



Today's climate-related disasters foreshadow the likely adverse future impacts of climate change, signalling an urgent need to minimize current vulnerabilities. For poor communities living on fragile and degraded urban and rural lands, such as steep hillsides, drylands and floodplains, actions must address the deteriorating environmental conditions that undermine their livelihoods and capacity to cope with disasters. IUCN, IISD, SEI and Intercooperation are working together to strengthen the role of ecosystem management and restoration activities in reducing the vulnerability of poor communities to climate-related disasters and climate change. Protecting and enhancing natural services through activities such as watershed restoration, mangrove reforestation and rangeland rehabilitation, can help these communities secure their livelihoods and improve their capacity for adapting to the impacts of climate change.

In an effort to encourage the use of such activities and their integration into emerging policy frameworks, this series of Information Papers has been developed to highlight success stories from around the world. It is hoped that the lessons learned in these stories will inform ongoing and planned adaptation efforts.

Sustainable Drylands Management

A Strategy for Securing Water Resources and Adapting to Climate Change

Vulnerability Focus: Dryland Communities

Home to over two billion people living in some 100 countries, drylands cover almost 40 per cent of the world's land area. While not as arid as deserts, drylands are characterized by their limited water supply, low and highly variable rainfall, and recurrent drought. Even where surface waters accumulate, these are not easily retained, as high temperatures and intense precipitation cause much to be lost to evaporation and run off, respectively.

In spite of the variable and extreme environmental conditions of drylands, they have been supporting human populations for thousands of years. Today, some of the world's biggest urban centres are located in these regions and an estimated one billion people depend on rural drylands for their livelihoods. Rural drylands consist primarily of (a) rangelands, which support domestic livestock production (b) rainfed and irrigated agricultural lands, which produce major food crops; and (c) woodlands, which are an important source of biomass for woodfuel and construction. Inhabitants of drylands have learned to cope with unreliable rainfall and threats of recurrent drought through practices including surplus accumulation, shifting cultivation, and nomadism.

However, amid widespread poverty and increased human pressure on the fragile resource base, these coping strategies are becoming insufficient in reducing people's vulnerability. Unsustainable farming, grazing and woodfuel gathering have led to dryland degradation and desert encroachment. Fuelled by poorly conceived policies and ineffective governance structures, desertification already affects 70 per cent of the world's drylands.

Climate change will likely exacerbate this trend, as increasing temperatures will bring drier conditions and shorter, more intense rainfall events. Reducing the vulnerability of dryland communities to climate change will require measures that diversify livelihood options, reduce pressure on natural resources, and restore and protect dryland ecosystems through sustainable management practices. Examples of such measures are already in use in communities around the world, and can offer guidance to the adaptation processes of dryland countries. Two examples of valuable community experience are highlighted here.

India: Building community resilience through watershed restoration¹

In the drought-prone regions of Maharashtra, a state on the western seaboard of India, the Watershed Organisation Trust (WOTR) is helping poor communities reclaim degraded lands through the regeneration and sustainable management of watersheds. About 70 per cent of Maharashtra's land area is hot semi-arid to arid, supporting agriculture that is largely dependent upon monsoon rainfall. Precipitation is concentrated in just a few months of the year and is highly variable in frequency, intensity and geographic coverage. In the dry rainshadow areas, there are no more than 10 days of harvestable rainfall. Even though agriculture contributes only 30 per cent of Maharashtra's GDP, these drylands support 65 per cent of the rural population and are the principal suppliers of coarse cereals, pulses and oilseeds. The importance of rainfed agriculture in terms of rural employment, sustenance and livelihoods cannot be over emphasized.

¹ Based on a draft consultation paper entitled, "Watershed Management: A Sustainable Strategy for Augmenting Water Resources and Mitigating Climate Changes" by Crispino Lobo, Executive Director of the Watershed Organisation Trust (WOTR).



<http://www.intercooperation.ch>



Gully Plugs, Nagzari Village, (Oct. 1999). Photo: WOTR

Yet the fragility of Maharashtra's drylands is being compounded by ecological degradation. The combination of recurrent drought and human pressure on the environment has rendered these watersheds barren, heavily eroded and unable to retain even limited rainfall. The poorest of the poor usually inhabit these degraded watersheds, subsisting in highly water-stressed circumstances. With limited resources and access to external services, these communities are unable to safeguard their livelihood systems, leaving them more vulnerable to extreme climate conditions. Improving the resilience of these communities is of utmost importance.

In response to this challenge, WOTR was established in 1993 to help villagers eradicate their poverty through watershed regeneration. As the official capacity building organization of the Indo-German Watershed Development Programme (IGWDP), WOTR provides support to Village Self Help Groups (VHSG) and grassroots NGOs in the technical and management aspects of local watershed development projects.

The program

Conducted on a micro-catchment basis, the watershed development effort emphasizes self-help, ecological regeneration and "catching rain wherever it falls." Upon developing a proposal for action, villagers agree to undertake a series of rigorous watershed development activities, such as:

- establishing Village Self-Help Groups to help guide the watershed effort;
- building hydraulic structures for *in-situ* water harvesting, aquifer recharge and erosion control;
- planting trees and grasses to stabilize waterways and provide fodder and fuelwood;
- instituting bans on tree felling and grazing for natural regeneration of shrubs and grasses;

- training villagers in new or improved agricultural practices and livelihood activities; and
- supporting cottage industries and supplemental income generation through micro-lending schemes.

Crucial to the successful implementation of these measures is the active participation of women. Almost 80 per cent of a rural household's consumption basket is derived from the environment. As the primary resource providers in rural households, women are intimately involved with the management of environmental resources to meet immediate household needs and are therefore crucial to the sustainability of the watershed effort.

Outreach and impact

To date, WOTR's activities have been conducted in over 150 watersheds, covering about 160,000 hectares and benefiting over 230,000 people. In all project areas, the local environment has started to recover and stabilize. Improved soil conditions and water availability have led to observable changes in the landscape. Previously barren hills are now covered with vegetation, as local flora and fauna begin to reappear. Springs and streams that used to run dry shortly after the monsoons are now showing signs of renewed vigour, with some becoming perennial and others flowing until the onset of summer.

Rehabilitated watershed ecosystems have boosted and diversified agricultural production, thereby securing food supplies and livelihoods. Dry climate conditions no longer signify hunger and migration, as communities have an increased resilience to drought.

Local examples of successful watershed development projects:

- In the semi-arid region of Darewadi watershed, where drinking water used to be supplied by water tanker five months a year, villagers now enjoy piped water from a perennial well. Between 1996 and 2001, the groundwater table rose three metres and there was a net increase in cropped land. Around 342 ha of land were brought under irrigation, of which 13 ha are now perennially irrigated. Over 378,000 trees were planted with a survival rate of over 90 per cent. Fodder availability increased 170 per cent and milk production rose over 1,500 per cent.
- Similarly, between 1994 and 2000 in the Sherikoldara watershed, the number of wells increased by nine per cent with the number of perennial wells growing by 300 per cent. Drinking water shortages have largely been solved. Perennially irrigated land increased by 315 per cent and milk production increased by 1,250 per cent. Over 250,000 trees have been planted with survival rate over 85 per cent, and fodder production increased by 2,700 per cent.

In both of these watersheds, there have been considerable socio-economic changes. Mud huts have been replaced by

brick houses. The purchase of consumer goods such as television sets, radios and motorcycles has increased. Those who formerly had no voice in village affairs are now elected to serve on public bodies and people are now able to manage livelihoods during times of scarcity.

Impacts have also been felt at the national policy and state levels. With the government of India now viewing watershed development as an effective strategy for stabilizing rainfed farming systems, WOTR's experiences have influenced the way resources at the national level are allocated and spent on these efforts.² At the state level, WOTR's experiences have informed the partnership arrangements in a large government-funded Watershed Development Program involving NGOs.³ Today, WOTR is training people from all over the country (and also internationally) in the skills and approaches for community-based watershed management.



Community Contribution, Kauthe Kamleshwar Village, India (Oct. 1999). Photo: WOTR

Sudan: Community-based rangeland rehabilitation

Since 1992, villages in the drought-prone Bara Province of western Sudan have been implementing community-based rangeland rehabilitation measures to restore overexploited lands and enhance local livelihoods. The area of Bara Province consists of marginal land, which is becoming increasingly degraded under combined anthropogenic and climatic pressures. With a population highly dependent on the productive capacity of rainfed agriculture and grazing lands, land degradation often leads to food insecurity; and in countries like Sudan where food insecurity can lead to massive dislocation and loss of life, food security is synonymous with human security.

Classified as semi-arid and dominated by sandy soils and poor fertility, most of the Bara Province consists of desert scrub vegetation on undulating sand dunes. Average rainfall in the areas is quite low, at roughly 250 mm per year, and the region experiences significant seasonal and inter-annual rainfall variability. The cumulative impact of recurring droughts, cultivation of marginal lands, fuelwood gathering

and overstocking of livestock have drastically depleted the vegetation. As a result, soil erosion, desertification and atmospheric dust have emerged as significant environmental challenges. The local resource base has been degraded, undermining livelihoods and leaving communities more vulnerable to the adverse effects of future droughts.

The program

Recognizing that communities were highly vulnerable to the effects of drought and grappling with the effects of degraded soil, failing livestock, dwindling crop production and chronic food insecurity, in 1992 a group of 17 villages within the Gireigikh Rural Council in central Bara Province took part in a pilot project entitled, "Community-Based Rangeland Rehabilitation (CBRR) for Carbon Sequestration." The project was funded by UNDP's Global Environmental Facility (GEF) and sought to:

1. Implement a simple model of community-based natural resource management to prevent overexploitation of marginal lands and rehabilitate rangelands for the purpose of carbon sequestration, biodiversity preservation, and the reduction of atmospheric dust; and
2. Help ensure the success and sustainability of this approach by diversifying local production systems and improving socio-economic conditions.

In designing its activities, the CBRR project emphasized strong community participation structured around local, traditional, social institutions, and the implementation of a range of activities that did not explicitly contribute to carbon sequestration, but secured the necessary support of villagers by meeting some of their near-term needs. More than 100 mutually-supportive activities were designed as part of the project, which can be broadly categorized as follows:⁴

- *Awareness and institution building* to mobilize and organize community groups for project planning and implementation
- *Training* in a wide range of activities to build local capacity for project implementation and ensure project sustainability;
- *Rangeland rehabilitation*—including land management, livestock improvement, agroforestry and sand dune fixation—to prevent overexploitation and restore productivity of rangelands

² Based on the experiences of the IGWDP, the Govt. of India has established the national Watershed Development Fund to spread the effort to 100 districts in the country.

³ The concept of "Mother NGO" to support and accompany the efforts of participating NGO's was based on the role WOTR played in the IGWDP.

⁴ Dougherty, B., A. Abusuwar and K.A. Razik. 2001. *Sudan: Community-based rangeland rehabilitation for carbon sequestration and biodiversity*. Report of the Terminal Evaluation, SUD/93/G31. UNDP GEF.

- *Community development activities* to address immediate needs of communities by diversifying local production systems and income-generating opportunities, thereby reducing pressure on rangeland resources.

Outreach and impact

The results of the CBRR management exceeded original expectations. For example, over 700 ha of rangeland were improved, exceeding the 100 ha goal. The rehabilitation of additional lands could be attributed to positive leakage, whereby additional communities undertook project activities after witnessing their early benefits. The project's short-term achievements included:

- Establishment of local institutions to coordinate community natural resource management and community development activities; development of land-use master plans to guide future resource use and implementation of sustainable rotational grazing systems; and establishment of community mobilization teams to conduct outreach and training.
- Revegetation and stabilization of five km of sand dunes to halt desert encroachment; construction of 195 km of windbreaks to protect 30 farms from soil erosion; and restocking of livestock by replacing goat herds with more resilient and less damaging sheep.
- Creation of water management sub-committees to better manage wells; establishment of 17 women's gardens to produce vegetables for household consumption, with surplus sold at local markets; establishment of five pastoral women's groups to support supplemental income generating activities including lamb fattening, handicrafts, milk marketing and cheese production.
- Preparation of a drought contingency plan, etc.

The long-term importance of these achievements lies in their effectiveness in increasing the capacity of people in the Gireigikh rural council to withstand drought. With improved land management and a more secure environmental and socio-economic asset base, communities were able to cope with climate stresses, establishing a solid foundation upon which to base climate change adaptation strategies.

Lessons for climate change adaptation

The experiences from India and Sudan have demonstrated that the resilience of dryland communities can be successfully built through a wide range of ecosystem

management and restoration activities, enabling them to better cope with climate-induced stresses such as drought. Both the WOTR and CBRR projects have yielded some important lessons for climate change adaptation, demonstrating the importance of certain enabling measures and conditions that lead to successful resilience-building projects. Among these are:

- *Understanding of local livelihoods and vulnerabilities*, knowing the assets that comprise peoples' livelihoods and the factors (including climate-related risks) that shape vulnerability to ensure the design of appropriate and locally-relevant project activities.
- *Community-driven implementation*, emphasizing the active participation of community members in the initiation, design, implementation and monitoring of project activities to secure community support and promote a strong sense of ownership
- *Community organization*, establishing or building upon social institutions—e.g., Village Self-Help Groups, women's groups and village water sub-committees—to carry out activities in a structured, participatory and efficient manner.
- *Strong participation of women*, recognizing their role as household and community resource managers, promoting their active involvement in project activities to ensure the success and sustainability of achievements.
- *Local training and capacity building*, enhancing the local human resource base and the effectiveness of project activities by teaching community members a range of technical, financial and managerial skills.
- *Blending of traditional and modern approaches*, using local traditional knowledge to develop appropriate project activities.
- *Reconciling short-term needs with long-term goals*, investing in the long-term success of the project with activities that meet the immediate development needs of the community and build local capacity to sustain the ecosystem management and restoration (EM&R) effort.
- *Supportive policy environment*, working within broader policy frameworks that support de-centralized natural resource management and community development processes.