

LIVING LAND



Reclaiming degraded lands and building resilience to climate change in Maharashtra, India

Dr Marcella D'souza, Executive Director and Karan Misquitta, Researcher, Watershed Organisation Trust

Drylands constitute 69 per cent of India's total area. These are heavily populated regions where the livelihoods of the inhabitants are vulnerable as they depend on a natural resource base that is degraded and deforested. According to the National Bureau of Soil Survey and Land Use Planning, an area of 146.82 million hectares is reported to be suffering from various kinds of land degradation, with erosion caused by water alone contributing to about 61.7 per cent and wind erosion contributing to 10.24 per cent. Much of this is reversible or can be arrested, as dryland regions and degraded ecosystems can be significantly improved by participatory and integrated management of water and natural resources. However, management of dryland resources must be viewed from the broader climatic and socioeconomic context.

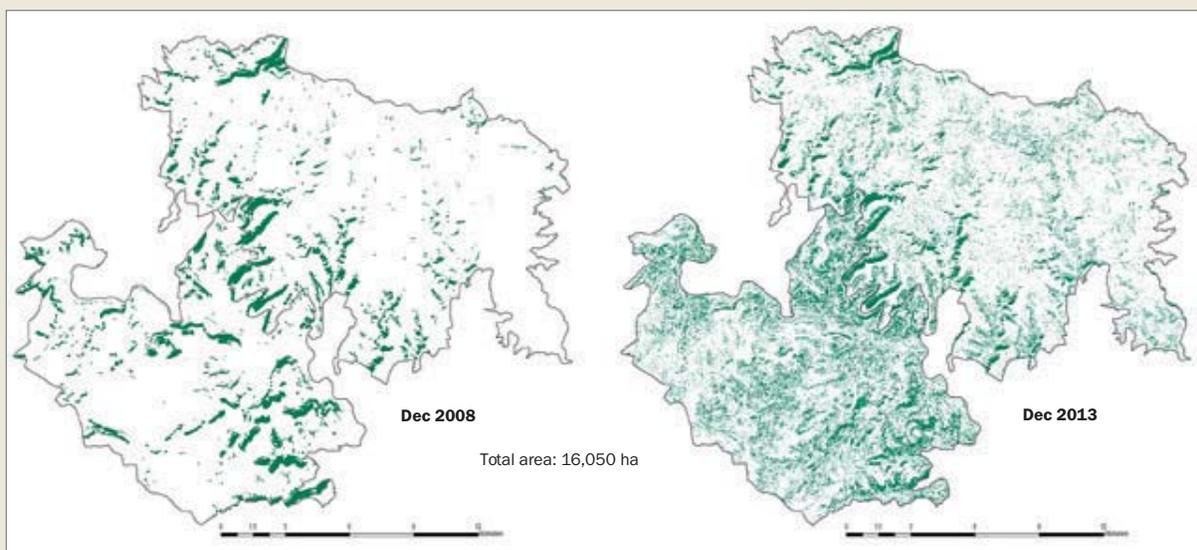
The Watershed Organization Trust (WOTR) has played an important role in developing techno-participatory approaches to watershed development that have proven to significantly

conserve soil and water and improve land productivity. Importantly, WOTR has always focused on developing scalable and replicable interventions and has directly and indirectly implemented and supported successful watershed development across 83,857 km² in 1,422 villages in seven states of India, benefiting over 1.2 million people.

However, it has been observed that unless climate change adaptation is factored into project design, weather variations will continue to obstruct progress and development. Hence, in 2009 WOTR included weather uncertainties into project design. There follows below an account of the impact in 16 villages, in the Sangamner Block of Ahmednagar, of a climate change adaptation (CCA) project implemented by WOTR and supported by the Swiss Agency for Development and Cooperation (SDC) and the National Bank for Agriculture and Rural Development (NABARD). The findings described are the results obtained from various studies, impact assessments and reports.

Ahmednagar district, Maharashtra, lies in the dry semi-arid rain shadow of the Western Ghats. The land has little biomass

Satellite image analysis of the Sangamner cluster project villages shows an increase in the area under vegetation cover



Source: WOTR

cover and rainwater run-off is high. It receives an average of 450 mm of annual rainfall. The temperature ranges between 19.2°C and 32.9°C in Sangamner. When the Community Driven Vulnerability Evaluation tool, developed by WOTR, was applied in representative villages, people highlighted delayed monsoons, prolonged dry spells, droughts, unseasonal heavy rainfall, increasing temperatures and prolonged summers as climate risks. They also stated that market demands pushed crops that were new to the region. In 2009 the majority of agriculture was rain-fed and 54 per cent of households were smallholder producers, dependent on agriculture for income. In times of climate stress, people coped by turning to seasonal distress migration for survival. Food security was met from the public distribution system, with a little from their farms and purchases when possible. During summers and in times of drought, wells ran dry and water had to be supplied in tankers for domestic purposes between February-March and June.

Leveraging WOTR's expertise in participatory watershed development, the 16 villages were organized into two clusters for better management. In each village the Village Development Committee and women's self-help groups were capacitated and worked in close cooperation as the primary stakeholders. WOTR moved to ecosystems-based adaptation to help vulnerable communities build the resilience of their livelihoods resource base, now threatened by climate change. WOTR introduced a bottom-up, holistic and integrated approach with appropriate interventions, towards adaptation and resilience-building.

Farmers in the region are mostly dependent on seasonal rains which are highly variable in time and space. Weather events such as drought, storms and heatwaves have severe effects on agricultural production. The impact of these events on farmers' livelihoods can be reduced if:

- farmers are able to align their agriculture with climate-smart, sustainable agronomic practices
- they are able to access advance information about the probable occurrence of these events, as well as the possible contingency measures for their geographical locations.

Responding to this WOTR has developed and promoted a locale-specific comprehensive package of agricultural practices. Through the CCA project more than 6,000 farmers in the 16 villages were trained in the use of these techniques. Applying these techniques improved yields, particularly of traditional dryland crops like sorghum and groundnut, which increased by 10-30 per cent, while reducing the costs of cultivation and promoting sustainable agriculture.

In response to the second need, WOTR installed automated weather stations in project villages. Locals were trained to read the meteorological data displayed on blackboards in the village. Information is provided in the local language to the villages through mobile telephone based Short Message Service (SMS) texts, together with crop-specific advisories. Weekly forecasts and advisories for the common crops are also printed on wall posters. Agro-advisories are prepared by in-house agricultural experts based on local soil conditions, crops currently grown in the villages and forecasts provided by the India Meteorological Department. The advisories place emphasis on organic and sustainable farming methods and contain marketing advice

Ecosystems-based adaptation: key features

Community-led: people-centric. Local Institutions are strengthened to be inclusive and to ensure that benefits reach all stakeholders. Attention is directed to building the capacity of local communities to participate in and lead interventions.

Ecosystems-based watershed development as a means to reduce risks, stabilize and enhance nature-based livelihoods, reduce the impact of extreme meteorological events, increase productivity, conserve biodiversity and improve quality of life.

Adaptive sustainable agriculture promotes Low External Input Sustainable Agriculture methods, use of indigenous seeds and the system of crop intensification to increase crop and land productivity and reduce costs of cultivation. This is combined with agrometeorology and water budgeting to make agriculture sustainable, efficient and adaptive keeping in mind food and nutrition security, markets and income.

Automated weather stations and SMS-based agro-advisories provide timely, locale-specific crop-weather advisories to farmers so that agricultural activities are planned accordingly. Evidence from around the world shows that texts-based advisories and reminders have a positive effect on the adoption of new technologies and techniques.

Water budgeting helps communities visualize and plan their crops based on water availability, their water needs and requirements, ensuring optimum and efficient use of water, equitable sharing of excess water, and informed decisions on groundwater withdrawals.

Biodiversity. WOTR integrates biodiversity concerns and builds awareness in the community about the importance of promoting, conserving and protecting the local biodiversity; helps them keep a record of it through participatory mapping; identifies and sustainably promotes biodiversity-based economic activities; and sensitizes local bodies to the likely adverse biodiversity-related impacts of decisions taken by them.

Source: WOTR

where appropriate. The objective of these locale-customized advisories is to help farmers take informed decisions, which in turn helps increase productivity, mitigate risks and reduce losses. The SMS-based delivery system for the agro-advisories allows WOTR to take advantage of the high degree of mobile telephony penetration in the Indian countryside. To date WOTR has sent approximately 300,000 SMS-based advisories to 6,612 farmers in Sangmaner and the adjoining block of Akole. The intervention helped create awareness among the farmers in the project and nearby villages about climate variability and means to reduce the negative impacts on their livelihoods. Further it serves as a platform to promote WOTR's package of climate-smart agriculture techniques. Increased usage of organic manure and pesticides has been observed by the villagers who received information from the Agro-SMS services provided to them, while decreasing the application of inorganic pesticides and fertilizers. All these efforts have helped farmers ensure income even during low rainfall years and improve overall crop productivity.

Under the CCA project in Sangamner at total of 4,180 hectares was treated. Besides this in the previous decade, 4,506 hectares in six villages had watershed development



Image: WOTR

Community members in Wankute collect data from an agrimet station

works implemented with the support of WOTR. Satellite image analysis shows that the area under vegetation cover in project villages increased by more than 500 hectares, or almost 30 per cent, between 2009 and 2013. This can be attributed to plantation and grazing regulation and monitoring activities done under watershed development projects by WOTR and other government project implementing agencies.

Besides the impact on land restoration and arresting degradation, the interventions under the project have had tangible impacts on the livelihoods and well-being of local communities. While the pre-project intervention was characterized by widespread reliance on daily wages, the end-line assessment of the project found that the average number of days where people are engaged in primary occupation (agriculture) has increased by 16.8 per cent (from 184 days to 215 days) post-project implementation. Further, due to poor land conditions within the village, in the pre-project period 22.7 per cent of the individuals reported temporarily migrating in search of labour. Post-project data indicates a 29 per cent reduction in the number of individuals reporting temporary migration.

As part of a more holistic approach to rural well-being, WOTR monitored the nutritional status of children of the 16 villages using the weight-for-age measure. There was a 25.9 per cent decrease in 'Grade III' malnutrition and during the same period an increase of 37.1 per cent in 'normal' grade children was noted.

Concerning the aggregate benefits of watershed interventions, the World Resources Institute calculates that the net present value of a project implemented by WOTR in Kumbharwadi village in Sangamner ranged from US\$5,573 to US\$8,172 per hectare treated or US\$29,650 to US\$43,479 per household, with a benefit-cost ratio that ranged from 2.28 to 3.76.

To move to scale, WOTR has developed a suite of tools, methodologies and implementation processes. The Community Driven Vulnerability Evaluation — Programme Designer (CoDriVE-PD) for adaptation planning identifies key vulnerabilities early on in the project design and integrates these variables within the project framework so as to minimize adverse impacts and ensure that the project is able to achieve the desired outcomes.

Given the complexity of the challenge presented by land degradation and climate change, it is apparent that any effort to respond to these problems would require collaboration among various stakeholders, both state and non-state. This project brought together experts from complementary fields — NABARD, SDC, the Central Research Institute for Dryland Agriculture, local agriculture universities, the International Centre for Research in Agroforestry, and the support of the Government of Maharashtra. WOTR's work demonstrates that with appropriate support, communities are able to co-create a sustainable natural resource base and leverage the possibilities presented by innovations in information technology to develop inclusive governance of shared resources and increased access to benefits for all.