

Chapter - 4

Data Collection



4 DATA COLLECTION FOR IMPACT OF CHECK DAMS ON BHADAR-I IRRIGATION PROJECT & RAJKOT DISTRICT

4.1 BASE LINE DATA COLLECTION

Base line data were collected for impact analysis of check dams on Bhadar-I irrigation project and Rajkot district. The data set included:

- Locational details and geographical areas of villages (Table 4.1).
- Details of beneficiary wells (Table 4.2).
- Weekly rainfall for years 2003, 2004 and 2005 (Table 4.3, 4.4 and 4.5).
- Rain gauge stations within and around Bhadar(s) catchment area (Table 4.6).
- River gauging sites in Bhadar river basin (Table 4.7).
- Salient features of Bhadar project (Table 4.8).
- Sedimentation survey in reservoirs of Saurashtra region (Table 4.9).
- Sedimentation survey in northern, central, southern and kachchh regions of Gujarat (Table 4.10, 4.11, 4.12 and 4.13).
- Talukawise geographical area of Rajkot district (Table 4.14)
- Talukawise average rainfall (mm) for years 1991 to 1997, 1998 to 2002 and 2003 to 2006 in Rajkot district (Table 4.15, 4.16 and 4.17).
- Talukawise average rainfall from year 1961 to 2006 of Rajkot district (Table 4.18)
- Typical records of check dams executed in people participation scheme (Table 4.19).
- Talukawise average rise in water level for years 1991 to 1997, 1998 to 2002 and 2003 to 2006 in Rajkot district (Table 4.20, 4.21 and 4.22).
- Talukawise recharge structures in Rajkot district (Table 4.23).

- Flooded/ waterlogged area (Table 4.24).
- Talukawise details of canals of major and minor irrigation schemes of Rajkot district (Table 4.25)
- Talukawise ground water draft through structures of Rajkot district (Table 4.26)

The details of data are presented in the tables given below:

Table 4.1 Sub basin wise geographical area of villages

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
1	Rajkot	Jasdan	Lalavadar	4.68
			Lilapur	22.34
			Madhavipur	6.10
			Mota Hadmatiya	8.80
			Shivrajpur	26.49
			(5) Total	73.41
2	Rajkot	Jasdan	Kalasar	24.65
			(1) Total	24.65
3	Rajkot	Jasdan	Bakhlvad	11.86
			Barvala	14.34
			Depara	9.81
			Jasdan	44.48
			Kamlapur	24.66
			Parewala	10.49
			Polarpar	6.05
			(7) Total	121.69
4	Rajkot	Jasdan	Juna pipaliya	12.58
			Kanesara	23.43
			Kothi	11.18
			Kundani	8.66
			Nani Lakhavad	12.57
			Rajavadia Jas	3.29
			(6) Total	71.71
5	Rajkot	Jasdan	Vimagar	27.84
			(1) Total	27.84
6	Amreli	Babra	Kalorana	10.34
	Amreli	Babra	Khanpar	5.10
			(2) Total	15.44

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
7	Rajkot	Jasdan	Atkot	21.90
			Jangvad	19.88
			Panchavada	20.90
			(3) Total	62.68
8	Amreli	Babra	Gami	11.90
			Karnuki	5.25
			Kotda Pitha	27.60
			Miya Khijadiya	8.12
			Navaniya	7.51
			Pansada	10.32
			Untvad	21.65
			Vavda	15.65
	Rajkot	Jasdan	Gandhiya (jas)	6.44
			Jivapar	15.23
			(10) Total	129.67
9	Amreli	Babra	Isapar	7.42
			Nadala	7.70
			Thorkhan	10.28
			(3) Total	25.40
10	Rajkot	Jaddan	Jasapar	16.24
			(1) Total	16.24
11	Rajkot	Jasdan	Baldhol	19.00
			(1) Total	19.00
12	Rajkot	Jasdan	Gandhiya (jam)	8.36
			Khadvavdi	11.88
			Ramaliya	10.43
	Rajkot	Kotada Sangani	Bagdadiya	5.15
			Nana mandava	8.89
			Nava Rajpipla	4.98
			Pipaliya karmal	3.39
			Vadipara	11.56
	Rajkot	Rajkot	Bhupgadh	11.18
			Badpar	6.89
			Bhangda	5.39
			Dungarpar	8.62
			Haripar	13.46
			Helenda	13.26
			Hodthali	7.15
			Karchachiya	8.01

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
			Makanpar	5.42
			Sardhar	31.81
			Umralli	8.84
			(19) Total	184.67
13	Rajkot	Gondal	Kamarkotda	7.23
			Mota mandava	17.94
			Ramod	23.60
			Rampara	7.45
			Sandhavaya	11.65
			Satapar	16.04
			Vadiya	8.45
			(7) Total	92.36
14	Rajkot	Gondal	Bandhiya	13.90
	Rajkot	Kotada Sangani	Shishak	9.36
			(2) Total	23.26
15	Rajkot	Gondal	Shrinathgadh	15.73
			(1) Total	15.73
16	Rajkot	Gondal	Madankundla	12.59
			(1) Total	12.59
17	Rajkot	Gondal	Shivrajgadh	52.4
			(1) Total	52.40
18	Rajkot	Gondal	Bandra	11.47
			Bhojpara	8.52
			Biliyala	8.92
			Chordi	18.7
			Devachadi	13.36
			Ghodavadar	18.07
			Gomata	28.45
			Gondal	66.28
			Gundasara	12.2
			Jamvali	4.75
			Kantoliya	8.95
			Karmal Kotda	8.71
			Khandhar	11.46
			Moviya	66.54
			Nagadka	5.1
			Navagam	11.05
			Panchiyavadar	6.24

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
			Pipaliya	8.15
			Bharudi	7.03
			Bhunava	8.17
			Vorakotda	10.52
			Lilakha	9.05
			Rupavati	8.11
			Shemla	9.32
			Vachhra	12.76
	Rajkot	Kotada Sangani	Anandpar	5.85
			Anida	14.98
			Ardoi	26.71
			Bhadoi	5.64
			Bhadva	9.84
			Detadiya	5.38
			Devaliya	5.61
			Hadamatala	11.32
			Khareda	9.43
			Khokhri	10.25
			Kotda Sangani	23.22
			Manekvada	10.01
			Naranka	8.83
			Panchtalavda	9.97
			Rajgadh	7.69
			Rajpara	19.03
			Soliya	7.02
	Rajkot	Rajkot	Chitravav	3.28
			Navagam	6.44
			Rampara	1.64
			Sar	5.75
			Suki Sajadiali	9.55
			(47) Total	599.32
19	Amreli	Babra	Charkha	25.33
			Chamardi	28.04
			Balel Pipaliya	16.6
			Devaliya Mota	33.74
			Dharai	15.61
			Fuljhar	7.81
			Gamapipaliya	19.75
			Ghughrala	16.95

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
19			Jivapar	3.75
			Khijadiya kotda	9.29
			Lonkotda	12.54
			Nonhganvadar	4.17
			Ranpar	7.82
			Tramboda	12.08
	Rajkot	Gondal	Keshvala	13.9
			Vasavad	24.28
	Rajkot	Jasdan	Madhda	5.26
			Meghpar	8.88
			Ranparda	7.33
			Zundala	12.96
	Amreli	Kunkavav Vada	Dadva (Randal)	12.14
			(21) Total	298.23
20	Amreli	Babra	Ishvariya	12.06
	Rajkot	Gondal	Bildi	10.51
			Derdi	31.69
			Dharala	6.87
			Kamadhiya	15.47
			Khambhalida	6.46
			Moti Khiroli	17.68
			Patkhilori	7.68
			Ravna	9.35
	Amreli	Kunkavav Vada	Badanpur Juna	4.32
			Badanpur Nava	2.62
			Bambhaniya	11.19
			Devgam	22.95
			Ishvariya	9.36
			Lakhapadar	8
			Maya Padar	8.88
			Megha-pipaliya	12.24
			Nanikunkavav	19
			Sanala	8.69
			Sarangpur	8.53
			(20) Total	233.55
21	Rajkot	Gondal	Mota Sakhpar	7.34
			Nana Sakhpar	6.81
			Ransiki	9.96

Sub Basin No.	District	Name of taluka	Name of village	Geographical area (km ²)
	Amreli	Kunkavav Vada	Sajadiyali	5.12
			Vinzivad	7.68
			Bhayavadar	9.68
			Sanali	13.12
			Talali	5.45
			Ujalal-Nana	7.45
			Ujala-Mota	12.5
			Vavdi	6.56
			(11) Total	91.67
22	Rajkot	Gondal	Dhudashiya	9.37
	Amreli	Kunkavav Vada	Anida	9.34
			Khajuri-Pipaliya	8.82
			Targhari	6.69
			(4) Total	34.22
23	Rajkot	Gondal	Devla	11.75
			Sultanpur	46.26
	Amreli	Kunkavav Vada	Bhuki-Santhali	7.66
			Khadkhad	11.66
			Khajuri	7.05
			Khakhariya	4.46
			Moti Kunkavav	37.77
			Surya Pratapgadh	8.19
			(8) Total	134.80
24	Rajkot	Jasdan	Dolatpar	8.03
			Sanathali	33.15
			Pratappur	8.67
			(3) Total	49.85
25	Rajkot	Jasdan	Veraval Sanathali	5.46
			(1) Total	5.46
26	Rajkot	Jasdan	Chitaliya	4.01
			(1) Total	4.01
27	Rajkot	Jasdan	Jasdan	5.15
			(1) Total	5.15
			Grand Total of 188 Villages	2425.00

(Source : Government census book 2001)

Note : Chotila Taluka of Surendranagar district is falling in Bhadar-I. However, its influence is very negligible and hence not considered.

Table 4.2 Sub basin wise details of wells benefited

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Rajkot	Jasdan	Lalavadar	1	0	0.000
Rajkot	Jasdan	Lilapur	1	0	0.000
Rajkot	Jasdan	Madhavipur	1	54	54.000
Rajkot	Jasdan	Mota Hadmatiya	1	85	232.000
Rajkot	Jasdan	Shivrajpur	1	0	0.000
		Total	1	139	286.000
Rajkot	Jasdan	Kalasar	2	7	5.000
		Total	2	7	5.000
Rajkot	Jasdan	Bakhlvad	3	28	31.000
Rajkot	Jasdan	Barvala	3	0	0.000
Rajkot	Jasdan	Depara	3	0	0.000
Rajkot	Jasdan	Jasdan	3	223	297.000
Rajkot	Jasdan	Kamlapur	3	72	76.000
Rajkot	Jasdan	Parewala	3	41	21.000
Rajkot	Jasdan	Polarpar	3	22	26.000
		Total	3	386	451.000
Rajkot	Jasdan	Juna pipaliya	4	71	123.000
Rajkot	Jasdan	Kanesara	4	140	121.000
Rajkot	Jasdan	Kothi	4	32	26.000
Rajkot	Jasdan	Kundani	4	0	0.000
Rajkot	Jasdan	Nani Lakhavad	4	129	93.000
Rajkot	Jasdan	Rajavadia Jas	4	61	38.000
		Total	4	433	401.000
Rajkot	Jasdan	Vimagar	5	54	31.000
		Total	5	54	31.000
Amreli	Babra	Kalorana	6	15	1.059
Amreli	Babra	Khanpar	6	54	420.473
		Total	6	69	421.532
Rajkot	Jasdan	Atkot	7	69	70.000
Rajkot	Jasdan	Jangvad	7	52	57.000
Rajkot	Jasdan	Panchavada	7	203	295.000
		Total	7	324	422.000
Amreli	Babra	Gami	8	17	12.577
Amreli	Babra	Karnuki	8	0	0.000
Amreli	Babra	Kotda Pitha	8	20	4.644
Amreli	Babra	Miya Khijadiya	8	0	0.000

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Amreli	Babra	Navaniya	8	11	97.000
Amreli	Babra	Pansada	8	0	0.000
Amreli	Babra	Untvad	8	4	2.000
Amreli	Babra	Vavda	8	0	0.000
Rajkot	Jasdan	Gandhiya (jas)	8	33	26.000
		Total	8	85	142.222
Amreli	Babra	Isapar	9	15	4.375
Amreli	Babra	Nadala	9	0	0.000
Amreli	Babra	Thorkhan	9	29	113.000
		Total	9	44	117.375
Rajkot	Jasdan	Baldhol	11	64	37.000
		Total	11	64	37.000
Rajkot	Jasdan	Gandhiya (jam)	12	0	0.000
Rajkot	Jasdan	Khadvavdi	12	46	38.000
Rajkot	Jasdan	Ramaliya	12	44	50.000
Rajkot	Kotada Sangani	Bagdadiya	12	0	0.000
Rajkot	Kotada Sangani	Nana mandava	12	73	77.000
Rajkot	Kotada Sangani	Pipaliya karmal	12	0	0.000
Rajkot	Kotada Sangani	Vadipara	12	53	80.000
Rajkot	Rajkot	Badpar	12	90	139.000
Rajkot	Rajkot	Bhangda	12	15	23.000
Rajkot	Rajkot	Dungarpar	12	16	12.000
Rajkot	Rajkot	Haripar	12	185	146.000
Rajkot	Rajkot	Helenda	12	136	128.000
Rajkot	Rajkot	Hodhali	12	74	76.000
Rajkot	Rajkot	Karchachiya	12	95	88.000
Rajkot	Rajkot	Makanpar	12	39	45.000
Rajkot	Rajkot	Sardhar	12	120	92.000
Rajkot	Rajkot	Umrli	12	151	153.000
		Total	12	1137	1147.000
Rajkot	Gondal	Kamarkotda	13	9	3.000
Rajkot	Kotada Sangani	Mota mandava	13	58	122.000
Rajkot	Kotada Sangani	Ramod	13	85	156.000
Rajkot	Kotada Sangani	Rampara	13	29	22.000
Rajkot	Kotada Sangani	Sandhavaya	13	11	20.000

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Rajkot	Kotada Sangani	Satapar	13	167	281.000
Rajkot	Kotada Sangani	Vadiya	13	48	52.000
		Total	13	407	656.000
Rajkot	Gondal	Bandhiya	14	29	120.000
Rajkot	Kotada Sangani	Shishak	14	0	0.000
		Total	14	29	120.000
Rajkot	Gondal	Shrinathgadh	15	34	43.000
		Total	15	34	43.000
Rajkot	Gondal	Madankundla	16	94	119.000
		Total	16	94	119.000
Rajkot	Gondal	Shivrajgadh	17	80	86.000
		Total	17	80	86.000
Rajkot	Gondal	Bandra	18	0	0.000
Rajkot	Gondal	Bhojpara	18	41	35.000
Rajkot	Gondal	Biliyala	18	16	21.000
Rajkot	Gondal	Chordi	18	79	73.000
Rajkot	Gondal	Devachadi	18	61	22.200
Rajkot	Gondal	Ghodavadar	18	34	101.000
Rajkot	Gondal	Gomata	18	88	124.000
Rajkot	Gondal	Gondal	18	71	65.000
Rajkot	Gondal	Gundasara	18	64	50.000
Rajkot	Gondal	Jamvali	18	31	22.000
Rajkot	Gondal	Kantoliya	18	22	57.000
Rajkot	Gondal	Karmal Kotda	18	102	93.000
Rajkot	Gondal	Khandhar	18	0	0.000
Rajkot	Gondal	Moviya	18	158	137.000
Rajkot	Gondal	Nagadka	18	37	45.000
Rajkot	Gondal	Navagam	18	27	15.000
Rajkot	Gondal	Panchiyavadar	18	26	24.000
Rajkot	Gondal	Rupavati	18	51	74.000
Rajkot	Gondal	Shemla	18	34	47.000
Rajkot	Gondal	Vachhra	18	4	8.000
Rajkot	Kotada Sangani	Anandpar	18	0	0.000

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Rajkot	Kotada Sangani	Anida	18	54	149.000
Rajkot	Kotada Sangani	Ardoi	18	0	0.000
Rajkot	Kotada Sangani	Bhadoi	18	0	0.000
Rajkot	Kotada Sangani	Bhadva	18	0	0.000
Rajkot	Kotada Sangani	Detadiya	18	27	66.000
Rajkot	Kotada Sangani	Devaliya	18	0	0.000
Rajkot	Kotada Sangani	Hadamatala	18	82	111.000
Rajkot	Kotada Sangani	Khareda	18	109	168.000
Rajkot	Kotada Sangani	Khokhri	18	0	0.000
Rajkot	Kotada Sangani	Kotda Sangani	18	84	122.000
Rajkot	Kotada Sangani	Manekvada	18	12	8.000
Rajkot	Kotada Sangani	Naranka	18	0	0.000
Rajkot	Kotada Sangani	Panchtalavda	18	9	10.000
Rajkot	Kotada Sangani	Rajgadh	18	30	140.000
Rajkot	Kotada Sangani	Rajpara	18	39	66.000
Rajkot	Kotada Sangani	Soliya	18	0	0.000
Rajkot	Rajkot	Chitravav	18	91	86.000
Rajkot	Rajkot	Navagam	18	44	30.000
Rajkot	Rajkot	Rampara	18	286	267.000
Rajkot	Rajkot	Sar	18	131	79.000
Rajkot	Rajkot	Suki Sajadiali	18	66	42.000
		Total	18	2010	2357.200
Amreli	Babra	Devaliya Mota	19	0	0.000
Amreli	Babra	Dharai	19	23	86.000
Amreli	Babra	Fuljhar	19	38	20.816
Amreli	Babra	Gamapipaliya	19	34	97.000
Amreli	Babra	Ghughrala	19	31	143.794
Amreli	Babra	Jivapar	19	0	0.000
Amreli	Babra	Khijadiya kotda	19	38	7.259
Amreli	Babra	Lonkotda	19	0	0.000
Amreli	Babra	Nonhganvadar	19	22	9.600
Amreli	Babra	Ranpar	19	0	0.000
Amreli	Babra	Tramboda	19	13	27.000
Rajkot	Gondal	Keshvala	19	8	125.000
Rajkot	Gondal	Vasavad	19	34	100.700
Rajkot	Jasdan	Madhda	19	6	11.000
Rajkot	Jasdan	Meghpar	19	26	21.000

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Rajkot	Jasdan	Ranparda	19	16	18.000
Rajkot	Jasdan	Zundala	19	0	0.000
Amreli	Kunkavav Vada	Dadva (Randal)	19	0	0.000
		Total	19	289	667.169
Amreli	Babra	Ishvariya	20	13	30.800
Rajkot	Gondal	Bildi	20	42	95.000
Rajkot	Gondal	Derdi	20	84	58.300
Rajkot	Gondal	Dharala	20	0	0.000
Rajkot	Gondal	Kamadhiya	20	34	34.000
Rajkot	Gondal	Khambhalida	20	4	10.000
Rajkot	Gondal	Moti Khiroli	20	34	162.000
Rajkot	Gondal	Patkhilori	20	5	5.000
Rajkot	Gondal	Ravna	20	5	2.000
Amreli	Kunkavav Vada	Badanpur Juna	20	17	3.000
Amreli	Kunkavav Vada	Badanpur Nava	20	0	0.000
Amreli	Kunkavav Vada	Bambhaniya	20	22	25.500
Amreli	Kunkavav Vada	Devgam	20	59	23.000
Amreli	Kunkavav Vada	Ishvariya	20	89	25.029
Amreli	Kunkavav Vada	Lakhapadar	20	59	21.802
Amreli	Kunkavav Vada	Maya Padar	20	0	0.000
Amreli	Kunkavav Vada	Megha-pipaliya	20	48	6.789
Amreli	Kunkavav Vada	Sanala	20	74	34.982
Amreli	Kunkavav Vada	Sarangpur	20	0	0.000
		Total	20	589	537.202
Rajkot	Gondal	Mota Sakhpur	21	20	56.000
Rajkot	Gondal	Nana Sakhpur	21	0	0.000
Rajkot	Gondal	Ransiki	21	98	113.000
Rajkot	Gondal	Sajadiyali	21	0	0.000
Rajkot	Gondal	Vinzivad	21	29	20.000
Amreli	Kunkavav Vada	Bhayavadar	21	0	0.000
Amreli	Kunkavav Vada	Sanali	21	74	9.691
Amreli	Kunkavav Vada	Talali	21	84	21.500
Amreli	Kunkavav Vada	Ujalal-Nana	21	0	0.000
Amreli	Kunkavav Vada	Ujala-Mota	21	0	0.000
Amreli	Kunkavav Vada	Vavdi	21	42	6.867
		Total	21	347	227.058

District	Name of taluka	Name of village	Sub basin No.	No of wells benefited	Area benefited (ha)
Rajkot	Gondal	Dhudashiya	22	0	0.000
Amreli	Kunkavav Vada	Anida	22	137	32.400
Amreli	Kunkavav Vada	Khajuri-Pipaliya	22	19	16.000
Amreli	Kunkavav Vada	Targhari	22	131	12.445
		Total	22	287	60.846
Rajkot	Gondal	Devla	23	0	0.000
Rajkot	Gondal	Sultanpur	23	73	158.000
Amreli	Kunkavav Vada	Bhuki-Santhali	23	85	15.752
Amreli	Kunkavav Vada	Khadkhad	23	154	84.275
Amreli	Kunkavav Vada	Khajuri	23	63	34.895
Amreli	Kunkavav Vada	Khakhariya	23	10	7.500
Amreli	Kunkavav Vada	Surya Pratapgadh	23	0	0.000
		Total	23	385	300.422
Rajkot	Jasdan	Dolatpar	24	16	26.000
Rajkot	Jasdan	Sanathali	24	117	226.500
Rajkot	Jasdan	Pratappur	24	54	170.000
		Total	24	187	422.500
Rajkot	Jasdan	Chitaliya	26	18	22.000
		Total	26	18	22.000
		Grand Total		7498	9079.525

(Source : Bhaskracharya Institute of Space Application and Geoinformatics, Gandhinagar)

Table 4.3 Weekly rainfall for year June 2003 to October 2003

Rain gauge Stations	(mm)																			
	JUNE					JULY					AUGUST					SEPTEMBER				
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
Week																				
Adiya	0	0	65	0	65	45	50		105	295	105	0	0	25	130	0	0	35	10	45
Amarnagar	0	15	92	0	107	129	72	32	59	292	143	0	0	44	187	0	0	0	0	0
Bhadar-I	0	0	175	0	175	135	75	38	73	321	137	84	0	78	299	4	0	3	36	43
Gondali	0	0	120	0	120	82	70	14	71	237	272	13	0	46	331	0	0	35	40	75
Ishvariya	0	0	78	0	78	72	74	55	103	304	143	1	0	63	217	1	0	0	7	8
Jasdan	0	0	90	0	90	50	168	73	163	454	112	7	0	38	157	0	0	0	26	26
K.Sanghani	0	0	74	0	74	146	82	33	42	303	211	2	0	58	271	0	0	73	10	83
Kamadhia	0	0	200	0	200	70	54	35	85	244	100	72	0	97	269	9	0	8	10	27
Rajwadala	0	0	52	0	52	30	78	45	62	215	138	15	0	77	230	0	0	6	65	71
Vachhapari	0	0	65	0	65	56	87	40	56	239	166	12	0	60	238	0	0	50	0	50
Total	0	15	1011	0	1026	815	810	460	819	2904	1527	216	0	586	2329	14	0	210	204	428
Average	0	2	101	0	103	82	81	46	82	290	153	22	0	59	233	1	0	21	20	43

Year	OCTOBER				Total	Year Total
	1	2	3	4		
	10	0	0	0	10	545
	0	0	0	0	0	586
	5	0	0	0	5	843
	0	0	0	0	0	763
	0	0	0	0	0	606
	0	0	0	0	0	727
	0	0	0	0	0	731
	0	0	0	0	0	740
	0	0	0	0	0	568
	0	0	0	0	0	592
	0	0	0	0	0	
	0	0	0	0	0	

(Source : State Water Data Center, Gandhinagar)

Table 4.4 Weekly rainfall for year June 2004 to October 2004 (mm)																										
Rain gauge Stations		JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER				Year Total				
Week	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total						
Adiya	0	70	15	25	110	20	0	15	65	100	130	40	15	0	185	0	0	45	90	135	10	10	0	0	20	550
Amamagar	0	61	50	35	146	97	0	25	62	184	261	31	0	0	292	17	0	0	12	29	29	0	0	0	29	680
Bhadar-I	0	26	179	26	231	86	9	8	83	186	198	55	21	0	274	8	2	1	3	14	0	10	0	0	10	715
Gondali	0	0	44	0	44	63	0	0	109	172	159	50	0	0	209	0	0	50	5	55	0	21	0	0	21	501
Ishvariya	0	0	106	28	134	50	5	13	42	110	97	50	8	0	155	0	0	35	42	77	3	0	0	0	3	479
Jasdan	0	1	48	0	49	24	0	23	94	141	79	51	8	1	139	0	8	5	43	56	0	0	0	0	0	385
K.Sanghani	0	0	35	25	60	75	5	3	93	176	150	35	9	0	194	0	0	111	9	120	0	0	0	0	0	550
Kamadhia	0	16	59	4	79	65	4	13	75	157	149	97	26	0	272	0	0	55	21	76	5	16	0	0	21	605
Rajwadala	0	50	10	15	75	25	0	0	90	115	82	27	22	0	131	15	0	0	91	106	25	0	0	0	25	452
Vachhapari	0	70	15	25	110	20	0	15	65	100	130	40	15	0	185	0	0	45	90	135	10	10	0	0	20	550
Total	0	61	50	35	146	97	0	25	62	184	261	31	0	0	292	17	0	0	12	29	29	0	0	0	29	680
Average	0	26	179	26	231	86	9	8	83	186	198	56	21	0	274	8	2	1	3	14	0	10	0	0	10	715

(Source : State Water Data Center, Gandhinagar)

Table 4.6 List of rain gauge stations within and around catchment area of Bhadar(S) river basin

Sr. No.	Name of rain gauge stations	Type of station	Name of district
1	2	3	4
1	Anandpur (Bhadla)	Ordinary Rain Gauge Station (O.R.G.)	Surendranagar
2	Adhiya Tank	O.R.G.	Rajkot
3	Alansagar	O.R.G.	Rajkot
4	Rajavadla	O.R.G.	Rajkot
5	Jasdan	S.R.R.G.	Rajkot
6	Babra	O.R.G.	Amreli
7	Sardhar	O.R.G.	Rajkot
8	Revania Tank	O.R.G.	Rajkot
9	Kotada Sangani	Self Recording Rain Gauge Station (S.R.R.G.)	Rajkot
10	Veri	O.R.G.	Rajkot
11	Gondal	S.R.R.G.	Rajkot
12	Kamadhia	O.R.G.	Rajkot
13	Vasavad	S.R.R.G.	Rajkot
14	Bhadar-I Dam	O.R.G.	Rajkot
15	Ishwaria	O.R.G.	Rajkot
16	Karmal	O.R.G.	Rajkot
17	Lodhika	S.R.R.G.	Rajkot
18	Chhaparwadi-I	O.R.G.	Rajkot
19	Chhaparwadi-Ii	O.R.G.	Rajkot
20	Jetpur	S.R.R.G.	Rajkot
21	Baria	O.R.G.	Rajkot
22	Amarnagar	O.R.G.	Rajkot
23	Kunkavav	S.R.R.G.	Amreli
24	Sankroli	O.R.G.	Rajkot
25	Jamkandorna	S.R.R.G.	Rajkot
26	Phophal	O.R.G.	Rajkot
27	Bhesan	O.R.G.	Junagadh
28	Dadar	O.R.G.	Rajkot
29	Samana	O.R.G.	Jamnagar
30	Seeth Wadala	O.R.G.	Jamnagar
31	Dhandh Wala	O.R.G.	Jamnagar
32	Venu-I	O.R.G.	Jamnagar
33	Dhandh	O.R.G.	Jamnagar
34	Jam Jodhpur	S.R.R.G.	Jamnagar

1	2	3	4
35	Moj	O.R.G.	Rajkot
36	Dhoraji	S.R.R.G.	Rajkot
37	Venu-Ii	O.R.G.	Rajkot
38	Nagvadar	O.R.G.	Rajkot
39	Upleta	S.R.R.G.	Rajkot
40	Kutiyana	S.R.R.G.	Junagadh
41	Manavadar	S.R.R.G.	Junagadh

(Source : Water Resource Investigation Circle, Ahmedabad)

Table 4.7 Statement showing name of river gauging sites in Bhadar river basin

Sr. No.	Name of sub-basin	Name of river/tributary	Name of river gauging site	Type of river gauging site
1	Bhadar-I	Bhadar	Bhadar @ Vegdi	Gauge and Discharge Site (G.D.S.)
2	Bhadar-I	Bhadar	Bhadar @ Kamadhiya	G.D.S.
3	Bhadar-I	Gondali	Gondali @ Gondal	G.D.S.
4	Bhadar-I	Vasavadi	Vasavadi @ Vasavad	G.D.S.
5	Lower Bhadar	Moj	Moj @ Upleta	G.D.S.
6	Lower Bhadar	Venu	Venu-II @ Varjang-Jaliya	G.D.S.

(Source : Water Resource Investigation Circle, Ahmedabad)

Table 4.8 Salient features of Bhadar project

District/ Taluko	Rajkot / Gondal
Village	Nilakha
River	Bhadar
Latitude	21 ⁰ 5' North
Longitude	70 ⁰ 46' East
Total catchment area	2467 Km ²
Intercepted C.A.	279 Km ²
Average annual rainfall	63.06 cm
Maximum rainfall	152.57 cm
Minimum rainfall	13.43 cm
Estimated run-off	17 %
Gross reservoir capacity	237.89 Mm ³
Live storage capacity	223.73 Mm ³
Capacity at sill of outlet	14.16 Mm ³
Evaporation & absorption losses	39.64 Mm ³
Post monsoon flow	25.49 Mm ³

Storage available for irrigation	209.57 Mm ³
Design discharge of spillway	200000 Cusecs
Top of Dam	R.L. 113.08 m
H.F.L.	R.L. 110.34 m
Free board	2.34 m
F.S.L.	R.L. 107.89 m
Crest of weir	R.L. 106.07 m
Dead storage level	R.L. 97.54 m
L.W.L.	R.L. 99.51 m
Nos. of Gates / Size of Gates	29 Nos / 10.07 m x 1.82 m
Discharge	506 Cusecs
Culturable command area	26400 ha
Crops to be Irrigated	
a. Sugarcane	960 ha
b. Other perennials	200 ha
c. Ground Nut	3200 ha
d. Rice	2000 ha
e. Cotton	560 ha
f. Bajri – Juwar	1680 ha
g. Rabi (Wheat)	3200 ha
h. Rabi (Other)	4800 ha
i. Hot Weather (Seasonal)	360 ha
Total irrigation	16960 ha

(Source : Rajkot irrigation circle, Rajkot)

Table 4.9 Sedimentation survey carried out in Saurashtra region of Gujarat

Sr. No.	District	Name of reservoir	Year of impounding/ survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham/ 100km ² / yr)
1	Amreli	Surajwadi	1954	-	9.79	-	-	1
			1986	32	6.36	3.43	1.09	7.97
2	Amreli	Dhatarwadi	1975	-	32.74	-	-	1.9
			1986	11	26.8	5.94	1.65	9.44
3	Amreli	Khodiyar	1967	-	40.35	-	-	18.6
			2002	35	33.98	6.37	0.45	4.75
4	Amreli	Sankroli	1961	-	11	-	-	-
			2000	39	7.87	3.13	0.73	10.13
5	Bhavnagar	Kharo	1983	-	14.71	-	-	-
			2000	18	12.24	2.47	0.93	8.09
6	Bhavnagar	Shetrunji	1959	-	415.41	-	-	4.76
			2000	41	291.49	123.92	0.73	7

Sr. No.	District	Name of reservoir	Year of impounding/ survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham/ 100km ² / yr)
7	Bhavnagar	Rajwal	1981	-	33.01	-	-	-
			2000	20	28.21	4.8	0.73	8.36
8	Bhavnagar	Lakhanka	1985	-	4.26	-	-	-
			2000	15	3.69	0.57	0.897	7.752
9	Bhavnagar	Hamirpara	1984	-	2.41	-	-	-
			2000	16	2.02	0.39	0.99	6.96
10	Bhavnagar	Bhimdad	1953	-	11.19	-	-	1.43
			1986	33	6.69	4.5	1.22	12.4
11	Bhavnagar	Ghelo(I)	1963	-	13.35	-	-	3.51
			1986	23	10.03	3.32	1.08	13.46
12	Bhavnagar	Goma	1972	-	18.26	-	-	1.92
			1986	14	15.91	2.35	0.92	10.97
13	Bhavnagar	Ranghola	1952	-	44.23	-	-	1.43
			1986	34	36.69	7.84	0.52	6.22
14	Bhavnagar	Rojki	1964	-	12	-	-	1.95
			1986	-	9.23	2.77	1.05	14.77
15	Jamnagar	Vartu	1964	-	13.3	-	-	-
			1986	22	11.7	1.6	0.55	4.09
16	Jamnagar	Fulzar-I	1957	-	14.9	-	-	-
			2000	44	11.36	3.54	0.54	5.62
17	Jamnagar	Vijarakhi	1904	-	10.26	-	-	-
			2000	97	9.71	0.55	0.06	1.83
18	Jamnagar	Ghee	1953	-	13.84	-	-	-
			1986	33	12.38	1.46	0.32	3.08
19	Jamnagar	Ghee	1953	-	13.44	-	-	-
			2003	50	10.969	2.471	0.415	4.432
20	Jamnagar	Rangamati	1988	-	3.75	-	-	-
			2002	14	3.35	0.4	0.76	4.08
21	Jamnagar	Sapada	1963	-	7.11	-	-	-
			2000	37	5.56	1.55	0.59	7.72
22	Jamnagar	Puna	1953	-	13.98	-	-	-
			2003	50	7.83	6.15	0.879	8.96
23	Jamnagar	Sani	1984	-	55.08	-	-	N.A.
			2001	17	45.45	9.63	1.03	11.19
24	Jamnagar	Fulzar-II	1973	-	4.75	-	-	-
			2003	30	3.1	1.65	1.157	6.437
25	Jamnagar	Fulzar-II	1973	-	4.75	-	-	-
			1986	13	3.82	0.93	1.51	8.41
26	Jamnagar	Sasoi	1954	-	51.03	-	-	-
			1986	32	38.97	12.06	0.74	6.76
27	Junaghdh	Jhanjeshri	1976	-	10.63	-	-	-
			1986	10	10.03	0.6	0.56	8.57

Sr. No.	District	Name of reservoir	Year of impounding/survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham/100km ² /yr)
28	Junagadh	Hiran-I	1966	-	21.66	-	-	8.37
			1987	21	20.23	1.43	0.31	8.41
29	Junagadh	Hiran-II	1981	-	38.58	-	-	1.91
			1998	18	35.15	3.43	0.49	5.46
30	Junagadh	Madhuvanti	1973	-	12.15	-	-	8.38
			1986	13	11.65	0.5	0.32	8.89
31	Junagadh	Vrajmi	1988	-	10.35	-	-	-
			2003	15	9.89	0.46	0.3	5.88
32	Porbandar	Sorthi	1974	-	10.69	-	-	-
			1986	12	7.31	3.38	2.63	14.14
33	Rajkot	Chhapparwadi	1974	-	5.01	-	-	-
			1986	12	4.22	0.79	1.31	7.69
34	Rajkot	Moj	1955	-	53.01	-	-	3.57
			1999	43	36.69	16.29	0.72	8.6
35	Rajkot	Gondali	1956	-	11.36	-	-	-
			1987	30	10.11	1.25	0.37	6.06
36	Rajkot	Demi-I	1959	-	21.52	-	-	-
			1984	25	16.65	4.87	0.91	11.45
37	Rajkot	Bhadar (I)	1964	-	178.84	-	-	-
			2004	40	146.31	32.53	0.45	3.38
38	Rajkot	Phophal	1974	-	59.6	-	-	-
			2000	26	51.82	7.78	0.5	5.6
39	Rajkot	Khodapipar	1996	-	3.37	-	-	-
			2004	8	2.99	0.37	1.38	8.72
40	Rajkot	Lalpari	1899	-	10.08	-	-	-
			2001	102	5.06	5.02	0.49	5.98
41	Rajkot	Ghodadhroi	1987	-	8.34	-	-	-
			2002	15	6.88	1.46	1.17	6.66
42	Rajkot	Aji-I	1957	-	32.29	-	-	-
			2000	43	26.43	5.86	0.42	9.64
43	Rajkot	Machhu-I	1958	-	83.13	-	-	7.4
			1994	36	75.09	8.04	0.22	3.06
44	Rajkot	Machhu-II	1972	-	100.56	-	-	4.76
			1997	25	60.69	39.86	1.59	8.27
45	Rajkot	Venu-II	1989	-	22.58	-	-	4.8
			1999	10	15.32	7.26	3.22	9.67
46	Rajkot	Motisar	1992	-	2.692	-	-	-
			2001	9	2.579	0.112	0.463	3.647
47	Rajkot	Bangawadi	1986	-	4.91	-	-	-
			2001	15	4.26	0.65	0.88	6.95
48	Rajkot	Nyari-II	1986	-	13	-	-	-
			2002	16	12.253	0.747	0.36	2.99

Sr. No.	District	Name of reservoir	Year of impounding/ survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham/ 100km ² / yr)
49	Rajkot	Ghelo(S)	1963	-	8.13	-	-	3.57
			1986	23	6.09	2.04	1.09	15
50	Rajkot	Chhapar-II	1979	-	18.89	-	-	-
			2001	22	16.612	2.278	0.548	2.77
51	Surendranagar	Vansal	1990	-	3.97	-	-	-
			2002	12	3.55	0.42	0.88	5.69
52	Surendranagar	Wadhawan-II	1959	-	23.36	-	-	7.62
			1988	29	20.39	2.97	0.44	1.75
53	Surendranagar	Wadhwan-I	1960	-	18.15	-	-	-
			1986	26	15.49	2.66	0.56	2.3
54	Surendranagar	Limbadi-	1960	-	30.16	-	-	8.88
			1986	26	22.5	7.66	0.98	8.87
55	Surendranagar	Bramani	1953	-	74.96	-	-	7.19
			1986	33	58.34	16.62	0.67	7.21
	Sub total of Saurashtra					390.89		
						22.23 % of Gross storage		

Table 4.10 Sedimentation survey carried out in north region of Gujarat

Sr. No.	District	Name of reservoir	Year of impounding/ Survey	Life in yrs	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham / 100km ² / yr)
1	Sabarkantha	Hathmati	1971	-	160.73	-	-	-
			1987	16	151.3	9.43	0.37	9.91
2	Sabarkantha	Waidy	1981	-	13.58	-	-	2.38
			2000	19	8.23	5.35	2.07	50
3	Sabarkantha	Meshwo	1968	-	82.12	-	-	0.86
			1997	29	53.13	28.99	1.18	37.45
4	Sabarkantha	Harnav-II	1990	-	21.67	-	-	0.02
			2000	10	20.99	0.68	0.31	6.03
5	Sabarkantha	Guhai	1990	-	68.75	-	-	-
			2000	10	67.09	1.66	0.24	4.03
6	Sabarkantha	Mazam	1984	-	44.65	-	-	3.57
			1998	14	44.08	0.57	0.09	0.98
7	Banaskantha	Dantiwada (Banas)	1965	-	464.39	-	-	3.61
			1994	29	319.32	145.07	1.08	17.47
8	Banaskantha	Mukteshwar (Saraswati)	1990	-	41	-	-	3.57
			1998	8	31.57	9.43	2.88	38.57
9	Banaskantha	Sipu	1992	-	177.8	-	-	7.2
			1998	6	133.05	44.75	4.19	61.03
10	Mehsana	Dharoi (Sabarmati)	1976	-	908	-	-	3.57
			2000	24	762.67	145.33	0.67	11.06
Sub total of North region						391.26		

Table 4.11 Sedimentation survey carried out in central region of Gujarat

Sr. No.	District	Name of reservoir	Year of impounding/ Survey	Life in (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham / 100 km ² /yr)
1	Dahod	Pata-Dungari	1974	-	41.06	-	-	-
			1986	12	39.04	2.02	0.41	5.73
2	Dahod	Kadana (Mahi)	1977	-	1249	-	-	
			2003	26	955.26	293.74	0.83	5.01
3	Dahol	Bhadar(P)	1983	-	46.72	-	-	3.57
			1999	17	32.17	14.55	1.83	21.03
4	Panchmahal	Hadaif	1986	-	32.26	-	-	3.35
			2000	14	22.29	9.97	2.21	14.03
5	Dahod	Machhannala	1982	-	37.9	-	-	3.35
			1999	17	27.12	10.79	1.67	25.92
6	Panchmahal	Panam	1977	-	735.8	-	-	3.57
			2004	27	544.95	190.85	0.96	11.21
7	Panchmahal	Deo	1986	-	84.09	-	-	3.33
			1998	12	74.26	9.83	0.97	31.63
8	Vadodara	Sukhi	1987	-	178.47	-	-	4.76
			1999	12	175.14	3.33	0.16	6.74
9	Vadodara	Rami	1983	-	7.08	-	-	1.9
			1999	16	4.55	2.53	2.23	64.07
10	Vadodara	Rami	1983	--	7.08	-	-	1.91
			2002	19	6.24	0.84	0.62	17.83
Sub total of Central Region					538.45			

Table 4.12 Sedimentation survey carried out in south region of Gujarat

Sr. No.	District	Name of reservoir	Year of impounding/ Survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham / 100 km ² /yr)
1	Bharuch	Chopadvav	1985	-	10.15	-	-	3.57
			1998	13	5.69	4.46	3.38	123.68
2	Bharuch	Baldeva	1979	-	8.15	-	-	-
			2001	22	7.29	0.86	0.48	14.64
3	Bharuch	Pigut	1983	-	7.52	-	-	-
			2001	18	7.49	0.03	0.02	0.68
4	Surat	Ver-II	1984	-	38.3	-	-	2
			1998	14	32.63	5.67	1.06	45
5	Surat	Lakhigam	1983	-	4.69	-	-	-
			2001	18	4.16	0.53	0.62	23.08
6	Surat	Ukai (Tapi)	1972	-	8510	-	-	1.49
			2003	31	7414.29	1096.72	0.42	5.68
7	Valsad	D'ganga	1983	-	567	-	-	5.71
			1999	16	525.81	41.19	0.45	14.2
8	Narmada	Karjan	1984	-	630	-	-	4.76
			1998	14	580.21	49.79	0.56	25.33
Sub total of South Region						1199.25		

Table 4.13 Sedimentation survey carried out in Kachchh region of Gujarat

Sr. No.	District	Name of reservoir	Year of impounding/ Survey	Life (yrs)	Gross capacity as per survey (Mm ³)	Loss in capacity (Mm ³)	Annual % loss in capacity	Silt rate (ham / 100 km ² /yr)
1	Kachchh	Nara-Gajansar	1975	-	41.06	-	-	1.9
			1987	12	39.7	1.36	0.28	12.59
2	Kachchh	Kankavati	1956	-	14.62	-	-	1.9
			1987	31	10.51	4.11	0.91	6.25
3	Kachchh	Rudramata	1963	-	64.78	-	-	1.9
			1987	24	61.17	3.61	0.23	2.62
4	Kachchh	Suvi	1964	-	14.28	-	-	2.38
			1987	23	10.45	3.83	1.17	10.56
5	Kachchh	Kaswati	1974	-	8.9	-	-	-
			1986	12	8.43	0.47	0.044	1.92
6	Kachchh	Sanandro	1956	-	12.28	-	-	2.38
			1986	30	5.24	7.04	1.91	15.54
7	Kachchh	Kaila	1956	-	13.99	-	-	2.38
			1987	31	8.86	5.13	1.18	8.99
8	Kachchh	Godhatad	1977	-	14.7	-	-	1.9
			1987	10	13.98	0.72	0.49	3.72
Sub total of Kachchh Region						26.27		

(Source : From Table 4.9 to Table 4.13 Gujarat Engineering Research Institute, Vadodara)

Table 4.14 Talukawise geographical area of Rajkot district

Sr. No.	Taluka	Total geographical area (km ²)	Hilly area (km ²)	Saline area (km ²)	Net suitable area (km ²)	Hard rock area (km ²)	Alluvial & sand stone area (km ²)
1	Dhoraji	484.94	0.00	0.00	484.94	484.94	0.00
2	Gondal	1193.62	0.00	0.00	1193.62	1193.62	0.00
3	Jam Kandorana	560.29	0.00	0.00	560.29	560.29	0.00
4	Jasdan	1326.42	0.00	0.00	1326.42	1326.42	0.00
5	Jetpur	627.58	0.00	0.00	627.58	627.58	0.00
6	Kotada Sangani	447.00	0.00	0.00	447.00	447.00	0.00
7	Lodhika	373.23	0.00	0.00	373.23	373.23	0.00
8	Maliya	769.98	0.00	769.98	0.00	0.00	769.98
9	Morbi	1029.27	0.00	247.00	782.27	322.47	459.80
10	Paddhari	599.33	0.00	0.00	599.33	599.33	0.00
11	Rajkot	1004.88	0.00	0.00	1004.9	1004.88	0.00
12	Tankara	668.71	0.00	0.00	668.71	668.71	0.00
13	Upleta	839.24	0.00	0.00	839.24	839.24	0.00
14	Wankaner	1117.57	0.00	44.13	1073.4	502.90	570.54
Total		11042.06	0.00	1061.1	9980.95	8180.63	1800.32

Source: Revenue Department & GWRDC

Table 4.15 Talukawise average rainfall year 1991 to 1997 (mm)

Sr. No.	Taluka	1991	1992	1993	1994	1995	1996	1997	AV
1	Dhoraji	395	598	341	854	474	562	668	556
2	Gondal	311	871	504	986	775	590	710	678
3	Jam Kanda	335	604	359	687	471	600	506	509
4	Jasdan	415	758	458	909	510	710	607	624
5	Jetpur	449	765	295	878	448	549	732	588
6	Kotada Sangani	423	696	484	847	519	482	926	625
7	Lodhika	406	693	261	770	380	759	638	558
8	Maliya	345	460	98	692	304	270	470	377
9	Morbi	213	426	320	1077	423	420	596	496
10	Paddhari	334	413	190	896	325	350	712	460
11	Rajkot	338	682	355	974	299	755	765	595
12	Tankara								
13	Upleta	310	886	260	830	525	470	798	583
14	Wankaner	251	470	353	1007	260	344	572	465

(Source : Indian Metrological and Revenue Department)

Table 4.16 Talukawise average rainfall year 1998 to 2002 (mm)

Sr. No.	Taluka	1998	1999	2000	2001	2002	AV
1	Dhoraji	694	397	297	585	324	459
2	Gondal	645	379	282	561	357	445
3	Jam Kandorana	601	339	435	623	339	467
4	Jasdan	631	584	346	564	398	505
5	Jetpur	528	415	231	481	340	399
6	Kotada Sangani	775	350	391	438	462	483
7	Lodhika	713	381	245	512	288	428
8	Maliya	392	279	191	509	180	310
9	Morbi	468	229	245	428	332	340
10	Paddhari	428	275	334	323	242	320
11	Rajkot	609	311	345	409	357	406
12	Tankara	440	270	217	276	205	282
13	Upleta	670	526	395	591	378	512
14	Wankaner	580	191	176	311	293	310

(Source : Indian Metrological and Revenue Department)

Table 4.17 Talukawise average rainfall year 2003 to 2006 (mm)

Sr. No.	Taluka	2003	2004	2005	2006	Average
1	Dhoraji	646	476	851	1084	764
2	Gondal	676	520	587	729	628
3	Jam Kanderana	732	401	622	896	663
4	Jasdan	678	691	664	886	730
5	Jetpur	548	560	766	840	679
6	Kotada Sangani	593	619	797	716	681
7	Lodhika	536	402	937	894	692
8	Maliya	542	428	591	848	602
9	Morbi	629	642	756	989	754
10	Paddhari	675	371	793	631	618
11	Rajkot	851	693	1072	913	882
12	Tankara	525	329	597	575	507
13	Upleta	820	610	763	1205	850
14	Wankaner	404	543	514	594	514

(Source : Indian Metrological and Revenue Department)

Table 4.18 Talukawise rainfall from year 1961 to year 2006 Of Rajkot district (mm)

Year	Dhoraji	Gondal	Jam Kandorana	Jasdan	Jetpur	Kotada	Lodhika	Maliya	Morbi	Paddhari	Rajkot	Tankara*	Upleta	Wankaner
1961	731	588	600	870	839	794	456	475	730	924	775	-	1050	538
1962	315	304	421	315	378	362	238	200	389	319	500	-	450	330
1963	320	859	462	507	474	523	426	288	290	379	499	-	538	312
1964	862	575	89	1118	757	922	498	525	423	473	765	-	950	218
1965	469	467	359	558	565	501	464	504	521	375	466	-	350	630
1966	355	183	248	359	303	248	350	333	409	471	437	-	275	477
1967	793	782	748	628	838	613	283	725	825	435	484	-	765	628
1968	799	449	698	625	355	453	639	172	273	419	591	-	416	515
1969	442	438	270	428	555	280	192	76	245	293	317	-	600	338
1970	863	733	1100	768	756	834	1132	1160	994	772	1152	-	825	425
1971	782	745	460	657	698	400	574	577	616	522	544	-	544	372
1972	235	382	155	209	454	274	286	490	211	160	355	-	355	171
1973	375	281	525	248	381	236	462	317	157	293	325	-	325	317
1974	222	213	332	404	195	288	172	127	110	153	296	-	228	172
1975	543	675	688	611	563	574	754	984	882	808	964	-	638	980
1976	648	620	929	847	588	490	808	494	762	608	870	-	628	917
1977	526	519	673	550	701	571	737	718	707	481	786	-	508	591
1978	420	435	466	512	537	401	476	345	765	542	720	-	530	390
1979	1188	1027	974	1238	986	853	1085	289	1087	885	1377	-	1200	1210
1980	1001	715	737	1020	1196	636	808	377	601	562	763	-	1200	1210
1981	707	788	945	722	660	524	858	533	710	721	811	-	1619	764
1982	546	383	193	426	482	332	448	238	502	370	626	-	898	620
1983	1587	1033	746	1590	1018	805	860	330	728	539	660	-	391	391
1984	509	550	554	451	553	629	718	322	437	447	606	-	391	391
1985	400	402	272	269	260	175	287	324	278	156	324	-	2290	723
1986	492	320	371	442	350	200	348	274	296	147	224	-	595	550
1987	100	219	159	135	58	138	95	53	95	110	178	-	306	292

Year	Dhoraji	Gondal	Jam Kandorana	Jasdan	Jetpur	Kotada Sangani	Lodhika	Maliya	Morbi	Paddhari	Rajkot	Tankara*	Upleta	Wankaner
1988	1175	792	952	1056	922	1055	985	571	1185	1112	1255	-	475	310
1989	578	493	560	534	511	624	656	394	374	405	473	-	106	183
1990	708	412	461	674	421	592	477	283	366	350	528	-	1161	699
1991	395	311	335	415	449	423	406	345	213	334	338	-	656	626
1992	598	871	604	758	765	696	693	460	426	413	682	-	387	464
1993	341	504	359	458	295	484	261	98	320	190	355	-	310	251
1994	854	986	687	909	878	847	770	692	1077	896	974	-	886	470
1995	474	775	471	510	448	519	380	304	423	325	299	-	260	353
1996	562	590	600	710	549	482	759	270	420	350	755	-	830	1007
1997	668	710	506	607	732	926	638	470	596	712	765	-	525	260
1998	694	645	601	631	528	775	713	392	468	428	609	-	798	572
1999	397	379	339	584	415	350	381	279	229	275	311	270	526	191
2000	297	282	435	346	231	391	245	191	245	334	345	217	395	176
2001	585	561	623	564	481	438	512	509	428	323	409	276	591	311
2002	324	357	339	398	340	462	288	180	332	242	357	205	378	293
2003	646	676	732	678	548	593	536	542	629	675	851	525	820	404
2004	476	520	401	691	560	619	402	428	642	371	693	329	610	543
2005	851	587	622	664	766	797	937	591	756	793	1072	597	763	514
2006	1084	729	896	886	840	716	894	848	989	631	913	575	1205	594
*New Taluka Came Into Existence Since Year 1998 (Divided From Morbi Taluka & Some Villages Of Paddhari Taluka)														

(Source : Indian Metrological Department and Revenue Department)

Table 4.19 Typical records of check dams executed in people participation scheme

Sr. No.	Name of village	Name of river/ Kotar / Tributary	Name of Prayojak	Survey no of RHS of check dam	Survey no of LHS of check dam	Starting date of check dam	Completion date of check dam	Actual cost incurred (Total) in Rs lacs	Actual Govt. contribution in Rs lacs	Length of structure (m)	Height of structure in Kotar bed level (m)	Storage capacity (10 ³ m ³)	No of wells benefited	Area benefited (ha)
1	Bhadajadia	North side Vokala	Shantilal Bhimji Paghdar	43	44	5/21/2001	6/30/2001	2.320	1.390	20.10	1.10	0.934	13	11.00
2	Bhader	Bhadiwalu	Vaghela Abhesang Devubha	184	207/3	12/3/2000	3/28/2000	1.497	0.898	20.00	1.00	88.263	4	40.00
3	Bhader	Merwad	Vaghela Bhagirathsinh Kiritsinh	130P	127/1	4/18/2000	4/30/2000	2.786	1.672	48.00	1.15	201.246	6	60.00
4	Bhader	Merwad	Parmar Rajabhai Hirabhai	137/7	115/1	4/5/2000	4/6/2000	2.598	1.559	30.00	1.70	381.283	8	80.00
5	Bhader	Merwad	Boghabhai Khimabhai Vadher	137/3	114/5	4/5/2000	5/29/2000	2.155	1.293	28.00	1.70	356.591	8	80.00
6	Bhader	Merwad	Vaghela Jagdishsinh Natubha	130P	126P	4/5/2000	5/29/2000	2.597	1.558	37.00	1.15	180.065	6	60.00
7	Bhader	Merwad	Sambada Kishorbhai Raiyabhai	129/1	126P	4/5/2000	6/21/2000	1.270	0.762	26.00	1.15	151.805	5	50.00
8	Bhader	Local St.	Karshan Sajjan Makavana	143	134	4/5/2000	5/29/2000	0.767	0.460	15.00	1.35	120.034	5	50.00
9	Bhader	Local St.	Lakhamanbhai Raiyabhai Sambada	142	136	8/5/2000	4/6/2000	1.224	0.735	16.00	1.40	137.704	6	60.00
10	Bhader	Bhadiwalu	Kadva Soma Muchhadiya	184/1	140	8/5/2000	6/13/2000	2.314	1.388	27.00	1.50	264.788	4	40.00
11	Bhader	Bharmo	Sambada Govindkhoda Rabari	146	144	8/5/2000	6/21/2000	1.165	0.699	24.00	1.10	127.085	5	50.00
12	Bhader	Bhadva Vokala	Anvind Maniyar Jan Kalyan Trust	60 P	Bhader 111	5/5/2002	6/14/2002	4.150	2.490	52.00	2.03	20.19	15	15.00
13	Bhola	Local Vokala	Vinod Zina Sudani	211/1	23	5/8/2003	6/4/2003	1.750	1.050	21.00	1.70	0.538	13	15.00
14	Bhutvad	Local St.	Jayantibhai Kanjibhai Rabadiya	12/4	12/3	3/5/2000	6/13/2000	1.210	0.726	20.00	1.40	172.986	4	40.00
15	Chhadvavadar	Samshana Vokala	Menand Devayat Dangar	177	28/2	4/25/2003	6/3/2003	1.480	0.890	23.90	1.98	0.425	15	13.00
16	Chhadvavadar	Sulkadha Vokala	Devraj Premji Ladani	12/2	7/4	4/25/2003	6/5/2003	1.400	0.840	17.10	1.46	0.142	9	10.00
17	Chhadvavadar	Kamadh Vokala	Kishor Ratilal Vaghela	44	43	4/25/2003	6/22/2003	3.200	1.810	43.30	1.28	2.973	18	18.00
18	Chhatrasa	Local St.	Danabhai Nathabhai Rathod	206	153/1	12/5/2000	6/13/2000	0.835	0.501	16.00	1.15	74.133	5	50.00
19	Chhatrasa	Bantia Vokala	Mansukh Naran	503 P	503 P	6/4/2001	7/5/2001	0.880	0.530	8.50	0.94	0.311	11	7.00
20	Chichod	Local St.	Bhanji Thobhanbhai Dabhi	Gan	13	12/3/2000	3/29/2000	1.434	0.861	27.00	1.25	91.802	3	30.00
21	Chichod	Local St.	Bhanji Thobhanbhai Dabhi	14	12	4/27/2000	5/13/2000	1.413	0.848	21.00	1.50	165.935	4	40.00
22	Chichod	Local St.	Koradiya Harsukh Popatbhai	9	17	9/5/2000	5/27/2000	0.823	0.494	18.00	1.00	63.542	4	40.00
23	Chichod	Bhartio	Koradiya Gordhan Kanji	139/1	131	4/30/2000	5/13/2000	0.558	0.335	14.00	1.15	63.542	3	30.00
24	Chichod	Velario	Haja Thobhan Dabhi	127	133/2	4/5/2000	5/22/2000	0.908	0.545	20.00	1.15	91.802	5	50.00
25	Chichod	Maneri	Chhellavada Bhanjibhai Tapubhai	10	9	4/5/2000	8/6/2000	1.194	0.717	17.00	1.50	134.164	5	50.00
26	Chichod	Dungarno	Mansukhbhai Somabhai Parghi	143	143/1	4/22/2000	7/5/2000	0.849	0.509	14.00	1.80	158.884	2	20.00
27	Chichod	Mendiyaara Vokala	Mayur Keshav Shingala	47 P	53	6/7/2001	7/2/2001	1.400	0.840	13.70	1.65	0.963	11	8.00
28	Dhoraji	Local St.	Shantilal Vashrambhai Vegad	37/2	89/3	4/14/2000	5/24/2000	1.340	0.804	20.00	1.50	197.706	7	70.00

Sr. No.	Name of village	Name of river/ Kotar / Tributary	Name of Prayojak	Survey no of RHS of check dam	Survey no of LHS of check dam	Starting date of check dam	Completion date of check dam	Actual cost incurred (Total) in Rs lacs	Actual Govt. contribution in Rs lacs	Length of structure (m)	Height of structure in Kotar bed level (m)	Storage capacity (10 ³ m ³)	No of wells benefited	Area benefited (ha)
29	Dhoraji	Local St.	Kanjibhai Vastabhai Valshnav	96/1	95/2	9/5/2000	6/28/2000	1.083	0.650	19.00	1.85	144.754	6	60.00
30	Dhoraji	Local St.	Bhikhabhai Hirabhai Baldha	700	696/2	9/5/2000	6/13/2000	0.582	0.349	26.00	0.95	102.393	6	60.00
31	Dhoraji	Local St.	Dinesh Chandubhai Antala	838/13	841/6	5/15/2000	6/13/2000	0.575	0.345	16.00	1.50	444.853	5	50.00
32	Dhoraji	Safura Vokala	Jaman Duda Baldha	642 P	641	10/15/2001	1/15/2002	2.930	1.760	27.00	2.21	2.322	14	10.00
33	Dhoraji	Tabulivav Vokala	Jintilal Pancha Baldha	725	726	5/19/2003	6/23/2003	1.120	0.670	18.60	1.14	0.283	10	11.00
34	Fareni	Local St.	Bhikhalal Lavjibhai Rabadiya	51/6	16/2	4/14/2000	6/22/2000	0.933	0.560	23.00	1.00	98.853	5	50.00
35	Fareni	Local St.	Dinesh Vallabh Bhensaniya	15	51/7	4/14/2000	6/22/2000	0.431	0.259	16.00	1.15	91.802	5	50.00
36	Fareni	Darvadi Vokala	Lalji Gordhan Rabadia	144/1	133 P	5/24/2001	7/26/2001	3.100	1.860	27.90	1.22	9.033	14	10.00
37	Hadmatiya	Local St.	Jalu Vinodrai Ramjibhai	26	3P	5/13/2000	5/27/2000	1.158	0.695	20.00	0.95	77.672	5	50.00
38	Hadmatiya	Local St.	Maheshkumar Govindbhai Jalu	26	23	5/13/2000	8/6/2000	0.978	0.587	18.00	1.00	77.672	5	50.00
39	Moti Marad	Khara	Ratilal Keshavji Bhut	517	515/3	3/16/2000	3/28/2000	1.306	0.784	16.00	1.25	109.444	5	50.00
40	Moti Marad	Maradio	Bharatbhai Maisurbhai Parmar	443	456/2	36629	36643	1.06578	0.63946	15	1.2	95.324	5	50
41	Moti Marad	Khara	Ukabhai Bhimabhai Ghughal	530	415	7/5/2000	6/13/2000	1.179	0.708	24.00	1.20	151.805	6	60.00
42	Moti Marad	Maradio	Parmar Madhabhai Mesurbhai	476	461	9/5/2000	5/27/2000	1.182	0.709	19.00	1.10	98.853	5	50.00
43	Moti Marad	Maradio	Parmar Ravjibhai Nathabhai	432	456/2	7/5/2000	6/21/2000	0.708	0.425	15.00	0.90	52.952	3	30.00
44	Moti marad	Near Baug	Jalu Dilip Rambhai	448	443	5/21/2001	6/15/2001	2.100	1.260	19.80	1.23	1.727	11	10.00
45	Moti marad	Chikhilia Vokala	Mohan Ambavi Patel	515 P	517	5/21/2001	7/25/2001	1.220	0.730	11.73	1.29	1.161	12	9.00
46	Moti marad	Motakharo Vokala	Suresh Valabh Kalaria	51/2	43 P	5/12/2003	6/5/2003	2.100	1.260	24.95	1.93	0.425	14	14.00
47	Moti marad	Khara Vokala	Vinod Narshi Sapatia	508	517/3	5/9/2003	6/7/2003	1.120	0.670	13.00	1.41	0.198	7	7.00
48	Moti marad	Local Vokala	Ashavin Gordhan Serathia	517 P/1	515/1 P	5/28/2005	7/18/2005	0.940	0.750	11.20	0.88	0.198	6	6.00
49	Moti Parabadi	Fulzar	Dinesh Arjanbhai Babriya	Other Dist.	58/2	3/4/2000	4/25/2000	0.782	0.469	14.00	1.20	88.263	4	40.00
50	Moti Parabadi	Fulzar	Rameshbhai Bhikhabhai Babariya	Other Dist.	27	4/25/2000	5/21/2000	1.291	0.774	18.00	1.35	144.754	6	60.00
51	Moti Parabadi	Fulzar	Ranchhod Amba Mavani	Other Dist.	30	4/17/2000	6/5/2000	0.881	0.529	15.00	1.60	169.475	6	60.00
52	Moti Parabadi	Fulzar	Rasiklal Dayabhai Gajera	22	18	4/25/2000	6/5/2000	0.777	0.466	28.00	1.05	105.904	4	40.00
53	Moti Parabadi	Fulzar	Shantibhai Jerambhai Thesiya	126/4	130/2	3/5/2000	11/6/2000	1.803	1.082	24.00	1.35	190.656	6	60.00
54	Moti Parabadi	Fulzar	Pravinbhai Dharamshibhai Dhankacha	Other Dist.	24	3/5/2000	11/6/2000	1.600	0.960	18.00	1.85	271.839	6	60.00
55	Moti parabadi	Fulzer	Harilal Nagji Babaria	20	132/2	5/29/2005	6/22/2005	0.780	0.620	24.30	2.00	0.425	20	5.00
56	Moti Vavadi	Local St.	Gokalbhai Vitthalbhai Manvar	126	220	1/5/2000	5/15/2000	0.174	0.104	7.00	0.70	10.59	2	20.00
57	Moti Vavadi	Local St.	Rasikbhai Chhaganbhai Manvar	124	222	1/5/2000	5/15/2000	0.166	0.100	7.00	0.65	10.59	2	20.00
58	Moti Vavadi	Local St.	Shantilal Kanji Manvar	124	222	1/5/2000	5/15/2000	0.121	0.073	6.00	0.65	7.051	2	20.00
59	Moti Vavadi	Local St.	Dineshbhai Chhaganbhai Manvar	113	222	1/5/2000	5/15/2000	0.162	0.097	6.00	0.80	10.59	2	20.00

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60	Moti Vavadi	Khalvu	Mansukhbhai Bhurabhai Dadhaniya	25	14/1	5/5/2000	5/23/2000	1.121	0.873	14.00	1.25	74.133	5	50.00
61	Moti Vavadi	Dhobi	Vithalabhai Ladhahbhai Koradiya	132	180/1	10/5/2000	5/23/2000	0.755	0.453	14.00	1.40	95.314	4	40.00
62	Moti Vavadi	Khalvu	Gopal Ratilal Dadhaniya	26	14/3	5/5/2000	5/6/2000	1.138	0.683	14.00	1.30	81.212	3	30.00
63	Moti Vavadi	Mophat	Dadhaniya Narotam Kanjibhai	37	34/5	10/5/2000	10/6/2000	1.027	0.616	18.00	1.20	88.263	4	40.00
64	Moti Vavadi	Kalongo	Haribhai Vashrambhai Koradiya	9	53	10/5/2000	10/6/2000	1.360	0.816	25.00	1.10	105.904	5	50.00
65	Moti vavdi	Panchasara Vokala	Jayantilal Madhavji	331 (Sevendra)	220/1	5/26/2005	6/17/2005	1.700	1.360	25.40	1.50	0.51	10	7.00
66	Nagaikhada	East Side Vokala	Jalu Dilip Rambhai	70/2	412	5/15/2001	11/13/2001	1.300	0.780	17.00	1.56	1.444	8	8.00
67	Nani marad	Narshari	Krushansinh Dilubha Jadeja	30/2	229	5/28/2003	6/23/2003	1.020	0.610	12.88	1.22	0.17	7	7.00
68	Nani Parabadi	Fulzar	Babubhai Lakhbhai Paghadar	45/1	57	5/14/2000	8/6/2000	1.326	0.796	21.00	1.50	208.297	6	60.00
69	Nani Parabadi	Fulzar	Ashwin Hirabhai Vagadiya	58/2	59/6	5/14/2000	8/6/2000	0.858	0.515	15.00	1.15	84.723	3	30.00
70	Nani parabadi	Fulzar	Daya Punja Sagadiya	93	102 P	1/1/2004	1/19/2004	0.580	0.350	15.80	1.49	0.283	9	9.00
71	Nani Vavadi	Local St.	Kanjibhai Khimibhai Solanki	133	71/1	2/5/2000	6/27/2000	2.050	1.230	21.60	1.80	250.658	6	60.00
72	Nani Vavadi	Local St.	Kanjibhai Khimibhai Solanki	132	6/2	2/5/2000	5/6/2000	2.161	1.296	21.60	1.90	278.918	6	60.00
73	Nani Vavadi	Local St.	Chauhan Ramesh Mangabhai	23	16	7/5/2000	6/13/2000	1.137	0.682	12.00	1.75	127.085	5	50.00
74	Nani Vavadi	Maduail Vokala	Hari Gokal Kalaria	52 P	179 P (Supedi)	11/26/2001	12/14/2001	2.100	1.260	21.00	2.78	2.322	11	12.00
75	Patanvav	Andharlo	Shantilal Meghijbhai Sejani	117	103	12/3/2000	3/28/2000	0.996	0.597	14.00	1.15	63.542	3	30.00
76	Patanvav	Undo	Hiribhai Bhimijbhai Pethani	442	439	4/30/2000	3/6/2000	1.254	0.753	20.00	1.10	84.723	4	40.00
77	Patanvav	Dhanavalo	Naranbhai Jethabhai Vijuda	348	347	4/30/2000	3/6/2000	0.599	0.359	12.00	1.70	120.034	5	50.00
78	Patanvav	Local St.	Jagdish Hiribhai Kansagara	355	345	5/5/2000	3/6/2000	0.542	0.325	11.00	1.40	74.133	4	40.00
79	Patanvav	Local St.	Chetan Ravijbhai Javiya	378/1	364	5/5/2000	3/6/2000	0.579	0.347	12.00	1.00	42.362	3	30.00
80	Patanvav	Patanvav Vokala	Ravji Jadav Javia	67/2 P	70/4	6/7/2001	7/10/2001	1.430	0.860	10.15	1.86	0.623	11	6.00
81	Supadi-1	Bhader	Saurashtra Jaldhara Trust	442	6/4	10/02/2004	18/07/2005	33.000	19.800	145.00	2.01	141.668	132	1320.00
82	Supadi-2	Bhader	Saurashtra Jaldhara Trust	535/2	84/1	24/03/2004	18/06/2005	28.300	16.980	197.00	1.00	36.812	75	750.00
83	Supadi-3	Bhader	Saurashtra Jaldhara Trust	506	532/2	24/03/2004	27/05/2005	50.000	30.000	195.00	2.50	153.193	19	190.00
84	Supadi-4	Utavadi	Saurashtra Jaldhara Trust	716/1	8	10/06/2004	20/06/2004	6.083	3.650	53.00	1.58	20.388	20	200.00
85	Supedi	Zanzmerio	Vallabhbai Kanjibhai Bangoriya	11/1	19	3/16/2000	7/4/2000	4.225	2.535	38.00	1.80	342.461	6	60.00
86	Supedi	Chanchadhar	Hasmukhbhai Khodabhai Butani	2/2	13	3/16/2000	3/28/2000	2.335	1.401	31.00	1.50	243.608	3	30.00
87	Supedi	Dharu	Lalibhai Premijbhai Makadiya	115/1	208	3/25/2000	4/14/2000	1.930	1.158	25.00	1.40	165.935	6	60.00
88	Supedi	Dharu	Laxmidas Valjibhai Govani	115/2	116	3/25/2000	4/14/2000	1.629	0.977	21.00	1.80	240.068	7	70.00
89	Supedi	Dharu	Ramji Mepabhai Govani	113/1	211/1	5/4/2000	4/23/2000	1.551	0.930	23.00	1.30	134.164	4	40.00

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90	Supedi	Local St.	Vijaykumar Jamnadas Ghetiya	249/1	257	4/14/2000	4/28/2000	1.034	0.620	12.00	1.85	144.754	4	40.00
91	Supedi	Dharu	Premjibhai Veljibhai Dadhania	128/1	121/2	4/14/2000	1/5/2000	1.285	0.771	23.00	1.40	158.884	5	50.00
92	Supedi	Zanzmerio	Rasiklal Mohanbhai Dadhania	46	69	1/5/2000	5/15/2000	1.030	0.618	18.00	1.10	74.133	3	30.00
93	Supedi	Dharu	Natha Desa Kantariya	147	146	4/20/2000	1/5/2000	0.732	0.439	15.00	1.10	63.542	3	30.00
94	Supedi	Zanzmerio	Govindlal Bavanji Makadiya	49	61	5/5/2000	5/22/2000	1.088	0.653	14.00	1.30	81.212	3	30.00
95	Supedi	Chor	Bhut Bharatbhai Nanal	530/1	511	6/5/2000	12/6/2000	5.365	3.219	24.00	1.95	321.28	7	70.00
96	Supedi	Local St.	Rasikbhai Naranbhai Vaghasiya	33	27	4/26/2000	5/30/2000	2.473	1.484	28.00	1.60	109.444	5	50.00
97	Supedi	Zanzmerio	Jamanbhai Karshanbhai Gor	46	68	5/5/2000	5/25/2000	0.819	0.491	17.60	1.30	105.904	5	50.00
98	Supedi	Local St.	Raiyabhai Ramjibhai Vaghasiya	22	109/2	12/5/2000	10/6/2000	0.921	0.552	11.50	1.70	98.853	3	30.00
99	Supedi	Local St.	Butani Lalji Vrujalal	590	589	12/5/2000	12/6/2000	1.637	0.982	18.00	1.90	225.938	3	30.00
100	Supedi	Khambhala	Kantariya Ramniklal Nathalal	591	590	12/5/2000	12/6/2000	1.955	1.173	22.00	1.60	197.706	5	50.00
101	Supedi	Khambhala	Pravinkumar Govindbhai Bangoria	591	592	12/5/2000	12/6/2000	1.545	0.927	20.00	1.30	116.494	4	40.00
102	Supedi	Dharadiya Vokala	Natha Desha Kantaria	146	149	6/2/2005	4/4/2006	1.480	1.170	20.60	1.50	0.481	7	7.00
103	Toraniya	Fulzar	Babu Ravji Sanadiya	104	80	1/1/2004	2/12/2004	0.580	0.350	18.00	1.58	0.142	11	11.00
104	Umarkot	Local St.	Ramniklal Kurjibhai Mavani	88	90	4/4/2000	4/17/2000	1.258	0.755	14.00	1.90	176.526	4	40.00
105	Umarkot	Local St.	Chhaganlal Premjilal Savaliya	11/1	9	2/4/2000	9/4/2000	0.599	0.359	8.00	1.30	45.901	2	20.00
106	Umarkot	Local St.	Manishaben Mansukhbhai Mavani	90	91	11/5/2000	5/23/2000	0.550	0.330	16.00	1.00	56.492	2	20.00
107	Umarkot	Saiyad	Ibrahim Ismailbhai Kureshi	95	90	9/5/2000	7/6/2000	1.271	0.763	20.00	1.10	84.723	3	30.00
108	Umarkot*	Local St.	Jusabbhai Sidibhai Mathupotra	54	52	9/5/2000	5/31/2000	0.488	0.293	22.00	0.95	67.082	3	30.00
109	Umarkot	Kureshi	Aminbhai Yusufbhai Kureshi	97	95	9/5/2000	7/6/2000	1.287	0.772	18.00	1.40	109.444	4	40.00
110	Umarkot	Khadkhadia Vokala	Mansukh Kuraji Mavani	88	90	5/1/2001	10/27/2002	2.970	1.780	32.75	2.21	8.467	7	6.00
111	Umarkot	Oriyavala Vokala	Janiben Osman	38/2	46	6/27/2001	11/20/2002	2.780	1.670	38.60	2.40	0.028	12	9.00
112	Vegadi	Kagdi	Govindbhai Shamjibhai Antala	63	716	10/3/2000	3/20/2000	1.559	0.935	26.00	1.25	141.215	5	50.00
113	Vegadi	Kagdi	Dilipkumar Govindbhai Antala	62	717/2	4/14/2000	4/28/2000	1.401	0.841	46.00	1.20	201.246	5	50.00
114	Vegadi	Local St.	Chhaganlal Premjilal Savaliya	46	48	4/14/2000	4/28/2000	1.342	0.805	26.00	1.00	91.802	3	30.00
115	Vegadi	Dharu	Jivabhai Ratrabhai Makvana	19/1	17	4/27/2000	5/23/2000	0.435	0.261	23.00	0.80	49.441	2	20.00
116	Vegadi	Sarvanio	Makvana Sharulbhai Jivabhai	22	24	9/5/2000	5/23/2000	2.847	1.588	29.00	1.60	261.249	6	60.00
117	Vegadi	Sarvanio	Arian Amara Solanki	21	25/2	7/6/2000	5/26/2000	0.579	0.347	17.00	1.10	49.441	2	20.00
118	Vegadi	Sondari	Jayantibhai Ramjibhai Baldha	59	60	4/25/2000	5/31/2000	0.559	0.336	15.00	1.00	52.952	3	30.00
119	Vegadi	Dharu	Devjibhai Tabhabhai Solanki	19/2	19/3	6/5/2000	6/13/2000	0.564	0.339	23.00	1.10	95.314	3	30.00
120	Vegadi	Sarvania Vokala	Puna Bhikh Vakatar	11/P	51/P	6/2/2001	6/14/2001	1.700	1.020	20.00	1.10	1.189	9	7.00

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121	Vegadi	Savaniya Vokala	Vasram Laxman Vaghela	512	11	5/29/2003	7/5/2003	0.820	0.490	8.80	1.80	0.142	5	5.00
122	Vegadi	Local		22	31	3/15/1999	7/4/1999	8.610	8.610	50.00	2.70	35.99	10	100.00
123	Velaria	Local Vokala	Ramesh Natha Jadav	60	57/1	8/11/2002	9/16/2002	1.430	0.860	11.80	2.05	0.623	10	6.00
124	Velariya	Tari	Hamirbhai Mamadbhai Sumara	59	5	4/27/2000	3/6/2000	0.754	0.452	19.00	1.05	70.622	3	30.00
125	Zanzmer	Arab	Babulal Vitthalbhai Padariya	115/P	130/P	11/5/2000	5/6/2000	0.705	0.423	26.00	1.20	88.263	3	30.00
126	Zanzmer	Arab	Harilal Bavajibhai Padariya	115/P	130/P	11/5/2000	5/6/2000	0.379	0.227	16.00	1.00	56.492	2	20.00
127	Zanzmer	Arab	Kantilal Vasharambhai Padariya	115/P	130/P	11/5/2000	5/6/2000	0.457	0.274	16.00	0.90	42.362	2	20.00
128	Zanzmer	Bhundwala	Govindbhai Dharamshibhai Dadhaniya	13	14/1	11/5/2000	12/6/2000	1.030	0.618	19.00	1.20	95.314	3	30.00
129	Zanzmer	Dhora's Vokala	Ramnik Bachu Marvania	64 P	62 P	12/15/2001	1/15/2002	1.080	0.650	10.90	1.93	2.18	12	5.00
130	Zanzmer	Utavadi	Chandu Bachu Marvania	64 P	62 P	12/25/2001	1/25/2002	2.220	1.330	29.80	1.55	8.382	12	11.00
131	Zanzmer	Fulzar	Mahendra Gopal Hansalia	4413	9211	5/24/2003	6/13/2003	0.870	0.520	8.95	1.12	0.142	7	5.00
132	Zanzmer	Sanala Vokala	Smt. Ushaben Manshukh	2213	2513	5/29/2005	7/15/2005	1.390	1.110	24.00	1.59	0.481	15	5.00
133	Zanzmer	Utavadi		382	1	8/2/1970	11/16/1970	0.400	0.400	80.00	2.00	44.995	16	160.00
134	Zanzmer	Savardi		366	109	1/19/1998	2/4/1999	4.570	4.570	41.00	2.40	28.005	15	150.00
135	Zanzmer	Utavadi		362	64	2/1/1998	9/13/1998	5.650	5.650	60.00	2.20	28.005	20	200.00
136	Toraniya	Fulzar		148	94/1	3/18/1978	4/17/1980	1.770	1.770	221.00	2.00	50.998	14	140.00
137	Umarcot	Local		38/3	43	11/3/1997	2/8/1998	5.480	5.480	65.00	4.90	28.005	21	210.00
138	Supedi	Utavadi		706	6	1/12/1978	5/18/1979	0.660	0.660	85.00	2.00	55.982	18	180.00
139	Supedi	Local		130/1	185	1/15/1999	4/30/1999	1.450	1.450	35.60	1.30	32.989	8	80.00
140	Supedi	Zanzmeriya		26/2	26/2	1/1/1999	4/30/1999	2.340	2.340	27.00	3.20	32.989	10	100.00
141	Supedi	Raydhara		455/2	449/2	8/11/2000	10/7/2000	3.900	3.900	55.30	1.00	55.982	5	50.00
142	Supedi	Utavadi		690	34	4/20/1983	4/4/1986	0.820	0.820	55.00	1.70	28.005	17	170.00
143	Patanav	Morjar		361	362	4/28/1979	6/15/1980	0.290	0.290	26.00	1.60	28.005	14	140.00
144	Patanav	Morjar		8	23/1	12/16/1996	5/15/1997	3.250	3.250	33.90	3.40	28.005	12	120.00
145	Patanav	Morjar		300	282	11/5/1997	5/3/1998	4.440	4.440	45.70	2.90	28.005	15	150.00
146	Patanav	Oriya		306	259	11/13/2000	1/6/2001	2.870	2.870	28.00	2.40	22.993	4	40.00
147	Patanav	Fatel		51/1	132	5/17/2002	8/6/2002	1.550	1.550	18.00	1.15	9.996	2	20.00
148	Patanav	Kharkhadi		22	447/6	7/12/1999	11/30/1999	3.260	3.260	55.50	2.50	41.993	15	150.00
149	Motivavadi	Local		5/1	100/1	8/26/1997	1/13/1998	3.200	3.200	34.00	2.20	28.005	12	120.00
150	Moti-Vavdi	Local		161/2	155/4	10/8/2001	12/6/2001	5.250	5.250	26.00	2.40	34.008	6	60.00
151	Moti Vavadi	Local		257	1	12/26/1996	7/31/1997	2.110	2.110	22.10	2.00	28.005	9	90.00
152	Moti Parabadi	Fulzar		20	143	4/12/1972	12/28/1972	0.000	0.000	70.00	2.50	29.987	13	130.00
153	Moti Parabadi	Local		24	24	4/17/1979	5/9/1980	1.160	1.160	98.00	2.80	112.983	30	300.00

Group names hence Prayojak name not given.

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154	Moti Parabadi	Local	Group names hence Prayojak name not given.	120	19/1	3/11/1980	1/2/1984	0.590	0.590	70.00	2.35	54	20	200.00
155	Jamanavad	Local		516	12	5/7/1974	6/9/1981	0.280	0.280	90.00	1.40	41.993	10	100.00
156	Kalana	Local		13/2	253/1	11/25/1997	2/23/1998	1.570	1.570	20.00	2.20	28.005	8	80.00
157	Kalana	Local		30	250	11/15/1997	2/23/1998	2.560	2.560	41.00	1.85	28.005	10	100.00
158	Bhader	Local		2	2	7/12/1999	3/28/2000	3.320	3.320	37.00	2.20	32.989	15	150.00
159	Bhutvad	Safura		801	28	12/2/1975	1/9/1977	0.270	0.270	60.00	3.00	28.005	15	150.00
160	Bhutvad	Safura		3	60	7/28/1986	6/5/1987	1.250	1.250	50.00	3.30	50.007	18	180.00
161	Bhutvad	Safura		829/2	849/4	2/26/1987	6/27/1989	1.450	1.450	54.00	1.80	47.997	15	150.00
162	Bhutvad	Safura		49	54	12/16/2004	1/31/2005	3.590	3.590	42.00	1.65	6.315	3	30.00
163	Bhola	Local		3	109	1/15/1999	7/6/1999	4.070	4.070	45.00	3.00	44.995	15	150.00
164	Dhoraji	Safura		838	841	3/4/1990	10/13/1990	0.450	0.450	19.00	2.10	28.005	5	50.00
165	Nagaikhada	Local		11	66/1	2/15/1985	10/10/1985	1.720	1.720	65.00	1.50	51.989	18	180.00

(Source : Bhaskaracharya Institute for Space Application and Geo-informatics, Gandhinagar)

Table 4.20 Talukawise average rise in water level (m) from year 1991-1997 in Rajkot district

YEAR 1997									
Sr. No.	Taluka	1991	1992	1993	1994	1995	1996	1997	Av. 1991-97
1	Dhoraji	2.72	8.68	1.81	10.70	3.57	4.89	5.63	5.43
2	Gondal	2.72	8.48	3.85	8.24	2.52	6.11	5.41	5.33
3	Jam Kanderana	1.99	8.54	1.07	8.82	2.57	3.97	5.95	4.70
4	Jasdan	1.15	4.67	1.94	4.78	2.44	3.66	5.54	3.46
5	Jetpur	1.10	9.97	3.35	10.58	3.04	4.29	5.10	5.35
6	Kotada Sangani	2.57	8.20	4.39	9.09	4.06	5.97	8.67	6.14
7	Lodhika	3.28	7.44	1.92	9.05	4.33	3.32	5.70	5.00
8	Morbi	0.96	6.77	2.58	6.71	2.72	1.92	4.41	3.73
9	Paddhari	2.40	8.71	2.04	8.50	1.81	2.77	7.38	4.80
10	Rajkot	2.51	6.61	2.65	6.72	3.09	3.70	4.87	4.31
11	Tankara	Taluka Came Into Existence In The Year 1998							
12	Upleta	1.50	9.56	0.75	9.30	2.44	4.30	2.92	4.40
13	Wankaner	0.64	4.75	1.87	6.92	2.36	4.08	4.71	3.62

(Source : Ground Water Resources Development Corporation)

Table 4.21 Talukawise average rise in water level (m) from year 1998 -2002 in Rajkot district

YEAR 2002							
Sr. No.	Taluka	1998	1999	2000	2001	2002	Av. 1998-02
1	Dhoraji	2.06	2.40	1.38	2.28	4.13	2.45
2	Gondal	5.55	4.01	2.14	5.06	3.86	4.12
3	Jam Kanderana	5.56	3.60	1.42	4.06	6.05	4.14
4	Jasdan	3.60	3.62	0.62	5.64	1.39	2.97
5	Jetpur	4.93	2.96	2.21	2.83	1.26	2.84
6	Kotada Sangani	4.40	3.70	3.47	5.81	3.05	4.09
7	Lodhika	3.67	2.27	4.37	3.47	3.08	3.37
8	Morbi	2.90	1.72	1.90	3.10	2.32	2.39
9	Paddhari	1.90		8.50	2.25	4.10	4.19
10	Rajkot	5.61	3.20	2.67	5.15	4.81	4.29
11	Tankara	6.25	4.35	1.15	4.60	3.37	3.94
12	Upleta	3.76	4.29	3.64	2.44	2.34	3.29
13	Wankaner	5.20	3.50	4.85	3.30	4.40	4.25

(Source : Ground Water Resources Development Corporation)

Table 4.22 Talukawise average rise in water level (m) from year 2003 -2006 in Rajkot district

Year 2006						
Sr. No.	Taluka	2003	2004	2005	2006	Av. 2003-06
1	Dhoraji	10.60	5.11	13.36	10.42	9.87
2	Gondal	10.91	3.92	10.31	7.77	8.23
3	Jam Kanderana	10.16	4.13	8.49	5.90	7.17
4	Jasdan	10.83	3.58	11.34	7.73	8.37
5	Jetpur	8.13	4.99	11.05	7.76	7.98
6	Kotada Sangani	9.38	2.34	8.67	5.99	6.60
7	Lodhika	12.14	6.63	13.45	10.16	10.59
8	Morbi	4.33	2.37	4.25	2.22	3.29
9	Paddhari	17.04	9.42	15.82	6.90	12.30
10	Rajkot	10.41	6.61	10.63	7.59	8.81
11	Tankara	6.78	5.03	7.19	4.14	5.79
12	Upleta	7.43	4.22	8.57	7.54	6.94
13	Wankaner	10.22	6.29	8.43	4.36	7.33

(Source : Ground Water Resources Development Corporation)

Table 4.23 Talukawise recharge structures (nos) in Rajkot district

Sr. No.	Taluka	Checkdams			Percolation Tanks			Ponds		
		1997	2002	2006	1997	2002	2006	1997	2002	2006
1	Dhoraji	14	125	165	15	3	81	30	30	30
2	Gondal	49	355	522	88	110	109	80	80	80
3	Jam Kanderana	24	138	178	38	7	82	45	45	45
4	Jasdan	39	414	450	172	200	118	100	100	100
5	Jetpur	23	287	361	64	19	53	45	45	45
6	Kotada Sangani	28	166	222	67	75	60	40	40	40
7	Lodhika	35	185	219	75	89	102	35	35	35
8	Morbi	39	191	231	120	95	89	100	100	100
9	Paddhari	38	482	399	86	100	109	55	55	55
10	Rajkot	47	280	634	98	110	136	100	100	100
11	Tankara		298	275		110	80	100	100	100
12	Upleta	19	120	307	46	62	87	50	50	50
13	Wankaner	29	417	630	161	165	184	100	100	100
Total		384	3458	4593	1030	1145	1290	880	880	880

(Source : Rajkot Panchayat Circle and Sardar Patel Sahbhagi Circle, Rajkot)

Table 4.24 Flooded / waterlogged area

Sr. No.	Taluka	Flooded Area (Km ²)	Days of Flooding
1	2	3	4
1	Dhoraji	62.55	15
2	Gondal	74.75	15
3	Jam Kanderana	50.94	15
4	Jasdan	35.33	15
5	Jetpur	0	0
6	Kotada Sangani	39.89	15
7	Lodhika	0	0
8	Morbi	0	0
9	Paddhari	153.15	15
10	Rajkot	102.51	15
11	Tankara	0	0
12	Upleta	172.24	15
13	Wankaner	139.26	15
Total		831	135
Source: Rajkot Panchayat Irrigation Division.			

4.2 METHODOLOGY USED FOR CALCULATION OF GROUND WATER RESOURCES ESTIMATION

In addition to the study of impact of checkdams in catchment area of Bhadar-I basin, talukawise separate study is also carried out. The details of analysis are narrated in this chapter. At present, Rajkot district is having 14 talukas. Earlier there were 13 talukas, but in the year 1998, a new Tankara taluka is created by division of Morbi & Paddhari talukas. In Maliya taluka, the quality of ground water is highly saline (TDS more than 2500 ppm), hence this taluka is not considered for the study of estimation of ground water resources of Rajkot district. The total geographical area of Rajkot district is 11074 km², out of which an area of 1061 km² is saline. From the remaining 10013 km² area, 80% area is comprised of hard rock formation i.e. basaltic trap and 20% area is having sandstone & alluvial strata.

For estimation of ground water resources, following methodology is adopted:

The ground water recharge in hard rock areas is chiefly dependent upon the permeability and transmissivity of the weathered/ fractured formation and hence, the recharge of ground water is effectively envisaged in areas where the check dams are constructed by thoroughly verifying the weathered/ fractured and or jointed basalt formations either in the form of structural disturbances or faults and dykes. Ground water recharge in any particular area is based on the incidence and intensity of rainfall. On the basis of the occurrence of rainfall, the recharge component of the rainfall is calculated even while considering several factors like evaporation, evapotranspiration, run off etc and the entire procedure of estimating the ground water recharge is a very vital part of Ground Water Assessment. The availability of ground water for further utilization is based on the ground water recharge that has taken place in a particular year.

Estimation of Ground Water Resources for Rajkot district has been carried out as per the methodology recommended by the Ground Water Resources Estimation Committee set up by Ministry of Water Resources, Govt. of India. The methodology and norms adopted for evaluating ground water Resources are given below:

4.2.1 Assessment year

Monsoon rain generally commences by second week of June and lasts till mid-October. The four months period i.e. between June and September is the monsoon period and from October to May (eight months) is the non-monsoon period. Ground Water Resources assessment has been carried out season wise.

4.2.2 Unit ground water recharge assessment

Unit for ground water recharge assessment to be taken is taluka since hard rock areas are distributed equally.

4.2.3 Delineation of sub-area in the unit

For the purpose of classification of the unit area into hard rock areas, dominant hydrogeology of the unit was considered and demarcated on maps and areas were calculated.

4.2.4 Suitable area

For determining the suitable area for ground water recharge, predominant hilly areas (slope more than 20%) were delineated and deleted out of the total geographical area of the unit. Further, areas where ground water quality is beyond usable limit, i.e., the saline areas (TDS more than 5000 ppm) were delineated.

4.2.5 Computation of recharge for the monsoon season

Ground water recharge during monsoon season has been computed using water level fluctuation method.

4.2.6 Recharge from other sources

Besides rainfall, the other sources which contribute towards recharge of ground water are seepage from canal, return flow from irrigation (both surface and ground water), recharge from tanks and ponds, recharge from water conservation structures, etc. The factors for computing return flow from irrigation, seepage from canals, and infiltration from tanks, ponds and water conservation structures have been taken.

4.2.7 Total annual recharge

The total annual recharge was obtained as the sum of recharge in the monsoon period and recharge in the non-monsoon season.

4.2.8 Gross ground water draft

Groundwater extraction from different structures for various uses in the different units has been estimated separately.

4.2.9 Irrigation draft

Taluka-wise ground water extraction for irrigation was estimated based on the number of structures and the unit draft of different types of structures. As major irrigation draft is from energized wells, data of HP wise number of irrigation connections were collected from Gujarat Electricity Board (GEB). Data in respect of energized wells using Oil Engines in each taluka was collected from Revenue/Agriculture Department.

For calculating the existing draft through various types of ground water structures like wells, tube wells, in different hydrogeological units, details like discharge, pumping hours during different irrigation seasons were collected to estimate the average annual draft. This quantity of seasonal as well as annual ground water pumped was cross checked with the area irrigated and crops grown.

[illegible]

Sr. No.	Taluka	1997						2002						2006					
		Name of scheme	Wetted area (million m ²)		Average running days		Wetted area (million m ²)	Average running days		Wetted area (million m ²)	Average running days		Wetted area (million m ²)	Average running days		Wetted area (million m ²)	Average running days		Wetted area (million m ²)
			Unlined Canal	Lined Canal	Non Mon soon	Mon soon		Unlined Canal	Lined Canal		Unlined Canal	Lined Canal		Unlined Canal	Lined Canal		Unlined Canal	Lined Canal	
9	Morbi	Machhu I		0.24	85	20			0.24		85	20		0.008			19	14	
		Machhu II		0.2	110	30			0.2		110	30		0.009			73	16	
		Demi I	0.148	0.02	100	65													
		Demi II		0.07	50	30			0.07		50	30							
10	Paddhari	Ghodadhari		0.10	30	0			0.10		30								
		Aji II		0.08	100				0.08		100				0.08				18
		Aji II		0.05	110				0.05		120				0.05		87	18	
		Bangavadi	0.002		60	30		0.002			60	30		0.002			30	20	
11	Rajkot	Lalpari	0.044	0.01	60			0.044	0.01		60			0.044	0.04		90		
															0.04		97	43	
12	Tankara							0.15	0.02		100	65		0.15	0.02		89	27	
														0.00			76	35	
13	Upleta													0.00			67	40	
		Bhadar		0.07	65				0.07		65				0.07		65		
		Moj	0.245	0.05	60			0.245	0.05		60			0.245	0.05		60		
		Venu II		0.13	80				0.13		80				0.13		42		
14	Wankaner	Machhu I	0.077	0.63	85	20		0.077	0.63		85	20		0.077	0.63		85	20	

Source: Rajkot Irrigation Circle, Rajkot and Rajkot Irrigation Project Circle, Rajkot)

Table 4.26 Talukawise ground water draft structures (wells/tubewells) of Rajkot district

Type of Wells	Unit Draft in Mm ³ /Year	Dhoraji	Gondal	Jam Kandora na	Jasdan	Jetpur	Kotada Sangani	Lodhika	Morbi	Paddhari	Rajkot	Tankara	Upleta	Wankane
1997	Upto 7.5 HP	3275	4670	2018	3275	2945	4465	4465	2382	2366	4465		3275	926
	Wells with Electric Motors	774	774	372	774	734	305	305	1200	284	305		774	2334
	15 to 30 HP						25	25	143	8	25	**		46
	>30HP													
	Wells with Diesel Pump Engine	4738	4738	4315	4738	3552	1691	1370	5448	3968	2001		4738	2740
2002	Total	8787	10182		8787	7231	6486	6165	9173	6626	6796		8787	6046
	Upto 7.5 HP	2354	6272	3121	5138	3087	1998	2434	1577	858	2840	2407	4184	926
	Wells with Electric Motors	591	581	336	353	374	250	79	1178	1735	510	495	1315	2334
	15 to 30 HP	20	49	2	42	27	68	0	217	206	64	73	118	46
	>30HP		4	24	7	0	0	0	10	29	0	7	0	0
2006	Wells with Diesel Pump Engine	0.01	3526	1545	1492	845	926	321	3098	1952	1753	652	1952	2740
	Total	3465	6272		7032	4333	3242	2834	6080	4780	5167	3634	7569	6046
	Upto 7.5 HP	3808	6272	2278	6219	3021	2951	2929	1053	2967	3377	2652	5138	2588
	Wells with Electric Motors	954	581	339	914	479	372	138	813	396	435	711	353	2924
	15 to 30 HP	24	49	4	33	51	1	1	392	43	38	118	42	290
2006	>30HP	2	4		1	2	0	0	26	4	0	2	7	13
	Wells with Diesel Pump Engine	1311	3526	3526	1492	845	926	2571	4564	5465	5214	2021	1492	1594
	Total	6099	10432	2909	8659	4398	4250	5639	6848	8875	9064	5504	7032	7409

(Source : Gujarat Electricity Board, Taluka Panchayat and GWRDC, Gandhinagar)

The above data sets have been used in working out the various impact parameters such as runoff interception, ground water recharge and draft, sediment entrapment, irrigation coverage of cultivated areas, etc. following the standard methodology.