

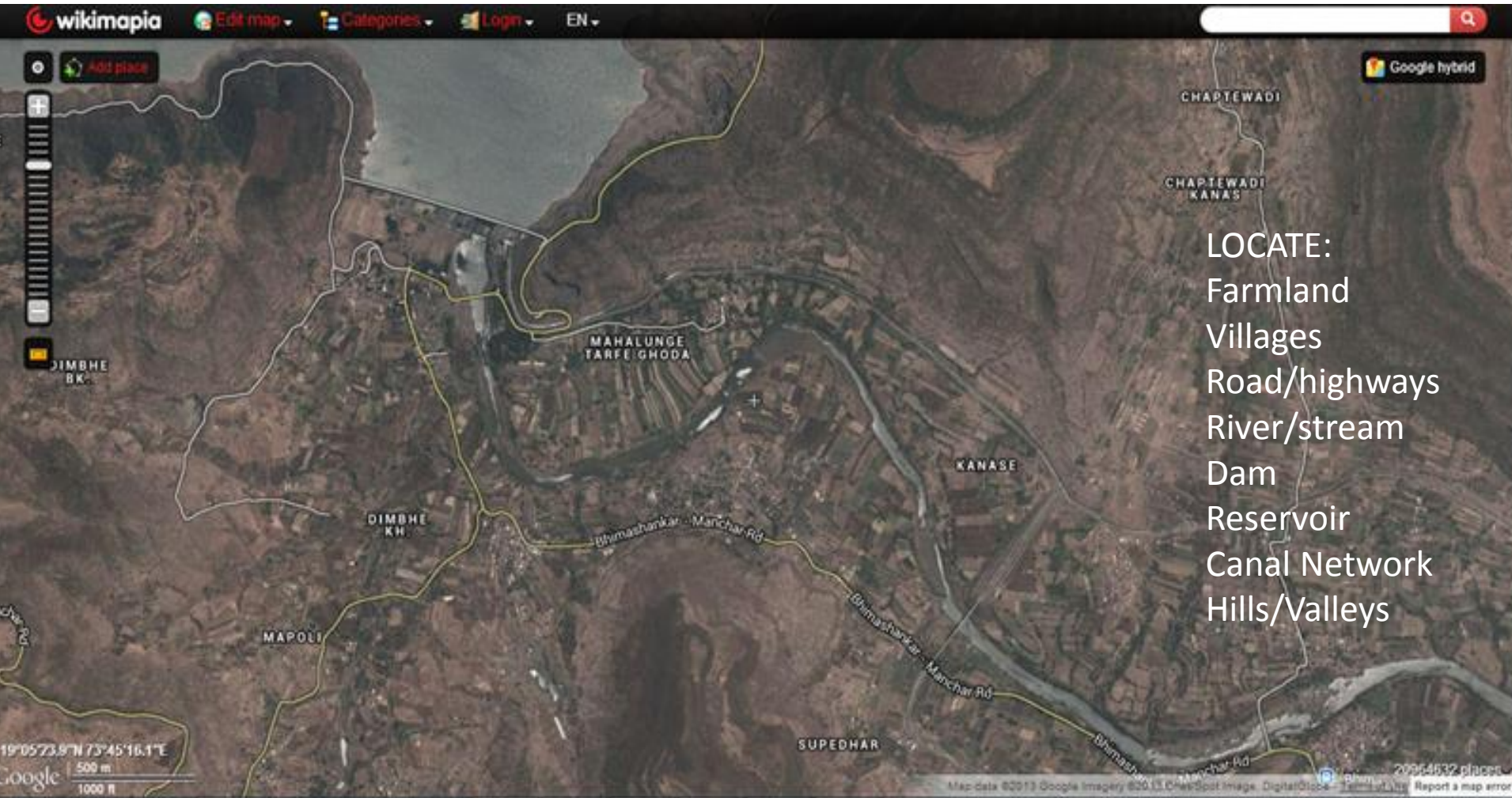
Regional water planning

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Need for planning

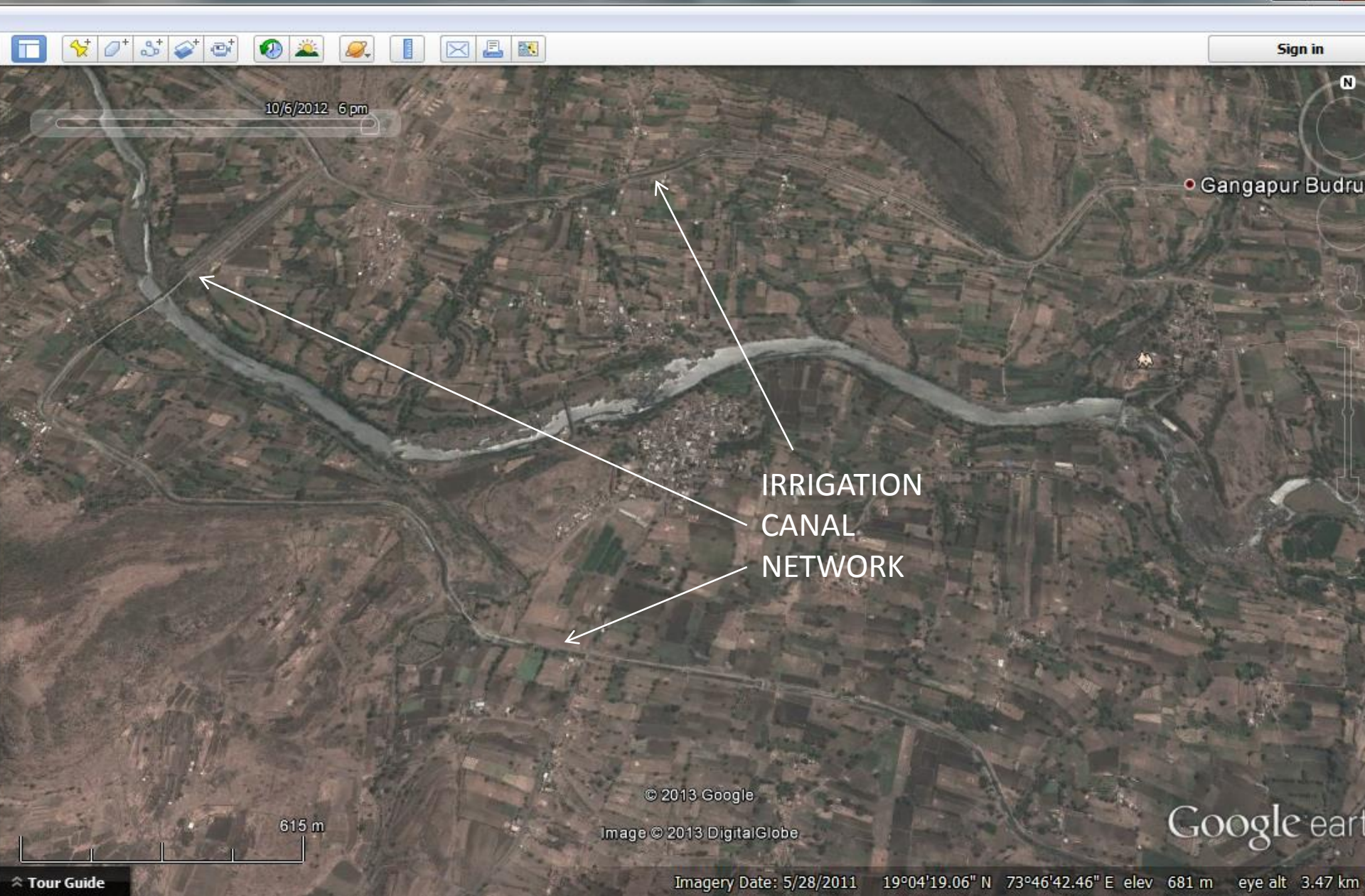
- Rising demand for resources **water, energy, firewood etc.**
- Need to meet demand with supply
 - Logistics of matching demand/supply
 - Transaction mechanism **public good, market, co-ops etc.**
 - Normative concerns **efficiency, equity, sustainability**

Regional View

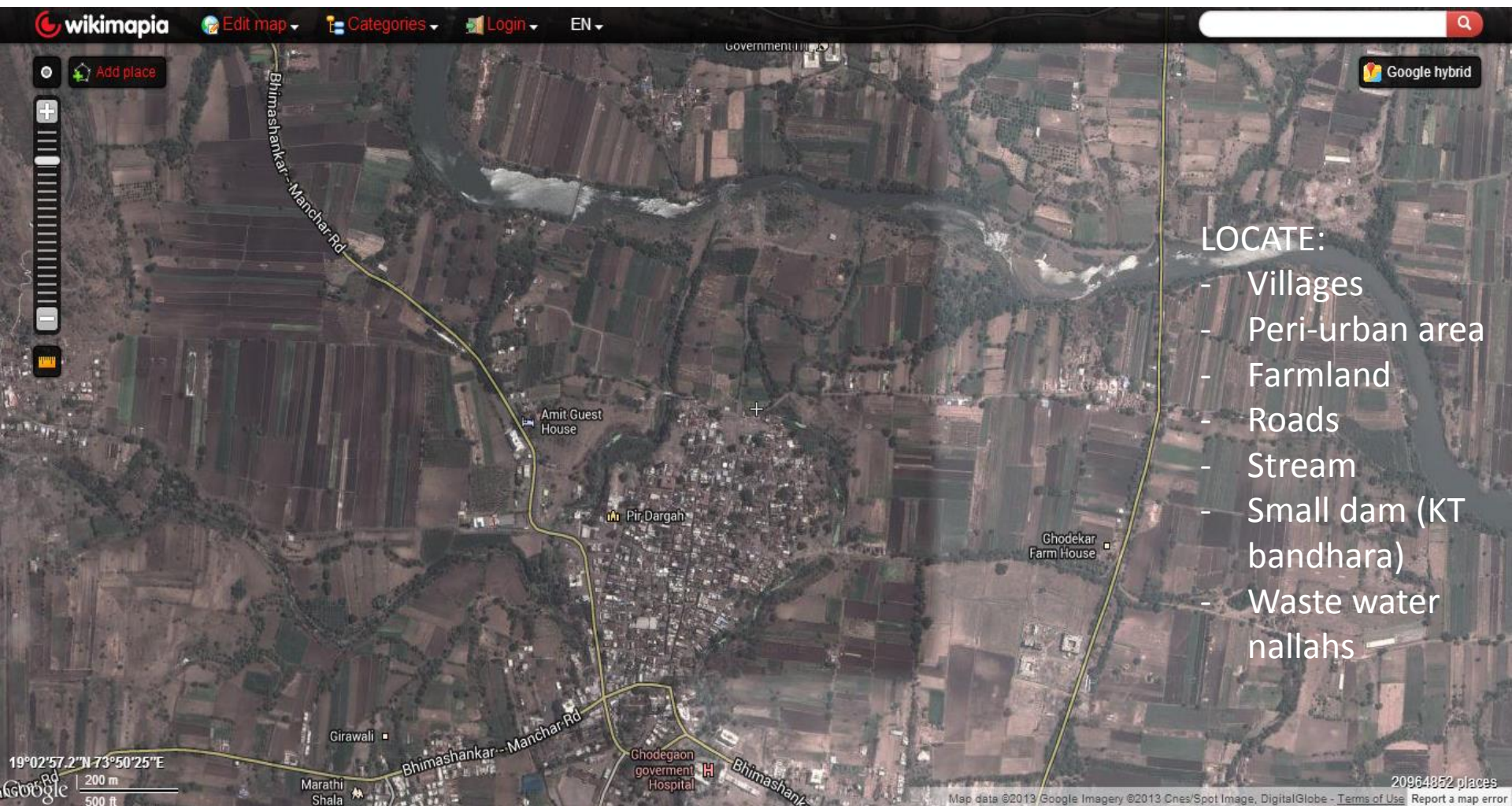


LOCATE:
Farmland
Villages
Road/highways
River/stream
Dam
Reservoir
Canal Network
Hills/Valleys

Irrigation canals



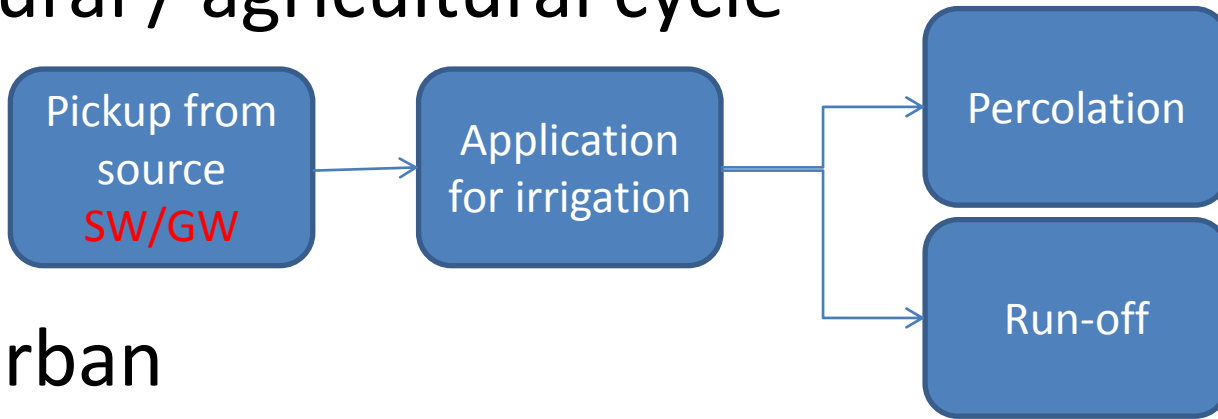
Regional view



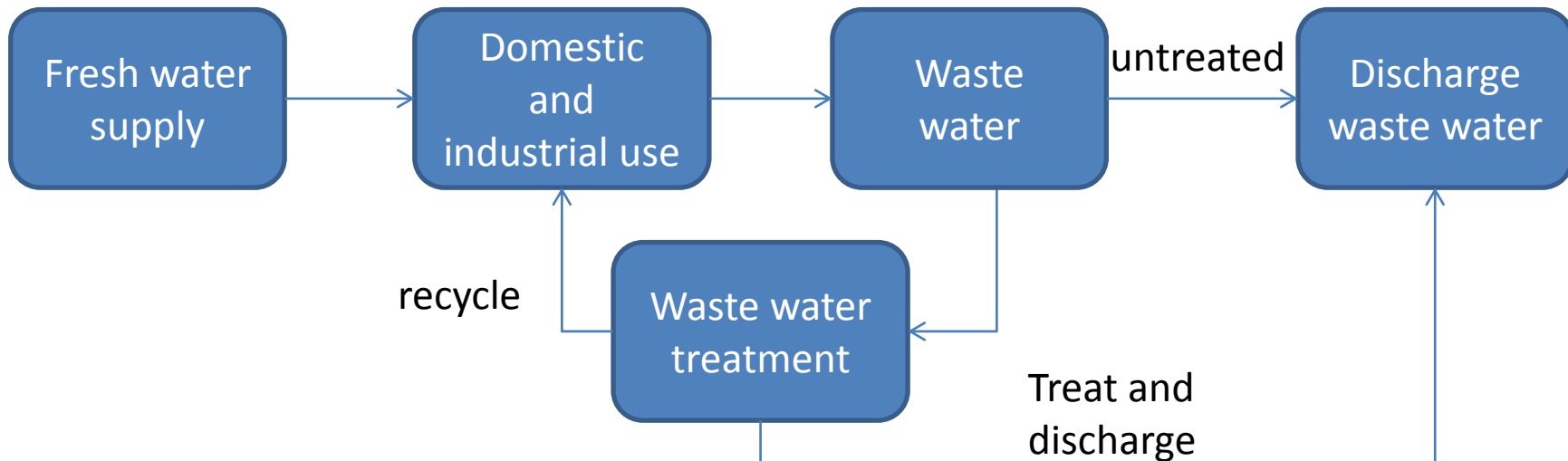
- LOCATE:
- Villages
 - Peri-urban area
 - Farmland
 - Roads
 - Stream
 - Small dam (KT bandhara)
 - Waste water nallahs

Water cycle

- Rural / agricultural cycle



- Urban



Urban water cycle



Regional water planning

Estimating Demand

- Drinking water/ domestic use
 - Central Govt norm: Minimum 40 LPCD water, year round, within 500m of household
 - Water for cattle: 15LPCD
 - Urban norm much higher

Purpose	Quantity (lpcd)
Drinking	3
Cooking	5
Bathing	15
Washing utensils and house	7
Ablution	10
Total	40

Regional water planning

Estimating Demand

- Agriculture demand
 - Kharif, Rabi and Hot Weather crops
 - Kharif crop typically rain fed
 - Typical budgeted amount for irrigation: 500mm per crop **5000 cu.m. per hectare**
- Others:
 - Industries/ Non-farm enterprises
 - Public school, offices

Water Supply

- Surface Water – lake, rivers, reservoirs, canals
dams, farm ponds
- Groundwater – dug wells, borewells, springs
sub surface bunds, trenches, contour bunds
etc.
- Rainwater Rain water harvesting structures
- Distribution network from supply to point of
use – canals, piped water schemes

Surface sources

Tokarkhand reservoir



Thangaon, Nashik



Jambhe reservoir

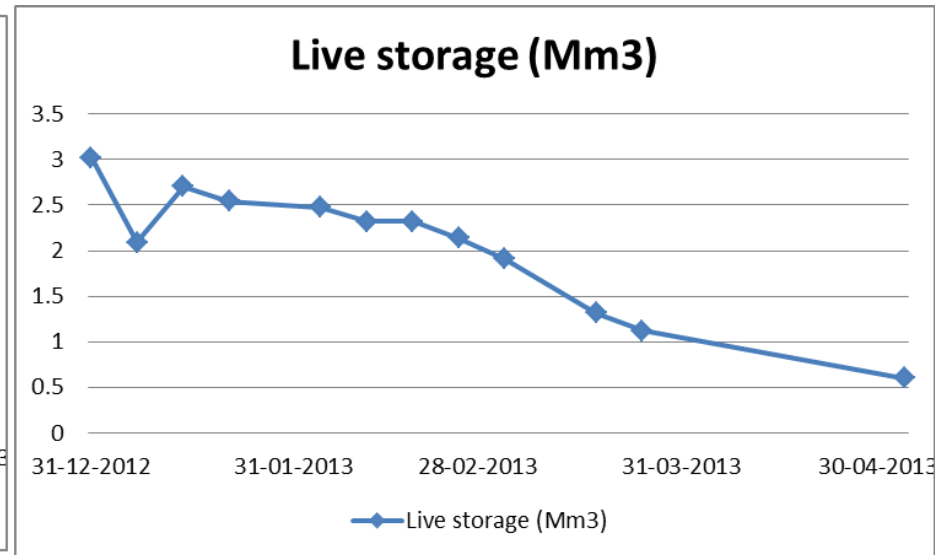
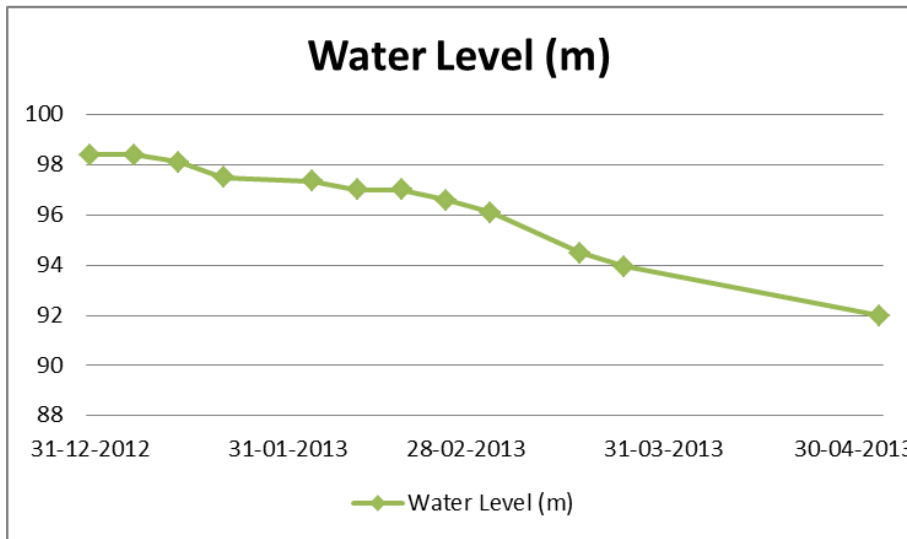


Small/ Medium Dams: Salient Features

1	Name of Project	:	Musai M.I.Scheme	Dolkhamb M.I.Scheme.
2	Source	:	Local Nalla	Local Nalla
	Location: State	:	Maharashtra	Maharashtra
	District	:	Thane	Thane
	Taluka	:	Shahapur	Shahapur
3	Village	:	Musai	Dolkhamb
4	Catchment Area	:	1.76 Sq.mile	3.68 Sq.miles
5	Average Annual Rainfall	:	107.7"	107.46"
6	75% dependable yield	:	244 Mcft.	-
7	Gross Storage	:	134.26 Mcft.	166.08 Mcft.
8	Dead Storage	:	5.75 Mcft.	9.32 Mcft.
9	Live Storage	:	128.51 Mcft.	156.76 Mcft.
10	Reservation for U/s	:	-	-
11	Annual Gross Utilisation	:	134.26 Mcft.	166.08 Mcft.
12	Top of Dam Level	:	103.00 m.	134.00 m.
13	H.F.L.	:	101.50 m.	132.50 m.
14	F.R.L.	:	100.00 m.	131.00 m.
15	M.D.D.L.	:	89.00 m.	120.00 m.
16	Max. Height of Dam	:	89.00 m.	19.76 m.
17	Type of Dam	:	17.90 m.	Earthen Dam.
18	Length of Earthen Dam	:	Earthen Dam.	213 m.
19	Length of Waste Weir	:	44 m.	60 m.
20	Max.Flood discharge	:	35.52 Cusecs	9284 Cusecs
21	Location of Waste Weir	:	Left side	Right flank
	Submergence area	:		65.59 Hect.

1	Name of Project	:	Musai M.I.Scheme	Dolkhamb M.I.Scheme.
	<u>CANAL</u>			
22	Canal length	:	3.00 Km.	7.17 Km.
23				
24	Canal Capacity	:	12.72 Cusecs	10.21 Cusecs, 4.875 Cusecs
25	Area under command (Irrigable)	:	600 Acres	196 Hect.
	i) Gross Command	:	1300 Acres	980 Acres
	ii) Cultural Command	:	1200 Acres	780 Acres
	iii) Irrigable Command	:	600 Acres	496 Acres
	Village benefitted	:	1) Musai, 2) Khaire.	1) Dolkhamb 2) Hedwali
	Village (Taluka wise)	:	-	3) Bandanpada 4) Sakurli
27	Total Cost of the Project	:	Rs.11,110.00	Rs.17,03,275/-
28	B.C.Ratio	:		2.31

Musai Reservoir



Annual Water Account for Minor Irrigation

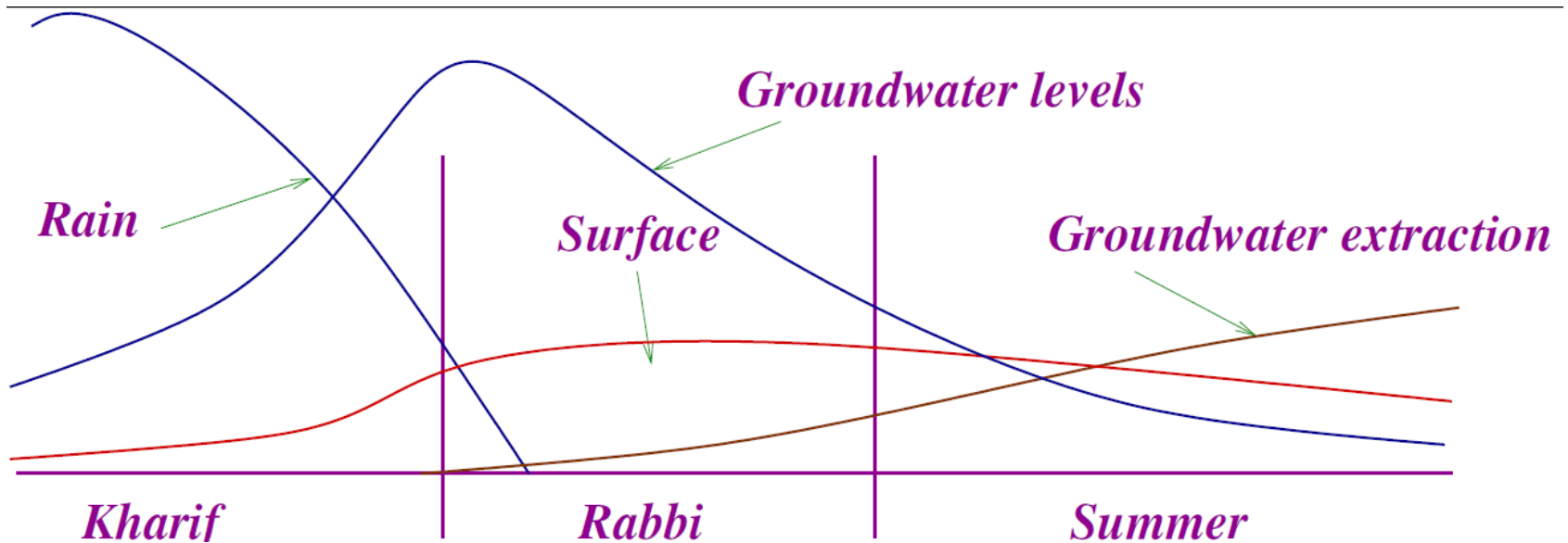
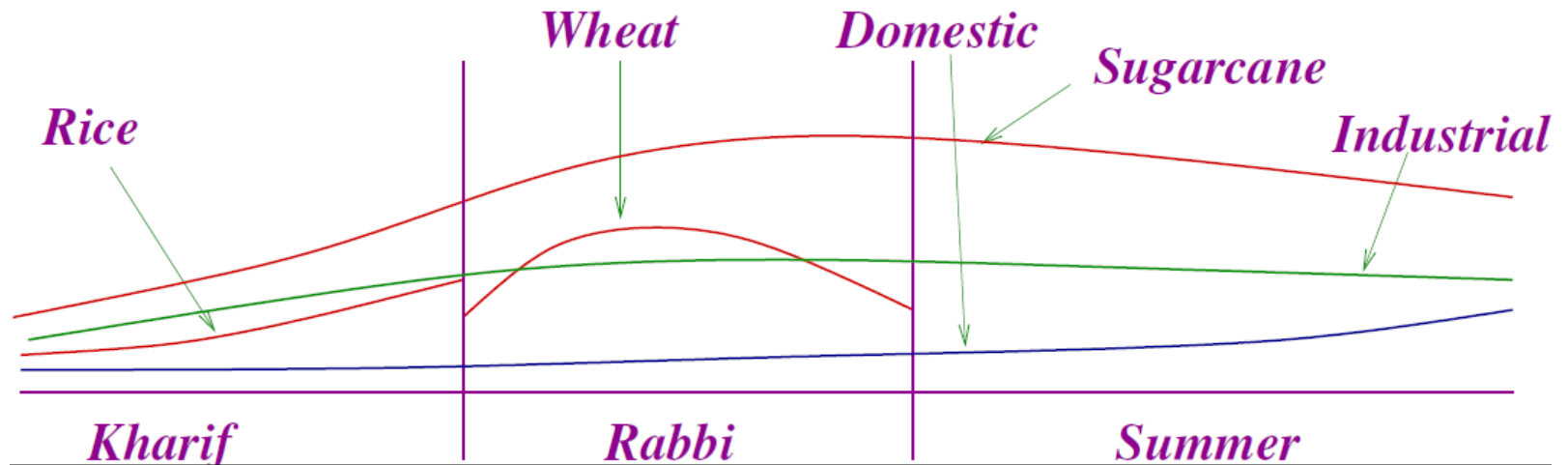
Irrigation Year:- 2010-11

Name of Circle:- TIC Thar

Name of Division :- TMID Kalwa Thane

	26	27	28	29	30	31	32
Name of Division :- TMID Kalwa Thane	26	27	28	29	30	31	32
Project No.-->	635	636	637	638	639	640	641
Name of Scheme	Adivali MI	Dolkhamb MI	Jambhe MI	Kharade MI	Musai MI	Velholi MI	Hattipada MI
Type viz. LMI, MI, LIS, ST etc.	MI	MI	MI	MI	MI	MI	MI
District	Thane	Thane	Thane	Thane	Thane	Thane	Thane
Taluka	Shahapur	Shahapur	Shahapur	Shahapur	Shahapur	Shahapur	Vasai
Sub-basin No.	21	21	21	21	21	21	21
1. Designed Storage in Mcum							
a. Gross	2.220	4.703	5.182	2.316	3.800	3.245	2.058
b. Live	2.030	4.439	4.842	2.054	3.640	2.997	1.923
2. Maximum live storage observed in the year	2.030	4.439	4.842	2.054	3.640	2.997	1.923
3. Projected water use in Mcum for							
a. Kharif	0.000	0.000	0.000	0.000	0.000	0.000	0.000
b. Rabi	2.030	4.439	4.842	2.054	3.640	2.997	1.923
c. Hot weather	0.000	0.000	0.000	0.000	0.000	0.000	0.000
d. Non irrigation	0.000	0.000	0.000	0.000	0.000	0.000	0.000
e.Total (3 a+3b+3c+3d)	2.030	4.439	4.842	2.054	3.640	2.997	1.923
4. Water drawn at canal head for irrigation							
a. Kharif	0.000	0.000	0.000	0.000	0.000	0.000	0.000
b. Rabi	0.945	0.400	1.357	0.950	1.290	1.560	0.300
c. Hot weather	0.000	0.000	0.000	0.000	0.000	0.000	0.000
d Total (4a+4b+4c)	0.95	0.00	1.36	0.95	1.29	1.56	0.30
5. Lifts From Tank							
a. Kharif	0.000	0.000	0.000	0.000	0.000	0.000	0.000
b. Rabi	0.000	0.000	0.000	0.000	0.000	0.000	0.000
c. Hot weather	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6. Evaporation Losses	0.179	0.609	0.350	0.195	0.515	0.420	0.240
7. Leakages through dam	0.668	1.887	0.000	0.028	0.625	0.260	1.271
8. Total (4d+5+6+7)	1.792	2.496	1.707	1.173	2.430	2.240	1.811
9. Actual Area Irrigated by Canals							
a. Kharif							
i) Area							
ii) Irrigation System Performance (ha/Mcum)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. Rabi							
i) Area	39.70	18.30	106.90	70.00	65.00	90.13	15.00
ii) Irrigation System Performance (ha/Mcum)	42	46	79	74	50	58	50
c. Hot weather							
i) Area							
ii) Irrigation System Performance (ha/Mcum)	0	0	0	0	0	0	0
10. Actual Area Irrigated by Tank lifts							
a. Kharif							
i) Area							
ii) Irrigation System Performance (ha/Mcum)	0	0	0	0	0	0	0
b. Rabi							
i) Area							
ii) Irrigation System Performance (ha/Mcum)	0	0	0	0	0	0	0
c. Hot weather							
i) Area							
ii) Irrigation System Performance (ha/Mcum)	0	0	0	0	0	0	0
11. Non irrigation use	0.150	0.550	0.250	0.380	0.140	0.182	0.000
12. Live Storage on 30 th June	0.088	1.393	2.885	0.521	1.070	0.575	0.112
13. Replenishment in the month June							
14. Area Irrigated on wells/rivers/drains in	0	0	0	0	0	0	0

Demand and Supply – Sectors and Seasonality



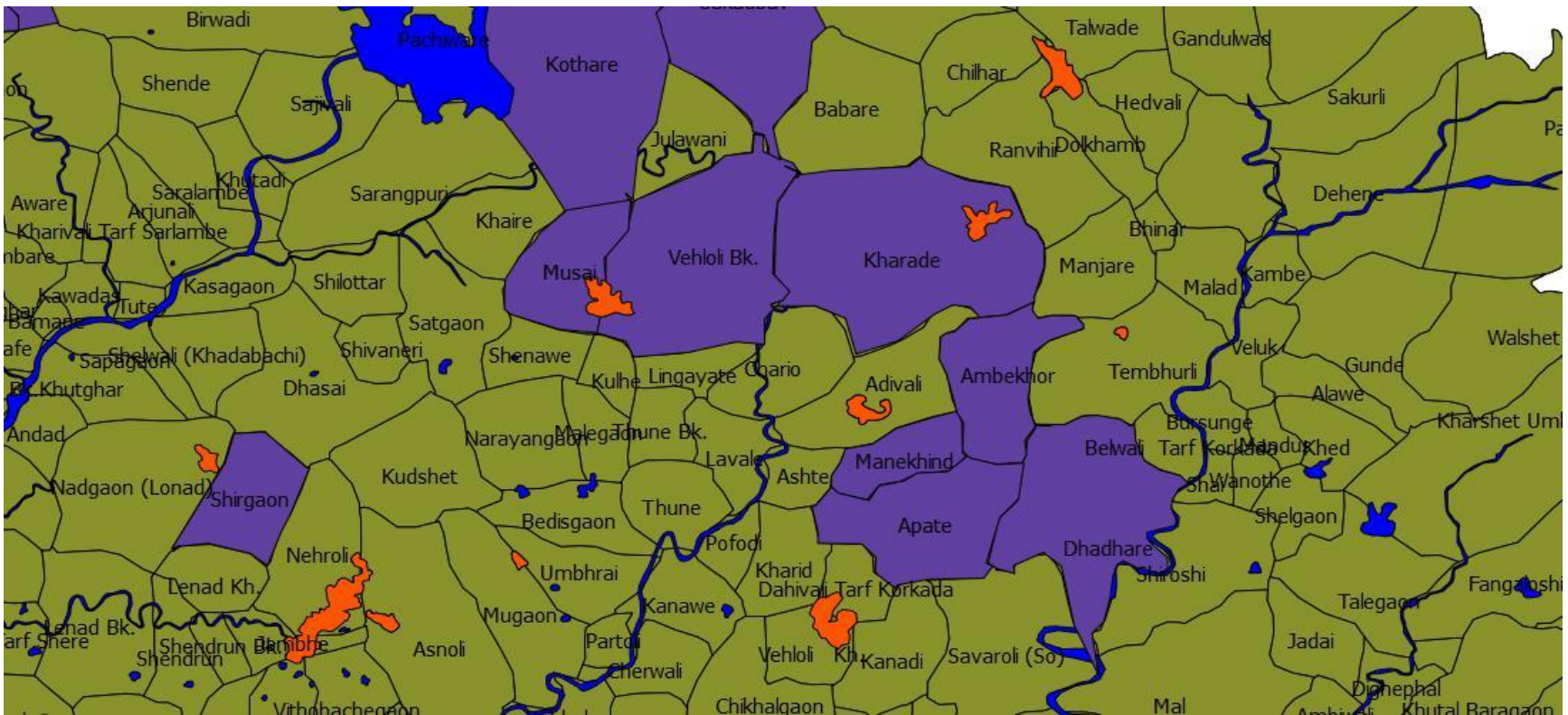
Matching demand and supply

- Logistics: cost of energy, capital and O&M
 - surface water: generally large investments, canals, pipelines
 - ground water: generally private and near demand point, electricity/diesel
- Policy: State priorities- drinking, agriculture and then industry
- Tariff, Subsidy and Ability to Pay:
 - industry subsidizes domestic
 - irrigation: generally subsidized by state
 - poor households generally subsidized within community

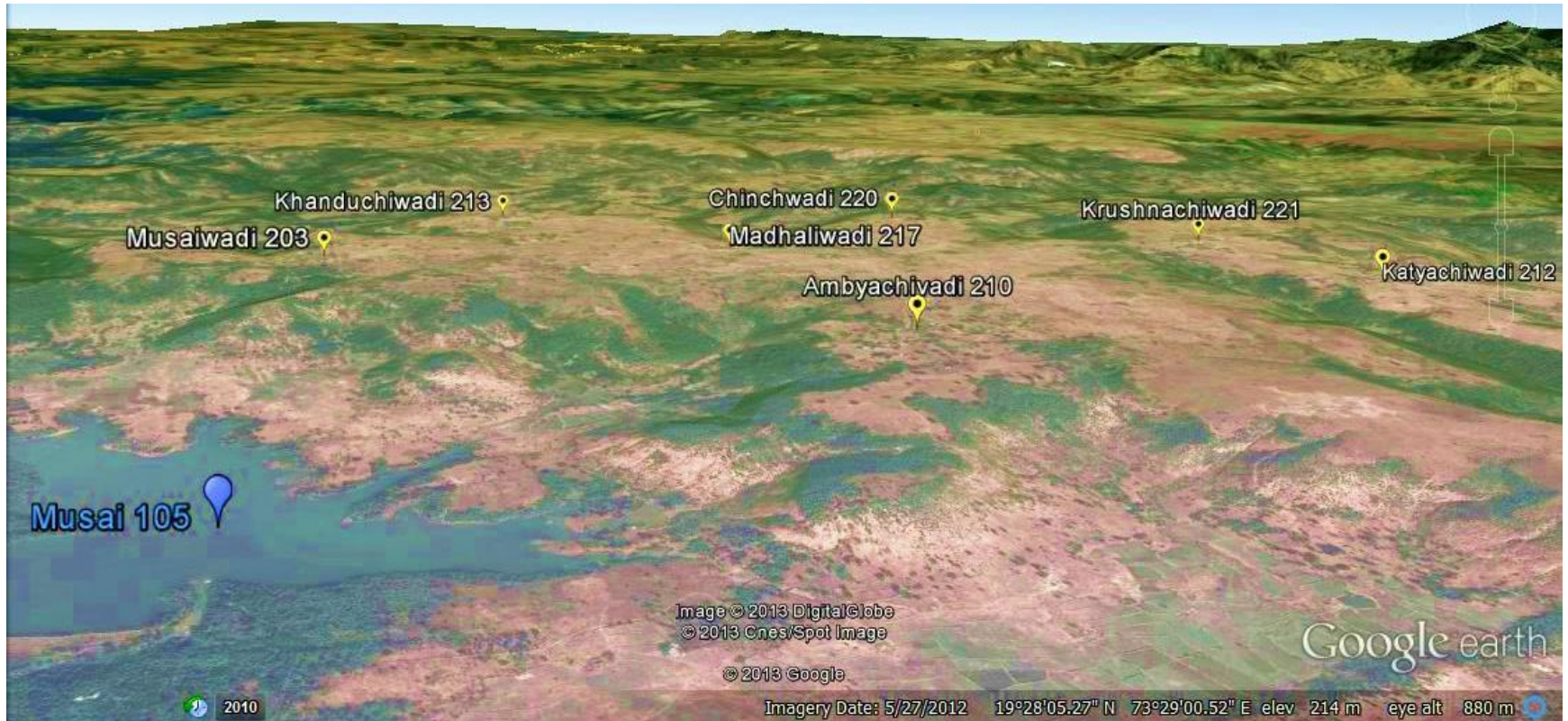
Case studies

- Utilizing unused water in reservoirs for regional drinking water needs
 - Shahpur tanker fed villages
- GP as a case study
 - Shallow reporting
 - Watershed modeling

Long term planning - Tanker Fed villages



Musai Reservoir and tanker fed villages

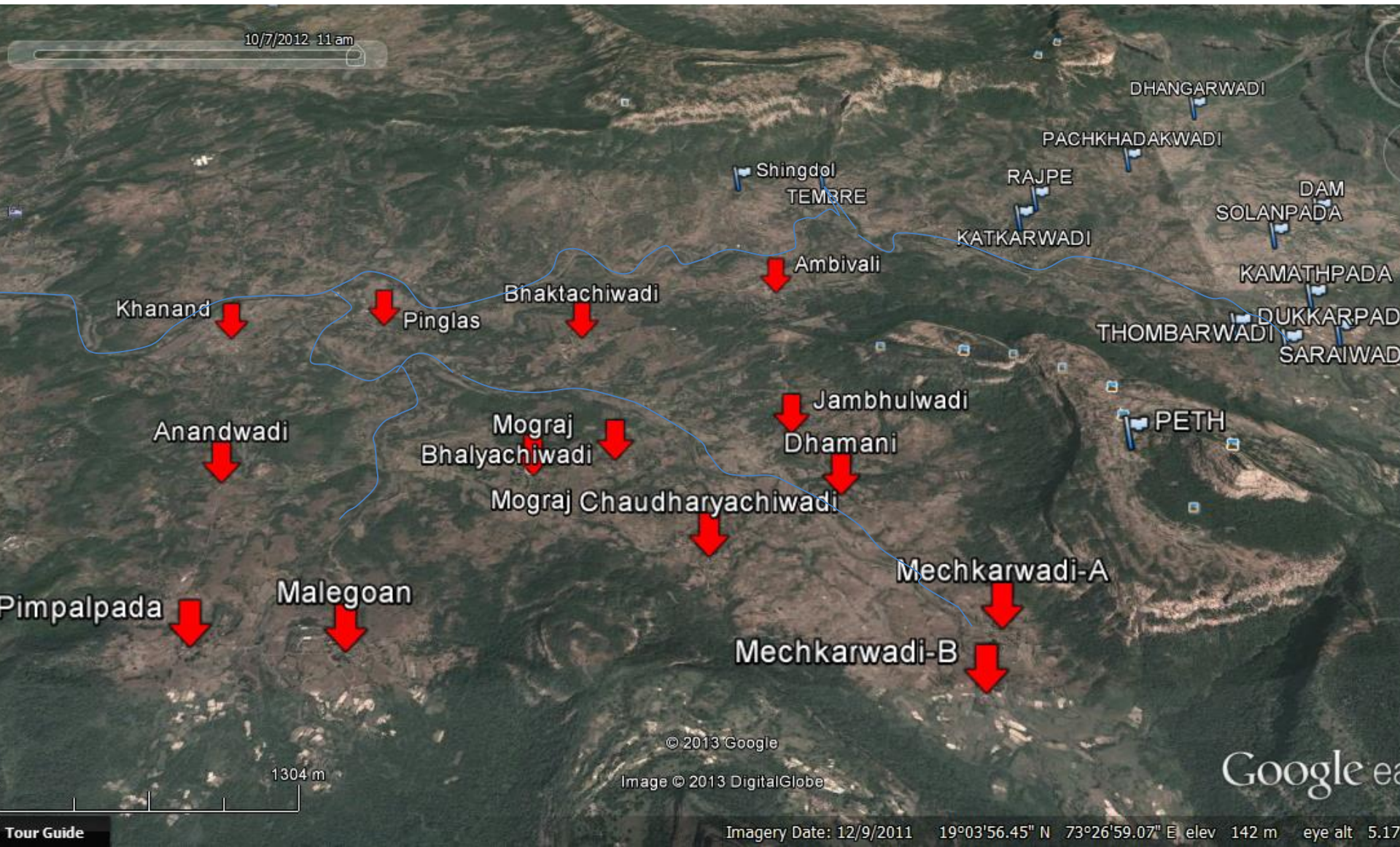


Proposed network



GP as case study

Mograj GP and Tembhare GP



Mograj GP

Secondary data - Census

NAME	Households	Total Population	Male Population	Female Population	Population under 6	Male population under 6	Female population under 6
Khanand	59	362	185	177	59	25	34
Pinglas	138	849	502	347	146	81	65
Ambiw adi T. Kothal Khalati	85	381	196	185	60	24	36
Dhamni	222	1219	633	586	190	114	76
Mograj	100	493	249	244	109	60	49
Pimpalpada	23	136	77	59	23	14	9
Malegaon T. Kothal Khalati	71	325	167	158	71	38	33
Total	698	3765	2009	1756	658	356	302

NAME	AREA (Hectares)	Forest Land	Total Irrigated land	Unirrigated land	Cultivable waste	NA land
Khanand	161	5	0	25	106	24
Pinglas	286	0	32	41	161	53
Ambiw adi T. Kothal Khalati	303	64	2	21	189	26
Dhamni	1125	450	0	76	525	74
Mograj	379	14	0	42	290	33
Pimpalpada	277	106	0	38	118	15
Malegaon T. Kothal Khalati	375	201	0	21	127	26
Total	2906	840	34	265	1517	251

Mograj and Tembhare GP – Supply sources

- Shilar river – seasonal
- Groundwater – dugwells, borewells, handpumps **Public vs. Private**
- Small reservoir - Solanpada dam in Tembhare GP **none in Mograj**
- Piped water schemes
- Tanker water during scarcity period **8 habitations in Mograj, none in Tembhare**

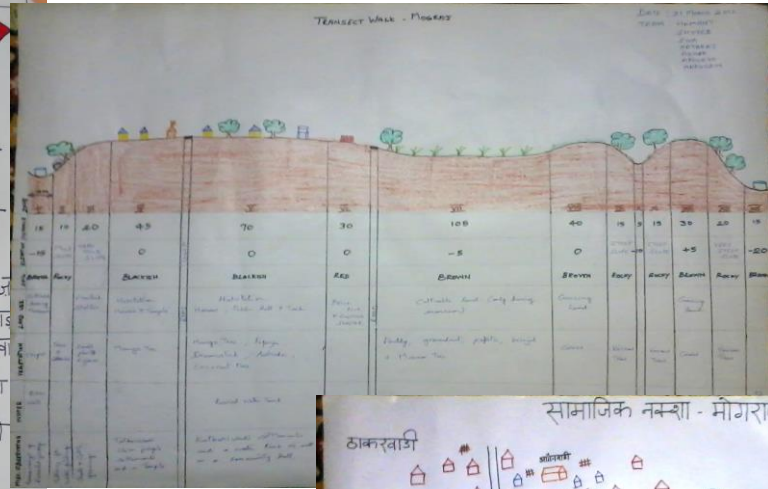
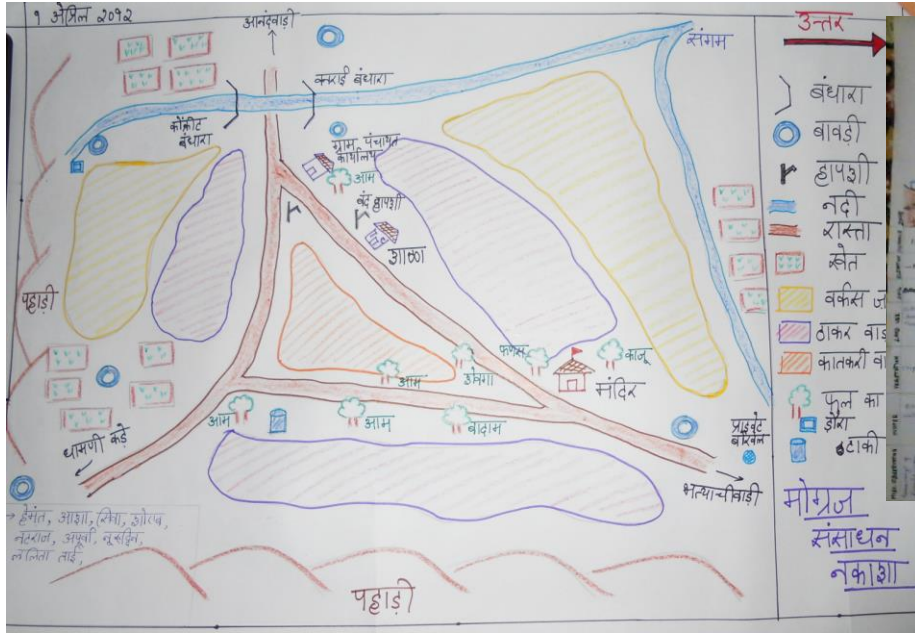
Mograj – scarcity?

- Tanker-fed villages in Mograj (23/4/12 to 10/6/12)

S. No.	Gram Panchayat	Village Name	Habitation Name	Tanker-fed in 2012?
1	MOGRAJ	AMBIVALI	AMBIVALI	No
2	MOGRAJ	DHAMNI	CHOUDHARWADI	No
3	MOGRAJ	DHAMNI	DHAMNI	No
4	MOGRAJ	DHAMNI	MECHKARWADI	No
5	MOGRAJ	KHANAND	BHALAYACHIWADI	Yes
6	MOGRAJ	KHANAND	KHANAND	Yes
7	MOGRAJ	MALEGAON	JAMBHULWADI	Yes
8	MOGRAJ	MALEGAON	MALEGAON	No
9	MOGRAJ	MOGRAJ	ANANDWADI	No
10	MOGRAJ	MOGRAJ	BHAKTACHIWADI	Yes
11	MOGRAJ	MOGRAJ	MOGRAJ	Yes
12	MOGRAJ	PIMPALPADA	PIMPALPADA	No
13	MOGRAJ	PINGLAS	PINGLAS	Yes

- Note: No tanker fed villages in Tembhare

Mograj PRA



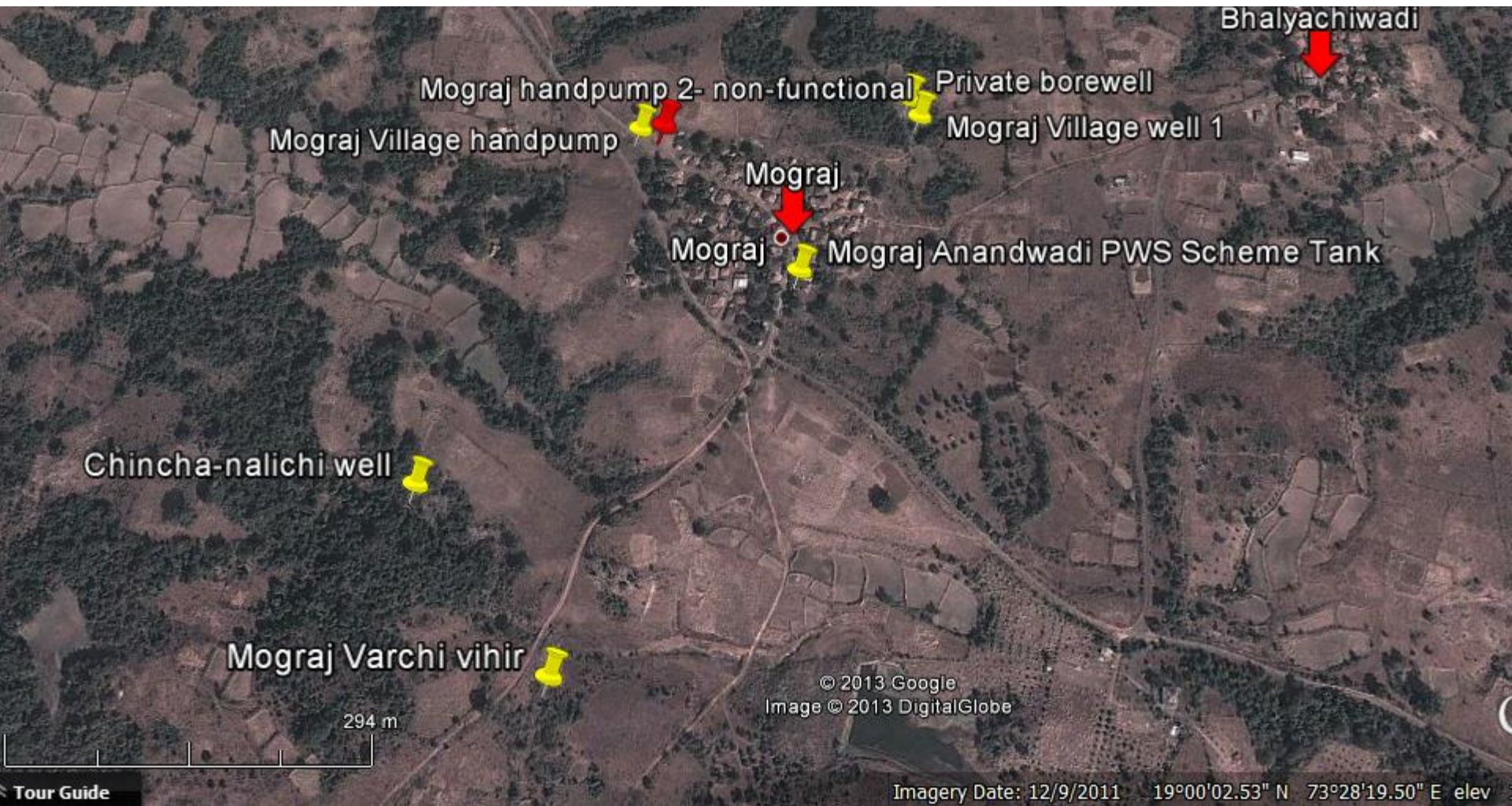
Resource mapping, social mapping, transect walk, FGD etc.



Seasonality

Water source	Type	Ownership	Distance	Depth	Water availability
Public Well 1	Open Dug well	Public	100 m	10 ft	Till January
Public Well 2	Open Dug well	Public	500 m	25 ft	Till 1 st week April
Hand pump 1	Bore	Public	Non functioning	-	-
Hand pump 2	Bore	Public	50 m	100 ft	Till April
Chinch-nalichi well	Open Dug Well	Public	750 m	20 ft	Till April
Farm house well	Open Dug Well	Private	1 km	20 ft	12 months
Purshottam Patil's Well	Open Dug Well	Private	1.6 km	25 ft	12 months
Anandwadi well	Open Dug well	Public	2 km	25 ft	12 months
Chaudharwadi well	Open Dug well	Public	2.5 km	-	12 months
Private bore well	Bore	Private	Not in use presently	100 ft	-

Mograj Habitation – Mapping Sources



Piped Water Scheme status

S.No.	Scheme Name	Beneficiary Habitations	Implementing Agency	Sanction Year	Year of completion	Source	Scheme status as of Dec 2012 (determined through field surveys)	Notes
1	Ambivali PWSS	Ambivali	Zilla Parishad	2008-09	2010	Groundwater	Functional	Functional
2	Mechkarwadi PWSS	Mechkarwadi	Zilla Parishad	2002-03	2005	Groundwater	Partly functional	Failed in 2005 and revived in 2010 for one part of habitation. Scheme has household connections for this part of habitation
3	Khandan PWSS	Khandan	Zilla Parishad	2008-09	2010	Surfacewater	Failed	Scheme does not exist on the ground
4	Malegaon Pimpalpada PWSS	Malegaon, Pimpalpada	Zilla Parishad	1997-98	2000	Groundwater	Failed	Failed for both habitations within a year. Scheme repaired in 2007 but failed
5	Mograj Anandwadi PWSS	Mograj, Anandwadi	Zilla Parishad	1997-98	2000	Groundwater	Failed	Failed in 2000 for Mograj and failed for Anandwadi in 4-5 years
6	Bhaktachiwadi PWSS	Bhaktachiwadi	Zilla Parishad	2002-03	2006	Groundwater	Failed	Failed in 2006
7	Pinglas WSS	Pinglas, Bhaktachiwadi, Ambivali, Tembhre (Tembhre GP), Shingdol (Tembhre GP)	Maharashtra Jeevan Pradhikaran	1998-99	2010	Groundwater	Failed	Failed within 1 year
8	Choudharwadi PWSS	Choudharwadi	Zilla Parishad	2004-05	2005	Surfacewater	Failed	Failed
9	Bhaktachiwadi Ashramshala PWSS	Bhaktachiwadi Ashramshala	Zilla Parishad	2005-06	2007	Groundwater	Functional	Functional except summer (school holidays)
10	Dhamni PWSS	Dhamni, Jambhulwadi, Choudharwadi	Zilla Parishad	1986-87	1988	Groundwater	Failed	Failed in 1989

Evaluating interventions

- Watershed treatment
 - Contour trenches, contour bunds
 - surface / sub-surface bunds
 - Well strengthening
- Proposed contour trenches

