

Advantage Declined

Part III

A Longitudinal Study of Sixteen Drought Prone Villages of Gujarat

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Preface

ROADMAP FOR WATERSHED PLUS

Launched in 1995, the Watershed Development Programme of the Ministry of Rural Development (MoRD) is the most significant, almost a revolutionary, programme for rural development, next only to the Community Development Programme which was launched in 1952. The watershed programme has taken care of technical, financial and institutional requirements of sustained development of natural resources. The author and his organisation – Development Support Centre (DSC) – have been studying the working of this very important programme since 1998. The first study, conducted in 1998, found that the principles and operational guidelines were laudable but several distortions took place during implementation. A study entitled “In the Hands of the People” pointed out its many strengths and several weaknesses.

The severe drought of 1999-2000 in Gujarat provided an opportunity to DSC to find out if watershed programme had any impact on the problems of drought-affected villages. A study was carried out in drought-prone districts of Gujarat. Sixteen villages, eight villages where watershed projects were implemented – to be known as watershed villages – and eight villages which did not have watershed projects -- to be known as non-watershed villages -- were selected. The study examined the impact of drought on these villages in terms of ten critical parameters: drinking water, crop seasons, crop area, crop yield, fodder availability, cattle population, milk yield, local employment, migration, and food security. The study confirmed the expected outcome: the impact of drought was mitigated in watershed villages.

In addition to the watershed programme, the role of the rainfall pattern in diluting the severity of drought also needs to be examined. Successive droughts for two to three years are not uncommon in drought-prone areas. How long the drought-mitigating effect of watershed programme lasts in watershed villages when they face serious drought years needs to be looked into.

Some evidence for this was found when DSC revisited the same villages to ascertain the extent to which watershed villages enjoyed a differential advantage over the non-watershed villages under repeated droughts in 2001-2002. The finding of the study “Advantage Watershed” was that though several watershed villages were better placed than non-watershed villages in the chosen life-saving parameters, the differential was reduced. In 2003, another year of drought, DSC revisited the same villages and found that the differential was almost flattened as shown in “Advantage Declined”. The comparison is given in Table PR1.

Table PR1: Impact of Continuing Drought on Watershed Villages

Parameters	1999-2000 (first year of drought)	2002-03 (fourth year of drought)
Tankers for Drinking water	1 village	4 villages
Failure of crop	2 villages	4 villages
Fodder available within the village	2 villages	1 village
Local employment available throughout the year	5 villages	2 villages
Migration out of watershed villages	No village had migration for more than 6 months	5 villages had migration for 6 Months

The findings of the DSC studies raise a very important issue about the measures required for alleviating the misery of the people who have to suffer drought conditions year after year. There is obviously a need for strengthening and augmenting the current programme of watershed development. This may be in terms of investment, better conservation of vital resources like water and fodder, and a strategy for productivity enhancement and value addition.

INVESTMENT ISSUES

There is need to review watershed investment strategy since the current investment of Rs.4, 000-6,000 per ha. (ha). does not provide drought proofing to a village if drought occurs for 2-3 years in a row. While revising the policy the following points may be kept in view:

I) Learn lessons from the villages, which have withstood two or more consecutive years of drought with a relatively comfortable situation, at least with respect to drinking water -- for people and cattle -- and food grains and fodder. For instance, in Ralegaon Siddhi about Rs.60 lakh were invested between 1972 and 1990 on various activities associated with watershed development. (There must have been more investment after 1990). The village has been able to withstand successive droughts. Its practices should be documented as "best practices" to learn lessons.

II) According to the 20-year perspective plan prepared by the Working Group (of the Planning Commission) for the treatment of degraded lands, the estimated cost of development would rise from Rs.5, 000-7,000 per ha. in the Tenth Plan to Rs.9,000-11,000 per ha. during the Thirteenth Plan. Correspondingly people's contribution was envisaged at 25% during the Tenth Plan, rising to 50% during the Thirteenth Plan. Even otherwise, additional funds will have to be generated to build capacities in villages so that they may successfully cope with the inevitable droughts. The Tenth

Plan outlay of the MoRD at Rs.4, 500 crore – against the Working Group's figure of Rs.14, 000 crore -- would not be enough to provide drought proofing even in twenty-five years. There is therefore scope for increasing beneficiary contribution, particularly

for the schemes that result in direct tangible benefits to individual landholders. Loans may be arranged for those who are not in a position to contribute from their own private resources.

III) Grant-cum-loan approach will also help in moving towards *Watershed Plus* that was first mentioned in the Council for People's Advancement and Rural Technology (CAPART) guidelines on watershed in 1995. The guidelines had noted the experience of voluntary organisations that have been implementing watershed development schemes. After the intensive phase of watershed development is over, a continuing presence of support agencies is required, but on a diminishing scale. During the next phase -- the extension phase -- they would be helping Self-Help Groups (SHGs) and other community organisations in linking watershed with downstream activities such as water utilisation, bio-mass production, marketing of agriculture and other produce as also in improving productivity of agriculture and of non-arable lands. CAPART may provide financial assistance, though on a reduced scale, for post-watershed stage, better known as *Watershed Plus*. This is the only way in which the potential created for increasing production can be fully exploited for productivity enhancement which will result in raising incomes on a sustained basis. The grant can be used for engaging experts to conduct feasibility studies which would explore the potential and offer options for consideration of the village watershed associations. The watershed committees may be given audio-visual presentation of successful stories and "best practices" and taken on exposure visits to the villages that have successfully adopted recommended practices to assist them in evaluating the options. They would also require training and support in evolving practices that would ensure efficiency, equity and sustainability.

The Guidelines on watershed of MoRD limit the financial assistance of Rs.6, 000 per ha. for 500 ha. in a village even when the village may actually have a larger area. Since the villages with larger areas would have to support larger populations, there is a need to provide additional assistance to them for the area over and above 500 ha. at the same rate, that is, Rs.6,000 per ha. However, care has to be taken to ensure that the proposed change does not lead to larger villages cornering the resources, leaving the small villages to wait indefinitely for their turn. Additional funds may be made available to larger villages only if the watershed association has carried out watershed activities on the first 500 ha. in a satisfactory manner with reference to (a) participation (of all stakeholders, particularly small farmers, the landless and women in decision-making and implementation), (b) efficiency, (c) cost effectiveness, and (d) equity. The evaluation of watershed associations should be carried out by an independent agency

IV) As pointed out earlier, the study of the villages that have largely attained the goal of “drought proofing” are likely to have investment of more than Rs.6, 000 per ha. – it may be as high as Rs.15,000 per ha. It is not going to be possible for the government to give such a large amount as grant. Therefore a strong case needs to be made, and can be made, for enhanced participation and contributions from villagers. The villagers, especially those who have already enjoyed the benefits of watershed development in the initial stage of the programme, should be willing to undertake additional work of land shaping and rainwater harvesting that would further raise the production potential of the entire watershed area.

DSC has recently carried out a pilot study of cost-benefit analysis in the two villages where it has completed watershed development. This exploratory study shows that the area under winter crop increased substantially after the completion of watershed development. The cost-benefit analysis of two villages is shown in Table PR2. Though the figures might change in a more systematic study with a large sample, the viability and the bankability of watershed programme is likely to hold good.

Table PR2: Cost-Benefit Analysis

Parameters	Village 1		Village 2	
	Before Watershed	After Watershed	Before Watershed	After Watershed
Area under Rabi (irrigated) crop	32 ha.	145.41 ha.	238 ha.	427 ha.
Net-present value (discounted @12%) at	Rs. 79, 00, 000		Rs. 1,00, 00, 000	
Benefit cost ratio	6.80		8.41	
Internal rate of return	86%		113%	

DSC is planning to carry out cost benefit study in more villages in different districts to ascertain the validity of the findings of the pilot study. There is, however, little doubt that the benefits of watershed development would more than make up for the cost in most of the villages that had the benefit of *good* watershed development programme. It should therefore be possible to convince the village community to take up additional development activities with loan finance. The Project Implementing Agency (PIA) will have to be equipped and ready to undertake additional development activities with loan finance. But this approach will require a change of the mind-set of the village community that has been accustomed to a culture of subsidy for fifty years.

A step-wise approach, moving from small treatments that give direct tangible benefits to individual farmers, such as land shaping of private land, to building nala plugs and check dams that benefit groups, may be taken up. Development of public land may have to wait still further.

Pilot projects should be set up and provided support in the watershed villages where watershed implementation has been completed for undertaking additional works of rainwater harvesting and land shaping for productivity enhancement and value addition before moving on to a full-fledged adoption of the next stage—*Watershed Plus*.

FUNDING FOR WATERSHED PLUS

Watershed Association

Even after enjoying the benefit of 90% subsidy for watershed development in the first phase, the watershed association would need considerable motivation and convincing to take up further development with loan funds. The association will have to put in substantial organisational effort as well. Funding support for the Watershed Plus phase may consist of:

- a) Grant to PIAs for their organisational overheads.
- b) Preparation of feasibility reports. The reports are expected to recommend measures and activities for higher productivity and earnings.

c) Expenses for motivational efforts and capacity building activities.

For the above three activities the PIAs may be given assistance of Rs.3 lakh - as against Rs. 9 lakh per project (of 500 ha.) given during the initial intensive five-year phase of the watershed programme. Out of 3 lakh, 25% will be allocated to (b) and (c) activities.

d) Providing a bridge loan of Rs.1 lakh per watershed village to initiate credit-based development until bank loans are obtained.

The watershed association should be encouraged to use its own Village Development Fund accumulated during the first phase in a manner that does not dilute the principal. It is to be hoped that the initial experience of using these funds would lead the watershed association and the banks to acquire confidence about employing loan funds for accelerated development.

One PIA is expected to work in 10 watershed projects (villages) covering 5,000 ha. During the *Watershed Plus* phase, the funds required for the 5-year period would be Rs.30 lakh for the PIA and Rs.10 lakh as bridge finance -- a total of Rs.40 lakh. Whereas the investment of Rs.300 lakh of the grant (to 10 watershed associations and the PIAs) in the first phase of watershed development ends up as a dead-end after five years, the investment of Rs.40 lakh in the *Watershed Plus* phase, in contrast, opens up new opportunities for attracting loan funds for which there is no limit in amount or time.

If the recommendations of the feasibility report are convincing to the local community and individual members, they should be willing to put in their own money supplemented by loan finance for continual raising of their production and income levels. Once local organisations/federations forge links with the external business organisations for processing, marketing, etc., the initial thrust of watershed development can reach the take-off stage where there is no limit to raising of incomes.

Loans will be given to and through a producer company at block/sub-block level. The company will implement an agreed-upon plan of development at the farm/family/village and block level to raise productivity and obtain value addition. This is likely to lead to almost drought proofing.

BASIN-WISE PLANNING

Both the scope and the need exist to cover the entire catchments of a local stream that may be serving several villages. This approach will obviate conflicts between upstream and downstream villages and ensure equitable use of available water. In a way this is a localised, small-scale application of basin-wise planning that has been recommended as the right approach in the National Water Policy 2001.

Stream-wise planning and management of watershed has two implications. First, it would mean that the village watershed of 500 ha. may extend to more than 10,000 ha., involving may be 10-12 villages. Secondly, for coordinating several village institutions and their common plan, there would be need for a supporting organisation that has competence in community organising as well as technical competence. NGOs, which have the experience, resources and capacity for innovation, can handle such projects. Fortunately, MoRD's revised guidelines as well as *Hariyali* watershed guidelines (2003) envisage that an NGO-PIA shall normally be assigned 10-12 watershed projects covering an area ranging from 5,000-6,000 ha. However, in exceptional and deserving cases, an NGO-PIA may be assigned a maximum of 12,000 ha. in a district and a maximum of 25,000 ha. in the State.

ORGANISATIONAL IMPERATIVES

All this will require not merely a "scheme" but an organisation that will coordinate the contribution of local stakeholders, technical experts, and loans from banks, with NGOs in a facilitating role.

District/Regional Level

Providing funds for activities of Watershed Plus will require knowledge and sensitivity on the part of professionals; they have to be well versed in social development as well as business management. To begin with, the funding support organisation may be constituted at the state level that may serve several districts. It may have to invite and assess proposals for funding support on merits and sanction funds according to the performance record and "carrying capacity" of the PIA and particular watershed associations.

The MoRD may like to undertake pilot projects in a few drought-prone states. It may provide funds to the state level funding support organisations. The structure of the state level support organisation will have to be modelled after the National Dairy Development Board and the National Bank for Agriculture and Rural Development (Indo-German Watershed Project) that provide grant-cum-loan for developing local capacities for development and business.

Local Level

a) *Village Level:* The structure at the village level should provide for full participation by those whose stakes are the highest. It should also inculcate a sense of responsibility in them. It has to promote and sustain the interest of all stakeholders, but particularly of the underprivileged among them. It should not be looking all the time to the external agencies for favours and patronage. As it would be increasingly availing of loans, it has to have a business orientation. A panchayat is ill suited to perform such role, increasingly so when stream-wise planning of watershed covering several panchayats spreads.

The stakeholders' organisation could be registered as a *Producers' Company* under the recently amended *Indian Companies Act*. It should function as a democratic organisation, acquiring its robustness from the willing support of the members who would expect their organisation to be responsive and responsible and strive for efficiency, equity and sound management.

While employing local knowledge and ingenuity to the maximum, the village organisations will have to federate at block/sub block level, to develop access to the external resources of knowledge, credit, marketing, processing, etc. All this will contribute to sustained development and growth.

b) *Block/Sub-block Level:* The village institutions and their federations will thus require support from a facilitating agency. The agency should constitute a professional team to motivate and organise the village communities and initiate them on the path of self-managed progress. To be eligible for selection, the agency should have professional staff, background of and experience in participatory development, competence to manage large funds, and proven capacity for community organising at village level. It should be ready to build up gradually federation at block/sub-block level to take over the functions of the facilitating agency.

It would also be useful to work out the composition of the block-facilitating agency. Both the details of funding requirements and the procedure for their selection would involve screening and even rejecting opportunist organisations that spring up whenever they smell money and power. The eligible organisations should be willing to be scrutinised by an independent and professional rating agency like CRISIL which rates business organisations that would like to raise funds from the market.

Watershed Plus, still a concept, has to be developed, to be evolved with flexibility and sensitivity, combining development approach with business acumen. A spirit of collaboration has to be developed between public agencies, NGOs and stakeholders' organisations at various levels.

DSC has already started working on *Watershed Plus*. Since 2001, it has been working with three PIAs in fifteen villages and added three more PIAs in fifteen more villages in 2003. There is an urgent need to support such initiatives in more locations in the country so that the pooled experience of such initiatives can help in preparing a more reliable roadmap for *Watershed Plus*.

Advantage Declined

Part III

BACKGROUND

The Ministry of Rural Development (MoRD) launched the Watershed Development Programme in October 1994. The main objectives of the programme were to mitigate the problems of drinking water, large variations in agricultural productivity and unemployment in the villages. Since the launching of the programme, Development Support Centre (DSC), particularly its chairman, Mr. Anil C. Shah has been concerned about the successful working of the programme. Mr. Shah has been intimately involved with it in a number of ways. He was a member of the study group set up by the MoRD and the Department for International Development, U.K. that looked into the impact of watershed programme in selected states in India. This was in October 1998. Later on in the same year, he took up the Indian watershed programme as a case study as a part of international research on “Policies That Work”. Though the programme was laudable in laying down the principles and operational guidelines, the research found that several distortions took place in its implementation. The study “In the Hands of the People” pointed out great strengths and weaknesses of the programme. The severe droughts of 1999-2000 in Gujarat provided an opportunity for Development Support Centre to test the impact of the programme in mitigating the problems of drought-affected villages.

The first study entitled “Eloquent ‘Silent’ Revolution” was conducted in the drought period of 1999-2000. Subsequently, the DSC decided to conduct a longitudinal study of the same villages. A study was conducted in May 2002 in the same villages. Though with continuing drought the benefits to watershed villages were reduced, the watershed villages were still better off than the neighbouring non-watershed villages. The second study was titled “Advantage Watershed”. When drought continued, in May 2003 the same villages were studied once again, and the result is the present study “Advantage Declined”. The objectives of this longitudinal study are

- to assess the impact of the watershed development programme in drought-prone villages,
- to identify the factors which can be strengthened to make the watershed development programme sustainable, and
- to provide lessons that may assist the policy makers and planners in decision making for drought proofing and relief programmes.

The following ten critical parameters were selected to assess the impact of drought:

- Drinking Water
- Crop Season
- Crop Area
- Crop Yield
- Fodder Availability
- Cattle Population
- Milk Yield of Cows and Buffaloes
- Local Employment
- Migration
- Food Security

The study gives a comparative picture of the coping patterns of watershed and non-watershed villages in drought years.

STUDY AREA AND SELECTION OF SAMPLES

The following eight drought-prone districts were selected: Amreli, Banaskantha, Bhavnagar¹, Jamnagar, Kachchh, Rajkot, Sabarkantha and Surendranagar. A list of the project implementing agencies and villages selected for the study is given in Annexure 1.

From each district, two villages—one watershed or experimental and one non-watershed or non-watershed village thus totally sixteen villages were selected. Several criteria were used to select watershed villages. First, the village should have enjoyed the benefit of watershed programme for the last four to five years and secondly, it should have utilised at least 70% of the total budget allocated under the programme. Once a watershed village was chosen, an adjoining village which did not have the benefit of watershed development programme was selected as a non-watershed or non-watershed villages

Thus, in each district, two villages (one watershed village and one non-watershed village) were selected. The primary data was collected through participatory rural appraisal techniques, field observations and focused group discussions. The secondary data consisted of - land use pattern, area under cultivation and irrigation, and accomplishments of the village under the watershed programme.

¹ Savarkundla, one of the talukas from which sample villages have been chosen, was part of Bhavnagar district earlier. After Gujarat districts were reorganised, it became part of Amreli district. As a result, there were no samples from Bhavnagar district. Thus although there were eight talukas and sixteen villages in the sample, the total number of districts went down to seven.

FINDINGS

Table 1: Drinking Water

Drinking Water Availability	Watershed Villages	Non-watershed Villages
Water available from existing bores	6	5
Old bores/ Common well repaired	-	-
Water supplied through tankers	4	4
Water supplied through pipelines	5	3
New private bore dug/ deepening of existing bores	-	-
Water brought from outside village	-	-

Watershed Villages: In 5 villages water was supplied by pipelines and in 6 of them water was available in existing bores. However, people believed that water table has gone down in most of the wells and bores and villagers were dependent on a few wells for their drinking water needs.

Non-watershed Villages: In 3 villages water was supplied through pipelines and in 5 of them, water was available from the existing bores. The women and girls were most adversely affected by water crisis. They had to travel long distances to fetch water. The villagers also said that the family members had to wait until women fetched water before they could begin their daily activities.

Ensuring regular and timely supply of water is essential during the drought. It may be noticed that scarcity of drinking water is a common phenomenon in both watershed and non-watershed villages. Generally common property resources (CPRs) like pastures and village tanks are developed as drinking water sources. However, in most watershed villages development of CPRs has not been undertaken. Furthermore, the repeated drought years left just enough water in the existing bores and water harvesting structures to last only till February. From March onwards, the villagers had to depend on water supplied through tankers which in most of the cases was not adequate to meet both the drinking and domestic water needs.

In the fourth consecutive year of drought, villagers faced drinking water crisis. Out of the 16 villages, tankers had to be used to supply drinking water in watershed villages and in 4 non-watershed villages.

Table 2: Crop Season

Seasons in which crops were taken	Watershed Villages	Non-watershed Villages
Three Seasons (Kharif, Rabi and Summer)	-	-
Only two Seasons (Kharif and Rabi)	5	4
Only one Season (Kharif)	2	4
Only Rabi	1	-
Nil	-	-

Scanty water supply affected severely both sowing of crops and their yield. The Kharif crops were sown hoping that there would be enough rainfall for good production. In the year 2002-2003, none of the sixteen sample villages were able to take crops in all three seasons nor could any village had sown crops during the summer.

Watershed Villages: Whereas in 1 village the farmers could take only Rabi crops, in 2 villages they were able to take only the Kharif crop, and in 5 villages they managed to take both Kharif and Rabi crops.

Non-watershed Villages: On the other hand, farmers of 4 villages were able to take both Kharif and Rabi crops and in the remaining 4 villages they were able to take only Kharif crops.

In the fourth consecutive year of drought, both the non-watershed and watershed villages have been severely affected. However, watershed villages enjoyed a slight advantage over the non-watershed villages as far number of crop season is concerned.

Table 3: Crop Area

Changes	Non-watershed Villages		Non-watershed Villages	
	Kharif	Rabi	Kharif	Rabi
Increase in cropping area	-	1	-	1
No change	6	5	7	3
Up to 25 % decrease in cropped area	1	-	1	-
25-50% decrease in cropped area	-	-	-	-
50-75% decrease in cropped area	-	-	-	-
More than 75% decrease in cropped area	-	-	-	-

Note: As shown in Table 2 farmers had sown only Rabi crop and no Kharif crop.

Scanty rainfall has forced the farmers to choose the safe option: they have selected to grow crops in the existing crop area and deliberately decided not to increase the crop area. Watershed villages had fared comparatively better than non-watershed villages. In the fourth year of drought, however, the difference between watershed and non-watershed villages was very little—watershed advantage had declined considerably.

Kharif: Out of 8 watershed villages, 6 villages saw no change in the cropping area of in the Kharif season and in only one village the crop area decreased by 25%. Out of 8 non-watershed villages, in 7 villages there was no change in the cropping area. In one village, there was a 25% decrease in Kharif crop area.

Rabi: Out of 8 watershed village, in one watershed village there was an *increase* in the cropping area. In 5 watershed villages, there was no change in the cropped area. In the non-watershed villages the situation was not much different-- in one village the cropped area increased and in 3 villages there was no change in the cropped area.

Watershed villages showed no advantage compared to non-watershed villages.

Table 4: Crop Yield

Changes in Yield	Watershed Villages	Non-watershed Villages
Increase in yield	1	-
No change in yield	3	4
Up to 25 % decrease in yield	-	-
25-50% decrease in yield	-	-
50-75% decrease in yield	-	-
More than 75% decrease in cropping area	-	-
Crops failed	4	4

In the fourth year of drought, as mentioned above, there has been no change in cropping area. As result of which, out of 8 WSD villages, in 4 villages there was complete crop failure. In one village there was increase in yield and in 3 villages there is no change in yield.

Out of 8 non-watershed villages, in 4 villages there was crop failure and in 4 villages there was no change in crop yield.

Farmers preferred to grow crops that required less water and give assured returns. In most of the villages farmers preferred to grow maize instead of wheat since maize requires much less water and therefore returns are more assured when water is scarce.

In one of the watershed villages there was an increase in yield whereas in none of the non-watershed villages increase in yield took place. Out of the 8 watershed villages, 3 saw no change in yield; 4 non-watershed villages had no change in yield as compared to the previous year.

Table 5: Fodder Availability

Fodder availability	Watershed Villages	Non-watershed Villages
Available throughout the year	1	1
Moderate problem (Available till April)	-	1
Problem (Available till February)	2	-
Severe Problem (Available till December)	3	3
Fodder unavailable in village	2	3

In the fourth year of drought, all the 16 villages faced fodder scarcity and had to get it from various sources. In most of the cases villagers tried to alleviate the fodder shortage by buying from outside villages at higher rates. Government also distributed fodder in most of the drought-affected areas and thus helped in reducing the burden of the villagers.

Watershed Villages: Out of 8 WSD villages, only in one village fodder was available throughout the year. In 2 villages fodder was available up to February; 3 watershed villages faced severe fodder scarcity as it was available only till December. In 2 villages, it had to be bought from outside the village.

Layiari in Kachchh is one of the villages where the villagers have developed a fodder bank. In the good years, when there was surplus fodder, it was stored in a fodder bank. Since drought is a recurring phenomenon in Kachchh, the villagers have adopted this practice. Government actually made payment to the villagers for using their own fodder in 2001! This amount has been kept in reserve, and the villagers plan to use this money to buy fodder during periods of severe shortage.

Non-watershed Villages: Out of 8 non-watershed villages, in one village, fodder was available throughout the year. One village had a moderate problem as fodder was available till April, 3 villages faced severe problem as fodder was available till December, and in 3 villages fodder was unavailable—it had to be bought from outside.

Watershed village fared slightly better than non-watershed villages in terms of fodder availability. There were only 2 watershed villages where fodder was unavailable within the village, whereas in 3 non-watershed villages fodder was unavailable throughout out the year.

Table 6: Changes in Cattle Population

Changes in cattle population	Watershed Villages		Non-watershed Villages	
	Cow	Buffalo	Cow	Buffalo
No change (Compared to the normal year)	3	3	5	3
Less than 10 % decrease	-	-	-	1
10 – 20 % decrease	1	2	2	2
20 – 30 % decrease	2	-	1	1
30 – 50 % decrease	1	3	-	1
50 – 75 % decrease	1	-	-	-

Watershed Villages: Cows: In 3 watershed villages cow population has remained same. In 2 villages the population of cow has decreased by 20-30% and in 1 of them it was reduced by 10-20%. In 1 village it went down by 30-50%, and in another there was a reduction between 50–75%.

Buffaloes: In 3 watershed villages buffalo population remained same. In 2 villages buffalo population went down by 10-20% and in 3 watershed villages there was 30-50% reduction.

Non-watershed Villages: Cows: In 5 non-watershed villages cow population remained same. In 2 villages it was reduced by 10-20% and in 1 village, by 20-30%.

Buffaloes: In 3 non-watershed villages buffalo population remained the same. In 2 villages it was reduced by 10-20%. The reduction was 10%, between 20 and 30%, and between 30-50% in 1 village each.

Buffalo population decreased by more than 30-50% in 3 non-watershed villages but the decrease of that proportion was found in only 1 watershed village.

Table 7: Explanation for Decrease in Cattle Population

Cattle	Watershed villages			Non-watershed Villages		
	Die d	Migrated	Sold	Die d	Migrated	Sold
Cows	3	1	1	3	-	-
Bullocks	-	-	-	-	-	-
Buffalos	5	-	-	5	-	-
Sheep	-	-	-	-	-	-
Goats	-	-	-	-	-	-

Watershed Villages: Reduction in the animal population was due to several reasons. The most important reason was death due to lack of food or water. In 5 watershed villages there was reduction in buffalo population and in 3 villages in cow population, all due to death. From one watershed village, *maldhari* (cattle-rearing) community migrated along with their cattle to a place in search of regular supply of fodder. Only in one village, cattle were sold.

Non-watershed Village: Death reduced cow population in 3 non-watershed villages and buffalo population in 5 villages. In all cases death was due to starvation.

In both the watershed and non-watershed villages, Villagers preferred to keep their cattle rather than sell. It would have been distress sale and they would not fetch a good price in a drought year. With shortage of fodder and water, there would be few buyers. Despite this, in most villages little effort was devoted to develop common land for grazing. It was surmised from the discussions with the villagers that cattle camps were stopgap arrangements to prevent death by starvation. In most of the watershed villages, villagers mentioned that when fodder was distributed under the scarcity relief programme, watershed villages were either excluded or given last preference. As a result, watershed villages faced fodder scarcity.

Table 8: Milk Yield (Cows)

Average yield (litres /day)	Watershed Villages	Non-watershed Villages
0 - 1.0	-	-
1.1 - 2.0	-	2
2.1 - 3.0	7	3
3.1 - 4.0	1	1
4.1 - 5.0	-	2

The milk yield of cow in both the watershed and non-watershed villages reduced significantly as a result of drought. The average milk yield of cow in 7 watershed villages is 2-3 liters and in one village it was 3.1-4.0 litres. In 3 non-watershed villages it was 2-3 litres, in 2 villages it was 4-5 liters, in 2 villages, 1-2 litres, and in 1 village it was 3-4 liters.

Table 9: Milk Yield (Buffaloes)

Average yield (Litres/day)	Watershed Villages	Non-watershed Villages
0 – 1.0	-	-
1.1 - 2.0	-	1
2.1 - 3.0	2	2
3.1 - 4.0	2	-
5.0 and above	4	5

In 4 watershed villages average milk yield from buffaloes was 5 litres and above which compares unfavourably with 5 non-watershed villages with similar yield. In 2 watershed villages the average milk yield was 3-4 litres and in another 2 it was 2-3 litres. In 2 non-watershed villages the average milk yield was 2-3 liters and in 1 village it was 1-2 litres.

Table 10: Local Employment

Employment available in months	Watershed Villages	Non-watershed Villages
Good (9-12 months)	2	-
Satisfactory (6-9 months)	-	1
Average (3-6 months)	2	3
Low (up to 3 months)	3	4
No employment	1	-

prevailing drought has a long-term effect on the local employment scene. Good monsoons means there would be plenty of cultivation and hence work on the agricultural lands. However, as a result of drought few farmers take up cultivation on a large scale; most of them prefer to do farming themselves rather than hire labourers. Villagers observed that the wage rate has crashed over the last two years.

Watershed Villages: There were 2 watershed villages where people got local employment through out the year. In 2 villages local employment was average—it was available for 3-6 months. In 3 villages local employment was low, i.e., available for a period of up to 3 months, and in 1 village no employment was available locally.

Non-watershed Villages: No non-watershed village had good employment opportunities. In one village, employment scenario was satisfactory--it was available for a period of 6-9 months. In 3 villages, local employment was available for 3-6 months and in 4 villages it was available only for a period of 3 months.

Watershed villages were better off in terms of employment opportunities. There were 2 watershed villages where employment was available throughout the year within the village whereas in no the non-watershed village had employment opportunities available throughout the year.

In Dhari Taluka and other areas where women have been organised into Self-help Groups (SHGs) in watershed villages, taken loans, and begun income generating activities. The programme has helped these women to earn additional money and contribute to family income in this lean period when it is difficult to get jobs.

Table 11: Type of Jobs Available

Nature of Employment	Watershed Villages		Non-watershed Villages	
	Female	Male	Female	Male
Agricultural labour	5	5	5	5
Forest work	-	-	-	-
Relief work	2	2	5	5
Artisan work	-	1	-	-
Business/trade	-	-	-	-
Casual Labor/ MFP collection	4	4	3	5
Not working	-	-	2	-
Jobs not available	-	-	1	1

Villagers had difficulty in finding jobs locally and were forced to go to the nearby towns in search of employment.

Watershed Villages: Out of 8 watershed villages, in 5 villages people got work as agricultural labourers. Villagers from 4 villages went to nearby towns for work and returned home in the evening, and in 2 villages villagers found work in drought relief programme.

Non-watershed Villages: Out of 8 non-watershed villages, in 5 villages villagers got work as agricultural labourers. In 5 villages work was available under drought relief measures. In 5 villages villagers worked as casual labour and in 1 village no work was available.

Scarcity work has provided large-scale employment to unskilled labours and helped them to earn wages. Since the demand for relief such work is very large--beyond what the state exchequer can afford, the government has put certain restrictions on scarcity works. First, it restricts the number of family-members who can be employed in relief work. Secondly, workers are not entitled to receive wages declared under the Minimum Wages Act. As a result, the wage rate has been fixed according to the schedule of rates which is lower. There is an additional uncertainty: scarcity work depends solely on the whim of the supervising officer and till the funds last. Moreover, the administrative officers believe that there are more employment opportunities in watershed villages than in non-watershed villages and hence do not readily choose watershed villages for relief work. For instance, whereas relief work was been taken up in 2 watershed villages, 5 non-watershed villages had relief work going on although all the villages were drought-affected.

Table 12: Forced Migration

Duration	Watershed Villages		Non-watershed Villages	
	Female	Male	Female	Male
No migration	4	1	4	1
Low migration (3 months)	3	2	1	1
Moderate migration (3-6 months)	-	2	2	3
High migration (6-9 months)	-	-	1	1
Very high migration (more than 9 months)	1	3	-	2

People are forced to migrate either when they do not find jobs locally or better opportunities are available elsewhere. Drought reduces employment and other income generation opportunities forcing people to migrate.

Watershed Villages: In 3 watershed villages there has been very high migration and people have migrated for more than 9 months. In 2 watershed villages there has been moderate migration for 3-6 months. In 2 watershed villages there has been low migration, for less than 3 months.

Non-watershed Villages: Out of the 8 non-watershed villages in 2 villages there has been very high migration for more than nine months. In one village there has been high migration for 6-9 months and in 3 villages there has been moderate migration--for more than 3-6 months.

Migration is an effective strategy for drought coping. It is likely to result in improved earning due to better economic opportunities in towns and cities. Higher level of economic growth, combined with market development, may help in further improving the earnings of migrants.

Table 13: Food Security

Food Available for	Watershed Villages	Non-watershed villages
Whole Year	3	-
6 to 9 months (Low shortage)	-	-
3-6 months (Moderate shortage)	-	4
1-3 months (High shortage)	1	1
Grains bought throughout the year	4	3

The prevailing drought has resulted in extreme food scarcity. Crop yield has decreased, and in many villages, year-round availability of food grains within the village has become a distant dream today. Now the villagers are forced to purchase grains from shops within or outside the village. Villagers have benefited from the drought relief work as they have a source of some income.

Watershed Villages: Even in the fourth year of drought, watershed villages were relatively better off than non-watershed villages. Out of 8 watershed villages in 3 villages food was available throughout the year. In 1 village there was a high shortage as food was available for not more than 3 months. In 4 villages, villagers had to buy grains from outside.

Non-watershed villages: In 4 villages there was a moderate shortage, and in 1 village there was a high shortage as food was available only for 1-3 months. In 3 villages grains were brought throughout the year.

Watershed villages had an advantage over non-watershed villages, as in 3 watershed villages food was available throughout the year whereas this was not the case in any of the non-watershed villages.

Annexure 2 provides an overall picture of declining advantages of watershed over the years. A comparative table of watershed and non-watershed villages with reference to the ten listed indicators is given as Annexure 3.

POLICY IMPLICATIONS

DSC's first study entitled "Eloquent 'Silent' Revolution" clearly pointed out that watershed villages had a distinct advantage over non-watershed village. In the following year, a drought year, DSC conducted a second study to find out the effect of drought on both watershed and non-watershed villages. The finding of the second study entitled "Advantage Watershed" was that watershed villages continue to enjoy the advantage over non-watershed villages though the differential was reduced. The present study reveals that the advantage that the watershed villages has considerably decreased. Watershed development programme has definitely led to development of local resources; however, since the advantage is seen as declining, there is a need to find out which factors contribute towards drought proofing especially when drought conditions continue for 2-3 years. A combined reading of these three studies underlines the need to pay urgent attention to the following issues.

Exploring Watershed Intensification

The studies have found that watershed development has not only helped the local community in drought years but has reduced the burden on the government. The latter has to run fewer relief programmes in watershed villages since the watershed programme provides a degree of drought proofing—for 2-3 consecutive drought years, but not beyond. This finding points to the need to explore the measures that can help in realising the full potential of watershed development programme. We suggest the following points for consideration of policy makers.

First, the watershed villages from drought-prone areas that have survived droughts well should be studied with a view to identify measures taken by them to combat drought, investments required in watershed development programme for sustainable drought proofing and incorporate the measures in the watershed programme.

Secondly, a revision of the funding pattern could be considered. After the initial spurt of activities in watershed treatment, both the investment and development become stagnant. Whereas in the canal areas public canal irrigation systems are twice blessed. As it is they are in the plains with a good supply of ground water. Secondly, the canals constructed at an enormous public cost—Rs. One Lakh or more per ha.; the present rate of public investment in watershed programme is Rs. 6,000 per ha..

Watershed programme should provide for investments to keep pace with the inflation and at the same time build up capacity of local communities and supporting agencies to absorb higher rate of investments, keeping in view that investment in watershed is linked to peoples contribution. This is not the case in canal irrigation system where all investment is by government, and no contribution from farmer is expected.

Once five years of watershed project are over, a second and subsequent phase should be ushered in: “watershed Plus”. Feasibility studies should be undertaken to find out what additional measures need to be taken to realise the full potential of watershed programme in a village or cluster of villages. Loans may be taken from institutions such as NABARD for taking up these measures.

Livelihood Enhancement in Watershed Approach

Continuing drought brings in a major shift in the occupational pattern in the village. Traditional occupations of farming and livestock farming were replaced by wage labour in relief works. Most of the farmer population has taken to temporary employment in relief works. Some have migrated to nearby cities to earn a living.

WSD needs to provide new opportunities for households to diversify their livelihood strategies. The programme should try to focus on capacity building, income generation programme (IGP), micro-credit and watershed plus.

Special attention may be paid to providing opportunities to the poor for income generation through the formation of self-help groups (SHGs) for women, the landless, and other marginal groups. The capacity building of the poor to undertake income-generating activities and providing them with timely credit for the same can make them less dependent on land. By shifting the focus from agriculture to self-employment is expected to lead to sustainable livelihood—a better drought coping strategy.

Fodder Banks

Animal Husbandry is one of the major contributors to household income in rural areas. It not only helps them in farming but also brings them additional income through selling dairy products. Consecutive drought years have had a major impact on livestock population. In the absence of regular availability of fodder, a large number of animals die of starvation. One of the reasons for this situation is that enough attention has not been paid to conserve and store the surplus fodder of good years. This study has already depicted the case of Laiyari village in Kachchh that has developed a “fodder bank”.

Women in Watershed

Women have always played an important role in management of natural resources. Women's SHGs are mainly engaged in saving and credit. Easy access to micro credit and skill enhancement training through the SHGs have helped these poor women to generate additional income for the family. In Laiyari, women are proactively involved in

the management of fodder bank. Even men acknowledged that women have been able to develop a good system of usufruct sharing which is community oriented and ensures equity in benefit distribution. There is a need to develop the capacities of the women to be better managers of the natural resources. Women can be encouraged to overcome their inhibitions and get involved in the watershed implementations.

SURVIVAL STRUGGLE DURING DROUGHT AS PRESENTED IN THE STUDIES

While collecting data for the three studies, understanding was acquired and information was collected on how people manage to cope with continuing drought conditions. Outside agencies, governmental and non-governmental, deliver their services at the village level and sometimes extend special help to destitute families. It is very rare that they try to understand how within the home, among the members of the family – men, women, children and even animals have to struggle to conserve their resources and make sacrifices for the sole purpose of surviving the drought period.

Economic Impact

- Farmers are doubly hit. The investment they have made in preparing the land, sowing seeds and buying fertilisers and labour do not give adequate returns, and sometimes the investment is totally wasted. If they have taken a loan for making the investment, the farmers sink in debt. They would not be able to repay the loan and therefore the following year they might not be entitled to apply for fresh loans for making investment. Meanwhile the meter of interest charge rolls on.
- Those who have already incurred debt and cannot get fresh a loan from institutions or from shopkeepers have to mortgage or sell their valuables like gold and silver ornaments and large utensils. If they become desperate they may even mortgage land and sell animals at distress price.
- The farmers whose only source of livelihood is their cattle face even greater problems. There would be hardly a blade of grass left on common lands. Bullocks, the most precious animals for the farmers, have hardly any service to render in the absence of agricultural operations during drought. They are underfed; often there may not be enough drinking water for them. Farmers have to resort to distress sale. Among milch animals, buffaloes that consume more grass are sold first. Since cattle rearing communities are averse to hard work like digging and carrying head loads of earth, they tend to migrate with the surviving animals to areas where there is more greenery, for instance, South Gujarat.
- The landless families hardly get any work in agriculture operations and therefore have to wait for government-run relief works which provides limited opportunities. Hence many of them migrate.

Health

Health and hygiene standards were very much compromised during drought which drastically reduced incomes. The ordinary, everyday measures to preserve good health are abandoned.

- Daily bath is given up and only washing hands and feet takes place instead. Regular bath is taken at an interval of several days. Fresh washed clothes are not put on everyday; they are changed only when bath is taken.
- Water is used sparingly in washing utensils. They do not pass through several washes. The utensils are first cleansed by using the earth, then cleaned with water but this water is not thrown away. It is kept aside for the dirt to settle so that the same water can be drained and used again for cleaning utensils. It may also be used for flushing the toilet if the family has one. However since flushing requires more water, such families revert to their earlier practice of going out in the field for defecation.
- The food intake is reduced in quantity and lower quality food is eaten. Three meals a day becomes a luxury--two meals or even one meal is taken. The meal does not have all the regular items of vegetables, milk, *ghee*, etc. It is a paltry meal – *khichdi* and potato curry. Consumption of tea is reduced.
- There is greater incidence of sickness among villagers due to the physical and mental stress. They work hard on relief works, usually during the very hot part of the day. In addition, there are uncertainties and anxieties about getting enough food and water. However, they do not rush to doctors; first they try home treatment and grandmother's medicines. When none of it works, the sick are taken not to a reputed private doctor but to government dispensaries where treatment is free or heavily subsidised. They do not even buy all the medicines prescribed by the doctor; they buy what they can afford and hope they would work. It was reported in 2 out of 16 study villages that to overcome depression, people take to drinking.

Social

- Survival being the first concern, the leftover food is not fed to the street dogs; it is kept aside for the next meal.
- Workload of women increases. Over and above their normal household duties, women have to join the men folk for a full day's work on the relief works.
- There is drastic cut in the expenditure on social occasions. With prosperity in rural areas, marriages become occasions to display newly acquired wealth – there would be fire works, several meals for the guests, and expensive gifts for the bride. During the drought, the event becomes simple and symbolic: less expensive gifts and fewer new clothes for the couple and for the other members of the family may be secondhand clothes. Some villages have also organised group marriages, sharing expenses and further reducing the already trimmed budgets.

- Less frequent visits to friends and relatives in other villages even on social occasions.
- Even though children are accorded priority in consumption of food, the older children are called back home from the hostels in nearby towns. They may go to school by bus. If there is need, children may be withdrawn from school and asked to contribute to the family income by working for wages.
- Though no increase in theft is reported, there is more tension and more quarrels in the family. One good consequence is that some families have understood the advantages of a small family and have adopted family planning methods.
- Not only humans and animals suffer, the trees also suffer because they are not watered regularly.

To sum, the fact that watershed programme has several benefits which decline with the passage of time suggests that the programme needs to be strengthened with further investment so that the benefits can be consolidated.

Annexure 1: Names of Project Implementing Agencies and Sample Villages

PIA, Taluka, District	Watershed Village	Non-watershed Village
Development Support Centre , Dhari, Amreli	Khicha	Veerpur
GRISERV, Jasdan, Rajkot	Bhupgarh	Ramadiya (has a WDP now)
M.G. Patel Sarvoday Kendra, Vav, Banaskantha	Padan	Jaloya (has a WDP now)
S.K.G.S.M., Savarkundla, Amreli	Dedakdi	Thordi
ANÄRDe Foundation, Malpur, Sabarkantha	Kanera	Pisal
Gramya Vikas Trust, Okha Mandal, Jamnagar	Lourali	Kuranga
Sahjeevan, Nakhatrana, Kachchh	Laiyari	Tal
Gujarat Land Development Corporation, Chotila, Surendranagar	Bhimgarh	Kalasar

Annexure 2: Declining Advantage in Watershed Villages

Parameters	1999-2000	2000-2001	2002-2003
Drinking Water	In 1 out of 8 villages water was supplied by tankers.	In 2 out of 8 villages water was supplied by tankers.	In 4 out of 8 villages water was supplied by tankers.
Crop Season	1 out of 8 villages could take Rabi , Kharif and summer crops.	1 out of 8 villages could take Rabi, Kharif and summer crops.	None of the villages could take crops in all 3 seasons.
Crop Area	In 3 out of 8 villages there was a negligible change in cropping area.	2 out of 8 villages there was increase in Kharif cropping area.	In 1 out of 8 villages there was up to 25% decrease in Kharif cropping area.
Crop Yields	In 2 out of 8 villages crop failed.	In 1 out of 8 villages crops failed.	In 4 out of 8 villages crops failed.
Fodder Availability	In 2 out of 8 villages fodder was available within the village.	In 2 out of 8 villages fodder was available within the village.	In 1 out of 8 villages fodder was available within the village.
Cattle Population	In none of the villages cattle population declined between 30- 50%.	In 2 out of the 8 villages cattle population declined between 30- 50%.	In 3 out of the 8 villages cattle population declined between 30- 50%.
Milk Yield	Cow: There was more than 75% decrease in milk yield in 1 village. Buffalo: In 4 non-wsd villages milk yield of cow decreased by more than 60%.	Cow: Average milk was 1.0-2.0 liters/ day. Buffalo: Average milk yield was 2.1-3.0 lit/day.	Cow: Average milk was 2.0-3.0 liters/day. Buffalo: Average milk yield was 4.0-5.0 liters/day.
Local Employment	5 villages had employment opportunities throughout the year.	4 villages had employment opportunities throughout the year.	2 wsd villages had employment opportunities throughout the year.
Migration	In none of the villages there was high migration --for 6-9 months.	In 5 out of 8 villages there was high migration-- for 6-9 months	In 5 out of 8 villages there was high migration-- for 6-9 months
Food Security	In none of the villages there was very high food shortage lasting for more than 9 months.	In none of the villages there was very high food shortage lasting for more than 9 months.	In 4 out of 8 villages there was very high food lasting shortage for more than 9 months.

Annexure 3: A Comparative Picture of Watershed and Non-Watershed Villages

Parameters	1999-2000	2000-2001	2002-2003
Drinking Water	Only 1 out of 8 wsd villages required water supplied through tankers, whereas 4 non-wsd villages required water supply by tankers.	Only 2 out of 8 wsd villages required tankers to supply water; 4 non-wsd villages required tankers to supply water.	Water had to be supplied by tankers to 4 wsd and 4 non-wsd villages.
Crop Season	1 out of 8 wsd villages could take Rabi, Kharif and summer crops, but none of the non-wsd village could take it.	1 out of 8 wsd villages could take Rabi, Kharif and summer crops but none of the non-wsd village could take it.	Neither wsd nor non-wsd villages could take crop for all three seasons.
Crop Area	In 1 wsd village there was an increase in Kharif cropping area whereas in none of the non-wsd villages there was any.	Whereas 2 out of 8 wsd villages had an increase in Kharif cropping area, only in 1 non-wsd village had an increase in cropping area.	An increase in Kharif cropping area took place in 1 wsd village and 1 non-wsd village.
Crop Yields	In 2 out of 8 wsd villages crops had failed; they failed in 4 non-wsd villages.	In none of the wsd villages crop failed; they did in 2 non-wsd villages.	Crops failed in 4 wsd as well as 4 non- villages.
Fodder Availability	Whereas in 2 out of 8 wsd villages fodder was available within the village, in none of the non-wsd villages it was the available throughout the year.	In 2 out of 8 wsd villages fodder was available within the village. Whereas in 1 non-wsd villages fodder was available throughout the year.	In 1 wsd village and 1 non-wsd village fodder was available throughout the year.
Cattle Population	In none of the wsd villages cattle population declined between 30-50%, but in 2 non-wsd villages cattle population declined between 30-50%.	In 2 wsd villages cattle population declined between 30-50%, whereas 4 non-wsd villages it declined by 30-50%.	In 3 wsd villages cattle population declined between 30-50%, whereas in 1 non-wsd villages cattle population declined by 30-50%. *(Cattle population had already declined in the previous years)
Milk Yield	Cow: Whereas in none of the wsd villages milk yield decreased by more than 70%, 1 non-wsd village had more than 70% decrease in milk yield. Buffalo: In none of the wsd villages milk yield decreased by more than 60%, but in 4 non-wsd villages milk yield decreased by more than 60%.	Cow: In 6 wsd villages average milk yield of cow was 1.1-2.0 lit/day whereas in 2 control villages average milk yield was 0.0-1.0 lit/day. Buffalo: In 3 wsd villages average milk yield of buffalo was 2.1-3.0 lit/day. Similarly in 3 control villages average milk yield was 1.1-2.0 lit/day.	Cow: In 6 wsd villages average milk yield was 2.0-3.0 lit/day, whereas in 3 non-wsd villages average milk yield was 2.0-3.0 lit/day. Buffalo: In 4 wsd villages average milk yield was 5 lit/day and above, whereas in 5 control villages average milk yield was 5 and above lit/day. (Drought relief programmes provided fodder to non-wsd villages but not to wsd villages.)
Local employment	5 wsd villages could provide employment opportunities throughout the year, but 4 non-wsd villages had no employment opportunities throughout the year.	2 wsd villages had no employment opportunities, whereas 6 non-wsd villages had no employment opportunities.	2 wsd villages had employment opportunities throughout the year, whereas none of the non-wsd village could provide employment opportunities throughout the year.
Migration	In only 1 wsd village there was high migration; in 6 non-wsd villages there was high migration.	Very high migration took place—lasting more than 9 months-- in 1 out of 8 wsd villages, but 4 non-wsd villages had very high migration.	Migration took place for 6-9 months in 5 out of 8 wsd villages, whereas from 7 non-wsd villages people migrated for 6-9 months.
Food Security	In none of the wsd villages there was very high food shortage, but in 1 non-wsd there was high food shortage—lasting for more than 9 months.	In none of the wsd villages there was very high food shortage—lasting for more than 9 months, whereas 1 non-wsd had very high food shortage.	In 4 wsd villages there was very high food shortage—lasting for more than 9 months--whereas in only 3 non-wsd villages there was high food shortage for more than 9 months. (Food for work programme took place in non-wsd villages, but not in wsd villages.)