingly more important role in ensuring coordinated responses and interventions, which is also the intended policy of the Government of Maharashtra. Today, however, the village (and block) level stands out as fairly weak in terms of coordinating sector schemes and interventions in response to drought and local development. In this regard, there is a need for a set of additional policy and institutional investments in support of CBA and drought risk management that relate to poverty, risk exposure and vulnerability but also to sustainable growth. Development as usual is not enough to address drought and future climate variability.

8.4 Complementarity between adaptation and sustainable development

The good news is that there is substantial complementarity between sustainable development efforts in for example agriculture, watershed development and social programmes, and enhancement of CBA. For example, critical work in agricultural extension, watershed development, infrastructure, food and nutrition management, education and job creation is typically supportive of good local adaptation. However, given the great risk of higher climate variability, more uncertain monsoons and more frequent droughts (as well as floods), the promotion of climate resilience requires a combination of specific adaptation and risk reduction measures; for example, climate services and social protection, combined with more significant integration of climate policies across key sectors and agencies. There are also risks of maladaptation; for instance, the promotion of sugarcane or other water demanding crops (sweet lime, cotton), come into conflict with water conservation needs.

8.5 Long experience, but no coordinated strategy

In response to the drought, there were many district and state government agencies involved in relief efforts, with considerable support and supplement of the central government. There were also several initiatives from local NGOs and private sector agencies that assisted with smaller or larger programmes with individual villages (e.g., to run fodder camps or assist with emergency water supply). In this regard, the state government of Maharashtra and the central government of India specify a large number of policies and schemes with a bearing on agriculture and watershed development and related drought risk management.[17] It is the state government which is primarily responsible for drought risk management, although considerable supplements and support will be provided by the central level. Despite or perhaps due to the many rural sector policies and schemes, it is hard to find one overall or strategic policy on drought that fully incorporates key policies at state or national levels (e.g., on agriculture, watershed development and rural employment and social safety and early warning and emergency relief).

However, as already indicated, the Government of Maharashtra is in this regard among the pioneering states in India and has

[17] For example, the National Policy for Farmers lists more than twenty policies to this end with diverse goals across a set of sectors and agencies, including the National Rural Employment Guarantee Programme, The National Food Security Mission, the Horticulture Mission and the Common Guidelines to Watershed development (Sivaramakrishnan 2012). There is also the 2008 National Action Plan on Climate Change. In 2012 a Crisis Management Plan on Drought was prepared by GOI, MOA, reflecting the severity of the event.

established a set of programmes, policies, and institutions to address the impacts of drought and climate-related risks. The apex level in Maharashtra for drought risk management is the State Cabinet, which takes all key policy decisions and monitors the decision. Inter-departmental coordination is done by the Chief Secretary. The Revenue and Forest Department (Relief and Rehabilitation), under the guidance of the Chief Secretary, coordinates with other line departments, district administration, and the central government. While the Department of Relief and Rehabilitation leads the institutional response to a drought, the mechanisms provided by other departments, such as Water Supply, Livestock, Agriculture and Rural Development (EGS), will get activated as response to local requirements and at the request of the district administration. In line with this institutional arrangement, actions at district level during the 2012 drought were coordinated by the District Collector as the nodal institution.

No prior drought emergency action plan existed at district level prior to the 2012 drought.[18] There was also no real drought early warning system at this level, although the situation was monitored closely from the District Collector's office, as well as from GOM centrally.[19] In fact, IMD had suggested 'normal' monsoons in their forecast. However, there were considerable past experiences in drought emergency planning at the level of the District Collector (e.g., with the 2002–04 drought). As such, an emergency 'action plan' was fairly quickly developed by the Collector as the impacts of the delayed monsoon evolved and needs were reported from the villages and support provided from the state administration and political system. While initiatives to engage by sector agencies were determined depending on the local situation, each sector agency responded according to their sector logic. There was limited hands-on coordination of activities at the block and village levels, reflecting capacity problems and lack of mandates. There was also no systematic participation of the private sector or NGOs in meetings at the level of the collector.

8.6 Stronger local capacity for coordination and convergence

However, there is clearly scope for improvements in terms of early warning, timeliness, distribution and coordination of the many initiatives and actors, which were implemented by a wide range of sector agencies, private business, and NGOs. For example, both government officials, NGOs, and private corporations complain about the lack of efficiency of the agricultural and rural development extension system in terms of capacity and ability to network and partner with them. At the same time, the private sector is heavily involved in commercial agriculture related to the production and marketing of cotton, sweet oranges, sugar cane and seed production in the region. Several national and international companies also pursue smaller, yet potentially important Corporate Social Responsibility programs. NABARD keeps playing and important role in agriculture, including as implementer under the new Adaptation Fund. The Government of Maharashtra has in this regard signalled that they want to explore and mobilize further the private and civic sectors, but which will demand stronger coordination for them to be utilized in optimal manners e.g. weather forecasting by sms (provided by Reuters and NOKIA or YR.no)[20] and weather forecasting with private crop insurance (e.g., through SKYMET or NABARD Met). There are also an array of local and international NGOs involved in community-based watershed and climate service programmes that can become closer coordinated with or through government initiatives in the region (e.g., WOTR, AFPRO, WWF).

Overall, from a drought risk management perspective, it is critical that the short-term drought relief planning and investments become

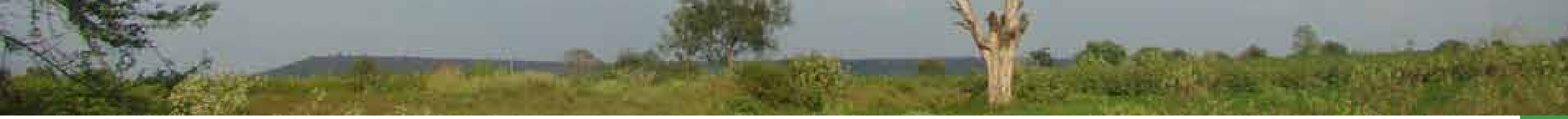
[18] Although an elaborate Jalna District Disaster Management Information Database & Disaster Response Plan existed, GOM, 2013, but without addressing drought. This would be done next year, according to a local Revenue Officer.

[19] However, the elaborate Jalna District Management Information Data Base & Disaster Response Plan (2013 update) did not address drought as a climate induced disaster (only floods).

[20] YR.no is an open access and non-profit public climate service in Norway accessible in India.

better integrated with the long-term adaptation agenda and sector development programmes. Here, the inclusion of watershed development as a focal area for MGNREGS is interesting both from an integrated environment/climate change protection program and from a social perspective. However, several local officials complained that the concentration of watershed development funding to MGNREGS has raised coordination and convergence issues locally in several ways. For example, MGNREGS is not able to take on a ridge-to-valley approach and ensure village-territory wide investments. MGNREGS has in many instances been geared towards renovation of individual wells and farmers' fields. Moreover, sector professionals within agriculture were not always available at the right time for the technical appraisal of MGNREGS watershed initiatives. Overall, the many programmes and schemes related to watershed development were not well coordinated on the ground. First, the local village and watershed development committees are not able to maintain existing structures. Second, new demands for ridge-to-valley watershed development are not met in the majority of the non-treated villages and watersheds. Third, there are also typical conflicts over the management and access to water not adequately tackled between e.g. upstream and downstream users.

Greater impacts on local watershed development and farming systems and thus community-based resilience can be achieved if the central government ensures improved policy and programme integration and, we suggest, greater transfer of capacity and powers to the district and local level levels for coordination and convergence of climate services, water governance and development programs. Coordination is particularly important, since local development has become more and more dependent on the efforts of the private sector, and NGOs for extension, investments, and sales and marketing. This also requires that the government works to bridge potential gaps between policies and local practice through more effective participatory governance at all levels. Improved climate services related to coordinated weather forecasting, early warning and drought contingency planning are central to this long-term climate risk management agenda.



9. Adaptation Options and Participatory Assessment

Changes in the frequency and magnitude of extreme events, such as droughts and floods require measures to reduce the vulnerability of communities in developing countries. To this end, there is a need to better understand the perspectives and responses of local communities and decision-makers to plan for such changes.

Within the EVA project we utilized a prioritization approach based on *multi-criteria analysis* with a participatory focus which has been applied to assess how local communities and local officers assess adaptation options in response to climate change.

Assessment of adaptation options requires the identification of alternatives, selection of evaluation methods, data collection, and evaluation of the options. Multi-criteria analysis can be a suitable approach to rank and prioritize adaptation options when the quantification and monetary valuation of adaptation options is difficult (Niang-Diop and Bosch 2005; De Bruin et al. 2009). The assessment of the options in a participatory setting enhances social learning (Antunes et al. 2011) and stakeholder participation in decision-making process (Haque et al. 2012). The prioritization approach consists of: (*i*) identification of adaptation options, (*ii*) identification of criteria for prioritization, (*iii*) pair-wise ranking of criteria, (*iv*) matrix scoring of adaptation options, and (*v*) ranking of adaptation options based on the weights identified through the pair-wise ranking of criteria.

On the basis of consultations with drought-affected communities and district-level officers in Jalna district, a long-list of 26 adaptation options pertaining to agriculture, water, and social development was identified. During workshops with block-level officers and village communities, participants were asked to rank criteria and score these adaptation options. At the village level, the scoring was done separately by different groups of stakeholders: farmers affiliated with village-level committees, other farmers, landless labourers, women, and youth. Table 9.1 gives an overview of the prioritized adaptation options in the block-level and village workshops.

The approach helped us understand the diversity of adaptation priorities across scales, and across different stakeholder groups within a community. Preliminary results indicate considerable agreement about some adaptation options, like construction of water conservation structures and vocational training for the youth, but sharp differences with respect to others. Some options, such as integrated farming system received high scores from officers, but were relatively unfamiliar to farmers; conversely, farmers appreciated the need for measures like groundwater regulation and water budgeting, while officers deemed them unfeasible. In prioritizing options, in addition to the two criteria selected by the research team, namely no regret characteristics of measures and administrative feasibility, officers added a third criteria, namely public participation which depends on perceived economic benefits by the community.

Women were less aware of policy-type options, but gave high scores to good practices such as water conservation, drip irrigation, and to social options like women's capacity building and strengthening of SHGs for credit. Even though several options related specifically to

farming practices (e.g., soil management or crop diversification), these were given high scores by landless labourers, whose livelihoods depend on drought-proofing agriculture, and for whom such measures can help assure employment in poor rainfall years and in slack seasons.

The preliminary findings indicate a mismatch between top–down government policy and local needs, and also reflect the gap between policy and implementation. In particular, the state government's focus on building irrigation infrastructure has been accompanied by maladaptive choices (diverting water to water-intensive crops and industries), rather than by strengthening efforts to improve the technical quality of and increase people's participation in watershed development programmes. Furthermore, the preliminary results also indicate the scope of improving access to reliable climate services, reducing misunderstanding and scepticism of crop insurance, and increasing the reach of crop research and practices that can help build resilience to drought in Jalna. The next step in the analysis will be to further evaluate the effectiveness and sustainability of the prioritized adaptation options.

PHOTO CREDIT: Ulka Kelkar

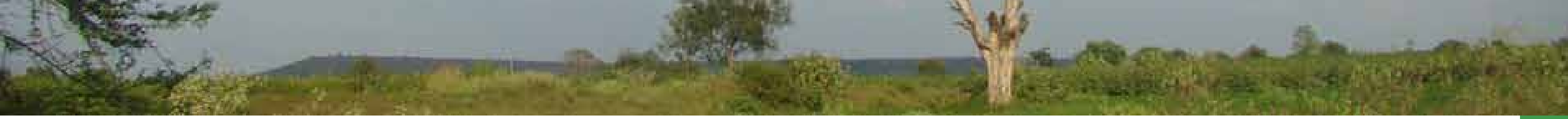
PHOTO 9.1 Scoring of adaptation options by block-level officers

PHOTO CREDIT: Ulka Kelkar

PHOTO 9.2 Scoring of adaptation options in village workshops

TABLE 9.1 Sector wise adaptation options prioritized by block level officers and village communities

	Adaptation options prioritized by block-level agriculture officers	Adaptation options prioritized by village communities
Agriculture	• Soil conservation and enrichment through construction of farm bunds • Promote better soil management • Promote adoption of integrated farming system model • Crop insurance	• Promote better soil management • Crop insurance • Integrated pest management (by youth) • Livelihood diversification (by landless labourers
Water	• Construction and maintenance of water conservation structures such as farm ponds and K T Weirs • Promote greater awareness about benefits of watershed development	• Construction and maintenance of water conservation structures such as farm ponds and K T Weirs
Social	• Set up SHGs and train them to implement drought resilient livelihoods options • Education and mobilizing of youth	• Set up SHGs and train them to implement drought resilient livelihoods options • Education and mobilizing of youth



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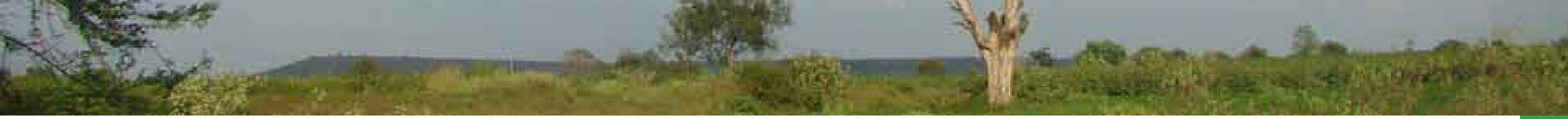

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