- water resources availability & use (incl. potential conflicts)
- village profiles

INPUT FORMULATION FOR NEW PROJECTS PROPOSED FOR INDO-DUTCH BILATERAL ASSISTANCE

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CHAPTER - I

INTRODUCTION

1.1 Background

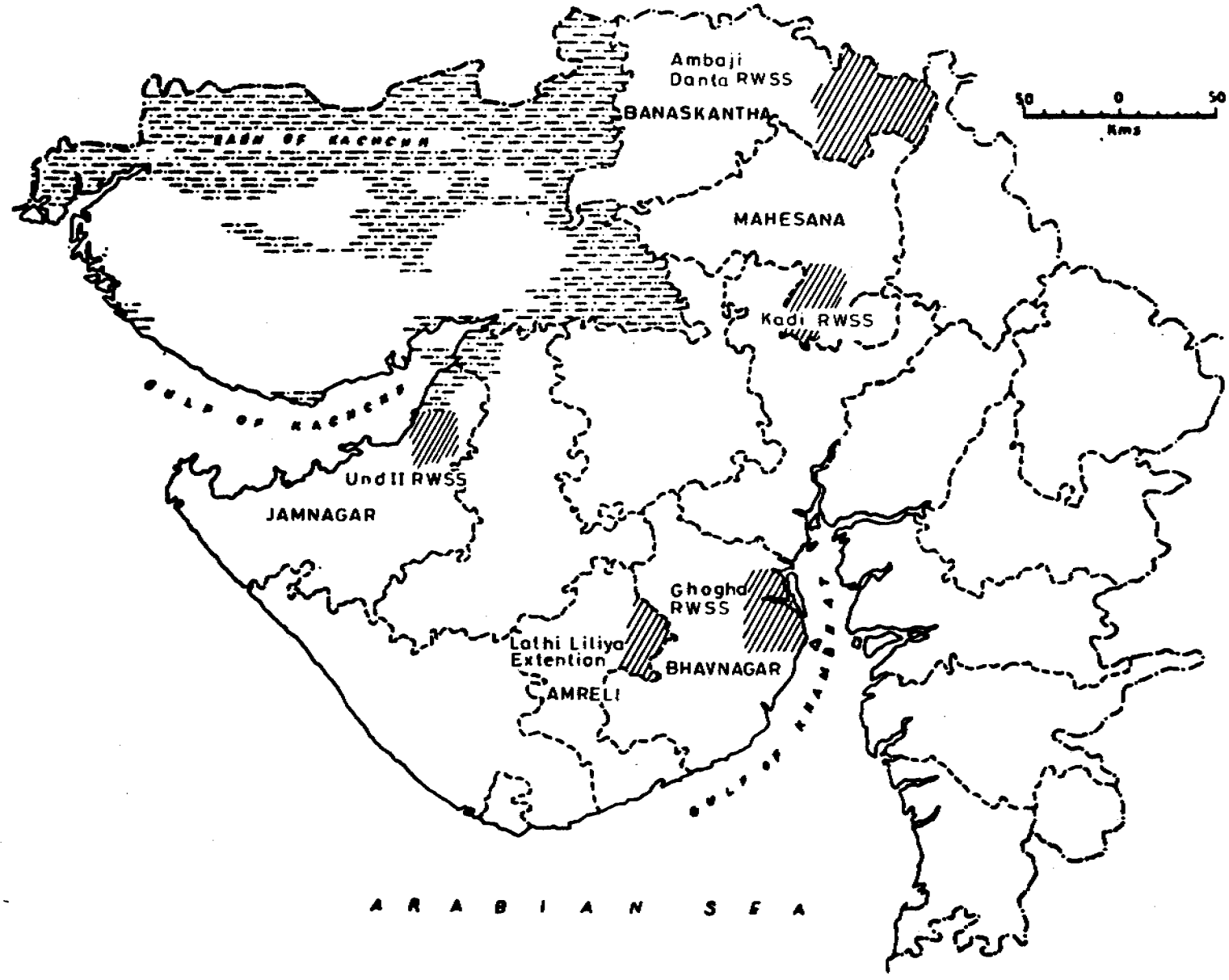
Within the framework of Indo-Dutch co-operation programme, the Government of Netherlands is providing financial and technical assistance, since 1978 to the Government of Gujarat for the implementation of Rural Water Supply Schemes. Under this programme, Government has forwarded a list of five new schemes from which schemes for financial assistance have to be selected. For this purpose, ORG has been asked to assist in formulation of project documents by providing inputs with special reference to the non-technical aspects. This report provides the final outputs of this exercise.

1.2 Scope of the Work

The assistance provided by ORG is with regard to the following five projects.

1. Lathi Liliya Extension Scheme, Amreli District
2. Ghogha RWS Scheme, Bhavnagar District
3. Und II RWS Scheme, Jamnagar District
4. Ambaji Danta RWS Scheme, Banaskanta District
5. Kadi RWS Scheme, Mehsana District

Fig. 1.1 : **LOCATION MAP** : PROJECTS PROPOSED FOR INDO - DUTCH BILATERAL ASSISTANCE



As a part of this exercise both technical and social aspects of these projects were reviewed. The information gathered and reviewed were as following :

1. Scope and size of the project
2. Design criteria for various components of the project
3. Financial aspects
4. Status and reliability of water resources
5. Current and planned utilisation of water resources
6. Village level infrastructure and communication
7. Current status of water supply
8. Health and Hygiene problems in the area
9. Position and Role of Women
10 Village level organisations

1.3 Methodology

The methodology adopted for the study involved the following tasks.

i) Review of Project Documents - Gujarat water supply and sewerage Board had prepared feasibility reports on each of the five projects. A review of these project reports has been carried out to highlight the technical and financial aspects of the projects.

ii) Village Survey - A village survey was undertaken in selected villages in these projects to ascertain existing situation in these villages. This survey focussed on the current status of village infrastructure, Women and their status, village level organisations etc. A questionnaire was prepared and was canvassed in the selected villages by trained investigators.

iii) Water Resources Data - Relevant hydrological data from the reservoirs project reports were analysed for assessing the status of water resources. The data was collected from Central Designs Organisation, Dept of Water Resources, Various Irrigation Circles.

iv) Rajiv Gandhi Water Mission - Gujarat Water Supply and Sewerage Board has carried out survey of village level water supply situation in most of the villages in Gujarat. The data from this survey has been collected through sets of questionnaires (form I to VII). Most of this data has been computerised. The data pertaining to habitations located within the service area of the five selected projects has been analysed and presented.

1.4 Presentation of Data

The data pertaining to Kadi Project was presented in an interim report. The technical and financial aspects of all the five projects have been reviewed and presented in an interim report prepared during the visit of Review and Support Mission Gu-26 during June, 1992. The present report contains the results of the analysis of the data pertaining to water resources, Village inventory and status of rural water supply for the four RWS Schemes. The following chapters include the highlights of this analysis.

CHAPTER - II

2.0 Water Resources

In all the five projects proposed , the water suply sources are the storage reservior on the various rivers as given below :

Project	Source
1. Lathi Liliya Extension Scheme	Thebi Reservior Project on Thebi River
2. Und-II RWS Scheme	Und-II Reservior Project on Und River
3. Ghogha RWS Scheme	Shetrunji Reservoir Project on Shetrunji River
4. Ambaji Danta RWS Scheme	Dharoi Reservior Project on Sabarmati River
5. Kadi RWS Scheme	-do-

Among the four projects two have already been functioning namely Shetrunji Project and Dhroi Project. Two of the projects are under construction namely Thebi and Und-II Projects. For each of these projects the details regarding the basin features, inflows, proposed utilisation of reservoir storage and for the completed

project the performance data for the past has been collected and analysed. The results of the analysis are presented in the following sections.

2.1 Sabarmati River Basin

2.1.1 Basin Features : River Sabarmati traverses States of Rajasthan and Gujarat in a Southernly direction till it reaches Gulf of Khambhat. Seventynine per cent of total basin area of 21085 Sq. Km. is located in the State of Gujarat. The river has a number of tributaries like the Sei Wakal, Harnov, Hathmati, Meshwa, Guhai etc. Most of the tributaries have reservoirs constructed for storage of water for irrigation purpose. However Dharoi Dam is the only storage reservoir on the main river. Downstream of Dharoi Dam there is a barrage at Vasna from which water is supplied to Fatewadi irrigation system. Till the Dharoi dam site, the river has a steep bad fall and high banks and runs in hilly area. Downstream of Dharoi Dam the river flows in a broad sandy bed with a fairly flat slope. The Weighted Mean Rainfall (WMR) for the catchment lying in Rajasthan has been computed to be 550 mm and for the Gujarat portion to be 725 mm.

2.1.2 Dharoi Dam : Dharoi dam is the first major reservoir on the main river. The dam intercepts an area of 5475 Sq. Kms. of catchment but for planning purposes water availability from only 3376 Sq. Km. of area was considered. The reservoir has been in operation since 1978. The reservoir has a gross capacity of 907.88 mm^3 and a live storage of 775.89 mm^3.

2.1.2.1 Inflows : The discharge data of Sabarmati River at Dharoi has been analysed for 29 years between 1961-62 and 1989-90. The monthwise discharge figures have been analysed both for their ranges as well as at various reliability levels. Table 2.1 and 2.2 indicates these details. It can be observed that the range of flows for each month is quite high. The comparision of monthly inflows to the live storage of the reservoir (table 2.1) indicates, the reservoir is replenished during July to September. Between November and May (7 months) the replenishment to the reservoir storage is marginal (an average of less than 1.5%). The discharges at various levels of reliability presented in table 2.2 indicate the annual yield at 75% reliability being 237.31 Million Cubic Meters. During Novermber - May period the monthly inflows at 90% reliability is less than 0.5 mcm.

The impact of these inflows on the reservoir storage since the inception of the project is presented in table 2.3. It can be observed in this table that the past fourteen years the reservoir was full five times and two thirds full eight times and it was empty only once. This analysis was based on the maximum level attained in the reservoir during that year.

2.1.2.2 Utilisation : The potential created at Dharoi dam site is planned to be utilised for both irrigation, water supply. The planned levels of water utilisation for different purposes is presented in Table 2.4 and are briefly discussed here.

Irrigation : The project envisaged providing irrigation to cropped area in 127 villages of Mehsana District and 50 villages of Sabarkantha District. The total area proposed to be irrigated was 43320 hectares and the irrigation water demand was estimated tobe 218.33 MCM (delta of 0.51 meters). The actual levels of irrigation achieved are as presented in Table 2.5. It can be observed from this table that during last eleven years the planned irrigation demand of 218 MCM has been exceeded only once (1984-85). On an average about 77% of the planned irrigation demand has been observed

during the last decade. There have been two drought years wherein the irrigation water releases have been zero. It can also be observed in this table that the area actually irrigated is about 30 to 40% of the potential created. Consequently it would be necessary to review the proposed storage allcoation of reservoir for the purpose of irrigation.

2.1.2.3 **Water Supply to Urban Areas** : The water supply demand of Ahmedabad , Gandhinagar and downstream riparian rights for a perid of 9 months from October to June has been assessed at 197.23 MCM at a rate of 177 Million Gallons per day. This figure has been computed considering a transit loss of 15% below the dam site.

2.1.2.4 **Water Supply Reservation** : To ensure 98% reliability of water required for water supply a provision of 137 Million in meters of storage has been made at the reservoir. This works out to be 17.65 per cent of the net reservoir storage. The actual utilisation of this storage for firming up of the water release for various uses downstream need tobe examined.

2.1.2.5 **Fatewadi Canal System** : Fatewadi project irrigates about 29138 hectares of area and has a water requirement of 190 MCM. During the project planning, it was considered that the monsoon flow in the river

from free catchment area would be sufficient to satisfy the requirements of the Fatewadi Command Area. From the actual performance after the construction of the Dharoi Dam, it was observed that the flow from the free catchment area was not available as per prior estimations to satisfy the requirements of Fatewadi Command Area. Consequently water was required tobe released from Dharoi reservoir to save Kharif Crop. The actual releases from the Dharoi reservoir was as given in table 2.6. It can be observed from this table that most of the releases for the Fatewadi command area occured during monsoon period where reservoir inflows are comparitively large. Consequently during good rainfall years its impart on the reservoir water availability for alternate uses may not be significant. However, during lean rainfall years the fatewadi requirements need tobe balanced with other requirements.

2.1.2.6 **System Losses** : Two types of system losses have been considered. Firstly a provision of 144 MCM has been made in the reservoir storage for evaporation and other lake losses. However, the actual lake losses have not been assessed accurately. Secondly a provision of 15% for the transit losses below the reservoir has been

made while computing the urban water supply. However various studies carriedout on observed data during non-moonsoon period reveal that transit losses are higher than the assumed levels. The study based on actual data reveals that the transit losses could be, on an average as high as 26%.

2.1.3 Conclusions :

From the foregone discussion it becomes evident that the inflows and the consequent reservoir storage vary significantly. The accretion to reservoir storage occurs during four month period of July to October. During rest of the eight months the available reservoir storage has to cater to the water demands from agriculture, urban water supply and power sectors. Though the estimates of water demand at the planning stage show the net reservoir storage would be fully utilised, the actual data of water utilisation/releases indicate significant departures from the planned levels. Some of the water demands which were not considered at the planning stage have been subsequently included in the reservoir water utilisation programme. As the drinking water supply to rural areas has been accorded high priority in the planning process of the Government and Sabarmati River is the only source of

potable domestic water. It is imperative that ways needs to be explored for satisfying this demand. This would involve recomputation and reprioritisation of water demand from various sectors and reviewing of current reservoir operations.

Table 2.1.1 : Range of Inflows at Dharoi

Month	Inflow (MCM)			% to Live Storage		
	Max.	Min.	Avg.	Max.	Min.	Avg.
June	359.0	-	33.49	46	-	4.3
July	661.96	6.38	121.37	85	0.8	15
Aug.	571.96	16.25	204.55	73	2	26
Sept.	1471.87	.38	144.15	189	.04	18
Oct.	134.15	-	33.04	17	-	4
Nov.	32.93	-	9.79	4	-	1.2
Dec.	79.51	.36	12.14	10	.04	1.5
Jan.	35.78	.17	4.52	4	.02	0.5
Feb.	15.09	.21	2.93	1.9	.02	0.3
March	30.62	.22	3.23	3	.02	0.3
April	12.84	.07	1.75	1.6	.005	0.2
May	28.36	.06	3.14	3	.007	0.4
Annual	2344.06	38.36	566.19	302	4.9	72

Note : 1. Live storage of the dam 776 MCM
2. Source of data : CDO, Gandhinagar

Table 2.1.2 : Monthly Inflows at Various Levels of Reliability
Discharge at Levels of Reliability as following(MCM)

Month	50%	75%	90%	98%
June	9.47	4.21	1.47	0.32
July	91.40	57.13	30.61	6.38
August	133.48	65.65	42.89	16.25
September	41.78	15.34	8.67	0.38
October	21.10	4.19	1.18	0.68
November	7.67	1.71	0.46	0.37
December	5.44	1.50	0.61	0.19
January	3.22	0.60	0.33	0.17
February	2.60	0.62	0.31	0.21
March	1.13	0.60	0.26	0.22
April	1.08	0.23	0.16	0.17
May	0.56	0.17	0.10	0.06
Annual	479.70	237.31	127.90	38.36

Source : CDO Gandhinagar.

Table 2.1.3 : Variation in the Live Storage in Dharoi Dam

Year	Reservoir Storage (MCM)	% to Live Storage
1978	401	51
1979	261	34
1980	736	95
1981	559	72
1982	519	67
1983	746	96
1984	758	98
1985	329	42
1986	132	17
1987	8	1
1988	632	81
1989	387	50
1990	778	100
1991	778	100

Source : CDO Gandhinagar

Table 2.1.4 : Proposed Water Utilisation of Dharoi Project

Sl. No.	Item	Rate of Utilisation	Planned Annual Utilisation (MCM)
1	Irrigation Water Use		
	i) Kharif Season	72.78 MCM	
	ii) Rabi Season	118.41 MCM	
	iii) Hot Weather Season	27.14 MCM	218.33
2.	Water Supply to Urban Areas From October to June (245 days)		
	i) Ahmedabad City	150 Mgd(0.682 MCMD)	167.09
	ii) Gandhinagar City	11 Mgd(0.05 MCMD)	12.25
	iii) D/S Riparian Rights	16 Mgd(0.073 MCMD)	17.89
	Total	-	197.23
3.	Lake Losses at Reservoir	-	144.32
4.	Water Supply Reserve Storage at Dam Site	-	137.66
5.	Additional Water Supply to Gujarat Electricity Board at Gandhinagar and Ahmedabad Electricity Company at Ahmedabad	10 Mgd (0.045 MCMD)	12.41
	Total Planned Utilisation		709.95

Note : 1. Source : CDO, Gandhinagar
2. The above plan of utilisation does not include Diversion to fatewadi irrigation command.

Table 2.1.5 : Actual Area Irrigated and Irrigation Water Used

Sl. No	Year			Water Released for Irrigation (MCM)			
		Potential created(Ha.)	Actual irri-gated (Ha.)	Kharif	Rabi	Hot Weather	Total
1.	1979-80	9990	755	1.917	5.78	0.60	8.297
2.	1980-81	16944	3470	1.233	8.119	9.823	19.065
3.	1981-82	34200	2994	2.747	22.793	23.064	48.604
4.	1982-83	43241	12823	0.95	17.01	61.85	79.81
5.	1983-84	48875	12395	6.12	93.42	93.39	192.93
6.	1984-85	50474	19855	13.73	148.67	95.19	257.59
7.	1985-86	50474	22070	22.05	91.71	52.52	166.27
8.	1986-87	50474	-	-	-	-	-
9.	1987-88	50474	-	-	-	-	-
10	1988-89	50474	17650	0.91	125.67	66.84	193.42
11	1989-90	52300	16213	4.30	114.23	3.24	121.77
12	1990-91	52300	22043	3.07	NA	NA	-

Source : CDO Gandhinagar

Note : 1986-87 and 1987-88 were the drought years.

Table 2.1.6 : Water Released from Dharoi Reservoir for Requirements of Fatewadi Canal Command Area

Sl. No.	Year	Period of Release Date - Month	Water Released MCM
1.	1983	16/6 to 15/10	130.24
2.	1984	8/8 to 30/9	87.40
3.	1985	16/6 to 15/10	121.32
4.	1986	-	Drought Year
5.	1987	-	Drought Year
6.	1988	30/8 to 17/9 3/10 to 23/10	125.79
7.	1989	1/6 to 13/6 14/9 to 16/10	30.10
8.	1990	-	Water Received through overflow

Source : CDO, Gandhinagar.

2.2 Shetrunji River Basin

2.2.1 Basin Features

The river Shetrunji is one of the main river of Saurashtra Region, which traverses in Southern part of the region. Shetrunji, an eastward flowing stream, originates from Dhundi hills in the Gir Range and drains into the Gulf of Khambhat stretching its course for about 120 km. The nature of shetrunji river is ephemeral which intercepts basin area of 4317 Sq. km. Thebi and Shel are two major tributories of Shetrunji river. Shetrunji dam is a major Irrigation Project on the river whereas Khodiar, Santali and Vadi are medium irrigation projects constructed on the tributaries.

2.2.2 Shetrunji Reservoir Project

2.2.2.1 Salient Features

Shetrunji Reservoir is located near village Nani-Rajasthali in Palitana taluka of Bhavnagar District which was completed in the year of 1965. To cater the increased water demand of the region, further Shetrunji Project has been modernised. The Shetrunji Reservoir Project consisting of an earthen dam with a Masonary spillway on river Shetrunji. The salient features of

the project are as follows :

Drainage area of the river above the dam site	:	4317 Sq. km.
Mean annual rainfall	:	55.20 cm.
Maximum annual rainfall	:	96.10 cm
Minimum annual rainfall	:	17.20 cm
Gross storage capacity (After Installation of Gates)	:	415.44 MCM
Live storage	:	326.89 MCM
Gross Command Area (G.C.A.)	:	76000 Ha.
Culturable Command Area (C.C.A)	:	57060 Ha.
Irrigable Area	:	35750 Ha.

2.2.2.2 Inflow Into the Reservoir

An analysis of water inflow in the Shetrunji Reservoir is attempted herewith. Based on the available time series data of 31 years from 1961 to 1992 on inflow into the reservoir, a consolidated analysis has been presented in Table 2.2.1.

It can be seen from the Table that out of the recorded series of 31 Years, the reservoir was full in ten years and significant spills occured in four years namely 1964-65, 1965-66, 1980-81 and 1988-89 where as in the year of 1983-84 spill occured was exceptionally high. While in as many as 14 out of 31 years, inflow was less

than half of the live storage of the reservoir. The minimum of 30 MCM of yearly inflow was recorded during the year 1987-88 which was declared as drought year. The average inflow for the reservoir works out to 287 MCM.

To estimate reservoir yield at different percentage of reliability, a graph has been plotted between Total Available inflow and time series of 31 years (Fig. 2.1). Total available inflow includes opening reservoir storage and utilisable inflow of a particular year. Estimated 50%, 60% and 75% reliable available inflow into the reservoir works out at 227 MCM, 162 MCM and 136 MCM respectively. While available inflow at 90%, reliability works out 75 MCM which is more than three times of Annual Water demand (22.65 MCM) computed for Ghogha Regional Water Supply Scheme.

2.2.2.3 Utilisation Level of Water

An attempt has been made herein to analysis changes in water allocation for different purposes, particularly due to variable inflows into the reservoir. In this connection proposed level of irrigation utilisation from the reservoir and approved supply of water for non-agricultural purpose have been presented in Tabular form.

Irrigation : The Shetrunji Project envisaged to serve the irrigation water to crops for all seasons together at 35750 Ha. which is 62.7 per cent of culturable command area (57060 Ha.) Planned Cropping Pattern and Irrigaticn Water utilisation have been presented in Tables 2.2.2 and 2.2.3. Proposed crop water utilisation worked out 164.44 MCM for all season crops. Major crops proposed are Ground Nut, Juwar in Kharif season and wheat, vegetables in Rabi seasson, Cotton has been recommended as two seasonal crop in the command of the project.

Analysis of seasonwise canal release (table 2.2.5) indicates that Kharif utilisation has been in general, a small fraction of the total canal release, except in 1974-75 where it more than that of canal release of Rabi and Hot weather. Wide variation has been recorded in the irrigated area for time series date of 19 years from 1970-71 to 1988-89. Maximum recorded area irrigated for all seasons was 31389 ha. in 1988-89. While the year 1987-88 was the drought year with no canal releases. Leaving drought year, in nine out of remaining eighteen years, Kharif irrigation was recorded nil.

2.2.2.4 Non-Agricultural Utilisation

Annual supply of water from the Shetrunji Reservoir for non-agricultural purposes has been presented in Table 2.2.4, which is already approved by the Govt. and works out 27.09 MCM.

To analysise actual total abstraction which includes agricultural as well as non-agricultural utilisation has been presented in Table 2.2.6 for the time series of recent twelve years. Spills occured four times out of 12 years, while in the year of 1983-84 spill (1713 MCM) was exceptionally high. In the year of 1987-88 the total abstraction was minimum. Hence water allocation analysis results point the variation of water supply depending on the variation of available inflow into the reservoir.

2.2.3 Conclusion

Evidently, variation of inflows into the reservoir affects the allocation of water positively or negatively depending on the good or bad rainfall year. According to the summary note of Bhavnagar Irrigation Division, part of the live storage of Kharo and Rajawal reservoirs are also utilised in the command area of Shetrunji Left Bank canal System through feeder canals.

On the other side a proposal for giving 20 cusecs of water when canal runs, to the plantation near Mahuva has been also approved.

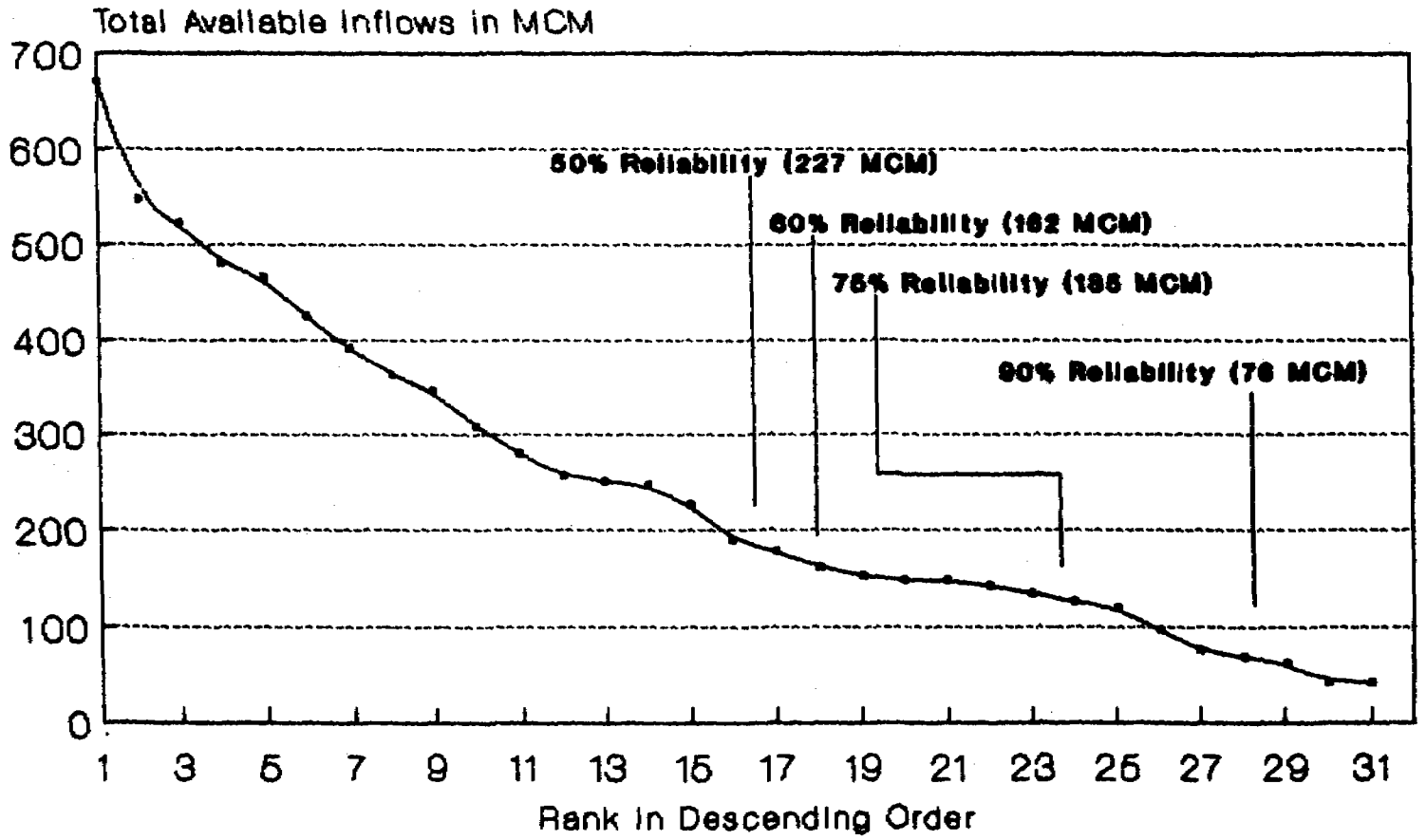
Thus keeping in view, the uncertainties of Rainfall, water resources in the region like Kharo, Rajawal, Khodiar, Lakhanka and ofcourse Shetrunji reservoirs and variation in water requirement, it may be necessary to review the current reservoir operations of the region and reprioritisation water demand before ascertaining the availability of riverwater for new rural water supply projects.

Table 2.2.1 : Time Series Data on Inflow - Shetrunji Reservoir

Sr. No.	Year	Inflow (MCH)	% of Live Storage	Sr. No.	Year	Inflow (MCM)	% of Live Storage
1.	1961-62	169	52	17	1977-78	351	100
2.	1962-63	136	42	18	1978-79	140	43
3.	1963-64	333	100	19	1979-80	412	100
4.	1964-65	453	100	20	1980-81	484	100
5.	1965-66	468	100	21	1981-82	256	78
6.	1966-67	105	32	22	1982-83	68	21
7.	1967-68	267	82	23	1983-84	2093	100
8.	1968-69	123	38	24	1984-85	92	28
9.	1969-70	174	53	25	1985-86	38	12
10	1970-71	378	100	26	1986-87	140	43
11	1971-72	234	72	27	1987-88	30	10
12	1972-73	50	15	28	1988-89	670	100
13	1973-74	216	66	29	1989-90	136	42
14	1974-75	151	46	30	1990-91	298	91
15	1975-76	113	35	31	1991-92	70	21
16	1976-77	238	100		Max.	2093	
					Min.	30	
					Average	287	

Note : 1. Source : Bhavnagar Irrigation Division, Bhavnagar
2. Live storage is 326.89 MCM as per silt survey 1986

Fig.2.1 Total Available Inflows at Different Reliabilities - Shetrunji Reservoir



Data Base 1961-1991 (31 Years)
Source: Bhavnagar Irrigation Division, Bhavnagar.

Table 2.2.2 : Planned Cropping Pattern - Shetrunji Project

Sr. No.	Particulars	Area on L.B.C. Ha.	Area on R.B.C. Ha.	Total Area Ha.
1.	Kharif	2480	3520	6000
2.	Rabi	4000	6000	10000
3.	8 Months Crop	1280	1920	3200
4.	Hot Weather	480	720	1200
5.	Perenials	500	1500	2000
6.	Extra Rabi	4920	7080	12000
	Total	13660	20740	34400

Source : Bhavnagar irrigation division, Bhavnagar.

Table 2.2.3 : Planned Irrigation Water Utilisation - Shetrunji Reservoir

Season	Crop Set	Irrigation Intensity	Proposed Crop Water Utilisation (MCM)
Kharif	Groundnut, Junior Bajri	27.5%	31.80
Rabi	Wheat, Vegetables and others	24.0%	90.87
Hot Weather	Groundnut	12.5%	41.77
Two Seasonal	Cotton	2.5%	-
Total	-	66.5%	164.44

Table 2.2.4 : Annual Water Utilisation For Non-Agricultural Purposes - Shetrunji Reservoir

Sr. No.	Institution	Approved Water Utilisation(MCM)
1.	Bhavnagar Municipal Corporation	22.64
2.	Palitana Nagarpalika	2.07
3.	Talaza Nagar Panchayat	0.40
4.	Gariadhar and Gariadhar Juth Yojna (two villages)	1.53
5.	Yeast ALCO Enzymes Co. (Industrial Use)	0.45
	Total	27.09

Source : Bhavnagar Irrigation Division, Bhavnagar

Table 2.2.5 : Area Irrigated in Recent Years - Shetrunji Reservoir

Sr. No.	Year	Area Irrigated (Ha.)		
		Kharif	Rabi & Hot	Total
1.	1970-71	-	13003	13003
2.	1971-72	749	13308	14057
3.	1972-73	4950	-	4950
4.	1973-74	-	10001	10001
5.	1974-75	6798	3660	10458
6.	1975-76	-	3593	3593
7.	1976-77	-	14483	14483
8.	1977-78	1688	16680	18368
9.	1978-79	NA	NA	NA
10	1979-80	2452	16270	18722
11	1980-81	2308	17660	19968
12	1981-82	368	12504	12872
13	1982-83	4886	20533	25419
14	1983-84	-	19724	19724
15	1984-85	-	2599	2599
16	1985-86	-	11151	11151
17	1986-87	1575	2187	3762
18	1987-88	-	-	-
19	1988-89	-	31389	31389

Source : Bhavnagar Irrigation Division, Bhavnagar.

Table 2.2.6 : Yearly Release of Water From Shetrunji Reservoir

Sr. No.	Year	Yearly Inflow (MCM)	Break up of Released Water(MCM)				Total Abstract (MCM)
			Irri-gation	Water Supply	Spill-way	Evato-ration	
1.	1980-81	484	319	7	133	39	498
2.	1981-82	255	158	11	-	39	208
3.	1982-83	68	284	14	120	64	482
4.	1983-84	2093	294	6	1713	37	2050
5.	1984-85	92	31	11	-	37	79
6.	1985-86	38	2	17	-	26	45
7.	1986-87	140	27	24	-	46	97
8.	1987-88	30	2	20	-	19	41
9.	1988-89	669	258	13	324	56	651
10	1989-90	136	92	19	-	26	137
11	1990-91	298	231	16	-	51	299
12	1991-92	70	19	27	-	23	69

All values are in MCM (Million Cubic Metre)

Source : Bhavnagar Irrigation Division, Bhavnagar.

2.3 Thebi River Basin

2.3.1 Basin Characteristics

The river Thebi, a tributory of Shetrunji river originates from hilly areas of village Charkha of Babra Taluka and Monpur of Amreli Taluka. The river traverses from North to South and meets river Shetrunji near village Devalia after covering about 42 Kms. The proposed Thebi Water Resource Scheme is in the basin of Shetrunji Irrigation Scheme and hence causes interception of existing Shetrunji Irrigation Scheme near Palitana Taluka. Designed Catchment area of existing project is 3934.21 Sq. Km. (1519 sq. miles) out of which 488.16 Sq. km (188.48 sq. miles) area is already intercepted by various other schemes. The balanced catchment within the prescribed limit of 20% available is 146.26 sq. km. (56.47 sq. miles) and accordingly the Thebi water resource scheme is proposed for the balanced catchment.

2.3.2 Thebi Reservoir

The water resources of river Thebi is proposed to be harnessed by construction of earthen dam on both the flanks of river with centrally located gated spill way in river gorge portion. The dam site is situated across the river just about 0.5 km. away from Amreli city. The catchment area, classified as Good Catchment

as per Strange's classification, is plain and fern leaf shaped in nature. The total catchment area at the proposed dam site is 224.12 Sq. km. (86.50 miles) with no interception area. As per the design criteria, the reservoir has been planned at 60% reliability whose salient features can be summarised as following :

1.	Maximum Rain Fall	87.98 cm
2.	Minimum Rain Fall	21.38 cm.
3.	Gross storage	10.65 MCM
4.	Live Storage	9.98 MCM
5.	Lake Losses	2.133 MCM
6.	Net Utilisation	7.747 MCM
7.	Gross Common Area(GCA)	3088 Ha.
8.	Culturable Command Area (CCA)	1916 Ha.
9.	Irrigable Command Area (ICA)	1745 Ha.
10	Irrigation Potential	
	Kharif Season - 1473 Ha	
	Rabi Season - 272 Ha	
	Total = 1745 Ha.	

2.3.2.1 Inflow Into the Reservoir

To analyse inflow variation into the proposed reservoir, available time series data of 24 years from 1962 to 1985 has been presented in Table 1. It can be

observed that in sixteen years out of 24 years, Inflows were recorded higher than the proposed live storage of the Thebi Reservoir. While in the two years, inflows were recorded as 97 MCM and 47 MCM respectively, which are exceptionally higher than the live storage (9.98 MCM) of the reservoir. While out of 24 years time series data, only thrice the inflows were recorded half than the live storage capacity of the proposed earthen dam. The average inflow works out 20.4 MCM whereas 97.0 MCM and 4.0 MCM are highest and lowest inflows recorded respectively.

To workout availability of water, Rainfall data has been arranged from June to September. Yield for the month of October has been considered as 8 per cent of the yield obtained from June to September. Yield for the November month is taken as nil which is based on the replenishment data of Khodiar Reservoir for time series from 1968 to 1980.

Estimated 50% and 60% dependable available inflow into the reservoir based on 19 Years observations works out at 15.10 MCM and 11.90 MCM respectively. At 90 per cent reliability inflow comes out 6.74 MCM which is more than two times of annual water demand for the Lati-Liliya Extension Scheme in the ultimate stage (2.91 MCM).

2.3.2.2 Proposed Utilisation Level

The storage provision in the reservoir is made considering the following aspects.

Sr. No.	Item	Reservoir Storage Provision (MCM)
1.	Full October Demand	1.2659
2.	75% Kharif Requirement (June to September)	2.3174
3.	Full Rabi Requirement	2.2645
4.	Wake Lossess (As per Reservoir Working Table)	2.133
5.	Carry Over	Nil
6.	Silt Pocket	2.0028
	Total	9.9836

The gross utilisation proposed is 10.65 MCM out of which net utilisation is 7.84 MCM and the balance is 2.13 MCM would contribute towards lake losses. The lake losses works out to 20% of gross utilisation and 27% of net utilisation. Thus it will be possible to have irrigation potential of 2058 Ha. at 60% reliability for lined canal system with 51% canal efficiency.

2.3.2.3 Reservoir Operation Table

Using the computed inflow series from 1962 to 1985 the reservoir working table (RWT) has been developed. The highlights of this reservoir working table is presented in table 2.3.1. The RWT has been developed assuming zero water supply abstraction and 1810 hactares of irrigation during the year. It was observed that there were nine years when the inflows and the reservoir storage did not match with the abstractions. The reliability of supply was assured for 15 years indicating 62.5% reliability of the system. In eleven years there were spills from the reservoir.

The demand for extended Lathi Liliya Scheme in the ultimate stage works out to be around 2.91 MCM. Addition of this water demand would decidedly decrease the reliability of the scheme. To maintain the reliability at 62.5% it would be necessary to divert the water proposed for irrigation use to drinking water requirement of Lathi Liliya Scheme. The otherr alternative would be to enhance the storage available with additional storage reservoirs upstream to Thebi Dam. In view of the fact that the spills that have occured are of significant magnitude, creation of more storage could be beneficial for utilisation of water.

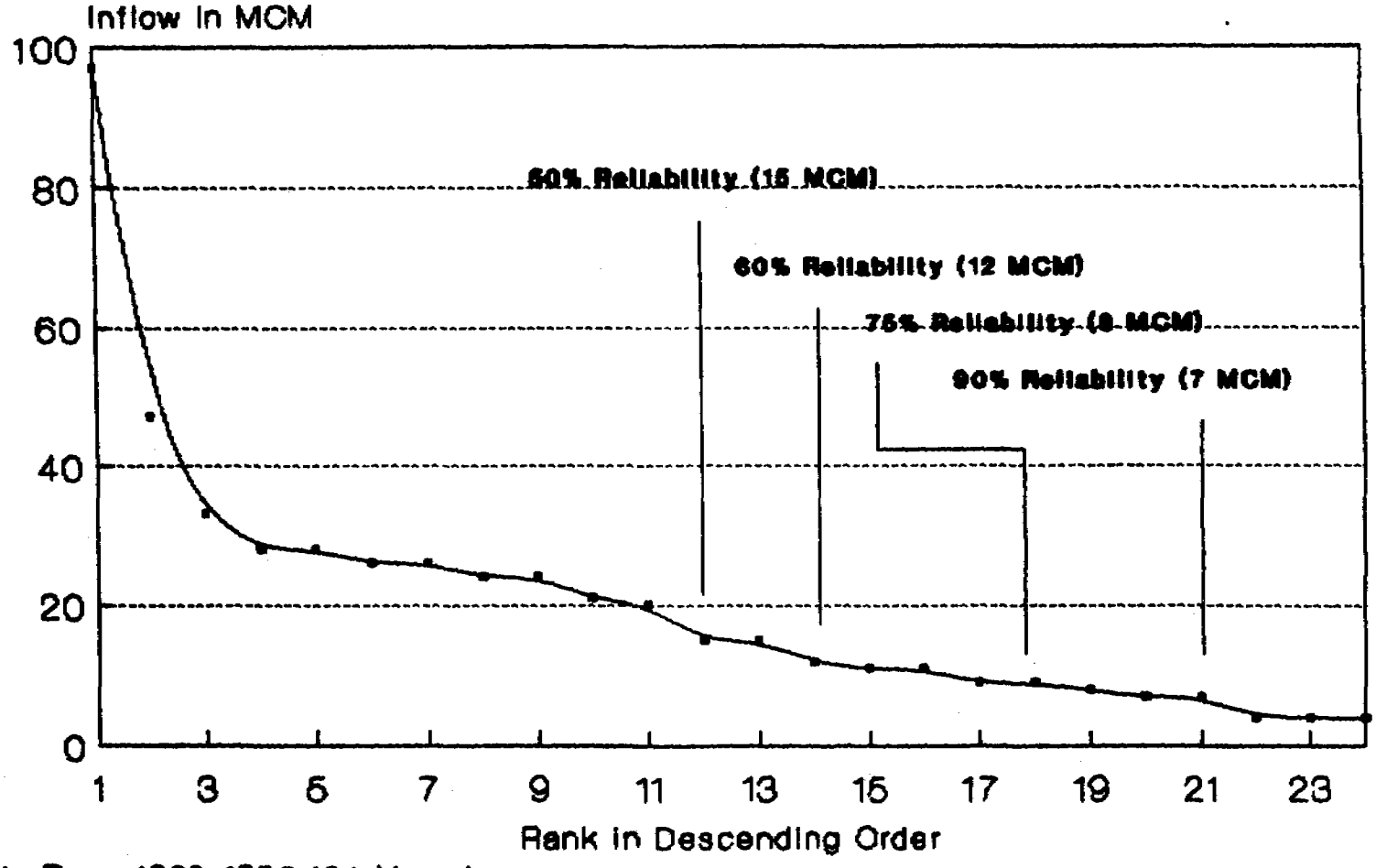
Table 2.3.1 : Inflow Variation in Thebi Reservoir

Sr. No.	Year	In MCM	% to Live Storage
1.	1962	11	100
2.	1963	26	100
3.	1964	33	100
4.	1965	24	100
5.	1966	9	90
6.	1967	11	100
7.	1968	15	100
8.	1969	7	70
9.	1970	28	100
10	1971	20	100
11	1972	4	40
12	1973	7	70
13	1974	97	100
14	1975	12	100
15	1976	15	100
16	1977	21	100
17	1978	9	90
18	1979	24	100
19	1980	26	100
20	1981	47	100
21	1982	4	40
22	1983	28	100
23	1984	8	80
24	1985	4	40

Maximum - 97.0 Minimum - 4.0 Average - 20.4

Note : Live Storage is 9.98 MCM
Source : Water Resources Ivestigation, Amreli.

Fig.2.2 Available Inflow at Different Reliabilities-Thebi Reservoir



Data Base 1962-1985 (24 Years)
Source: Water Resources Investigation, Amreli.

Table 2.3.2 : Reservoir Working Table

(Values in M.C.M.)

Sr. No.	Inflows	Abstractions for					
		Irriga-tion	Water Supply	Evapora-tion Loss	Total Abstra-ctions	Reser-voir Spills	Addition to Storage
1.	11.1	9.2	-	2.1	11.3	-	-
2.	26.5	9.5	-	4.8	14.3	9.5	2.7
3.	32.9	9.5	-	6.0	15.5	17.3	2.9
4.	24.2	9.5	-	5.9	15.4	9.1	2.6
5.	8.9	8.7	-	2.8	11.5	-	-
6.	11.1	9.2	-	1.9	11.1	-	-
7.	15.5	9.5	-	4.3	13.8	-	1.7
8.	6.8	6.7	-	1.9	8.6	-	-
9.	27.7	9.5	-	4.8	14.3	10.7	2.7
10	20.2	9.5	-	5.7	15.2	5.3	2.4
11	3.7	5.0	-	1.1	6.1	-	-
12	6.7	6.0	-	0.7	6.7	-	-
13	97.1	9.5	-	4.7	14.2	80.1	2.8
14	11.9	9.5	-	4.4	13.9	-	-
15	15.2	9.5	-	4.8	14.3	-	0.9
16	21.0	9.5	-	5.4	14.9	5.3	0.8
17	8.9	8.5	-	2.6	11.1	-	-
18	25.0	9.5	-	4.8	14.3	8.3	2.4
19	25.8	9.5	-	5.9	15.5	10.3	-
20	47.1	9.5	-	6.1	15.6	31.3	0.2
21	3.8	5.4	-	1.2	6.6	-	-
22	27.6	9.5	-	4.5	14.0	10.8	2.8
23	8.0	8.1	-	2.5	10.6	-	-
24	4.4	4.0	-	0.6	4.6	-	-

Note : 1. Inflow used of data from 1962-85 2. Irrigable area -1810 Ha.; Water supply allon = 0.

2.4 *Und River Basin*

2.4.1 Basin Characteristics

The river Und, originates from the hilly area of Saurashtra region into the three parts which confluences near Virpur in Jamnagar district, where Und-I, Irrigation scheme is under construction. Und river traverses from South to North and drains into the Gulf of Kachchh. The total catchment area available at Und-II dam site is 1513 Sq. kms. (584.0 Sq. miles). Where as, total intercepted catchment area by different schemes, works out 1132.62 Sq. Kms. Thus net catchment area available at Und-II site is 381.16 Sq. kms. (121.90 Sq. miles).

2.4.2 Und-II Reservoir

It has been proposed to construct an earthen dam with gated ogee spillway of 623 metres length to harness surface water from the river Und. The earthen dam site is located at village majoth of Dhrol Taluka in Jamnagar District. The salient features of proposed Und-II dam can be given as below :

1.	Maximum Rainfall	105.56 cm
2.	Minimum Rainfall	12.70 cm
3.	Average Rainfall	52.69 cm

4.	Gross Storage	37.12 MCM
5.	Live Storage	30.20 MCM
6.	Lake Losses	11.53 MCM
7.	Net Utilisation	18.67 MCM
8.	Gross Command Area	8076 Ha.
9.	Culturable Command Area	5313 Ha.
10	Irrigable Command Area	4250 Ha.

(Source : Project Construction Division No.1, Rajkot)

2.4.2.1 *Inflow Into the Reservoir*

Based on the available time series data of 28 years from 1961 to 1988 on inflow into the Und reservoir has been presented in Table 2.4.1. It can be seen that in 19 years out of 28 years, water spilled out from the proposed dam site. The average inflow works out 87.7 MCM where as 558.6 MCM and 1.8 MCM are highest and lowest inflows recorded into the catchment respectively. To compute variation of available inflow at different reliability, a graph is plotted between rank of years and available inflows. Inflows work out at 61.1 MCM and 50.0 MCM for 50% and 60% reliability respectively. Whereas at 90% reliability it is 8.8 MCM only.

2.4.2.2 Proposed Utilisation Level

To compute proposed utilisation level, Reservoir working table studies have been prepared for the yield series for the period from 1961 to 1988 and results are summarised in table 2.4.2. for four alternatives considered. Since the catchment of proposed Bavani scheme intercepts the catchment of Und-II sscheme, this point has also accounted for second and fourth alternatives. The overall canal efficiency for the unlined canal system is considered as 40 per cent to find gross irrigation water requirements. In last two alternatives minimum drawdown level of reservoir is also lowered from R.L. 15.85 m to R.L. 14.50 m. to use maximum availability of water.

In first two alternatives, water for domestic purposes has not been proposed, thus irrigated area works out 4250 Ha. at 62.5 per cent of reliability. In second alternative intercepted area by Bavani scheme is also considered but it does not effect the outcome significantly. In last two alternatives, water allocation has been proposed for both Irrigation as well as domestic purposes. For the 10 MLD and 4.5 MLD of water supply, the percentage of reliability works out 80 and 90 respectively alongwith irrigation water supplied to 20 Ha. at 60 per cent of reliability.

Since average daily water demand of 10.3 MLD in the intermediate stage and 11.5 MLD in the ulttimate stage has been worked out for Und-II RWSS, it may be suggested either to create more storage because spill also occured significantly or revision of proposed priority of water abstraction from Und-II reservoir.

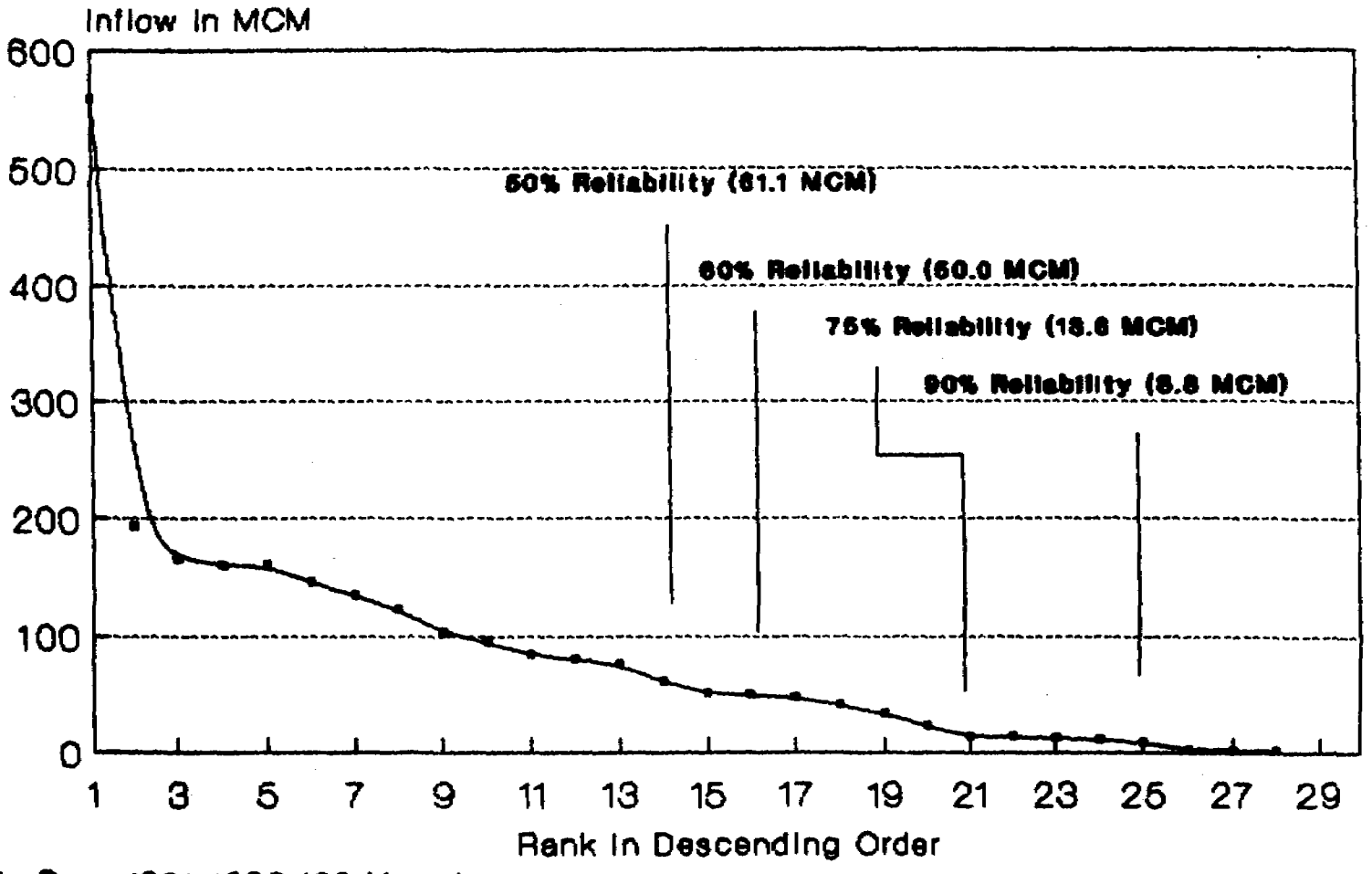
Table 2.4.1 : Inflow Variation in Und-II Reservoir

Sr. No.	Year	Inflow (MCM)	% of Live Storage	Evaporation Loss (MCM)	Reservoir Spill (MCM)
1.	1961	160.5	100	25.7	118.9
2.	1962	12.6	42	17.6	-
3.	1963	11.5	38	12.1	-
4.	1964	50.9	100	24.4	10.3
5.	1965	50.0	100	24.1	23.9
6.	1966	23.4	77	21.9	-
7.	1967	80.2	100	25.8	46.8
8.	1968	47.4	100	24.7	18.9
9.	1969	41.4	100	25.0	13.6
10	1970	146.0	100	25.9	115.2
11	1971	84.2	100	26.4	54.0
12	1972	13.6	45	18.5	-
13	1973	13.6	45	13.5	-
14.	1974	2.2	7	4.7	-
15	1975	94.6	100	25.3	50.7
16	1976	123.0	100	26.5	92.8
17	1977	61.1	100	26.5	30.8
18	1978	103.5	100	26.5	73.3
19	1979	558.6	100	26.5	528.4
20	1980	160.4	100	26.5	130.1

Sr. No.	Year	Inflow (MCM)	% of Live Storage	Evaporation Loss (MCM)	Reservoir Spills (MCM)
21	1981	165.5	100	25.9	135.8
22	1982	76.1	100	25.5	46.8
23	1983	134.8	100	26.5	104.6
24	1984	33.5	100	23.9	6.5
25	1985	2.5	8	12.0	-
26	1986	8.8	29	7.7	-
27	1987	1.8	6	2.6	-
28	1988	192.4	100	24.5	149.0

Note : Proposed Live Storage - 30.20 MCM
Source : Central Design Organisation, Gandhinagar

Fig.2.3 Available Inflow at Different Reliabilities-Und II Reservoir



Data Base 1961-1988 (28 Years)
Source: Central Design Organisation, Gandhinagar.

Table 2.4.2 : Expected Utilistion Level for Different Alternative Reservoir Operations - Und-II Reservoir

Alter-native	Particulars	Proposed Abstraction for		Percentage Reliability of Meeting Abstractions
		Irrigation of Area (Ha.)	Water Supply (MLD)	
1.	C.A. = 381 Sq. km. (147.05 Sq. mile)	4250	-	64.5
	M.D.D.L. = 15.85 m			
2.	C.A. = 316 Sq. kms. (122.02 Sq. mile)	4250	-	-
	M.D.D.L. = 15.85 m			
3.	C.A. = 381 Sq. km (147.05 Sq. mile)	i) 20	10	I.W.-60 W.S.-82
	M.D.D.L = 14.50m	ii) 20	4.5	W.S.-90
4.	C.A. = 316 Sq. km (122.02 Sq. mile)	70	3.5	I.W.-60
	M.D.D.L. = 14.50 m			W.S.-90

Note : M.D.D.L - Minimum Drawdown level
I.W. - Irrigation Water, W.S. - Water Supply
Yield Series from 1961-1988, Overall canal efficiency=40%

Source: Central Design Organisation-Gandhinagar

CHAPTER - III

3.0 VILLAGE PROFILES

To ascertain the prominent features of the villages included in the four projects a village level survey was carriedout. The survey covered about 111 villages out of 384 Villages giving a coverage of about 29%. The survey was accomplished by means of canvassing a village schedule among selected villages and collecting information from village level officials. The information collected from this survey included the following :

i) Population and Number of households

ii) Infrastructure at the villages

iii) Educational and Health facilities

iv) Status of sanitation facilities and water supply facilities.

v) Diseases reported

vi) Status of women

vii) Income levels of Panchayats/income levels of households

viii) Existing village level institutions

The data collected during the survey was analysed and tabulated. The main tables and their discussion for the four projects have been presented in the following sections.

3.1 Lathi Liliya Extension RWS Scheme

The proposed Lathi-Lilia Water Supply Scheme mainly comprises three taluka of Amreli district, namely Amreli, Lathi and Lilia. During the survey 23 sample village have been covered and details of socio-economic profile and infrastructural development have been collected and data analysis has been presented in Table 3.1.1 to 3.1.11.

Most of the surveyed villages at all three talukas having population ranges between 1000 to 3000 souls. However, few villages of Lathi and Lilia taluka also have reported population more than 3000 souls. Similarly size of the villages have been analysed by means of number of households. About 70 per cent of the villages recorded number of household between 200 to 500. Except Maurada Village of Lathi and Saludi Village of Lilia taluka where more than 500 number of household has been reported.

Among the surveyed villages all the villages have reasonable level of road accessibility. In Amreli taluka more than 70 per cent of the villages have Pucca approach road. However, in few villages, the facility of Pucca approach has not been provided. All the villages have bus facilities and frequency of service being at least once a day to many time during the day. In few villages bus services are not operating during rainy season due to Kutcha approach roads.

Most of the villages have reported post office facilities, telegraph facilities are available in six villages of Amreli taluka and few villages of Lathi and Lilia taluka. All the villages have electricity facilities for household and street light purpose. However, in few villages have electricity for cottage industries like diamond cutting also.

Most of the villages have rudimentary educational and health facilities. The available education facilities are upto primary level in all the villages, except Vadera of Amreli taluka, Matirala of Lathi taluka and Saludi of Lilia taluka, where education facilities available higher than middle school. The collage level education is only available at Amreli town. Status of women education level appears to be upto primary level.

However, six villages of Amreli taluka, one village of Lathi taluka and 4 village of Lilia taluka have reported 20 to 50 per cent of total women population educated upto highschool level also. It is also important to note that from most of the villages boys and girls daily approach nearby vvillage or Amreli town for their higher education.

The health facilities comprise of primary health centres, family planning centres and private doctors. Most of the villages have primary health centre at village level and community health worker visiting regularly in the village. None of the villages have facilities or family planning centre. None of the villages have hospital or dispensaries through some of them have services of private doctor. Nearest hospital located at Amrali town.

Sanitation facilities at Village level as well as household level have been reported to be very poor. None of the village have reported sewerage facilities or Public latrine arrangement. Only three villages of Amreli taluka and one village of Lathi taluka have open drainage facilities constructed by Grampanchayat.

In most of the villages handpumps and tubewells appear to be the main source of water supply. Other sources like Ponds and rivers mainly utilised for domestic cattle use. In few villages of Amreli taluka (2 village) where water supply has been provided through tankers. It has been also observed that pumped water storage facilities are also constructed in most of the villages and pumped water from dugwells or tubewells has been supported through such storage. However, due to non availability grond water or non-functioning of pumping system, number of schemes were not functioning properly.

All most all the villages have Grampanchayat with elected members. Atleast two of them represent women and schedule caste. None of the villages have reported any government offices. Not a single village have any or voluntary agencies except few youth associations.

The level of internal income of these village Panchayat is very meagre and ranges between 2000 to 6000 Rupees. However, few villages of Amreli and Lathi taluka's have reported their income between 6,000 to 10,000 Rupees and above. Other than internal income most of their development funds comes as grants under development programme, through taluka or Zilla Panchayat.

At households level, most common income generating activities are observed as agricultural and agricultural labourers, while small business, dairying service and cottage industries are also adopted by few households. Most of the households are depends on a single activity that is mainly agriculture. However, agriculture labour and dairying are the most frequent combination of activities among the households. The details of household income by activities has been presented in relevant Table.

To assess the perception of the women about the major problems confronting them, each village was presented with a list of 4 to 5 problems, which were common to all villagers. It revealed that inadequacies regarding quality and quantity of water supply and education facilities have been indicated as a most critical in all the villages. The problems related to household health appears to be secondary major issues. Lack of sanitation facilities are not considered as an important deficiency in their villages.

Table 3.1.1 : Population and Household Size Distribution

No. of Villages Surveyed in Taluka	No. of Villages Having Population				No. of Villages Having No. of Households			
	< 500	501-1000	1001-3000	> 3000	< 100	101-200	201-500	> 500
Amreli (15)	-	3	12	-	1	3	11	-
Lathi (4)	-	-	3	1	-	1	2	1
Lilia (4)	1	-	2	1	-	1	2	1

Source : ORG Field Survey 1992

Table 3.1.2 : Service Levels in Survey Villages

No. of Villages Surveyed in Talukas	No. of Villages Reporting Having Following Services					
	Kutcha Road Approach	Pucca Road Approach	Post Office	Telegraph	Bus Service	Electricity
Amreli (15)	5	11	12	6	15	15
Lathi (4)	2	2	3	1	4	44
Lilia (4)	2	2	3	2	4	44

Source : ORG Field Survey 1992

Table 3.1.3 : Income of Village Panchayats

Taluka with No. of Villages Surveyed	Number of Villages Reporting Income From Own Sources as (Rs.)				Number of Villages Reporting Income From Govt. Grants as (Rs.)			
	< 2000	2001-6000	6001-10000	> 10000	< 5000	5001-15000	15001-25000	>25000
Amreli (15)	-	5	5	5	3	10	1	1
Lathi (4)	-	2	-	2	-	2	2	-
Lilia (4)	-	4	-	-	-	3	1	-

Source : ORG Field Survey 1992

Table 3.1.4 : Level of Annual Household Incomes Reported for Different Occupations

Taluka with No. of Survey Villages	Occupation and No. of Villages Reporting	No. of Villages Reporting Income Levels as (Rs.)				
		< 2000	2001-5000	5001-10000	10001-15000	> 15000
Amreli (15)	Agriculture	-	-	11	4	-
	Dairying	-	-	1	-	1
	Small Business	-	-	14	1	-
	Service	-	-	-	-	7
	Agri. Labours	3	13	-	-	-
	Demand Work	-	-	9	1	-
Lathi (4)	Agriculture	-	-	1	2	1
	Dairying	-	-	-	-	-
	Small Business	-	-	3	1	-
	Service	-	-	-	-	4
	Agri. Labours	-	4	-	-	-
	Demand Work	-	-	3	1	-
Lilia (4)	Agriculture	-	-	3	1	-
	Dairying	-	-	-	-	-
	Small Business	-	-	1	2	-
	Service	-	-	-	-	3
	Agri. Labours	-	2	2	-	-
	Demand Work	-	-	3	-	-

Source : ORG Field Survey 1992

Table 3.1.5 : Status of Existing Water Supply by Different Sources

Taluka with No. of Villages Surveyed	Source of Water	No. of Villages Reporting Source Used for		No. of Villages Reporting Adequacy		No. of Villages Reporting Source as		No. of Villages Reporting Pumped Storage Scheme
		Human Use	Cattle Use	Round the Year	Part of the Year	Potable	Non-Potable	
Amreli (15)	Hand Pump	15	11	14	1	15	-	-
	Dugwell	8	8	3	5	8	-	-
	Tubewell	7	7	4	3	6	1	-
	Tank/Pond	-	4	-	4	-	4	-
	River	-	2	-	2	-	2	-
	Tankers	2	1	-	2	2	-	-
	Pumped Storage Scheme	-	-	-	-	-	-	13
Lathi (4)	Hand Pump	3	3	3	-	3	-	-
	Dugwell	-	-	-	-	-	-	-
	Tubewell	4	4	1	3	3	1	-
	Tank/Pond	-	2	-	2	-	2	-
	River	-	-	-	-	-	-	-
	Tankers	1	1	-	1	1	-	-
	Pumped Storage Scheme	-	-	-	-	-	-	4
Lilia (4)	Hand Pump	4	3	4	-	3	1	-
	Dugwell	3	3	3	-	2	1	-
	Tubewell	-	1	1	-	-	1	-
	Tank/Pond	-	1	-	1	-	1	-
	River	-	-	-	-	-	-	-
	Tankers	-	-	-	-	-	-	-
	Pumped Storage Scheme	-	-	-	-	-	-	4

Source : ORG Field Survey 1992

Table 3.1.6 : Status of Sanitation Facilities

Taluka and No. of Villages Surveyed	Type of Sanitation Facility	No. of Villages Reporting
Amreli (15)	Household Latrines	10 (6.2)%
	School Latrines	1
	Public Latrines	-
	H/H Sewerage Connection	-
	Open Gutters	3
	Piped Gutters	1
Lathi (4)	Household Latrines	3 (5.4)%
	School Latrines	1
	Public Latrines	-
	H/H Sewarage Connection	-
	Open Gutters	1
	Piped Gutters	-
Lilia (4)	Household Latrines	2 (10)%
	School Latrines	-
	Public Latrines	-
	H/H Sewerage Connection	-
	Open Gutters	-
	Piped Gutters	-

Source : ORG Field Survey 1992

Table 3.1.7 : Educational Facilities

Taluka and No. of Villages Surveyed	Number of Villages Reported Having							
	Primary School	Secondary School		High School		College	Adult Literacy Centre	Anganwadi
		Within Village	Nearby Village	Within Village	Nearby Village			
Amreli (15)	15	1	14	-	15	-	5	2
Lathi (4)	4	1	3	1	3	-	3	2
Lilia (4)	4	1	3	-	4	-	1	2

Source : ORG Field Survey 1992

Table 3.1.8 : Health Facilities and Diseases Reported

Taluka and No. of Villages Surveyed	Number of Villages Having					Number of Villages Reporting					
	Dispensary/ Hospital	PHC(s)	CHW	FPC	Private Doctors	Malaria	Jaundice	Typhoid	Skin Diseases	Stone	Tooth Problem
Amreli (15)	-	15	15	-	5	11	1	1	2	1	-
Lathi (4)	-	2	3	1	2	4	-	-	-	-	-
Lilia (4)	-	4	4	-	-	2	-	-	-	-	1

Source : ORG Field Survey 1992

Table 3.1.9 : Educational Standards of Women

Taluka and No. of Villages Surveyed	Level of Education	Villages Reporting Women Population as			
		< 20%	20-50%	51-80%	> 80%
Amreli (15)	Illiterate	5	7	3	-
	Less than 5th Standard	1	7	7	-
	High School	8	6	-	-
	College	6	-	-	-
Lathi (4)	Illiterate	2	1	1	-
	Less than 5th Standard	-	2	1	1
	High School	3	1	-	-
	College	2	-	-	-
Lilia (4)	Illiterate	-	4	-	-
	Less than 5th Standard	-	4	-	-
	High School	2	2	-	-
	College	1	-	-	-

Source : ORG Field Survey 1992

Table 3.1.10 : Problems Identified by Women

Taluka and No. of Villages Surveyed	Dificiency of	Villages Reporting Deficiency Priority as				
		1	2	3	4	5
Amereli (15)	Health Services	-	8	6	1	-
	Water Supply	10	1	-	2	-
	Sanitation	-	-	4	9	1
	Education	5	4	5	-	1
Lathi (4)	Health Services	-	1	2	-	-
	Water Supply	4	-	-	-	-
	Sanitation	-	-	-	3	-
	Education	-	2	1	-	-
Lilia (4)	Health Services	-	4	-	-	-
	Water Supply	2	-	1	-	-
	Sanitation	-	-	1	1	-
	Education	2	-	2	-	-

Source : ORG Field Survey 1992

Table 3.1.11 : Existing Village Level Institutions

Taluka and Number of Villages Surveyed	Number of Villages Reported Having					Other (Yuvak Mandals Mahila Mandals)
	Gram Panchayat	Group Panchyat	Government Offices	Private Offices	NGO/Voluntary Agencies	
Amreli (15)	15	-	-	-	-	4
Lathi (4)	3	-	1	-	-	2
Lilia (4)	4	-	-	-	-	-

Source : ORG Field Survey 1992

3.2 Und-II Regional Water Supply Scheme

Und-II regional water supply scheme planned to supply water to 68 Villages at Jamnagar, Jodia and Dhrol talukas of Jamnagar district. To analyse the socio-economic and infrastructural profile of the villages, total 21 village have been covered under survey and result has been presented in Table 3.2.1 to 3.2.11.

Most of the villages have population ranges between 1000 to 3000 souls, few villaves have also reported population ranges between 500 to 1000 souls and some villages with more than 3000 souls also. Similarly size of the villages based on households size have been also observed to be between 200 to 500 and sometimes less than that.

Among the surveyed villages, the level of infrastructural facilities have been reported to be marginally good. More than 50 per cent of the surveyed villages have pucca approach road. While remaining have Kutcha approach road. Bus services are operating in all the villages and post office facility has been reported from all the villages. Few villages have telegraph facility also. Primary level education have been reported from most of the villages except a few

villages of Jamnagar taluka. Secondary and high-school level education have been made available in nearby villages or at tehsil headquarter. Colleage level education is available at Jamnagar town. Some of the villages have reported Adult Education centre as well as Anganwadi Centres in their villages.

Health facilities have been reported to be resonably good from all the Villages, as all the villages have primary health centres and community health worker also visits regularly these villages. None of the villages have family planning centre. Except Malaria, none of the villages have reported frequent occurence of diseases at village level. Status of sanitation facilities have been observed to be very poor, except one or two villages. No where sewerage system has been provided.

Existing sources of water supply comprises handpumps, dugwells and tubewells in all the villages. However, inadequate quality and quantity of water supply force them to utilise tanker for water supply in number of villages. Except few villages of Jodia taluka, remaining villages have reported problem of availability of water and its quality round the year.

Almost all villages have Gram Panchayats with elected members. None of the villages have any Govt. Office or NGO's or voluntary organisations. Most of the Gram Panchayats have reported their internal income between Rs.2000 to 6000 per year. However, few Gram Panchayats have reported income more than Rs.10,000. Most of their funds comes as grant under various Government sponsores programmes.

At households level most common income generating activities are observed to be cultivation and as agricultural labours. However, some households have also reported their main income generating activity as a small business or service. The details of household income by activities has been presented in relevant table.

Inadequacy of Water Supply has been reported as a must common problem identified by women in all the villages. Other than this, in few villages lack of health and education facilities have been indicated as a second major issues. Lack of sanitation facilities are not considered as an important deficiency in most of the villages.

Table 3.2.1 : Population and Household Size Distribution

No. of Villages Surveyed in Taluka	No. of Villages Having Population				No. of Villages Having No. of Households			
	< 500	501-1000	1001-3000	> 3000	< 100	101-200	201-500	> 500
Jamnagar (7)	-	2	3	2	1	1	4	1
Jodia (7)	-	1	5	1	-	2	6	-
Dhrol (7)	-	2	5	-	-	4	3	-

Source : ORG Field Survey 1992

Table 3.2.2 : Service Levels in Survey Villages

No. of Villages Surveyed in Talukas	No. of Villages Reporting Having Following Services					
	Kutcha Road	Pucca Road	Post Office	Telegraph	Bus Service	Electricity
Jamnagar (7)	2	5	7	3	7	
Jodia (7)	3	4	7	2	7	
Dhrol (7)	2	5	5	1	7	

Source : ORG Field Survey 1992

und.

Table 3.2.3 : Income of Village Panchayats

Taluka with No. of Villages Surveyed	Number of Villages Reporting Income From Own Sources as (Rs.)				Number of Villages Reporting Income From Govt. Grants as (Rs.)			
	< 2000	2001-6000	6001-10000	> 10000	< 5000	5001-15000	15001-25000	>25000
Jamnagar (7)	2	3	1	1	-	4	3	-
Jodia (7)	-	3	3	1	-	6	-	1
Dhrol (7)	2	5	-	-	-	7	-	-

Source : ORG Field Survey 1992

Table 3.2.4 : Level of Annual Household Incomes Reported for Different Occupations

Taluka with No. of Survey Villages	Occupation and No. of Villages Reporting	No. of Villages Reporting Income Levels as (Rs.)				
		< 2000	2001-5000	5001-10000	10001-15000	> 15000
Jamnagar (7)	Agriculture	-	-	-	4	3
	Dairying	-	-	-	2	-
	Small Business	-	-	2	2	3
	Service	-	-	-	-	-
	Agri. Labourer	-	-	4	2	1
Jodia (7)	Agriculture	-	-	1	6	-
	Dairying	-	-	2	-	-
	Small Business	-	-	4	-	3
	Service	-	-	-	-	3
	Agri. Labourer	-	1	5	1	-
Dhrol (7)	Agriculture	-	-	1	5	1
	Dairying	-	1	1	-	-
	Small Business	-	-	-	-	-
	Service	-	2	5	-	-
	Agri. Labourer	-	6	1	-	-

Source : ORG Field Survey 1992

Table 3.2.5 : Status of Existing Water Supply by Different Sources

Taluka with No. of Villages Surveyed	Source of Water	No. of Villages Reporting Source Used for		No. of Villages Reporting Adequacy		No. of Villages Reporting Source as		No. of Villages Reporting Pumped Storage Scheme
		Human Use	Cattle Use	Round the Year	Part of the Year	Potable	Non-Potable	
Jamnagar (7)	Hand Pump	6	5	-	6	5	1	
	Dugwell	-	2	-	2	1	1	
	Tubewell	4	3	-	4	4	-	
	Tank/Pond	-	2	-	-	-	2	
	River	-	1	-	1	1	-	
	Pumped Storage Scheme	-	-	-	-	-	-	7
	Tankers	6	6	2	4	6	-	
Jodia (7)	Hand Pump	4	2	1	3	4	-	
	Dugwell	4	5	1	4	4	1	
	Tubewell	6	6	3	3	6	-	
	Tank/Pond	-	2	-	-	-	2	
	River	-	2	-	2	-	2	
	Pumped Storage Scheme	-	-	-	-	-	-	7
	Tankers	7	6	7	-	7	-	
Dharol (7)	Hand Pump	7	7	1	6	6	-	
	Dugwell	4	4	-	4	4	-	
	Tubewell	3	3	-	3	3	-	
	Tank/Pond	-	2	-	2	-	2	
	River	-	2	-	2	1	1	
	Pumped Storage Scheme	-	-	-	-	-	-	7
	Tankers	7	7	7	-	7	-	

Source : ORG Field Survey 1992

Table 3.2.6 : Status of Sanitation Facilities

Taluka and No. of Villages Surveyed	Type of Sanitation Facility	No. of Villages Reporting
Jamnagar (7)	Household Latrines	3
	School Latrines	-
	Public Latrines	-
	H/H Sewarage Connection	-
	Open Gutters	1
Jodia (7)	Household Latrines	4
	School Latrines	-
	Public Latrines	-
	H/H Sewarage Connection	-
	Open Gutters	-
Dharol (7)	Household Latrines	3
	School Latrines	-
	Public Latrines	-
	H/H Sewarage Connection	-
	Open Gutters	-

Source : ORG Field Survey 1992

Table 3.2.7 : Educational Facilities

Taluka and No. of Villages Surveyed	Number of Villages Reported Having							
	Primary School	Secondary School		High School		College	Adult Literacy Centre	Anganwadi
		Within Village	Nearby Village	Within Village	Nearby Village			
Jamnagar (7)	7	2	5	-	7	7	5	2
Jodia (7)	7	1	6	-	7	7	7	5
Dhrol (7)	7	-	7	-	7	7	1	3

Source : ORG Field Survey 1992

Table 3.2.8 : Health Facilities and Diseases Reported

Taluka and No. of Villages Surveyed	Number of Villages Having					Number of Villages Reporting		
	Dispensary/ Hospital	PHC(s)	CHW	FPC	Private Doctors	Malaria	Skin Diseases	Kaulera
Jamnagar (7)	1	6	6	-	4	1	-	2
Jodia (7)	-	7	7	-	3	1	-	-
Dhrol (7)	-	7	7	-	-	2	-	2

Source : ORG Field Survey 1992

Table 3.2.9 : Educational Standards of Women

Taluka and No. of Villages Surveyed	Level of Education	Villages Reporting Women Population as			
		< 20%	20-50%	51-80%	> 80%
Jamnagar (7)	Illiterate	-	7	-	-
	5th Standard	-	4	3	-
	High School	7	-	-	-
	College	5	-	-	-
Jodia (7)	Illiterate	-	7	-	-
	5th Standard	-	5	2	-
	High School	3	4	-	-
	College	2	-	-	-
Jodia (7)	Illiterate	-	6	1	-
	5th Standard	-	2	5	-
	High School	6	1	-	-
	College	1	-	-	-

Source : ORG Field Survey 1992

Table 3.2.10 : Inadequacies/Problems Identified by Women

Taluka and No. of Villages Surveyed	Dificiency of	Villages Reporting Deficiency Priority as			
		1	2	3	4
Jamnagar (7)	Health Services	-	2	1	-
	Water Supply	7	-	-	-
	Sanitation	-	2	-	1
	Education	-	2	3	-
	Others	-	1	-	-
Jodia (7)	Health Services	-	3	3	-
	Water Supply	7	-	-	-
	Sanitation	-	1	-	2
	Education	-	3	3	-
	Others	-	-	-	-
Dhrol (7)	Health Services	-	1	5	1
	Water Supply	7	-	-	-
	Sanitation	-	-	-	3
	Education	-	6	1	-
	Others	-	-	1	2

Source : ORG Field Survey 1992

Table 3.2.11 : Existing Village Level Institutions

Taluka and Number of Villages Surveyed	Number of Villages Reported Having					Other (Yuvak Mandals Mahila Mandals)
	Gram Panchayat	Group Panchyat	Government Offices	Private Offices	NGO/Voluntary Agencies	
Jamnagar (7)	5	2	-	-	-	-
Jodia (7)	7	-	-	-	-	1
Dhrol (7)	6	1	-	-	-	-

Source : ORG Field Survey 1992

3.3 Ghogha Regional Water Supply Scheme

Ghogha Regional Water Supply Scheme covers villages of Bhavnagar, Ghogha and Talaja Talukas of Bhavnagar district To identify the socio-economic and other developmental profile of the area some sample; villages (25) have been covered under a survey. Analysis of data collected has been presented in Table 3.3.1 to 3.3.11.

The size of the villages have been assessed by means of number of households reported and total population of the surveyed villages. About 60 per cent of the surveyed villaged have reported having population between 1000 to 3000 souls and 200 to 500 households. However, population more than 3000 souls has been also reported from few villages like Kharsalia, Bhadi and Ukrala.

Details of infrastructural facilities available in the surveyed villages have been presented in relevant tables. It reveals that all the villages have Pucca approach road facility, except few villages where only Kutcha approach road is available. Bus services were operating in all the villages.

Post office and telegraphic facilities have been available in some of the villages. Electricity facilities for domestic, agricultural and streetlight purpose have been also reported from all the villages.

The level of educational facilities have been supported upto primary level in most of the villages. None of the village have secondary or higher secondary educational facilities at village level except Rajpura and Jasapura village of Talaja taluka. Colleage level education is available at Bhavnagar town. Few villages have reported about adult education centres and anganwadi centre also.

Status of health facilities have been reported reasonably good, as all the villages have facilities of primary health centre, family planning centre. Visits of community health worker in the village have been reported to be regular. Other than these facilities, some villages have private doctor's clinics. The nearest hospitals are located at Talaja and Bhavnagar. Health status of the villagers have been reported to be normal. Only Malaria and general fever has been reported as common diseases in most of the villages. Few villages have reported occassional cases of Cholera.

Level of sanitation facilities at villages and household level were observed to be very poor. None of the village have sewage system except Bhadi village of Ghoga taluka. In few villages, less than 5 per cent of total household have been reported having latrine facilities.

As presented in table 3.3.5 the villagers depend upon number of sources for their daily water requirement, such sources are handpumps, tubewells and dugwells. It was also revealed that groundwater was the only source of watersupply in most of the villages. Few villages have been provided water supply through tankers also. Pumped Water Storage facilities are also available in few villages.

Grampanchayats have been reported as village level institutions in all the villages. None of the villages have reported any NGO's/voluntary agency working at village level except youth association and gram rakshak dal. Most of the Grampanchayats have reported their internal income to be less than 6000 Rupees per year. Other than internal incomes most of their development funds come as grant through taluka or Zilla Panchayat or Javahar Rozagar Yojana. Such funds have been

reported between Rs.5000 to 15000 in majority of the villages.

At household level, most common income generating activities have been observed to be cultivation and as agricultural labourers. Other than these small business, cottage industries also appear as income generating activities.

To assess the perception of the women about major problems confronting them, each village was presented with a list of 4 to 5 problems issues, which were common to all villages. It revealed that availability of proper water supply round the year has been indicated as a most critical problem in all the villages. However, few villages have reported health and sanitation facilities at village level as a most critical problem. Education facilities considered as a secondary problem in most of the villages.

Table 3.3.1 : Population and Household Size Distribution

No. of Villages Surveyed in Taluka	No. of Villages Having Population				No. of Villages Having No. of Households			
	< 500	501-1000	1001-3000	> 3000	< 100	101-200	201-500	> 500
Bhavnagar (9)	-	2	6	1	2	3	4	-
Talaja (8)	-	-	7	1	-	2	5	1
Ghogha (8)	-	2	5	1	1	3	4	-

Source : ORG Field Survey 1992

Table 3.3.2 : Service Levels in Survey Villages

No. of Villages Surveyed in Talukas	No. of Villages Reporting Having Following Services					
	Kutcha Road	Pucca Road	Post Office	Telegraph	Bus Service	Electricity
Bhavanagar (9)	3	8	4	3	9	9
Talaja (8)	4	7	4	3	8	8
Ghogha (8)	5	5	5	1	8	8

Source : ORG Field Survey 1992

Table 3.3.3 : Income of Village Panchayats

Taluka with No. of Villages Surveyed	Number of Villages Reporting Income From Own Sources as (Rs.)				Number of Villages Reporting Income From Govt. Grants as (Rs.)			
	< 2000	2001-6000	6001-10000	> 10000	< 5000	5001-15000	15001-25000	>25000
Bhavnagar (9)	3	5	1	-	-	6	1	2
Talaja (8)	5	2	1	-	-	7	1	-
Ghogha (8)	7	1	-	-	1	3	4	-

Source : ORG Field Survey 1992

Table 3.3.4 : Level of Annual Household Incomes Reported for Different Occupations

Taluka with No. of Survey Villages	Occupation and No. of Villages Reporting	No. of Villages Reporting Income Levels as (Rs.)				
		< 2000	2001-5000	5001-10000	10001-15000	> 15000
Bhavnagar (9)	Agriculture	-	1	3	4	1
	Cottage Industries	-	-	3	2	-
	Dairying	-	-	-	-	-
	Small Business	-	-	2	3	2
	Others	-	4	3	2	-
	Service	-	-	-	-	3
Talaja (8)	Agriculture	-	-	1	6	1
	Cottage Industries	-	-	-	1	-
	Dairying	-	1	2	-	-
	Small Business	-	-	5	-	-
	Others	-	5	-	-	-
	Service	-	-	-	-	1
Ghogha (8)	Agriculture	-	-	4	4	-
	Cottage Industries	-	-	4	4	-
	Dairying	-	-	2	2	-
	Small Business	-	-	3	-	-
	Others	-	-	1	3	4
	Service	-	-	-	-	2

Source : ORG Field Survey 1992

Table 3.8.5 : Status of Existing Water Supply by Different Sources

Taluka with No. of Villages Surveyed	Source of Water	No. of Villages Reporting Source Used for		No. of Villages Reporting Adequacy		No. of Villages Reporting Source as		No. of Villages Reporting Pumped Storage Scheme
		Human Use	Cattle Use	Round the Year	Part of the Year	Potable	Non-Potable	
Bhavnagar (9)	Hand Pump Scheme	4	4	4	-	4	-	
	Dug well/ Openwell	5	5	5	-	5	-	
	Tube well	5	4	5	-	5	-	2
	Tank/Pond	-	5	-	5	4	1	
	River	-	3	-	3	3	-	
	Tankers	1	1	1	-	1	-	
	Others	3	2	3	-	2	1	
Talaja (8)	Hand Pump Scheme	7	7	7	-	7	-	
	Dug well/ Openwell	4	3	4	-	4	-	1
	Tube well	2	2	2	-	2	-	
	Tank/Pond	-	6	1	5	6	-	
	River	-	2	1	2	2	-	
	Tankers	1	-	1	-	1	-	
	Others	7	2	7	-	7	-	
Ghogha (8)	Hand Pump Scheme	8	8	8	-	7	1	
	Dug well/ Openwell	2	2	2	-	2	-	
	Tube well	3	3	3	-	3	-	3
	Tank/Pond	-	3	-	3	2	1	
	River	1	2	1	2	2	-	
	Tankers	-	-	-	-	-	-	
	Others	4	3	4	-	4	-	

Source : CRG Field Survey 1992

Table 3.3.6 : Status of Sanitation Facilities

Taluka and No. of Villages Surveyed	Type of Sanitation Facility	No. of Villages Reporting
Bhavnagar (9)	Household Latrines	2
	School Latrines	-
	Public Latrines	-
	H/H Sewerage Connection	-
Talaja (8))	Household Latrines	5
	School Latrines	-
	Public Latrines	-
	H/H Sewerage Connection	-
Ghogha (8)	Household Latrines	4
	School Latrines	-
	Public Latrines	2
	H/H Sewerage Connection	1

Source : ORG Field Survey 1992

Table 3.3.7 : Educational Facilities

Taluka and No. of Villages Surveyed	Number of Villages Reported Having							
	Primary School	Secondary School		High School		College	Adult Literacy Centre	Anganwadi
		Within Village	Nearby Village	Within Village	Nearby Village			
Bhavnagar (9)	9	-	9	-	9	9	2	8
Talaja (8)	8	2	8	-	8	8	4	1
Ghogha (8)	8	-	8	-	8	8	5	2

Source : ORG Field Survey 1992

Table 3.3.8 : Health Facilities and Diseases Reported

Taluka and No. of Villages Surveyed	Number of Villages Having					Number of Villages Reporting		
	Dispensary/ Hospital	PHC(s)	CHW	FPC	Private Doctors	Malaria	Skin Diseases	Gastro Enteritis
Bhavnagar (9)	-	9	9	9	7	1	-	1
Talaja (8)	1	8	7	7	3	1	4	-
Ghogha (8)	1	7	7	7	4	2	1	-

Source : ORG Field Survey 1992

Table 3.3.9 : Educational Standards of Women

Taluka and No. of Villages Surveyed	Level of Education	Villages Reporting Women Population as			
		< 20%	20-50%	51-80%	> 80%
Bhavnagar (9)	Illiterate	1	4	4	-
	Less than 5th Standard	1	4	3	1
	High School	1	1	-	-
	Colleage	-	-	-	-
Talaja (8)	Illiterate	-	8	-	-
	Less than 5th Standard	-	4	4	-
	High School	7	-	-	-
	Colleage	1	-	-	-
Ghogha (8)	Illiterate	-	5	3	-
	Less than 5th Standard	-	5	3	-
	High School	3	1	-	-
	Colleage	2	-	-	-

Source : ORG Field Survey 1992

Table 3.3.10 : Inadequacies/Problems Identified by Women

Taluka and No. of Villages Surveyed	Dificiency of	Villages Reporting Deficiency Priority as				
		1	2	3	4	5
Bhavnagar (9)	Health Services	-	2	3	1	-
	Water Supply	9	-	-	-	-
	Sanitation	-	1	-	-	3
	Education	-	1	2	3	-
	Others	-	5	2	-	-
Talaja (8)	Health Services	1	1	2	-	1
	Water Supply	6	2	-	-	-
	Sanitation	1	1	1	3	-
	Education	-	3	2	-	-
	Others	-	1	-	1	-
Ghogha (8)	Health Services	-	2	1	1	-
	Water Supply	7	-	-	-	-
	Sanitation	-	1	1	-	-
	Education	-	2	2	-	-
	Others	1	-	1	1	-

Source : ORG Field Survey 1992

Table 3.3.11 : Existing Village Level Institutions

Taluka and Number of Villages Surveyed	Number of Villages Reported Having					Other (Yuvak Mandals Mahila Mandals)
	Gram Panchayat	Group Panchyat	Government Offices	Private Offices	NGO/Voluntary Agencies	
Bhavnagar (9)	7	-	2	-	-	-
Talaja (8)	7	1	-	-	-	-
Ghogha (8)	7	1	-	-	-	3

Source : ORG Field Survey 1992

3.4 Ambaji-Danta Regional Water Supply Scheme

Proposed Ambaji Danta Regional Water Supply Scheme has been planned for Danta and Palanpur talukas of Banaskantha district of North Gujarat. It comprises of all the villages of Danta taluka. During the village profile survey, 40 villages of Danta taluka and 2 village of Palanpur taluka have been covered. Details of informations has been presented in Table 3.4.1 to 3.4.11.

The size of the villages have been assessed by means of number of households and total population as recorded during the survey. Most of the villages have number of households between 100 to 200 or less than that and population ranging between 500 to 1000.

The level of infrastructural development are marginally good as road approaches to these villages comprise of both Pucca and Kutcha road. Bus services were operating in all the villages. However, in 19 villages of Danta taluka and one village of Palanpur taluka, Bus facilities does not operating during rainy season. Post office and telegraphic facilities have been reported from few villages. Electricity facilities have been provided in all the villages for domestic and agricultural use.

Educational level has been reported upto primary level in most of the villages. Except Rampur and Janod villages of Danta taluka secondary and higher secondary education are available in nearby town. Collage level education are available at Palanpur town. Anganwadi centres have been reported from all the villages.

The medical facilities available to rural population are of different types varying from community health workers to primary health centres. The family planning centres have been reported from four village only. Private doctor's availability are observed to be poor. The status of health of the population has been reported to be good. Only few villages have reported occasional occurrence of diseases like Malaria, Skin diseases etc.

The sanitation facilities have been observed to be almost absent in all the villages.

Main sources of water supply to the rural population comprises of handpump, dug wells and tubewells. However, handpumps appear to be the main source of water supply round the year. In case of tubewells and dugwell, year to year decline of ground water level is a common problem. Few villages have pumped water storage facility.

About 50 per cent of the villages have Grampanchayats, while remaining were covered under group panchayat. Other than Gampanchayat, village level institution like NOO's/voluntary organisation are absent in all the villages.

About 70 per cent of Grampanchayat have reported their internal income less than 2000 Rupees. Other than internal income most of the development funds comes as grant through taluka and Zila panchayat grant. In 23 villages of Danta taluka and one village of Palanpur taluka external grants were more than Rs.25,000.

Household level income generating activities mainly observed as from cultivation and agricultural labourers. Other than these, few households were also carrying on small business or services. Details of households income has been presented in relavent table.

The education levels of the women appears to be very low. In most of the villages, percentage of illiterate womens have been reported to be more than 80 per cent. However, in few villages, women were educated upto primary and high school level also (less than 20 per cent).

Inadequacies of quality and quantity of water supply and education facilities have been indicated as a most critical problem by women population. The household health and sanitation facilities are reported as seems major issues.

Table 3.4.1 : Population and Household Size Distribution

No. of Villages Surveyed in Taluka	No. of Villages Having Population				No. of Villages Having No. of Households			
	< 500	501-1000	1001-3000	> 3000	< 100	101-200	201-500	> 500
Danta (40)	9	15	15	1	11	21	7	1
Palanpur(2)	-	1	1	-	1	-	1	-

Source : ORG Field Survey 1992

Table 3.4.2 : Service Levels in Survey Villages

No. of Villages Surveyed in Talukas	No. of Villages Reporting Having Following Services					
	Kutcha Road	Pucca Road	Post Office	Telegraph	Bus Service	Electricity
Danta (40)	19	29	9	8	40	40
Palanpur (2)	1	2	-	-	2	2

Source : ORG Field Survey 1992

Table 3.4.3 : Income of Village Panchayats

Taluka with No. of Villages Surveyed	Number of Villages Reporting Income From Own Sources as (Rs.)				Number of Villages Reporting Income From Govt. Grants as (Rs.)			
	< 2000	2001-6000	6001-10000	> 10000	< 5000	5001-15000	15001-25000	>25000
Danta (40)	27	9	3	1	-	7	10	23
Palanpur (2)	1	1	-	-	-	-	1	1

Source : ORG Field Survey 1992

Table 3.4.4 : Level of Annual Household Incomes Reported for Different Occupations

Taluka with No. of Survey Villages	Occupation and No. of Villages Reporting	No. of Villages Reporting Income Levels as (Rs.)				
		< 2000	2001-5000	5001-10000	10001-15000	> 15000
Danta (40)	Agriculture (40)	-	4	32	4	-
	Dairying (18)	9	7	1	-	-
	Small Business(36)	-	13	16	5	2
	Service (2)	-	-	1	-	1
	Agri. Labourer(27)	2	19	6	-	-
Palanpur(2)	Agriculture (2)	-	1	-	1	-
	Dairying (0)	-	-	-	-	-
	Small Business(2)	-	-	2	-	-
	Service (1)	-	-	-	1	-
	Agri. Labourer(2)	-	1	1	-	-

Source : ORG Field Survey 1992

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Table 3.4.5 : Status of Existing Water Supply by Different Sources

Taluka with No. of Villages Surveyed	Source of Water	No. of Villages Reporting Source Used for		No. of Villages Reporting Adequacy		No. of Villages Reporting Source as		No. of Villages Reporting Pumped Storage Scheme
		Human Use	Cattle Use	Round the Year	Part of the Year	Potable	Non-Potable	
Danta (40)	Hand Pump	38	38	38	-	38	-	-
	Dugwell	23	17	20	3	23	-	-
	Tubewell	4	4	4	-	4	-	-
	Tank/Pond	-	6	-	6	-	6	-
	River	1	15	-	15	-	15	-
	Pumped Storage Scheme	-	-	-	-	-	-	9
Palanpur (2)	Hand Pump	2	2	2	-	2	-	-
	Dugwell	1	-	-	1	1	-	-
	Tubewell	-	-	-	-	-	-	-
	Tank/Pond	-	1	-	1	-	1	-
	River	-	2	-	2	-	2	-

Source : ORG Field Survey 1992

Table 3.4.6 : Status of Sanitation Facilities

Taluka and No. of Villages Surveyed	Type of Sanitation Facility	No. of Villages Reporting
Danta (40)	Household Latrines	4
	School Latrines	1
	Public Latrines	2
	H/H Sewerage Connection	1
	Open Gutters	1
Palanpur(2)	Household Latrines	1
	School Latrines	-
	Public Latrines	-
	H/H Sewarage Connection	-
	Open Gutters	-

Source : ORG Field Survey 1992

Table 3.4.7 : Educational Facilities

Taluka and No. of Villages Surveyed	Number of Villages Reported Having							
	Primary School	Secondary School		High School		College	Adult Literacy Centre	Anganwadi
		Within Village	Nearby Village	Within Village	Nearby Village			
Danta (40)	40	2	16	1	9	1	6	35
Palanpur (2)	2	-	1	-	1	-	-	2

Source : ORG Field Survey 1992

Table 3.4.8 : Health Facilities and Diseases Reported

Taluka and No. of Villages Surveyed	Number of Villages Having					Number of Villages Reporting		
	Dispensary/ Hospital	PHC(s)	CHW	FPC	Private Doctors	Malaria	Skin Diseases	Gastro Enteritis
Danta (40)	1	39	38	2	2	14	5	1
Palanpur (2)	-	2	2	-	-	-	-	-

Source : ORG Field Survey 1992

Table 3.4.9 : Educational Standards of Women

Taluka and No. of Villages Surveyed	Level of Education	Villages Reporting Women Population as			
		< 20%	20-50%	51-80%	> 80%
Danta (40)	Illiterate	1	1	11	27
	5th Standard	31	9	-	-
	High School	15	2	-	-
Palanpur (2)	Illiterate	-	-	1	1
	5th Standard	1	1	-	-
	High School	2	-	-	-

Source : ORG Field Survey 1992

Table 3.4.10 : Inadequacies/Problems Identified by Women

Taluka and No. of Villages Surveyed	Dificiency of	Villages Reporting Deficiency Priority as			
		1	2	3	4
Danta (40)	Health Services	4	18	15	-
	Water Supply	29	5	3	2
	Sanitation	1	2	3	5
	Education	6	14	16	2
Palanpur (2)	Health Services	-	1	1	-
	Water Supply	2	-	-	-
	Sanitation	-	-	-	-
	Education	-	1	1	-

Source : ORG Field Survey 1992

Table 3.4.11 : Existing Village Level Institutions

Taluka and Number of Villages Surveyed	Number of Villages Reported Having					Other (Yuvak Mandals Mahila Mandals)
	Gram Panchayat	Group Panchyat	Government Offices	Private Offices	NGO/Voluntary Agencies	
Danta (40)	20	20	1	-	1	3
Palanpur (2)	1	1	-	-	-	-

Source : ORG Field Survey, 1992

CHAPTER - IV

4.0 RAJIV GANDHI WATER MISSION DATA

The data on the status of rural water supply in villages and hamlets proposed tobe covered by the new regional water supply schemes has been covered under separate survey by the Gujarat Water Supply and Sewerage Board. The data collected covers various aspects like population, safe drinking water sources, level of coverage, existing problems of drinking water at different villages. The data which has been collected till data has been presented in the following sections.

4.1 Lathi Liliya Extension RWS Scheme

Table 4.1.1 to 4.1.6 contains the information about the current drinking water status in this project. The distribution of the population appears tobe more in the large villages with population greater than 1500. 52% of the villages and 75% of the population are accounted for under this category of large village. All the project villages in Amreli and Lathi talukas have

currently pumped systems mostly based on tubewells. In Liliya taluka ten out of twelve villages have gravity cum lift schemes functioning on a regional basis. Though the coverage of these villages indicate fairly high degree of coverage, actually the reliability of the sources is not very high. This is due both to the irregular power supply and low groundwater yield during summer. There about 62% of the villages in Amereli taluka and 87% of the villages in Lathi taluka have water supply level less than 25 Lpcd. There are about 83% of the villages in Liliya taluka who have an water supply level between 26 to 40 lpcd.

Table 4.1.1 : Distribution of Villages by Population

Taluka	No. of Villages	No. of Villages with Population			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Amreli	34	3	4	9	18
Lathi	8	1	-	3	4
Liliya	12	1	4	1	6

Table 4.1.2 : Distribution of Population by Village Size

Taluka	Total Population	% Population in Village Size by Popln. of			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Amreli	56981	1.8	4.3	19.9	74.1
Lathi	14024	2.9	-	23.5	73.6
Liliya	22652	2.1	14.7	6.3	76.9

Table 4.1.3 : Coverage of Population by Types of Schemes

Taluka	No. of Villages	Total Population	Pumped Systems Cover		Gravity(Regional) Schemes	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Amreli	33	55286	33	55286	-	-
Lathi	8	14024	8	14024	-	-
Liliya	12	22652	2	4653	10	17999

Table 4.1.4 : Coverage of Population by Existing Schemes

Taluka	No. of Villages	Total Population	Partly Covered		Fully Covered	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Amreli	34	56981	-	-	34	56981
Lathi	8	14024	-	-	8	14024
Liliya	12	22652	2	7944	10	14708

Table 4.1.5 : Distribution of Villages by Safe Water Sources

Taluka	No. of Villages	No. of Villages with No. of Water Sources		
		1	2-3	> 3
1	2	3	4	5
Amreli	34	-	4	30
Lathi	8	1	2	5
Liliya	12	-	6	6

Table 4.1.6 : Distribution of Villages by Level of Water Supply

Taluka	No. of Villages	% Villages with Supply Level (lpcd)		
		< 25	26-40	41-55
1	2	3	4	5
Amreli	34	61.8	35.3	2.9
Lathi	8	87.5	12.5	-
Liliya	12	16.7	83.3	-

4.2 Und II RWS Scheme

Tables 4.2.1 to 4.2.6 contains informations about the current drinking water status in this project. The distribution of the villages by population appears more uniform in Dhrol and Jodiya talukas while in Jamnagar taluka about 89% of the population is accounted for in larger villages having population of more than 1500 people. Except for one village of Dhrol taluka, remaining villages are all having pumped water system based on groundwater. Excepting the population one village in Jodiya taluka the remaining villages of the project area are fully covered by the existing schemes. However, the level of the supply appears tobe not very high as 70% of villages in Jamnagar and 100% of the villages in Jodiya talukas have reported supply of less than 25 lpcd. In Dhrol taluka 91% of the villages have reported water supply level between 25 and 40 lpcd.

Table 4.2.1 : Distribution of Villages by Population

Taluka	No. of Villages	No. of Villages with Population			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Dhrol	24	6	6	7	5
Jamnagar	18	1	5	-	12
Jodiya	21	4	5	4	8

Table 4.2.2 : Distribution of Population by Villages Size

Taluka	Population	% Population Covered by Village of Population Size			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Dhrol	30924	6.8	14.4	26.7	52.1
Jamnagar	38122	1.3	9.2	-	89.5
Jodiya	28769	3.0	14.4	15.9	66.8

Table 4.2.3 : Coverage of Population by Types of Schemes

Taluka	No. of Villages	Total Population	Pumped System Coverage		Gravity(Regional) Schemes Coverage	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Dhrol	25	30924	24	30472	1	452
Jamnagar	18	38122	18	38122	-	-
Jodiya	21	28725	21	28725	-	-

Table 4.2.4 : Coverage of Population by Existing Schemes

Taluka	No. of Villages	Total Population	Not Covered		Fully Covered	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Dhrol	25	28824	-	-	25	28824
Jamnagar	19	36658	-	-	19	36658
Jodiya	24	28072	1	44	23	28028

Table 4.2.5 : Distribution of Villages by Safe Water Sources

Taluka	No. of Villages	No. of Village with No. of Water Sources		
		1	2-3	> 3
1	2	3	4	5
Dhrol	1	1	-	-
Jamnagar	18	18	-	-
Jodiya	17	10	6	1

Table 4.2.6 : Distribution of Villages by Level of Water Supply

Taluka	No. of Villages	% Villages with Supply Level (lpcd)		
		< 25	26-40	41-55
1	2	3	4	5
Dharol	24	8.3	91.7	-
Jamnagar	17	70.6	29.4	-
Jodiya	17	100.0	-	-

4.3 Ghogha RWS Scheme

Tables 4.3.1 to 4.3.6 contains information about the current drinking water status in the villages included in this project. Both Bhavnagar and Talaja talukas have more of large villages with population of more than 1500. 86% of population of Bhavnagar taluka and 84% of the Jalaga taluka are located in such large villages. The villages currently are having both pumped system and gravity system in equal proportion. There are seven villages which are not covered and 16 villages which are partially covered by these existing schemes. This has resulted in about 10% of the population being left uncovered and 25% of the population being partially covered under these existing schemes. With regard to safe water sources available at village level, the Ghogha taluka appears tobe well endowed. The level of water supply, however, appears to be low in this area with almost all the villages reporting the supply level less than 40 lpcd.

Table 4.3.1 : Distribution of Villages by Population

Taluka	No. of Villages	No. of Villages with Population			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Bhavanagar	22	2	3	3	14
Ghogha	28	-	10	8	10
Talaja	24	1	2	5	16

Table 4.3.2 : Distribution of Population by Villages Size

Taluka	Population	% Population Covered by Village of Population Size			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Bhavnagar	50215	1.2	4.7	7.3	86.9
Ghogha	48769	-	15.3	20.2	64.4
Talaja	49700	0.1	2.9	12.7	84.3

Table 4.3.3 : Coverage of Population by Types of Schemes

Taluka	No. of Villages	Total Population	Pumped System Coverage		Gravity System Coverage	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Bhavnagar	15	37918	7	21730	8	16188
Ghogha	20	38824	10	16608	10	22216
Talaja	3	9625	-	-	3	9625

Table 4.3.4 : Coverage of Population by Existing Schemes

Taluka	No. of Villages	Total Population	Nor Covered		Partlyt Covered		Fully Covered	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7		
Bhavnagar	22	49914	6	12665	4	14954	12	22295
Ghogha	28	48769	-	-	-	-	28	48769
Talaja	25	49700	1	1714	12	21842	12	26144

Table 4.3.5 : Distribution of Villages by Safe Water Sources

Taluka	No. of Villages	No. of Village with No. of Water Sources		
		1	2-3	> 3
1	2	3	4	5
Bhavnagar	16	10	5	1
Ghogha	28	3	5	20
Talaja	23	5	4	14

Table 4.3.6 : Distribution of Villagee by Level of Water Supply

Taluka	No. of Villagee	% Villages with Supply Level (lpcd)			
		< 25	26-40	41-55	> 55
1	2	3	4	5	6
Bhavnagar	14	14.3	85.7	-	-
Ghogha	28	42.9	57.1	-	-
Talaja	23	39.1	56.5	-	4.3

4.4 Ambaji Danta RWS Scheme

Tables 4.4.1 to 4.4.6 contains information about the current drinking water status in the villages included in this project. Distribution of villages by size indicate predominance of smaller villages less than 1000 persons accounting for about half the population of the project area. Most of the population is covered by pumped water supply system based on groundwater. Except for 17 villages the remaining villages within the project area are fully covered by the existing schemes. The level of supply reported by more than 75% of the villages was between 26 to 40 lpcd.

Table 4.4.1 : Distribution of Villages by Population

Taluka	No. of Villages	No. of Villages with Population			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Danta	181	83	65	20	13
Palanpur	7	2	3	-	2

Table 4.4.2 : Distribution of Population by Villages Size

Taluka	Total Population	% Population Covered by Village of Population Size			
		< 500	501 to 1000	1001 to 1500	> 1500
1	2	3	4	5	6
Danta	121414	18.3	37.9	20.1	23.8
Palanpur	8145	30.3	24.5	-	45.2

Table 4.4.3 : Coverage of Population by Types of Schemes

Taluka	No. of Villages	Total Population	Pumped System Coverage		Gravity(Regional) Schemes Coverage	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation
1	2	3	4	5	6	7
Danta	184	121414	182	118172	2	3242
Palanpur	6	8145	6	4771	1	3374

Note : Including Hamlets Around the Villages.

Table 4.4.4 : Coverage of Population by Existing Schemes

Taluka	No. of Villages	Total Population	Nor Covered		Partlyt Covered		Fully Covered	
			No. of Villages	Popu-lation	No. of Villages	Popu-lation	No. of Villages	Popu-latio
1	2	3	4	5	6	7		
Danta	185	121414	6	1682	11	9455	168	110277
Palanpur	11	8145	-	-	-	-	11	8145

Note : Including Hamlets Around the Villages.

Table 4.4.5 : Distribution of Villages by Safe Water Sources

Taluka	No. of Villages	No. of Village with No. of Water Sources		
		1	2-3	> 3
1	2	3	4	5
Danta	175	32	59	84
Palanpur	9	6	3	-

Table 4.4.6 : Distribution of Villages by Level of Water Supply

Taluka	No. of Villages	% Villages with Supply Level (lpcd)		
		< 25	26-40	41-55
1	2	3	4	5
Danta	176	6.2	89.2	4.5
Palanpur	10	30.0	70.0	-