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IMPACT AND EFFECTIVENESS OF WATERSHED DEVELOPMENT IN DAREWADI

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Abstract- In drought-plagued Maharashtra, good water management is a matter of life and death. Small-scale farmers in the Indian state are dependent on infrequent rainfall to maintain their fields, livestock, and forest based livelihoods. During the dry season, drinking water is so scarce that supplies are trucked into thousands of villages (D'Souza and Lobo 2004:2). In recent years, development initiatives in the region have focused on village-led watershed management activities, aimed at conserving natural resources and improving livelihoods. Among these is the Indo-German Watershed Development Program (IGWDP), which has funded 145 projects in 24 districts, successfully mobilizing villagers to regenerate land through tree-planting and water and soil conservation (D'Souza and Lobo 2004:3).

One of the program's more dramatic success stories is Darewadi village, in Ahmednagar, Maharashtra's most drought-prone district. As recently as 1996, the main village and its twelve hamlets were on the verge of desertification. Scarce rainfall supported only 3-4 months of agricultural activity a year, forcing villagers to migrate in search of seasonal work for the rest of the year. Today, farm-based employment is available 9-10 months of the year, and agricultural wages have doubled. More crop varieties are now grown due to extensive new irrigation, and the value of cultivated land has quadrupled (WOTR 2002:4). Before the watershed was regenerated, Darewadi 921 residents depended on water deliveries from a tanker truck from April to July. Yet in summer 2004 the village was tanker-free, despite receiving only 350 mm of rain in 2003—100 mm less than its annual average Inhabitants have also gained in less tangible ways from the self-organization that has driven their village's revival. They have learned new skills and found new social cohesion. The Darewadi project and similar experiments are not perfect: the role of women can be limited, and landless people may not share equally in the benefits. Nevertheless, Darewadi undoubted success provides one encouraging model for people led sustainable development in arid regions, where many of the world's poor live.

Keywords— watershed development, rural development, land use, catchment stabilization, human effort etc.

I. INTRODUCTION

In the 1980's, the Indian government shifted its approach to watershed management in drought-afflicted rural areas. Traditional bureaucratic, top-down projects had often failed due to lack of consultation with or buy-in from local people. In an effort to increase success rates, the government began to encourage programs based on smaller, people-led projects. Among these was the Indo-German Watershed Development Program, launched in 1992.

Co-founded by Father Hermann Bacher, a Jesuit priest, the IGWDP is funded by the German government through the German Agency for Technical Cooperation and the German Bank for Reconstruction. It is implemented by an independent, state-wide NGO, the Watershed Organization

Trust (WOTR), in partnership with the Indian government's National Bank for Agriculture and Rural Development (NABARD).

The program funds village-based, participatory watershed development projects, with communities chosen for their low rainfall, geographical position—generally within primary water catchment areas—and social composition. Villages where a few families dominate land ownership are disqualified on the grounds that such power imbalances would deter consensus on developing local land to the benefit of all. To qualify, villages must agree to temporary bans on tree-cutting and grazing on land designated for regeneration. They must also contribute free labor—a common rural practice known as shramdan—to cover at least 15-20 percent of project costs (D'Souza and Lobo 2004:4; Lobo and D'Souza 2003:9).

Capacity-building is the program's first priority. In each community, a Village Watershed Committee of local residents is nominated, usually by the village assembly, to make and implement decisions. Villagers also work on a pilot project, learning water and soil conservation techniques, with WOTR or another local NGO providing training, technical organizational, and financial support. After 12 to 18 months, NABARD assumes project oversight, funding scaled-up watershed activities designed by and delivered through the village committee, again with local NGO support (Lobo and D'Souza 2003:6, 15).

By late 2004, the Indo-German Watershed Development Program had spent US$21.9 million funding projects on 165,439 hectares of land, occupied by some 190,000 people (D'Souza and Lobo 2004:3). After 12 years of first-hand experience across Maharashtra, WOTR's co-founder and executive director, Crispino Lobo, summarizes village-based watershed development as "a proven strategy for poverty reduction, augmentation of water resources, livelihood diversification, enhancing well-being, building social capital, and widening the decision-making and opportunity space for women" (D'Souza and Lobo 2004:2).

II. A PATH OUT OF POVERTY

Many of these benefits are apparent in Darewadi, a formerly impoverished and despairing community that now generates year-round employment for a majority of inhabitants.

Back in 1995, with farm work in short supply, Darewadi 131 households were losing many men to far-flung seasonal work as sugarcane cutters or building laborers. Those who remained often herded sheep, further depleting grazing lands and draining the low water table. The village and its satellite hamlets were surrounded by barren hills, and women walked miles to fetch water and fuel wood. When Father Bacher visited at that time, he concluded that if rejuvenation were possible in Darewadi, it would be possible in any watershed (WOTR 2002:1).

The Darewadi watershed covers 1,535 hectares. Two-thirds is privately owned; the rest is made up of common lands owned by the Maharashtra state government's Forest Department (WOTR 2002:1). WOTR's first task was to overcome the mistrust of many villagers, especially sheep and goat farmers, including many poorer families, who feared that grazing bans on regenerating land would cut down the available fodder, harming their already fragile livelihoods. Through a series of village meetings, the NGO explained how the temporary bans would allow trees to grow, eventually yielding more fodder and more water for crops.

III. WOMAN DEVELOPMENT

The women's developments: These information provided by Ms.Jina, the social worker of Darewadi. The women of Darewadi and Shelkewadi were never exposed much to the outside world and therefore many difficulties had to be faced in the beginning during group formation (arrangement and attendance of meetings, responsibilities of keeping accounts of savings groups etc.) The news about formation of Mahila Mandal spread fast among the village women.

The idea of income generation and savings schemes especially attracted the women. 140 women joined the MahilaMandal that was started on the New Year day of Maharashtra in 1996 (19th of April).

IV. EDUCATION

In the watershed area there are 2 anganwadis and 2 schools up to the 4th standard. The school building of Darewadi was repaired by the villages in the beginning of the watershed work, which mead it possible for the children to have their classes inside the school building.

A new school building is under construction in Darewadi so that teaching by shifts. (i.e. two standard in the morning and two in the afternoon) won't be needed anymore. Plans for a middle school (standard 5-8) within the watershed are under construction. For higher education the villages have to go to sakur (8 km away) which is hardly a manageable distance by walking.

V. PLANTATIONS IN THE WATERSHED (AFTER AND BEFORE)

Watershed program started. In the second year of watershed development an improvement of the natural green cover is visible on the forestland and other treated slopes of the watershed. Since the watershed program started 10000 saplings were planted in the forestland and 3000 saplings in private land. The survival rate of the saplings is 95% in 1996 and also in 1997. in addition to the saplings, tree seeds and seeds of improved varieties of grass were also sown. This has resulted in a minimum of additional 123,500 plants within the watershed. The type of trees planted during the watershed

Table 1 : Educational status in Darewadi. (After and before)

Educational Status	***1995***	***2000***	***2010***
1th-2nd	***66***	***58***	***51***
3rd	***32***	***23***	***30***
4th	***8***	***22***	***11***
11th -12th	***1***	***1***	***3***
Not eligible	***14***	***18***	***17***
Literate	***55***	***48***	***47***
Total	***176***	***159***	***171***

Table 2. Comparison before and after watershed development of Darewadi

Impact Indicator	**Before Watershed Development, 1996**	**After Watershed Development, 2001**
Months requiring delivery of drinking water by tanker truck	February to June	Tanker free
Average depth of water table below ground level	6.5 m	3.5 m
Number of active wells	23	63
Electric motors for pumping water	6	32
Land under irrigation	197 ha	342 ha

FIGURE 1 ANNUAL RAINFALL AND AQUIFER LEVELS, DAREWADI WATERSHED, 1995-2000

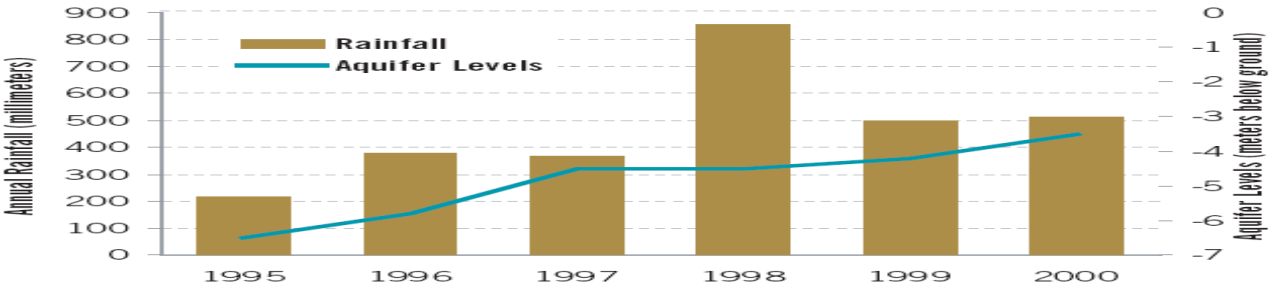

Fig 1. Annual rainfall and aquifer level.

VI. INCREASE IN LAND PRICE

Prices of agricultural lands are indictors of perceived changes in the value of the land. The rise in land prices can be due to several reasons.

In the case of Darewadi watershed the change in water levels and soil erosion (indicating enhancement in fertility of the soil) is one reason for the change in land prices. The new training center in shelkewadi could be another reason

Table 3 :Type and Price of land (after and before)

Type of land	Price per acre in 1997	Price per acre in 2005
Rain-fed farm(poor soil)	10000	25000
Rain-fed farm Heavy soil	15000	40000
Irrigated land	40000	80000

A community's poorest families often receive limited benefits from watershed development, despite their greater need. The landless are unable to take advantage of improved soil and water conditions to plant more crops and vegetables. Those who own only a few sheep or goats may suffer disproportionately from grazing bans imposed on common lands. At the other end of the social scale, by the WOTR's own admission, farmers with the most land have benefited disproportionately in Darewadi and other IGWDP project villages from new consumer items such as televisions, radios, motorcycles, and cooking utensils (D'Souza and Lobo 2004:10).

On the positive side, work on watershed projects can provide sustained wages for poor villagers with no livestock or crops. Families that earn enough to save can then lease, or even buy, small plots of arable land and pull themselves one rung up the economic ladder (Lobo 2005a).

Table 3: Type and number of trees planted (after and before)

Sr.No	Name of tree	No. of tree in 1997	No. of tree in 2000	Sr.No	Name of tree	No. of tree in 1997	No. of tree in 2000
01	Babul	365	450	09	Khair	160	236
02	Bor	368	566	10	Umbar	05	50
03	Chinch	100	150	11	Shubahul	196	651
04	Custard Apple	106	169	12	Mango	622	2015
05	Gul-mohar	1000	1498	13	Wad	02	09
06	Jambhul	320	562	14	Shirus	100	198
07	Limb	320	598	15	Bambo	--	201
08	Shevga	100	1000	16	mormat	150	215

In Darewadi, new agricultural work opportunities and the doubling of hourly wages for such labor have proven a big boon for poor families (Lobo 2005c). (See Table 1.) In the mid-1990s, two-thirds of households migrated each year in search of livelihoods. Today, people who had moved away are returning. In fact, additional farm laborers are now being drawn from nearby villages to work the

new acres of cultivable land (D'Souza and Lobo 2004:11).
In another positive sign for poorer families, sheep and goat ownership has increased since 2001 as villagers benefit from the removal of grazing bans and increased fodder supplies (Lobo 2005c). "People do not have to go outside looking for work now and do not have to starve," says Mrs. Zumbarbai M. Borade, a landless Darewadi resident. "The poor have benefited a lot from this project" (WOTR 2002:6).

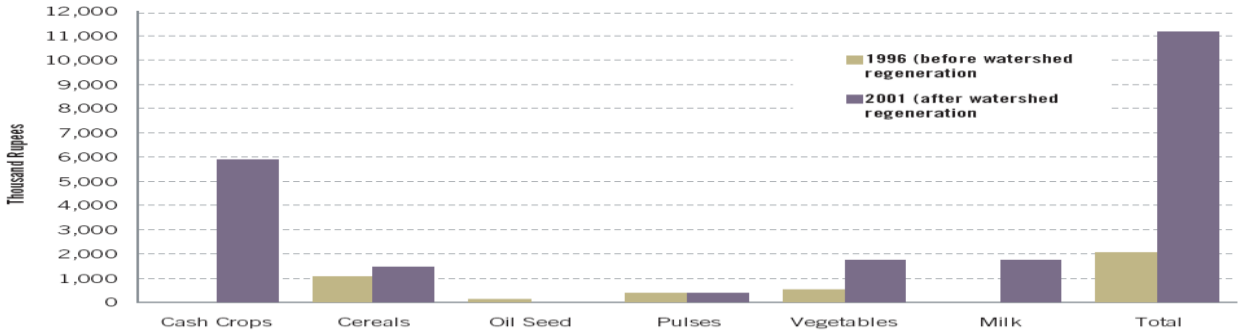

Fig 2. Agriculture income Darewadi before and after

VII. CONCLUSION

Convincing the villagers and making them understand the inter-relationship between environment and health and quality of human life was a challenging before WOTR and the villagers was to win the confidence of the entire village Awareness generation was achieved through constant interaction, audio-visual aids, exposure visits to areas where people have conserved and mobilized resources for betterment of their own life. The next stage was to mobilize and capacitate the entire community to undertake the responsibility of managing their resources and life. A series of technical treatments (contour trenches, gully plugs, farm bunds and contour bunds, check dams, etc.) along with bio regeneration (plantation, grass seeding, etc.) were undertaken. The once degraded landscape was slowly transformed, providing adequate drinking and irrigation water with increased soil moisture for better crop production and sufficient (sometimes even surplus!) fodder and fuel

REFERENCES

[1]John Kerr and Kimberly Chung, Evaluating Watershed Management Projects, International Food Policy Research Institute, CAPRi Working Paper, 2001, No. 17, U.S.A.2.
[2]Salah Darghouth, Christopher Ward, Gretel Gambarelli, Erika Styger, and Julienne Roux, Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up, WaterSector Board Discussion Paper Series Paper No. 11, The World Bank, Washington.2008.3
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