

**A STUDY OF  
LAND AND WATER RESOURCES DEVELOPMENT PROGRAMME  
PROMOTED BY N M SADGURU WATER AND DEVELOPMENT  
FOUNDATION IN THE TRIBAL REGIONS OF GUJARAT AND  
RAJASTHAN**

Promoted by

IWMI - TATA WATER POLICY RESEARCH PROGRAMME

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## PREFACE

*Sadguru foundation has for nearly two decades advocated an idea that needed further discussion and development. It was about the water potentials in the 400 km wide belt cutting across central India- from Sadguru's own operating domain in the west right up to Western Orissa and Bihar Plateau having length of 1500 Km- is home to over 70% of India's tribal population. The region does not offer scope for big irrigation or intensive ground water development for the local tribals but has very high drainage density, and offers virtually limitless scope for small scale water and land resources development of the type Sadguru has been promoting. However this opportunity may remain under developed for a long time unless a well-orchestrated initiative is launched to fast track it as a poverty-alleviation program. It was decided that IWMI, Sadguru and PRADAN will work together under the IWMI-Tata program to develop this idea and share it more widely through a collaborative policy paper.*

*The IWMI-Tata program, NM Sadguru Water and Development Foundation (NMSWDF) and PRADAN have worked together in conceptualizing Central India Initiative to promote sustainable livelihoods through NRM. In the policy consultation organized by IWMI-TATA program on 07 June, 2002, one of the key recommendations for actions was to conduct some case studies on successful programs in central India. A major consideration was to do research on field based actions and explore practical approaches to develop the potential available in central tribal belt. The idea is conceived as non-government initiative governed by a representative body of stakeholder organizations. However it is expected that it will work in close partnership with government agencies for developing action program and implementing the same for the whole region. It was decided to analyse and highlight successful stories of NRM interventions by scanning the whole region and studying what different sectors like the NGOs, GOs, Individuals, private enterprises have done to improve the livelihoods of people.*

*The case studies were to be done by the NGOs working in the Central India, dealing with similar problems and programs.*

*One such NGO is N M Sadguru Water and Development Foundation (NMSWD), which has been operating in the tribal regions of Gujarat, Rajasthan and Madhya Pradesh. The aim of the research given to Sadguru is to draw on the specific activities which deal with key aspects of Sadguru's programme interventions in NRM and outlines the main objectives, methods and results.*

*The study involves the assessment of technical, physical as well as social -economic impact of integrated NRM interventions. The content of this study highlights two types of opinions on the development debate: one which supports irrigations alone, the other the integration of irrigation with other programmes to make development sustainable.*

*Cases from the organization have been taken to look at both the opinions and to understand what is more sustainable and have more impact in the long run.*

*This study will be helpful for the development sector in planning NRM programmes for the rural/ tribal areas.*

## CHAPTER - I

### THE ORGANISATION AND PROGRAMMES

#### On the Organisation

Established in 1974, the organisation NMSWDF is a non-profit organisation promoting rural and tribal development through community based natural resources management in the tribal, rain-fed districts of Dahod and Panchmahal (Eastern Gujarat), Jhabua (Madhya Pradesh) and Banswara (Rajasthan), with recent expansion in Jhalawar, Rajasthan. It started out by facilitating land and water resource management with the tribal people of Dahod and Panchmahal districts in Eastern Gujarat. It has gradually evolved into an organization providing an integrated approach in natural resources management (NRM) to improve the lives of rural people. The organisation's natural resource programme includes water resource management, environment and forestry, and micro-watershed development. These are integrated with biogas, agricultural extension, off-farm income generation, and other related programmes. Village institutions and trainings are important and integral cross cutting part of all these activities

#### Mission of the organisation

The organisation endeavors to develop and expand environmentally, technically and socially sound natural resource interventions leading to poverty alleviation, through community participation and empowering women and other disadvantaged groups, to ensure equitable and sustainable development.

In addition, Sadguru's long-term objectives include:

- i. To improve the living conditions of rural and tribal people, chiefly by developing environmentally sound land and water resources programmes.
- ii. To improve the environment through various programmes, this will in turn improve the natural resource base.
- iii. To arrest distress migration from rural to urban areas.
- iv. To improve and empower rural people socio-economically and strive for their overall development through village institutions.
- v. To impart training for the capacity building and strengthening of village institutions and also training other groups in the field of natural resources management.

#### Project Area Description

Of the six villages selected for this study, 4 fall in Dahod district of Gujarat and 2 in Banswara district of Rajasthan. Almost 73 percent of the districts population is tribal, thus placing the both districts among the highest tribal populated districts in our country.

The population in both districts is also predominantly rural. The total population of Dahod district is 16,35,374, which is 3.23 percent of total population of Gujarat state (according to 2001 census). Out of this total population, 90 percent reside in rural areas (census 2001).

The total population of the Banswada district is 11,55,600 which is 2.05 percent of total population of Rajasthan state (according to 2001 census). Out of this total population, 92 percent resides in rural areas (census 2001).

Both the districts are at the bottom of virtually all kinds of development and progress in the state scenario. It is among the poorest districts in both the states. Among the tribal regions also, both are not only the poorest, but also the lowest in respect to the Human Development Index.

### **Agro climatic conditions of the Study Area**

The project area also comes under semi arid and drought prone region of India repeating the cycle of drought once after every 2 to 3 years. The tribal region is extremely poor considering the indicators like agriculture, irrigation, education etc. The natural resources, particularly, land and water are not managed adequately and properly. The district has very good potential of natural resources like rainfall, forestland etc., but, requires proper technological interventions in terms of conservation, development and management of Natural resources, such as Water, land, forest etc.

### **Physiography, Drainage and Soil**

The region represents an undulating topography with hills and sparse valleys. Large part of the area is occupied by flat-topped hills of the Deccan trap. The plains are covered mostly by black and loamy soils. The Central and Western parts of the region are cultivable plains. There are scattered ranges of the Aravallis in the North and Eastern half of the district. The highest range in the south is about 610 m, in the north 440 m and in the east 550 m and the average height is 350 m above Mean Sea Level.

The drainage system belongs to the Mahi river basin which originates from Dhar in Madhya Pradesh. Its main tributaries are Anas, Machchan, Hadaf, Kagdi and Nal and other rivers like Hiren nadi, chhayan. The area is criss-crossed by rivers, streams and a number of rivulets. The basin is well drained, thus, the length of overland flow is very short. Consequently the surface run-off concentrates quickly, the flood peaks are high, and in all probability the minimum flow is very low.

Deforestation in the hilly and upland tracts has led to strong gully erosion with siltation in the drainage basin.

### **Climate & Rainfall**

Both the districts are identified as drought prone regions of Gujarat and Rajasthan. The average maximum temperature goes up to 46° C and minimum 8° C. The mean annual temperature of the district is 26° C. The climate of this area is influenced by

the rain bearing South-West wind which produces an average annual rainfall of 828 mm. The region recorded highest rainfall of 1377 mm in the year 1994 and lowest of 290 mm in year 2000, in recent years.

### **Cropping Pattern**

The kharif is the main cropping season of the district. The important crops sown in the district in order of their importance are maize, rice, gram and wheat, the first two in the kharif and the later two in Rabi season.

### **Land Use**

Total geographical area and land use pattern of both the districts are shown in the table below;

The Land Use Pattern (all figures in Hectare)

Name of District	Total geographical area	Land under forest	Net sown area	Waste Land	Area not available for cultivation	Other uncultivated Land
Banswara	501384	100672 (20.07)	226620 (45.19)	46367 (9.24)	88041 (17.56)	39684 (7.91)
Dahod	363256	86150 (23.71)	207947 (57.24)	10572 (2.90)	44913 (12.36)	13674 (3.76)

Source- Census-2001 (The figures in parenthesis are percent of total geographical area.)

### **Nature of programmes**

In its NRM approach, the organisation provides an integrated package of 4 programs along with other activities to the villagers for overall development. This package encompasses following 4 specific programs:

1. Lift Irrigation System which pumps the water up from the water source through an underground network of pipe lines, a few kilometers in total length in each scheme to distribution points up to a few meters of elevation. From there the water is distributed by gravity to individual plots.
2. The check dam, mainly masonry structure creates a reservoir. They are built on river, rivulets and small streams. The major purpose is to conserve and provide water for irrigation and other purposes. These structures also help in recharging ground water in the adjacent area.
3. The above two water resources programmes are integrated with the micro watershed development interventions which include gully plugs, stone walls, gradonies, contour trenches, soil bunding, terracing and such relevant measures to conserve soil as well as moisture.
4. Another important programme integrated is agro forestry, farm forestry and horticulture development that includes a variety of species, combined with wasteland development, both on private and public wasteland and JFM.

All these NRM activities carried out by the organization are initiated, developed and managed by the communities through various formal and informal village groups and institutions. These communities are part of all the processes of planning, implementation and management. In order to develop the skills of such village institutions regular and constant training and exposure inputs are provided.

### **Coverage**

The NRM programmes of the organization have been so far spread in 6 districts of 3 states, effectively covering about 550 villages directly and about 150 villages through small and new NGOs supported by the organization in their initial stages. The families covered are about 1, 25,00000 and population of more than 7, 25,00000. The cumulative achievements under various programmes are reflected in ANNEXURE-I

### **Development Process**

All the six villages being part of drought prone regions, the memories around famines and droughts are very much haunting the minds of local people. The recurrence of drought has been very frequent in recent period, especially between 1980 and 2002. The long spell of successive drought years in recent times were the years 1985, 86 and 1987, and most recently the successive drought years of 1999, 2000 and 2001, with apprehension of 4<sup>th</sup> consecutive year of drought in 2002, though at the time of writing the study in the first week of September 2002, the rainfall in the region has reached 2/3<sup>rd</sup> of normal, most of which coming in August-September.

The government did make good efforts in the field of land and water resources development in recent years, but without tangible impacts for the reasons that either the programmes were not implemented properly or the people did not show interest in those programmes. Often both the factors were responsible for no success or partial success of the government programmes.

The organisation chose the area for the development work on the basis of the fact that the area happened to be among the poorest. Further the interventions were selected on the basis of the priority clearly indicated by the local people during lengthy socio-economic survey of the area. The number one priority expressed by the people during such survey was water. Incidentally, there was potential for water resources development in the region.

Based on the felt need of the people and potentials, the first intervention by the organization in the region was through community lift irrigation system installed at village Shankarpura in 1976, followed by few more schemes and subsequent other NRM interventions.

Having seen the impact of lift irrigation and other interventions such as the checkdams, micro watershed, forestry etc. the people started demanding this programmes from the organization and this is how for last several years the organisation's interventions are demand driven and the process of intervention is initiated by the people and the organization simply responds to such demands.

Every day atleast one or two groups of villagers approach the organization for its interventions.

In this study, and in following chapters we will be looking at the methodology of the study followed by the the impact of the various NRM activities and the management of the same by the village institutions, ensuring sustainable development.

## CHAPTER-II

### OBJECTIVES AND METHODOLOGY

#### Broad Objectives

The study aims to determine the factors responsible for the success of land and water resources development programmes promoted by the organisation and to highlight the replicability of the same in other tribal regions.

In order to achieve the objective of the study, following aspects of the integrated land and water development in the field of natural resources development would be studied;

- a. Background of the programmes.
- b. Technical aspects of the project, such as the suitability of site, soundness of design, workmanship, quality of material used, etc.
- c. Cost of the project, cost benefit details of the project, sources of funds, community contribution, if any, etc.
- d. Benefit of the scheme in terms of the area irrigated against the design command, the cropping pattern, and additional gross and net earnings on account of availability of irrigation, numbers of households benefited, quantifying the benefits to such households or group of households.
- e. Equity and gender considerations.

#### Research Methodology

##### Profile and Selection of villages

The villages under the study are located in the Dahod and Banswada district. The terrain is hilly and rocky. The slopes of the hills are generally steep with flat ridges and plateaus of varying width. The soil is generally dry, impoverished and deficient in humus. The villages are situated in a radius of 60 km and are separated by district and block boundaries.

From the 218 lift irrigation projects, considering the timeframe and other constraints a sample of 6 villages, satisfying the set criterion were drawn at random. The study projects selected are very different from each other in terms of location, accessibility and kinds of interventions done. The schemes/project villages were selected from the Banswada and Dahod District, of the Western tribal region. The villages chosen for the studies have been divided into 3 sets, each set of 2 villages to present the analysis and impact of different interventions in different periods. Each set commonly focuses on NRM interventions with the changes in the nature and magnitude of such interventions in different sets.

**Set-1** has focused only on irrigation development through lift irrigation and the impact of the same as decided by the promoters and referee of the study. Even

though village institutions in the form of irrigation cooperatives do exist for the management of the lift irrigation, this aspect is not elaborately described in this set for the main reason that this aspect is common in all the lift irrigation schemes and the same is elaborately described in other set so as to prevent duplication of this aspect in all the sets. Incidentally, 2 lift irrigation projects/villages narrated in the set have only lift irrigation programme and no other NRM programme

**Set-2** contains villages having most of the integrated programmes promoted by the organisation. In this we are focusing on the impact and development which take place due to integration of various NRM activities. Even though, irrigation cooperatives exist in these villages too, they are not dealt with in this set purposefully as decided with the promoters and referee of the study.

**Set-3** The villages selected in this set also represent integrated development model of the organization, with special focus on the community management and village institutions, mainly the irrigation cooperatives. It is also tried here to highlight how these village institutions take initiatives on their own for other developments in their villages.

The names and district of the villages grouped in different sets are as follows;

Set	Name of the Villages	District	State
Set-1	1. Jher 2. Rupakheda	Banswada	Rajasthan
		Banswada	
Set -2	3. Dhabudi 4. Padatiya	Dahod	Gujarat
		Dahod	
Set -3	5. Mahudi 6. Vankol	Dahod	Gujarat
		Dahod	

Following are the village wise details of the various programmes undertaken at different time in 6 villages selected for the present study;

Name of the Villages/project	District	Name of program/year			
		Lift Irrigation	Check Dam	Watershed	Forestry
1. Mahudi	Dahod	1992	1993	1994	1994
2. Vankol	Dahod	1995	1996	2001	1996
3. Dhabudi	Dahod	1995	1996	1985	1999
4. Padatiya	Dahod	1993	1992	1994	1990
5. Jher	Banswada	1996	-	-	-
6. Rupakheda	Banswada	1997	-	-	-

All these villages' ranges from 5 -10 years of NRM programme interventions .

The schemes are around 5-10 years old, as this will better reflect on how the different programs have functioned and the impacts that have been achieved.

## **Data Collection**

The technique of stratified random sampling was used at village level to give representation to all hamlets coming under the programme interventions. The sampling consisted of 15% farmers in the command area of the programme villages/hamlets. 5 women were also interviewed in each village/hamlet.

Since the base-line data was available for all the selected villages/hamlets, an analysis of before and after- scenario was conducted to determine the impact of the program. This is a reason for not undertaking a study of non-intervention village.

The study involved a formal questionnaire for a preliminary assessment of an integrated development and pattern of agriculture and other developments in the villages under the study.

To assess the functioning of various programmes in the villages, interviews were conducted with villagers in each of the study villages/hamlets. Interactions were done with the executive committee members of the village institution of each village to understand how the villagers perceived the various activities and impacts.

In addition to this information, secondary sources of data, such as project reports village baseline data, were referred to. This included maps, data on the physical structure and capacity of the various irrigation systems, as well as information related to cropping patterns and agricultural output. Data were also gathered from the 2001 census statistics and village revenue records. The village institutions records were one of the main sources of all the data collected on the functioning and impact of the programmes.

The household Questionnaire contained questions dealing with the issues relating to level of involvement, water allocation, conflict resolution and satisfaction with the institution governing irrigation. It also had questions pertaining to agricultural productivity, cropping patterns, use of agricultural inputs, and rate of distressed migration. The information concerning level of involvement was cross-checked with information extracted from the village institution records. The pre-implementation survey and present survey were compared in order to assess the changes occurred. Information from household questionnaire was used to study the impact on entire village/hamlet as a unit. Questionnaire has been attached as ANNEXURE -2

In the following chapters, the impact of the various programmes on the lives and Livelihoods of the villagers and the importance of community involvement and village institutions in the same.

## CHAPTER – III

### A STUDY OF TWO COMMUNITY LIFT IRRIGATION SCHEMES IN RAJASTHAN

#### Introduction

This chapter looks at the 2 villages/hamlets which have only have lift irrigation as development intervention. The villages selected in this category are both from Rajasthan. Jher is 7 years old lift irrigation scheme and Rupakheda is nearly 5 years old. The chapter will describe the lift irrigation schemes, their functioning and impact on the lives of rural/tribal people.

15 respondents from each of the villages/schemes were interviewed along with meeting the executive committee members of the lift irrigation cooperatives for the purpose of data collection and information gathering. Both the schemes are managed by farmers registered cooperatives.

#### The Lift Irrigation System

To irrigate lands that are situated at higher levels than the water source it is required to lift water through mechanical device. This system of device used for lifting the water for irrigation is known as lift irrigation. Advancement in the technology has made it possible to lift water to any height and length.

Lift Irrigation comprises of constructing suitable head-works near water source and lifting water by pumping machinery through the pipe line. The pipe line laid up to the highest elevation in the command known as rising-main. The water is distributes to individuals fields by suitable distribution system. The main sources of lifting water are rivers-storage, canals, community wells etc. As compared with flow irrigation, capital cost and running cost of Lift Irrigation is more but generally Lift Irrigation is considered for areas where flow Irrigation System is not possible and most of of our tribal regions fall in this type of topography. The main advantage of lift irrigation, over flow Irrigation is the economic use of water. As farmers have to pay running cost almost directly proportional to the utilization of water, lands are irrigated very carefully by using minimum required water.

A brief on the technical details of the programmes in above two villages is given below:

Name of Villages	Lift Irrigation			
	Command Acres in rabi	HP	Head In m	Cost in Rs (lakh)
1. Jher moti	140	40	39	12.08
2. Rupakheda	135	30	32	10.19

## **Technical Aspect**

Detailed technical description of above schemes is presented in ANNEXURE-3

As shown in the above appendix both the schemes have been well designed having very good workmanship and distribution network through pipes and distribution chambers/ outlets. They are very user friendly schemes easily regulated in terms of water distribution through various sluice valves and outlets. Jher has such well located outlets at 24 Points and Rupakheda has outlets at 14 points. Each serving near by command of between 5 to 10 acres.

## **Irrigation Achievement**

Against the design command in above table the actual achievement in the most favorable condition was reported to be 100% in both the schemes. This is an excellent achievement. The average achievement would be some what less in the years of drought or when electricity was not adequately available. The 100% achievement could be attributed to technical soundness, good management and availability of adequate electricity.

## **Impact of Lift Irrigation Programme**

When irrigation is available, the result in terms of impact is always obvious and tangible as to how much it has benefited the farmers in favorable conditions.

In interpreting the economic results achieved by the program, one need to bear the fact that the data was collected in a drought situation, last 3 years were drought years in the region. The region received only 300-450 millimeters of rain (instead of the normal 828 millimeters) and yet both the schemes operated very well indicating fairly reliable water source even in difficult years.

## **Impact on Agriculture**

Before the lift irrigation projects, both the villages showed that the farmers were taking only Kharif crop depending on the rainfall. Partial Rabi was done in case of farmers who had some source of water available like well etc, but the irrigation was negligible in that condition.

After the creation of the irrigation systems, both the villages are able to take crops not only in Kharif but Rabi and summer also in normal years. In case of severe drought conditions also the schemes functioned with some cropping pattern changes requiring less irrigation. As reported by the farmers due to irrigation the agricultural yields and thereby the incomes increased minimum by 300%.

## **Food Security**

As reported by the farmers, before irrigation the 100% households were facing food insecurity. As per the statements given by the respondents earlier they had secured food from there agriculture for about 4-6 months in a year. After the irrigation virtually every household has enough food grain to last for the whole year. This is not only a

dramatic improvement but it also gives lot of confidence to the people as they have not to depend for food grain on market or others.

### Cropping Pattern

All the respondents said that before the lift irrigation, they used to only take Kharif crop which was rainfed and negligible Rabi crop on small patch of lands. After the irrigation system they said that they take 3 crops in a year, Kharif, Rabi and partially in summer based on availability of water in the source. The crops grown also changed drastically as expressed by the respondents. Before the lift irrigation, in Kharif only rainfed maize and paddy were taken and there is not much change in Kharif. Major changes have come in Rabi and Summer crops. All farmers are now growing wheat, gram and maize under irrigation in Rabi and on part of the land maize, pulses and fodder in summer. The cropping pattern shows major changes for all the seasons. In Rabi earlier 1% of people were doing wheat but now almost 100% people are doing wheat and vegetables and pulses are a new addition which was never done before in Jher. Similar trend is visible in Rupakheda also. In summer earlier no crops were grown but after the irrigation system crops like groundnut, pulses and fodder are being grown by almost 50-60% farmers. The crop yields in Jher and Rupakheda are given in figures below.

fig. Crop yield - Zer Village

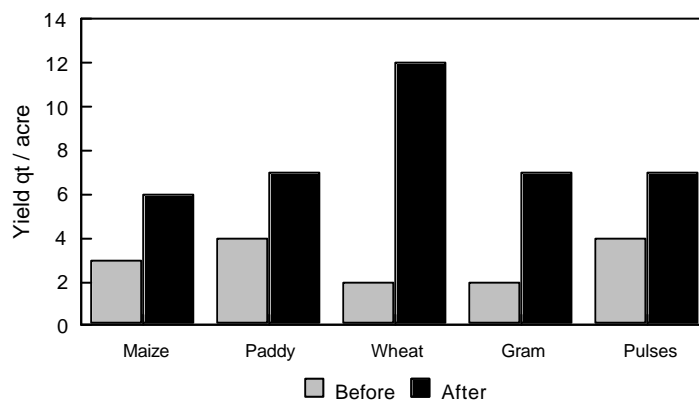
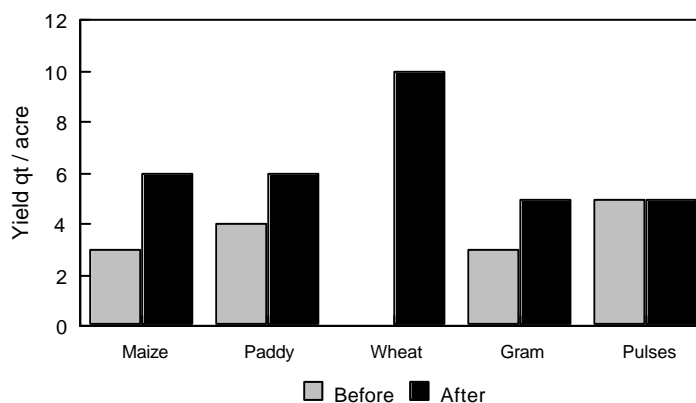


fig. Crop yield - Rupakheda Village



## **Migration**

There was mass distressed migration from both the villages to progressive and prosperous areas big cities in Gujarat as expressed by the farmers. There was hardly any family from which few persons, excepting old persons, were not migrating for the period of 8-10 months in a year. After the irrigation project, as shared by the farmers very few people from few families now migrate that too for a period of 2-3 months. Previously when all the able bodied members from almost all families were migrating, now only 1 or 2 young people from few families are migrating. This is again a very good impact which has stabilized lives of most of the people in their own village and surroundings for major part of the year.

## **Other Impacts**

Besides above important impact of irrigation, there are improvements in various areas described by the respondents. These are;

### ➤ **Housing**

Previously in both the villages almost all the houses were Kutchcha. Now due to increased income, almost 53% have semi-pucca houses and 20% have pucca houses.

### ➤ **Assets acquired**

Various people have acquired additional assets like jewelry, grain storage bins (kabla), cycles, radio, watches etc. These are all symbols of improvement among the one time poor farmers. They said earlier each family had silver jewellery worth about 100-200 grams. The same farmers are now possessing silver jewellery worth 5-10 Kilos. This is amazing. From maximum 1 kablas (food storage bin), each farmer now boast of 3-5 kablas indicating clearly availability of additional agriculture yields. All the respondents expressed the same.

### ➤ **Money lenders**

Private Money lenders were one of the biggest exploiters of the farmers in this region and in the 2 villages of the study. As reported by the farmers borrowing from private money lenders has been reduced drastically. Earlier all the respondents were borrowing money from private money lenders. All said none were borrowing from private money lenders now. Due to the incomes earned in agriculture, borrowing money from money lenders has gone down drastically. Their financial needs are now met substantially from their agriculture income and the bank finance is also now accessible to them due to irrigated agriculture land. Of course on need they do occasionally borrow from the neighbors and relatives in the villages, but not from the private traditional moneylenders like Banias and traders. Of course it was not known what interest was charged by their neighbours and relatives on borrowed money. It is not easy to get truth in such matter.

### ➤ **Education**

Education which was almost negligible has gone up many folds particularly the number of school going children has increased manifold. The girls who were never sent to school are being encouraged to attend the schools and as reported by the respondents large numbers of girls are attending school. Few of the boys and girls are attending the college.

### ➤ **Malnutrition**

Though there is no scientific data collected on nutritional status but all the respondents clearly indicated that from food insecurity by all earlier, now none of their family members were facing food problems and all were adequately fed, this would naturally result in the improvement in nutritional level of everyone including children and women. People reported that they are now much less vulnerable to various diseases and sickness.

### **Irrigation Management**

The village cooperative has been responsible for the management and maintenance of the lift irrigation systems. Both these irrigation systems function on hourly basis. Irrigation charges and the farmers have to pay water charges in advance before taking each water. Water is given according to schedule fixed by the managing committee. Changes are made in the cooperative functioning according to the lessons learnt in each operational season. Regular meetings are a common phenomenon, where not only issues regarding the irrigation system are discussed but also other village issues are shared. The irrigation cooperative is the major village level institution responsible for the effective and efficient functioning of the system. These cooperatives due to their good management have been able to have savings around Rs 40,000 by each after paying various charges like electricity bills, maintenance charges and salaries to paid employees of the cooperative.

The details of the functioning of such cooperatives and village institutions are described elaborately in chapter V, where institutional aspects are focused, which are commonly applicable to all the lift irrigation schemes and cooperatives of the organization.

## **CHAPTER - IV**

### **A STUDY OF TWO VILLAGES WITH INTEGRATED NRM INTERVENTIONS**

#### **Introduction**

This chapter gives an insight into the impact of various integrated programmes in villages, Dabudi and Padatiya, both in Gujarat. The institutional aspects of these programmes are not dealt in this chapter as the same are commonly addressed and described in chapter V.

In these 2 villages there is an integration of programmes of lift irrigation, check dams, watershed, forestry and environment.

#### **The Lift Irrigation System**

The definition and purpose of lift irrigation is already described in chapter III and various components of design aspects of lift irrigation are also described in previous chapters. The technical details of lift irrigation system are given in ANNEXURE-4.

Dabudi Lift irrigation is 5 years old and Padatiya lift irrigation is around 10 years old. The command area and achievements of the same in these two are given thereafter in this chapter. The achievements in normal years in these schemes are almost 100% to the design command and both are functioning well ever since they were installed.

#### **Check Dams**

The check dams are designed according to the size and shape of river and constructed in masonry, mass and reinforced concrete. Check-Dams are usually situated on sites where suitable hydraulic conditions are present. The dams are well embedded in the embankments. They are provided with opening so that sediments can pass through during the monsoon floods. The openings of the dam are closed by means of shutters (Steel/RCC).

To conserve and effectively use both surface and ground water the organisation constructs a series of check dams along rivers. The check dams are situated in a way that the tail water of one reservoir at full supply level reaches the apron level of the reservoir upstream of it. Hence, the river gorge is used for the storage of water. The reservoirs are used for recharging the groundwater and as water sources for irrigation of the adjacent lands. Water is lifted from the reservoir created by the check dams by electric or diesel driven pumps sets under the lift irrigation installed on such checkdams.

The construction of a series of check dams, which form artificial cascades of reservoirs, has several significant advantages: The area adjacent to the catchments benefits from the stored water ensuring enough water for the community lift irrigation schemes and also by several portable pumps. The storage also recharges the ground water in the adjacent wells. Technical details given as ANNEXURE-5

### Some basic details of 2 programmes in both the villages are as follows;

Name of Villages	Lift Irrigation				Check-Dam			
	Command in acres in Rabi	HP	Head in m	Cost in Rs. Lakh	Water storage capacity	Length	Height	Cost in Rs. Lakh
1.Dhabudi	108	30	31	12.85	17 mcft	133 m	3.15 m	20.00
2.Padatiya	144	50	42	13.10	2 mcft	60 m	2.50 m	5.60

### Management of Water Resources Projects

The village cooperative has been responsible for the management and maintenance of the water resources projects in both the villages. The aspect of water resources management has been dealt elaborately in chapter V.

### Watershed Development

The main objective of the this activity is to conserve and manage land and water on area basis so that the basic needs of people like food, fodder, fuel and water are met on sustainable basis. The various interventions usually undertaken in this programme focus on in-situ soil and moisture conservation and checking environmental degradation processes. The usual measures adopted are mainly bunding, gully plugging, terracing, grade stabilization structures etc.

### Forestry

The main objectives of these programmes are to conserve and rehabilitate degraded environment and undertaking plantations on appropriate land use practices with the ultimate objective to improve the environment and provide livelihood to the people. The various activities undertaken are Agro-farm forestry, JFM, Horticulture development. Under the agro-farm forestry tree plantations are promoted on private and wastelands. In the JFM programme the main aim is to rehabilitate degraded forest lands through people's action and help in establishing clear user rights. The horticulture promotes assured income from marginal lands through horticulture and vegetable plots.

The important aspect of watershed and agro forestry, in comparison to the water resources programme is that while water resources/ irrigation may have limitations in serving the village and it may serve part of the village but in agro forestry and watershed such limitations are not there and entire village is covered under such programmes. Thus these 2 programmes are much more equity based than the water resources.

### Impact of Programmes

#### Agriculture

The impact was most visible on Rabi and Summer crop production. The data showed that the grain production in Rabi in both villages increased significantly.

However there was not much change in cropping pattern in these two villages in Kharif but in Rabi season vegetables were introduced at a large scale. Farmers benefited most because of additional crops in Rabi and Summer due to irrigation. In Dabudi almost entire area in summer was brought under crops like groundnut and vegetables giving very good income to the farmers as the summer harvest particularly like groundnut and vegetables fetches very high value. Padatiya showed cultivation of pulses and vegetables during summer.

In best of the year the achievement in agriculture under the irrigated agriculture was 112% of the design command. The excess achievement could be attributed to the change in cropping pattern as some crops required less irrigation. In the worst of the year, the achievement of command was 80%. This is very good position. The achievement in Padatiya was 83% of the command which is fairly good considering that the scheme was designed for 16 hours pumping whereas power available was between 10-12 hours.

The increase in yields reported to be higher by 300-400 % in comparison to the situation prior to the irrigation and integration. With double cropping, with additional season of Rabi the increase reported was 300 % and wherever summer crop was taken the overall increase in yield was about 400 %. In terms of value, the benefits were still higher because the prices of Rabi and Summer crops were much higher than that of Kharif crops. Also vegetable on small patch of land fetched handsome amount. The crop yield in these two villages are given in figures below.

fig. Crop yield - Dhabudi Village

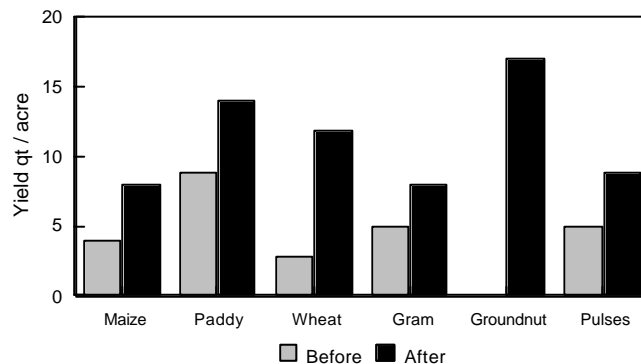
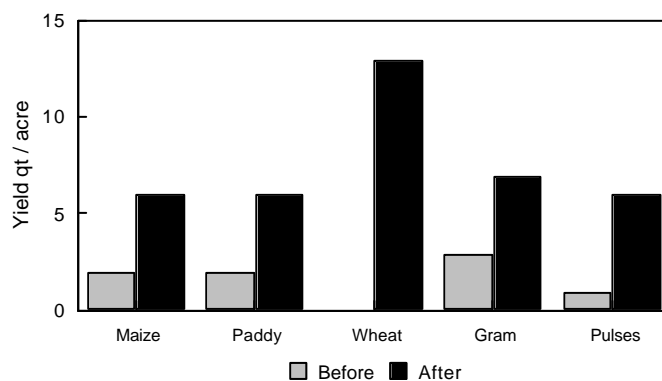


fig. Crop yield - Padatiya Village



## **Migration**

As reported by the respondents in both the villages the migration was resorted by 3 to 4 members from each family for about 8 months in a year prior to the irrigation, which is almost nil in Dabudi after irrigation. Whereas in Padatiya the migration is reduced to 1-2 persons from some families for only 1-2 months in a year after irrigation. Dabudi's rate of migration reduced to nil mainly because of the 3 season crops and also because of vegetable cultivation at good scale ensuring much more income.

## **General Impacts**

Before the programmes 85% of household were living in Kutcha, houses in Dabuhdi and 100% kutchha houses in Padatiya. After the programmes in Dabuhdi 53% of the houses are pucca and 47% semi-pucca. In Padatiya now 47% have semi pucca houses and rest are still having kutcha but with extended area.

Most of the farmers invested in assets like cycles, radio, watches and women particularly in jewelry, grain storage bins (kabla), etc. Earlier the farmers had 1 kabla to the maximum, but now most of the respondents boast of 3-7 kablas in Dabudi village and 2-3 in Padatiya village. In case of jewellery in both the villages the respondents shared that earlier they had 100-200gm in Dabudi and in Padatiya none had silver jewellery but now in Padatiya and Dabudi they have 2-3 kg of jewellery in each household. Money earned from agriculture was ploughed back for buying bullocks, agricultural equipment and cart. These are all symbols of prosperity for the farmers.

Most of the farmers no longer went to moneylenders who were one of the biggest exploiters of the farmers in the region. This change occurred because of the incomes earned in agriculture and finance available from financial institutions like Banks, women groups etc.

In education in both the villages the school enrollment and attendance has increased manifolds.

Before the programme the malnutrition was very common because of food insecurity. Now due to 100% food security and surplus food there is hardly any case of malnutrition as reported by the respondents.

Besides above impacts it needs to be mentioned that because of the intervention of checkdam at both the places the benefits of the water was available not only to the farmers of community lift irrigation but also to the large number of non lift irrigation farmers drawing water by their own portable pump sets. Sizeable land was irrigated at both the villages through these portable pump sets whose detailed impact is not described in this chapter though such farmers got enormous benefits through irrigation by portable pumps. Also not elaborated but visible was the impact on ground water increase in the adjacent wells due to the check dams.

Chapter IV deals with bit more detailed of the impact of integration of various programmes.

## CHAPTER-V

### NRM PROGRAMMES AND COMMUNITY MANAGEMENT

#### Introduction

In this chapter, along with the description of 2 villages Mahudi and Vankol in Gujarat in respect of the programme interventions in integrated manner, the focus is on community management and village institutions with their functioning.

These 2 villages have all the 4 major programmes integrated; they are lift irrigation, check-dam, forestry and watershed.

Basic details of lift irrigation and check dam are as follows;

Name of Villages	Lift Irrigation				Check-Dam			
	Command in acres in Rabi	HP	Head	Cost in Lakh	Capacity	Length	Height	Cost in Lakh
1. Mahudi	100	40	45 m	9.50	12 mcft	95 m	3.00 m	10.00
2. Vankol	108	30	35 m	14.40	4 mcft	57 m	2.00	13.75

Detailed technical description of above programmes is presented in ANNEXURE-6 and 7

In addition to the above water resources interventions there are 2 other major interventions like forestry and micro-watershed development in both the villages. The basic details of these 2 programmes in these 2 villages are as follows;

In Mahudi micro watershed development programme was taken up in 476 acres of land and in Vankol it was taken in 444 acres of land. Similarly under forestry programme the plantation of nearly 7 lacs seedlings was done in the entire village outside the command area also in Mahudi and in Vankol the plantation of more than 38, 0000 was done in the command area, on sizeable land.

#### The Impact of Integrated Natural Resource Development Programme

We first examine the impact of the NRM programmes on agricultural resources. The development of agricultural resources, especially water for irrigation, net cropped area, and crop productivity show highly positive trends for all farmers. The integration of other major interventions of micro watershed, forestry and horticulture has multiple impacts. The watershed programme has improved the land shape fertility and moisture and the forestry programme has improved ecology, environment and given economic assets in the hands of tribals in the form of trees. Particularly, watershed development and forestry are benefiting non-command area as these two programmes are taken up in the entire village land bringing in equity among the people.

## Cropped Area and Crop Productivity

The net cropped area for the Mahudi irrigation area as a whole increased to 90 acres in Rabi from almost nil as there was no irrigation before the intervention. Whatever crop was taken in Rabi was non-irrigated and therefore very low yields were recorded. The cropping pattern has changed significantly after the introduction of irrigation. Before the program, maize was the main crop, and paddy was the second most cultivated crop in valley portions in Kharif. In kharif with water availability, the share of these two crops has reduced, whereas pulse and vegetable crops has increased. The Rabi and summer are completely new additions into cropping system. This change was caused by availability of irrigation through lift irrigation system supported by check dam.

Due to availability of water round the year Kharif yields have increased from about 3 quintals to 8 quintals, an increase of about 250%. The Rabi crop and summer crops are net additions and when the yields of Rabi and summer are added to the increase of yields of Kharif the overall increase of yields has gone up about 900% in terms of overall production.

The above data is very much substantiated by the respondents who shared that the annual agricultural production had witnessed phenomenal increase from 62 metric tonne to 421 metric tonnes after the interventions, particularly on the availability of water round the year in the command area.

The farmers in Vankol have experienced increases in agricultural production of 336 Metric tonne against 56 Metric tonnes before the programmes. These data for both villages clearly demonstrate the impact of integrated programmes in the area, an increase of 600 %. The crop yield in these two villages are given in figures below.

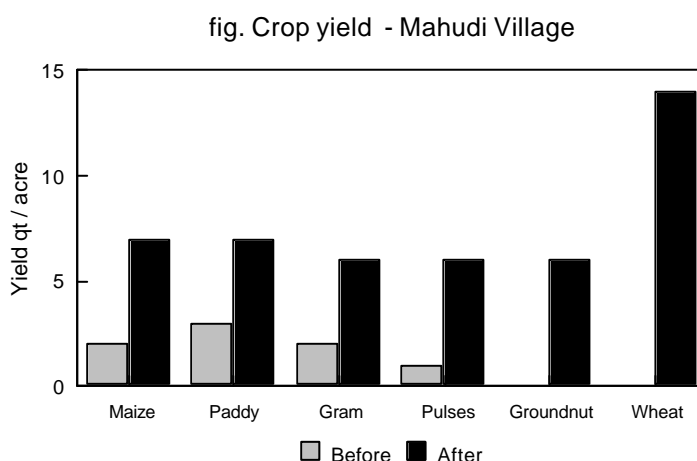
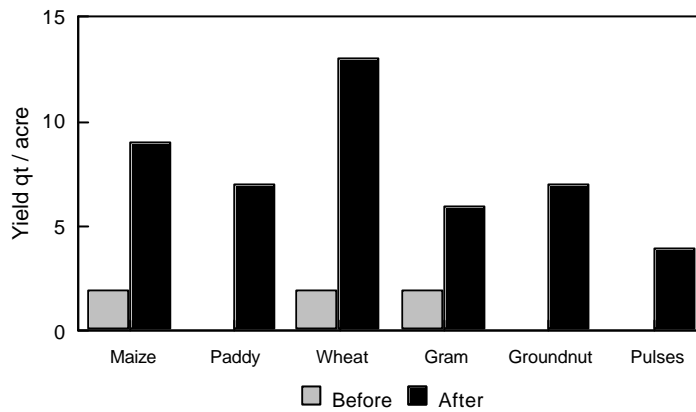
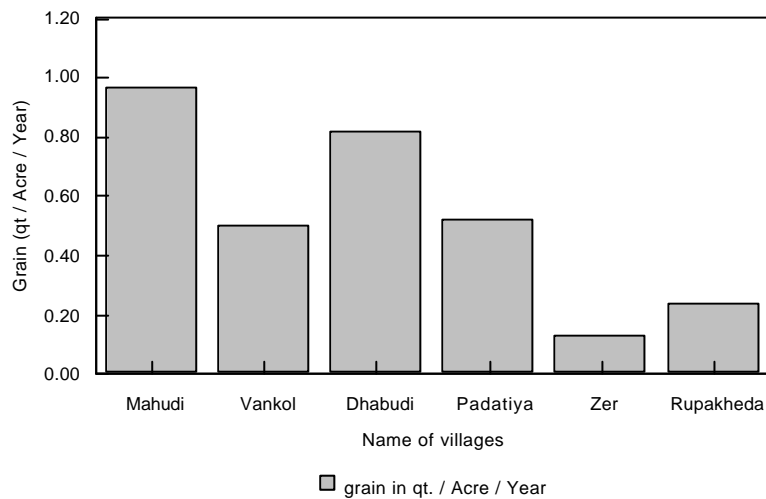


fig. Crop yield - Vankol Village



A comparative net grain production among six study villages after different programme interventions

fig. Net grain production - After Programmes



### Wells and Water Availability

Prior to the development programs, the village Mahudi had only one well, which had water for a maximum of nine months. By 2001-2002, the village had six wells, which had water for nearly 12 months. One well which was located immediately down stream of Check-dam had water round the year in year 2001 & 2002, including summer during above severe drought years. Some of the wells that previously had no water for irrigation purposes now have water available for about eight months, which include irrigation season of Rabi.

Village Vankol had only 3 wells which had water only for 8 months. In 2000-2001 the village had 17 wells with water for 10 months, though the above year was drought year. If it had not been a drought year these wells would have definite water round the year. The well that is at the down stream of Check-Dam had enough water even after the 3<sup>rd</sup> consecutive drought year, meeting the drinking water requirement of the village.

The increased water availability under these adverse conditions implies that the water table had risen as a result of the integrated NRM activities. The water resources development does enhance this process at a faster pace. The farmers also perceived this increased water availability in the same way. Their simple expression on this improved water situation was: "We didn't strike such a good water table in the last forty years".

### **Horticulture, Forestry, and JFM**

In addition to new cash crops, horticulture has been introduced in Vankol and Mahudi. In Vankol the villagers have brought 5 acres of common and barren wasteland under drip irrigated horticulture, thereby increasing the productivity of wastelands. Individual farmers have planted on another 22 hectares of irrigated horticulture species.

To date, the villagers have planted around 7, 00000 saplings in both villages. All households in the command area as well in the entire village are owning sizeable trees of their own. The species include Nilgiri, Neem, Teak, Mango, Amla, Lemon etc. The purpose is not only to provide the soil with adequate green cover but also to meet the villagers' basic biomass needs: fodder, fuel and timber. Despite the harsh environmental conditions and poor rainfall, in village Vankol the saplings are surviving fairly well, but any significant impact in the area of forest resources development will not be apparent for several years.

In Mahudi the plantation was done more than 10 years ago, the villagers have got benefit of the trees. In the area of fodder availability, however, the increase in the population of high-yielding milk cows and buffaloes demonstrates a significant improvement. Farmers have also access to reserved forest area lands in Mahudi under joint forest management programme giving benefits of fodder, grass etc to the villagers. It is one of the successful JFM villages in the region.

### **Livestock**

One of the first effects of the program was a decrease in the number of goats, which were kept mainly by the poor to sell during bad times. Out of 585 head, 285 were sold off progressively, and a total of 300 goats remain. This was a result of the villagers' decision to reduce the number of goats to protect the crops and plantation in JFM.

The total number of cows in both villages has increased. The number of cows rose from 45 in 1993 to 175 in 2002, an increase of 290 percent. While buffaloes increased from 45 to 75, in the same period, an increase of 70 %. This indicates that the farmers, with availability of irrigation quickly recognized the economic potential of milching cattle.

The farmers have two cows and one buffalo on an average in every household after irrigation development.

Daily milk output has increased everyday from 170 liters per day to 675 liters per day among the command area farmers, an overall increase of about 400 %.

### **Self Employment**

The important impact on employment of all these programmes in the 2 villages is that almost all the beneficiary households have been engaged in self employment on their farms, horticulture orchards, JFM programme almost round the year, as against majority of them migrating elsewhere for about 8 months as reported elsewhere in this study

### **Migration**

There was mass migration from both the villages to progressive regions of Gujarat. Even skilled people also migrated to city centers for various kinds of job. All the able bodied people from most households used to migrate for about 6 to 8 months with the peak months being March to mid-July.

In Mahudi, migration which was 77% has come down to only 8%. In Vankol the migration has come down to 10 % from 83%.

### **General Economic Impact**

We now consider the impact of the integrated NRM program on the household economy and on the economy of the village as a whole, as reported by the respondents unanimously

#### **➤ The Household Economy**

In the eight years of the implementation of the NRM program, from 1994 to 2002, both the villages profited from regular and substantial incomes created by the program activities. This cash income has enabled them to improve the farms and farm operations.

The programmes have helped them to secure their livelihoods, improve their living conditions, and eliminate longstanding debts and helped in many other respects.

The farmers saved money to purchase equipment and stabilized their economic condition.

The farmers have gained access to special government subsidy and loan schemes, which have enabled them to get the necessary financing to start micro-enterprises and other economic activities.

Establish their own credit group and to start supplementary income-generating schemes. This applies more to the women, who form the bulk of wage laborers. The health and nutritional intake of women and children has also improved considerably, due to food security.

The increase in disposable cash income especially that of the cattle-owning farmers with irrigated lands has resulted in an increased demand for agricultural labor and locally available specialized skills (masons, technicians). Some enterprising villagers have combined their savings and bank loans to invest in micro enterprises, such as flour mill, well digging, and handicrafts. Thus, the risks to people's livelihoods, especially in times of drought, have been reduced because of the increase in the number of economic activities and improved management practices.

The agricultural daily wage rate has increased from Rs. 10 to Rs. 45 for women and from Rs. 20 to Rs. 60 for men. The value of irrigated land has gone up from Rs. 5,000 to Rs. 40, 000 per acre, and that of rainfed land from Rs. 4, 000 to Rs.12, 000 per acre.

The increase in incomes has led to the rapidly increasing availability of investment and credit funds in local indigenous institutions, such as the Gramin Bank, the Youth Group, and the Women's Fund.

The villagers have built several new houses and renovated some old ones. In addition, the villages now have two grocery shops rather than none to before, almost every one has wrist watch, six motorbikes have come in the village compared to none previously, television sets and one jeep are new additions in the village. The villagers now generally wear clean clothing of better quality.

The practice of private money lending has ceased completely. Indigenous credit associations or groups now provide loans. Estimates indicate that nearby banks have some Rs.100, 000 in fixed deposit savings from farmers.

### **Impact on Natural Resources**

The overall impacts of all the programmes have resulted in the overall improvement and expansion of natural resource base, without harming the environment. The water table has increased, the streams have been made perennial from seasonal tree cover has increased, soil erosion has declined, siltation has decreased, degradation has decreased and the overall ecology and eco systems of the village has improved.

### **Gender**

Sadguru's interventions have had a direct impact on women's practical gender needs, contributing to their economic empowerment and slowly challenging the gender division of labour and patriarchal control over resources and decision-making. In Sadguru's overall approach, mainstreaming of gender is very much attempted successfully. Women have been trained in non-traditional areas, as biogas masons and site supervisors (*karkuns*) and they are actively participating in the management of community resources and institutions. The organization has promoted certain natural resources programmes which are exclusively women managed; they are forestry, horticulture activities, agriculture extension, off-farm income generation activities etc. Although addressing issues like land ownership etc. are the preview of the government policies and in this direction not much can be done in the present legal framework. Though the organization has made serious

attempts in inducting women in various formal institutions like irrigation cooperatives, horticulture cooperatives, watershed associations etc.

Sadguru's programmes address and fulfill women's needs and issues such as drinking water, fuel, etc. and make their lives much more comfortable.

The active participation of women in various economic activities, increased enrolment and attendance of girls in schools and growing participation of women in local governance show fast changing trends in favor of women. Infact many of the women associated with the programmes of the organisation are now sarpanchs and local leaders.

### **Institutional Development and Management**

It has come out clearly in the study that the main secret of the success of LIS is the successful management of irrigation cooperatives.

For the management of water resources development programme in effective and sustainable manner, the farmers in these villages formed irrigation co-operatives. All these co-operatives were formed and managed by the people themselves on the principles of cooperation and democracy.

In the present study undertaken, it has been observed that participatory initiatives have led to efficiency, effectiveness, self reliance and better and sustained project interventions. Participation in these villages enabled the people to expand the scope of one programme to several other programmes.

Irrigation cooperatives in the organisations programme area were initiated by the organization since 1982, when through experience it was learnt that in order to have effective and sustainable management by the people themselves it was imperative to organize the village communities under a formal institution and in that context through the consensus of the villagers it was felt that the cooperatives were the most effective form of institutional management for the villagers. These cooperatives are dynamic, functional institutions at the village level which have been operating and managing the irrigation systems.

These tribal farmers who only used to do rainfed agriculture are now working together as collective groups under irrigation cooperatives working towards achieving higher agriculture productivity and managing their natural resources and systems on their own.

The main functions of these cooperatives is to provide water to the farmers, manage recurring costs, maintain and manage the systems and motivate farmers to use improved varieties of crops and better agriculture methods.

The co-operatives are dynamic bodies, and their roles differ and keep changing to meet the new situations and challenges. These cooperatives depend not only on the enthusiasm, attitude and participation of the people but also on the quality of leadership, the availability of resources and the will of the people to succeed as can be seen in all the cases shared in the study. The impacts of the natural resource

activities described in previous chapters have been only possible because of the sound management by these village level institutions.

## **Cooperative Management**

All the L. I. Systems promoted by the organisation are maintained by the community under statutorily set up irrigation cooperatives. The important body in cooperative is the managing committee or executive committee which is chosen by the general body of all the users of the system. The managing committee looks after the scheme. It consists of 7 to 12 members including a chairman and a vice-chairman. The general body consisting of all farmers meets at least once before every watering season i.e. in July/August every year. The members of managing committee usually are elected by consensus for a term of three years. Membership is renewable and changes are made according to need of the members. The cooperatives are based on the values of self help, mutual responsibility, equality and equity amongst all members. There are usually 3 paid employees such as secretary, operator and water distributor, who are responsible for accounts management, water distribution, and operation of the irrigation system.

The broad objective of formation of cooperative is to increase the capacity of the local people to improve their own welfare & overcome the problems facing them collectively. The emphasis is on collective management, sustainable livelihood, human Resource development & financial self reliance.

The executive committee of both the villages shared the views as described below and all of them considered their cooperative management as most effective. This is a symbol of confidence in themselves and their cooperatives.

The government auditors from the cooperative department have certified these cooperatives as very good.

From the present study and several other studies done by other researchers it has come out clearly that following factors are mainly responsible for the success of irrigation co-operative societies of the organisation;

- The process and formation of the executive committee as reported by the respondents the selection or election of the executive committee is done by consensus to avoid conflict and group rivalry. All the hamlets or water outlets of the system are represented in the executive committee. People chosen are the ones generally who are willing to give time, are honest and hard working. In the selection of chairman his social status also counts.
- Rules and regulations governing the co-operative- The rules and regulations are formulated by the general body and the executive committee. The rules formed focus on management aspects, salaries, default punishment, monitoring of paid employees, water charges and cropping patterns.
- Water distribution and management- Any cooperative can be successful if it is able to manage water delivery on time and with minimum losses. The secretary, operator and distributor work in coordination to distribute water to the farmers in

the sequence decided according to the crops and water charges deposited by the farmers.

- Financial management and account keeping- Proper accounts and records are important for the effective functioning of the cooperatives. Timely payment of salaries, electricity dues, maintenance charges are important factors which ensure timely functioning and progress of the cooperatives. All the cases studied had their financial records and documents fully written and audited.
- Leadership - good leaders are important for the growth of any institution; in the cooperatives also leadership plays a very important role in the success of the irrigation systems and undertaking of other development activities.
- Awareness and co-operation of the water users- Regular information sharing, exposure to other areas, new information sharing regarding agriculture, and trainings are important aspects in making the village institutions strong. All the village institutions studied have undergone these processes of development.
- Accountability of the paid employees - the sincerity, commitment and efficiency in carrying out the assigned roles ensures the success of cooperatives. These aspects were taken care of by the cooperatives.
- Adherence to rules and regulations - if the members follow the rules formed, the systems are able to deliver effective results with benefit to all members, which has been the case in the cooperatives studied here.

The above similar views were expressed by 100% of the respondents in both the villages and also in other cases in the study. The respondents also felt that they were performing well because of the regular training and guidance that they got from the organization and the farmers federation of Jhalod which was promoted by the organization in 1996.

#### **RESPONSIBLE IRRIGATION COOPERATIVE**

Padatiya Lift Irrigation Cooperative, which is one of the schemes in the present study, is situated in Jhalod taluka and operating for about last seven years satisfactorily. It was one of those lift irrigation cooperative which functioned in the drought year of 2001-2002 as enough water was available. On one night (electricity is usually available at night) one farmer violating the rules took out of turn water by opening directly valve nearby his field. The violation was notices by the Secretary and Operator and they reported promptly to the Chairman of the cooperative. Chairman in turn convened a meeting of Executive Committee on the very day. The committee in turn unanimously decided to impose a fine of Rs. 300/- from the erring farmer and also decided that he would get water only after the payment of his penalty as well as his outstanding dues. The farmer paid the penalty amount as well as the entire outstanding. This is an example of prompt action in which the committee meeting, penalty and payment of penalty, everything was done within 24 hours, regarding misconduct by a farmer.

## Participation and Management

Certain indicators were used in all six villages in order to look at the performance of the co-operatives. The common trends observed in all the cooperatives were as under;

Sr. No	INDICATOR USED	OBSERVATIONS AND FINDINGS
1.	<p><b>PARTICIPATION</b></p> <p>In planning, implementing and decision making.</p> <p>Operation and Maintenance</p> <p>Access to information</p>	<p>All the members take part in the village meeting. Generally there is attendance of 85-90 % and in villages like Mahudi and Vankol 100 % attendance is seen.</p> <p>In all the 6 cooperatives studied it was seen that the water charges were paid in advance by the farmers before each watering. The charges were fixed on hour basis or acre basis based on the villagers' consensus. This charge included maintenance charges, salaries and electric bills and exigency needs.</p> <p>All the members are informed and accounts are shared in meetings.</p>
2.	<p><b>WATER DISTRIBUTION</b></p> <p>Equity</p> <p>Reliability</p>	<p>Members are given water according to the sequence fixed by the executive committee and depositing of water charges. All members are given water in fixed acres.</p> <p>Same amount of water is given to near outlet farmers and far of farmers.</p> <p>Water is given on the time fixed, only in cases of electricity not available, the sequence is changed.</p>
3.	<p><b>MAINTENANCE</b></p>	<p>During season any maintenance is looked into within 24 hrs. Members get involved in maintenance of pipeline, outlets etc.</p>
4.	<p><b>EXECUTIVE COMMITTEE</b></p>	<p>The committee is elected/ selected by the water users in the general body meeting and they are responsible for the efficient and effective functioning of the irrigation systems and to look into the issues of the members and resolve conflicts, if any.</p>
5.	<p><b>MEETINGS</b></p>	<p>During water operation, monthly and at times weekly meetings are held and all issues related to the functioning are discussed. General body meeting is held once a year, where the accounts, audited statement, changing of executive members, paid employees etc. is done.</p>
6.	<p><b>RULES, REGULATIONS AND ADHERENCE</b></p>	<p>Rules for the management of the cooperative, water distribution, record keeping, money payment, etc are made by the executive committee and are shared with the members in the general body meeting and these rules are followed by all members. Defaulters are punished. Many a time's even Chairmen were punished for out of turn water taking. In some cases when occasions demanded, the Chairmen and committees were changed by the community.</p>

7.	<b>FINANCIAL MANAGEMENT AND RECORD KEEPING</b>	The secretary is responsible under the guidance of the executive committee for writing and managing all the records of the cooperative, Collection of dues, repayment of electricity bills, maintenance bills etc. Audit by the government cooperative auditor is undertaken and accounts are shared with all members in general meeting regularly. Cooperatives like Mahudi, Vankol are considered as A class by the auditors, as has also been shared by the auditors in their interactions with us.
8.	<b>LINKAGES</b>	The cooperative has links with the local banks, government departments and takes the services of the same. Vankol was able to get 5 acres of village wasteland in the cooperatives name because of their responsible style of management.
9.	<b>EQUITY</b>	<p>Being a tribal area all farmers fall in the same category of backwardness. For all the activities the hamlet is unit of functioning, so when irrigation or any other NRM programme is taken the complete hamlet is covered.</p> <p>The cooperatives give special preference to widows and very poor farmers in water distribution. Generally during Rabi, the electricity supply is at night in that case the cooperatives ensure that women living alone are given water in the morning sequence. In the lift irrigation systems, the outlets are placed at points, around which the fields are located, the issue of tail enders does not arise in such systems.</p>
10.	<b>INSTITUTIONAL STRENGTH</b>	<p>The cooperatives have been efficiently running the systems since last 5-10 years in different lift irrigations studied.</p> <p>All bills and payments are made on time without any subsidies Repair and maintenance is done timely. Other Initiatives are undertaken by the cooperatives apart from the NRM Programmes-Drinking water project and wasteland was initiated by the cooperatives with the guidance of the farmer's federation. Cooperatives have savings in the bank ranging from 20,000-40,000 Rs. as fixed deposits, after settling all dues of regular operational cost.</p>

The above aspects of irrigation cooperatives establish emphatically that the tribal farmers have been managing their institutions very well.

Mahudi L. I. Cooperative lost its very dynamic Chairman in road accident. After three years equally dynamic Secretary of this cooperative died. In spite of this, serious setback of losing very able leaders, this cooperative has continued functioning very well. This speaks on the collective strength and resilience of cooperative.

### **Other Initiatives by Village Institutions**

In all the six villages it was observed that on one hand the integrated NRM programmes not only brought about manifold changes in the economic, social and cultural lives of the people but the strong village level institutions made the villagers take up many more development initiatives in their villages.

The village cooperative in Mahudi undertook a drinking water project in their village and installed a drinking water system which is providing water to each household in the village. Vankol on the other hand not only installed a drinking water project in the

village with the support of their farmer's federation but also took up development of the wastelands in the village by trying to convert them into horticulture orchards. During the course of interactions in all the villages it was clearly visible, that the villages where the village institutions were strong and communities were fully involved, development took a major course ensuring progress in all aspects within the village.

Rarely in tribal regions anywhere have water supply systems been installed by tribal cooperatives on their own. It is an example that when food security is achieved and farmers progress, they develop spirit of enterprise. With their collective strength, these cooperatives have managed getting more electric power (from 8 hours to 12 hours in a day). The cooperatives and their federation, on account of their success and numbers have developed sufficient political clout to take up any issue successfully with the Government and get the things done. No one can ignore these cooperatives and their federation. People respect successful individuals and institutions. This is what has happened with the cooperatives in Dahod and Banswara.

### **Proud cooperatives**

These cooperatives are aware that there are not too many such successful cooperatives in the tribal regions of our country, particularly in the field of irrigation and therefore they are very proud of their success and management. They are always aspiring to improve their functioning and more specifically they emphasize that irrigation federation should become best in the country.

It's a tribute to the tribal farmers that these illiterate and semi-literate people have managed their community schemes so well and for so long, ensuring sustainability.

“Establishing and strengthening village institutions held the key to the success of the project. These provided the vehicle to enable a maximum participation by the village community in the planning, implementation and monitoring of the various project activities and eventually to ensure the sustainability and replicability of the other project activities. Placing emphasis on village institutions wasn't misplaced as these eventually fulfilled a number of useful functions.”

*From Mid-Term Evaluation by International Team in 1998*

## CHAPTER-VI

### CONCLUSIONS AND LESSONS LEARNT

Based on the narration and various findings in the previous chapters of different studies, following conclusions could be drawn;

- The lift irrigation technology is very appropriate for the tribal region, and the systems have benefited immensely to the tribal communities in both Banswada of Rajasthan and Dahod of Gujarat.
- The irrigation has improved economic and social status of the tribals.
- The agriculture yields have increased many folds on account of irrigation. In case of perennial irrigation in 3 seasons such increase is phenomenal.
- Tribal people and their own institutions have managed the irrigation systems very effectively and successfully under the formal set up of registered cooperatives.
- The technically sound irrigation system and good community management have resulted in very good achievement in terms of the coverage of irrigation in each scheme. In most of the cases in normal situation near 100% or 100% designed command was achieved. It was only due to the shortage of water or electricity that the achievement was less.
- On availability of water tribals have shown enterprising attitude in changing the cropping pattern and opting for vegetables and horticulture.
- The size and quality of check dams have not only supported the irrigation system but also facilitated the irrigation through portable pump-sets by large number of farmers.
- The special approach of optimum check dams on the same source has optimized the water storage through out the run of the rivers and rivulets and made the sources perennial.
- The check dams have increased the ground water table in the adjacent areas.
- The watershed development programme has multiple impacts in terms of improving the land and its productivity, reduction in soil erosion, improvement in ground water etc.
- The plantation activities under various patterns like agro forestry, farm forestry, wastelands development, JFM have not only increased substantially the tree cover but also improved ecology and eco-system.
- The integration of various interventions have multiple and manifold impact on economy and environment.
- The protection, development and management of natural resources, particularly through the community management are crucial for the development of the tribal region and tribal people.

## **Relevance and Replicability of Programme**

All the programme interventions in the study villages were appropriate and relevant for the specific villages and region on the basis of the agro-climatic conditions, potentials and need of local people. Infact the success of these programmes could be attributed to their relevance, suitability and appropriateness in the given conditions. Therefore all the programmes are very much replicable in the similar conditions

## **Lessons Learnt**

These studies offer few important lessons for the planners, implementers, the government, ngos and institutions who are intending to develop tribal regions and help improving the conditions of the tribals who are the poorest lot.

The lessons are;

- The interventions based on NRM, more specifically on water and land are most appropriate and beneficial to the tribal regions and people.
- The development interventions/ programmes have to be first and foremost need based, combined with the available resources.
- For any effective development, use of appropriate technology is imperative.
- The technology used should not only be appropriate but it should be executed with the best possible quality workmanship to ensure desired results.
- To instill greater confidence among the tribals for managing their systems, it is imperative to offer them technically sound systems followed by appropriate training to handle and manage such systems.
- The social aspects of the systems are as important as the technical aspects in the management and sustainability of the system.
- The integration of various interventions gives much better and sustainable results in comparison to single programme.
- The government support in the programme interventions for the tribal development is important and crucial.
- The electricity policy should be conducive to the development in the tribal regions and such policy needs to be tribal friendly, atleast ensuring the adequate supply with reasonable tariff. Perhaps adequate power supply is more important and crucial than the tariff aspect in the tribal regions.
- Given the potentials and need, the water resources development need to be given top priority along with other NRM interventions described in the study.
- Lastly and importantly the cases reflected in the study have given clear lesson that the tribals are capable of managing the sophisticated systems like lift irrigations and others, given the appropriate inputs and building their capacity.

## NM SADGURU WATER AND DEVELOPMENT FOUNDATION, DAHOD

## CUMULATIVE ACHIEVEMENTS FROM BEGINNING TO 30TH JUNE, 2002

Programmes	Physical achievements	Acres covered	No. of Beneficiaries	
			Households	Persons
Lift Irrigation (Nos.)	218	33767	17443	104658
Water Harvesting Structures - Check Dams (Nos.)	226	25651	11268	67608
Wells Recharging (Nos.)	16662	24543	17640	105840
Intensive Micro Watershed Development (Acres)	-	39666	12614	75684
Social Forestry (No. of seedlings)	43176829	44847	51011	306066
Joint Forest Management (Acres)	-	13390	4103	24618
Horticulture Development (Plots)	5051	2525	5051	30306
Biogas (No. of Plants)	1110	-	1110	6660
<b>TOTAL</b>	-	184298	120240	721440

- No. of beneficiaries and Acres have been overlapped to some extent in more than one programme.

**QUESTIONNAIRE****Interview with Beneficiaries of Sadguru Programme**

The interview is part of data gathering process in relation to the "Study Title".

1	Name of person		
2	Sex and Age		
3	Education		
4	Land holding	Before programs-	After programs-

**NRM Programme**

What are the types of programs you have in the village -

1. Lis -
2. CD -
3. Watershed -
4. Forestry -
  - Farm forestry -
  - Horticulture -
  - JFM –
  - Other -

What was the condition of the village before above programmes –?

What was done to improve this –?

Who took the initiative –?

How above programmes came about –?

How have you benefited from the above programs-?

What was your contribution in bringing out the changes -? Physical -? Monetary-?

**SOCIO-ECONOMIC STATUS**

Before program

1. Type of housing
2. Type of farm implements owned
3. Type of assets owned
4. Impact on migration
5. Availability of loans
6. Problem of unemployment

After program

1. Type of housing
2. Type of farm implements owned

3. Type of assets owned
4. Impact on migration
5. Availability of loans
6. Problem of unemployment

## RESOURCE AND RESOURCE USE

### Kharif

Size of land-                      Irrigated-                      Non-irrigated-

Crop	Before project		After project	
	Yield	Fertilizer/input	Yield	Fertilizer/input
Paddy				
Maize				
Pulses				
Vegetable				
Other-				
1				
2				

### Rabi

Size of land-                      Irrigated-                      Non-irrigated-

Crop	Before project		After project	
	Yield	Fertilizer/input	Yield	Fertilizer/input
Wheat				
Maize				
Gram				
Pulses				
Vegetable				
Other-				
1				
2				

### Summer

Size of land-                      Irrigated-                      Non-irrigated-

Crop	Before project		After project	
	Yield	Fertilizer/input	Yield	Fertilizer/input
Groundnut				
Maize				
Pulses				
Vegetable				
Other-				
1				
2				

1. Do you produce surplus food for sale?
2. What are your main sources of advice?
3. What are your agriculture related problems?

### **LIVESTOCK**

Livestock owned

Type, breed & No.

1. ---
2. --

What are the major problems in regard to livestock?

What are the possible solutions?

### **Afforestation**

Have you planted trees in last some years?

What species?

For what use?

Where do you obtain your seedlings?

How many acres are under this program?

What is the source of advice on afforestation?

What are the problems related to trees afforestation?

What else could be done under this program?

### **WATER**

#### **Irrigation**

##### Type of water source

Sustainability of water source

If seasonal? For how many months

Water sharing if any?

Do you face any problem with the water source?

Have you ever experienced scarcity of water?

##### Type of irrigation scheme

Views in favour of LI scheme

Opposing views

Do you any problem with the water source?

### Water Allocation

How water is distributed

Time basis-	Size of holdings-	Other criteria-
-------------	-------------------	-----------------

If time basis:

How many hours -	How many times-	Other -
------------------	-----------------	---------

How water is allocated?

Who determines the water allocation in each time?

Do the farmers have the ability to influence decisions made about water allocation?

Can individual farmers ask to have their amount of water increased?

Who receives water first?

Is the current water supply is sufficient?

How water is allocated during scarce years?

How water is rotated?

How many outlets still do not receive water?

Water is equally shared or those who are close to the source get more water?

Are there any technical problems with the scheme?

Amount charged?

- per acre (Rs)
- per hour (Rs)

Outstanding amount –

Surplus paid -

Are there any rules you want to change?

Are there any functionaries you want to change?

Suggest the system which could perform better?

### Water Availability for Crops

#### **Kharif**

Crop	Before project Acres or hrs	After project Acres or hrs
Paddy		
Maize		
Pulses		
Vegetable		
Other-		
1		
2		

**Rabi**

Crop	Before project Acres or hrs	After project Acres or hrs
Wheat		
Maize		
Gram		
Pulses		
Vegetable		
Other-		
1		
2		

**Summer**

Crop	Before project Acres or hrs	After project Acres or hrs
Groundnut		
Maize		
Pulses		
Vegetable		
Other-		
1		
2		

➤ **Household water supply**

	Before	After
Distance in Km		
Quality		
Personal well		
River		
Check-Dam		
Sustainability of source		
Problem you encounter in water access		

**INFRASTRUCTURE AND SERVICES**

	Before	After
<u>Health</u>  1. Diseases 2. Malnutrition problem 3. Nearest health facility 4. Family planning  <u>Education</u>  1. School in the village 2. School is adequate 3. Any member of the family attending the school		

**N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD**

LIFT IRRIGATION SCHEME AT VILLAGE: **ZHER MOTI**  
 TALUKA: **BAGIDORA** (RAJASTHAN)

**SALIENT FEATURES**

Programme	:	Executed under T.A.D. & SWDF	
Executing Agency	:	N M Sadguru Water and Development Foundation, Dahod	
Year of commissioning	:	1996	
Cost of the scheme	:	Rs.12,08,622.00	
Source of water	:	River Anas	
Design discharge	:	1.58 cusecs i.e. 45 LPS	
Gross Head	:	39.00 m	
Installed pumping capacity	:	40 H.P.	
Area under Irrigation	:	Kharif	: 140 acres
		Rabi	: 140 acres
		Summer	: - acres
		Total	: <u>280 acres</u>
No. of beneficiaries	:	70 families	

**Pipe Network**

		Diameter & class	Length(Rmt)
Rising Main	:	250 mm dia PVC (4 kg)	150
		250 mm dia PVC (2.5 kg)	715
Distribution system	:	140 mm dia PVC (4 kg)	1062
		110 mm dia PVC (4 kg)	551
		75 mm dia PVC (4 kg)	514
No. of distribution chambers	:	24 Nos.	

N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD

LIFT IRRIGATION SCHEME AT VILLAGE: **PADATIYA FALIYA**

TALUKA: **JHALOD**, DISTRICT: DAHOD

### **SALIENT FEATURES**

Programme	:	Executed under TSP,DRDA & SWDF	
Executing Agency	:	N M Sadguru Water & Development Foundation, Dahod	
Year of commissioning	:	1992-93	
Cost of the scheme	:	Rs. 13,10,221.00	
Source of water	:	River Kali	
Design discharge	:	1.70 cusecs i.e. 48 LPS	
Gross Head	:	42.00 m	
Installed pumping capacity	:	50 H.P.	
Area under Irrigation	:	Kharif	: 96 Acres
		Rabi	: 144 "
		Summer	: 15 "
		Total	: 255 Acres
No. of beneficiaries	:	65 families	

### **Pipe Network**

		Diameter & Class	Length (Rm)
Rising Main	:	300 mm dia R.C.C.M.S. 'P1', 'P2', 'P3, class	810
Distribution system	:	200 mm dia PVC (2.5 kg)	174
		160 mm dia PVC (4 kg)	366
		140 mm dia PVC (4 kg)	1014
		110 mm dia PVC (4 kg)	672
		90 mm dia PVC (4 kg)	78
No. of distribution chambers	:	17 Nos.	

**N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD**

LIFT IRRIGATION SCHEME AT VILLAGE: **DHABUDI**  
 TALUKA: **LIMKHEDA**, DISTRICT: **DAHOD**

**SALIENT FEATURES**

Programme	:	Executed under J.R.Y.-III & SWDF												
Executing Agency	:	N M Sadguru Water & Development Foundation,Dahod												
<b>Year of commissioning</b>	:	<b>1995-96</b>												
Cost of the scheme	:	12,86,277.00												
Source of water	:	River Hadap												
Design discharge	:	1.27 cusecs i.e. 36 LPS												
Gross Head	:	31.00 m.												
Installed pumping capacity	:	30 H.P.												
Area under Irrigation	:	<table> <tr> <td>Kharif</td> <td>:</td> <td>72.00 Acres</td> </tr> <tr> <td>Rabi</td> <td>:</td> <td>108.00 Acres</td> </tr> <tr> <td>Summer</td> <td>:</td> <td>95.00 Acres</td> </tr> <tr> <td>Total</td> <td>:</td> <td><u>275.00 Acres</u></td> </tr> </table>	Kharif	:	72.00 Acres	Rabi	:	108.00 Acres	Summer	:	95.00 Acres	Total	:	<u>275.00 Acres</u>
Kharif	:	72.00 Acres												
Rabi	:	108.00 Acres												
Summer	:	95.00 Acres												
Total	:	<u>275.00 Acres</u>												
No. of beneficiaries	:	36 families												

*Pipe Network*

	diameter & Class	Length (Rmt)
<b>Rising Main</b>	<b>225 mm.dia.P.V.C. (4KG)</b>	<b>100</b>
Distribution system	160 mm dia P.V.C. (2.5 ")	600
	140 mm dia P.V.C.(4 kg)	900
	110 mm dia P.V.C.(4 kg)	660
No. of distribution chambers	:	9 Nos.

**N M SADGURU WATER & DEVELOPMENT FOUNDATION. DAHOD**

***SALIENT FEATURES OF DHABUDI CHECK DAM***

**HYDROLOGY**

1.	Catchment Area	:	162.18 Sq.mile
2.	Design Discharge	:	194164.94 Cusce
3.	Bed Gradient	:	1 : 160
4.	H. F. L.	:	97.65 m
5.	F. S. L.	:	96.00 m
6.	A. H. F. L.	:	100.60 m

***CHECK DAM***

1.	Crest R.L.	:	96.00 m
2.	Sill R.L.	:	95.35m, 94.35m, 93.85m
3.	Foundation R. L.	:	89.25 m
4.	Bed of River	:	92.85 m
5.	No. of Opening	:	21 Nos.
6.	Size of Opening	:	1.50 m * 0.50 m, 1.50 m * 1.50m 1.50 m * 2.00 m
7.	Size of Piers	:	2.00 m * 3.00 m
8.	Size of M. S. Shutter	:	1.50 cm * 50 cm * 10 cm
9.	Length of Check Dam	:	132.50 m
10.	Crest Length of check dam	:	80.20 m
11.	Top Width of Body Wall	:	2.50 m
12.	Height of Check Dam	:	3.15 m
13.	Crop Area	:	1800.00 Acres
14.	Cost of Scheme	:	Rs. 2098826.00 /-
15.	Storage Capacity	:	17 mcft
16.	Funding Agency	:	GOVT(JRY III) + CEC + NORAD
17.	Year of Completion	:	1996

**N M SADGURU WATER & DEVELOPMENT FOUNDATION. DAHOD**

***SALIENT FEATURES OF PADATIYA CHECK DAM***

**HYDROLOGY**

1.	Catchment Area	:	37.21 Sq.mile
2.	Design Discharge	:	44194 Cusce
3.	Bed Gradient	:	1 : 143
4.	H. F. L.	:	100.25 m
5.	F. S. L.	:	97.50 m
6.	A. H. F. L.	:	102.00 m

***CHECK DAM***

1.	Crest R.L.	:	97.50 m
2.	Sill R.L.	:	96.00m
3.	Foundation R. L.	:	92.50 m
4.	Bed of River	:	95.05 m
5.	No. of Opening	:	5 Nos.
6.	Size of Opening	:	1.50 m * 1.50m
7.	Size of Piers	:	2.00 m * 3.00 m
8.	Size of M. S. Shutter	:	1.50 cm * 50 cm * 10 cm
9.	Length of Check Dam	:	59.50 m
10.	Crest Length of check dam	:	30.20 m
11.	Top Width of Body Wall	:	1.00 m
12.	Height of Check Dam	:	2.50 m
13.	Crop Area	:	275.00 Acres
14.	Cost of Scheme	:	Rs. 5,66,450.00 /-
15.	Storage Capacity	:	2 mcft
16.	Funding Agency	:	NORAD
17.	Year of Completion	:	1992

N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD

LIFT IRRIGATION SCHEME AT VILLAGE: **VANKOL**

TALUKA: **JHALOD**, DISTRICT: DAHOD

### SALIENT FEATURES

Programme	:	Executed under JRY III & SWDF	
Executing Agency	:	N M Sadguru Water & Development Foundation, Dahod	
Year of commissioning	:	1995-96	
Cost of scheme	:	Rs. 14,40,000.00	
Source of water	:	River Machhan	
Area under command (In Acres)	:	Kharif	: 72.00 Acres
	:	Rabi	: 108.00 "
		<hr/>	
		Total	: 180.00 Acres
No.of Beneficiaries	:	73 (families)	
Gross Head	:	35 m	
Design Discharge	:	1.26 cusecs i.e. 36 LPS	
Installed pumping capacity	:	30 H.P.	

### Pipe Network

	Diameter & Class	Length(Rmt)
Rising Main	225 mm dia PVC (4 kg)	360
	225 mm dia PVC (2.5 kg)	1020
	160 mm dia PVC (4 kg )	555
	140 mm dia PVC (4 kg)	780
	110 mm dia PVC (4 kg)	300
No. of distribution chambers	:	12 Nos.

N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD

LIFT IRRIGATION SCHEME AT VILLAGE: VANKOL

TALUKA: **JHALOD**, DISTRICT: DAHOD

### SALIENT FEATURES

Programme	:	Executed under JRY III & SWDF	
Executing Agency	:	N M Sadguru Water & Development Foundation, Dahod	
Year of commissioning	:	1995-96	
Cost of scheme	:	Rs. 14,40,000.00	
Source of water	:	River Machhan	
Area under command (In Acres)	:	Kharif	: 72.00 Acres
	:	Rabi	: 108.00 "
		-----	
		Total	: 180.00 Acres
No.of Beneficiaries	:	73 (families)	
Gross Head	:	35 m	
Design Discharge	:	1.26 cusecs i.e. 36 LPS	
Installed pumping capacity	:	30 H.P.	

### Pipe Network

	Diameter & Class	Length(Rmt)
Rising Main	225 mm dia PVC (4 kg)	360
	225 mm dia PVC (2.5 kg)	1020
	160 mm dia PVC (4 kg )	555
	140 mm dia PVC (4 kg)	780
	110 mm dia PVC (4 kg)	300
No. of distribution chambers	:	12 Nos.

N M SADGURU WATER & DEVELOPMENT FOUNDATION, DAHOD

**SALIENT FEATURES OF MAHUDI CHECK DAM**

**HYDROLOGY**

1.	Catchment Area	:	158.95 Sq.mile
2.	Design Discharge	:	107438.00 Cusce
3.	Bed Gradient	:	1 : 250
4.	H. F. L.	:	99.00 m
5.	F. S. L.	:	96.25 m
6.	A. H. F. L.	:	100.60 m

**CHECK DAM**

1.	Crest R.L.	:	96.25 m
2.	Sill R.L.	:	94.25m, 94.75m, 95.85m, 94.05m
3.	Foundation R. L.	:	90.85 m
4.	Bed of River	:	93.25 m
5.	No. of Opening	:	17 Nos.
6.	Size of Opening	:	1.50 m x 0.40 m, 1.50 m x 1.50m 1.50 m x 2.00 m, 1.50 m x 2.20m
7.	Size of Piers	:	2.00 m x 3.00 m
8.	Size of M. S. Shutter	:	160 cm * 23 cm * 6 cm
9.	Length of Check Dam	:	95.25 m
10.	Crest Length of check dam	:	57.50 m
11.	Top Width of Body Wall	:	1.00 m
12.	Height of Check Dam	:	3.00 m
13.	Crop Area	:	300.00 Acres
14.	Cost of Scheme	:	Rs. 1000000.00 /-
15.	Storage Capacity	:	12 mcft
16.	Funding Agency	:	CAPART + NORAD
17.	Year of Completion	:	1993

**N M SADGURU WATER & DEVELOPMENT FOUNDATION. DAHOD**

**SALIENT FEATURES OF VANKOL CHECK DAM**

**HYDROLOGY**

1.	Catchment Area	:	33.69 Sq.mile
2.	Design Discharge	:	40931.04 Cusce
3.	Bed Gradient	:	1 : 115
4.	H. F. L.	:	100.40 m
5.	F. S. L.	:	97.30 m
6.	A. H. F. L.	:	101.50 m

**CHECK DAM**

1.	Crest R.L.	:	97.30 m
2.	Sill R.L.	:	96.90m, 96.30m, 95.80m
3.	Foundation R. L.	:	91.00 m
4.	Bed of River	:	95.30 m
5.	No. of Opening	:	10 Nos.
6.	Size of Opening	:	1.50 m * 0.40 m, 1.50 m * 1.00m 1.50 m * 1.50 m
7.	Size of Piers	:	2.00 m * 3.00 m
8.	Size of M. S. Shutter	:	1.50 cm * 50 cm * 10 cm
9.	Length of Check Dam	:	57.10 m
10.	Crest Length of check dam	:	32.25 m
11.	Top Width of Body Wall	:	1.00 m
12.	Height of Check Dam	:	2.00 m
13.	Crop Area	:	250.00 Acres
14.	Cost of Scheme	:	Rs. 1376449.00 /-
15.	Storage Capacity	:	4 mcft
16.	Funding Agency	:	TSP + CEC + NORAD
17.	Year of Completion	:	1996

## TERMS OF REFERENCE FOR THE STUDY OF SADGURU WATER AND LAND RESOURCES PROGRAMME IN GUJARAT AND RAJASTHAN

### BACK GROUND

One obvious fact acknowledged by everyone is that our tribal regions and tribal people are the most backward, particularly, tribal people are the poorest segment of our society. Paradoxically, tribal regions and tribal people are poor, inspite of rich natural resources in the form of land, water, mineral, etc. available in every tribal region. From this paradoxical situation it is clear that something is grossly missing in the protection, development and management of natural resources in our tribal region and as a result, our tribal people are constantly deprived of the benefit of such natural resources.

Though the overall scenario and picture of NRM is depressing and gloomy, there are examples of good work, particularly, by NGOs, in which the NRM based activities have benefited tribal people greatly and such examples have offered great deal of hopes for the betterment of tribal regions and tribal people.

One such successful example in the field of NRM vis-à-vis poverty alleviation had been offered by an NGO, N M Sadguru Water and Development Foundation, which has been working actively and intensively in the tribal regions of western India, Viz., Gujarat, Rajasthan and Madhya Pradesh for nearly three decades. The NGO's overall approach is to integrate various NRM interventions such as micro watershed, small scale water resources, forestry, horticulture, etc. The community based NRM activities of NGOs are managed by the community under village institutions.

### STUDY TITLE

A study of integrated Land and Water Resources Development Programme in the project villages of Sadguru Foundation in tribal regions of Dahod, Gujarat and Banswara, Rajasthan focussing on interventions, impact and replicability.

### BROAD OBJECTIVES

The study aims to determine the factors responsible for the success of land and water resources development programmes promoted by Sadguru and highlight the replicability of the same in the tribal regions.

In order to achieve the objective of the study following aspect of the integrated land and water development in the field of natural development would be studied.

- a. Background of the programme
- b. technical aspects of the project, such as suitability of site, soundness of design, workmanship, quality of material used, etc.
- c. cost of the project, cost benefit details of the project, sources of fund, community contribution if any etc.
- d. benefit of the scheme in the terms of area irrigated, against the design command, the cropping pattern and additional gross and net earnings on account of availability of irrigation, numbers of households benefited, quantifying the benefits to such household or group of households.
- e. equity and gender considerations

## **Methodology**

- It is decided that 6 project villages of the organization would be studied. 2 villages with only lift irrigation, 2 with lift irrigation and integrated programmes and 2 focussing on institutional development for the above categories.
- Suitable sampling methods will be adopted to determine the sample size to collect data from the farmers.
- The researchers would study demand supply factors, timeline, various records and background of the scheme available with the various sources.
- Interview with selected beneficiaries/farmers. A questionnaire guide will be prepared for the well directed interviews
- Group discussion with the village institutions, their functionaries and various groups.
- Existing data and informations maintained by the village institutions will be analyzed
- Views of various government officers and elected representatives on the impact and replicability of the programmes

## **Outcome**

- Appropriateness of technology
- Significance of the impact of irrigation on socio-economic conditions of the people.
- Significance and importance of the integrated interventions in land and water resources
- The role of community based village institutions for the sustainability of the programme
- The replicability of such institutions and approach in similar regions

## **Time frame**

If no unforeseen difficulties take place, the researchers will complete the study and produce the 1<sup>st</sup> draft by 7<sup>th</sup> September, 2002.

## **Researchers**

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## GLOSSARY

C	Degree Celsius
CD	Check Dam
JFM	Joint Forest Management
Ha	Hectare
HP	Horse Power
IWMI	International Water Management Institute
LIS	Lift Irrigation Scheme
m	meter
mm	millimeter
NGO	Non Government Organization
NRM	Natural Resource Management
Qt	Quintal
Rs.	Indian Rupees