Regional Drinking Water Security
District Level Pilot Project
Concept Note

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1 The Proposal

Large parts of western and central Maharashtra have had scanty rainfall this year. As a consequence, it is likely that most habitations of several talukas will face drinking water stress for much of the coming year. This stress will create a composite set of demands: domestic water, water and fodder for cattle, livelihoods and so on. This note outlines a collaborative project between (i) a district administration (Sangli), (ii) a Regional Engineering and Research Institution (Rajaram Bapu Institute of Technology, RIT) and (iii) CTARA, IIT Bombay, to address largely the domestic water stress of various habitations across a district. The central objective of the project will be to ensure regional drinking water security for a district throughout the year 2012-2013 and to bring about medium and long-term planning for this recurring problem. The scale of the project will require able technical, coordination, optimization, informational and logistical skills. We hope that this three-way collaboration will bring many sets of experience and skills to face this difficult situation and lead to efficiency, transparency and accessibility to the mitigation process.

The methodology will be to set up a **Drought Mitigation and Monitoring Cell** (DMMC) for the district reporting to the District Collector. The DMMC will led by a key person, the **Project Coordinator** (PC) and will be assisted by the Assistant Project Coordinator (APC). Taluka level people will be hired as per needs and the preparedness of taluka staff.

The DMMC will operate in a purely consultative role to the District Collector and will help in the coordination, planning, monitoring, design and solution functions of the state administration and departments. Its principal objective is to improve the outcomes and to bring efficiency

through the use of new technical interventions such as the use of GIS, simulations, testing and design protocols. Ultimate responsibility of execution and the chain of command will remain undisturbed.

The role of the DMMC will be to

- **Demand**: To collate and represent the demand for drinking water on a periodic basis. To assist habitations in registering their demand for drinking water.
- **Supply and Logistics**: To assist the rural drinking water department in various logistical tasks such as building tanker schedules, GIS representations and so on.
- **Water Science**: To assist in the survey sources of water and to assess quality and quantity of supply. To utilize CTARA/GSDA models, and rainfall to build scarcity scenarios.
- **Schemes**: To verify the coverage of PWS schemes and to assist departments in ensuring the smooth running of these schemes.
- **Monitoring and Reporting**: To assist in running a monitoring system and a weekly dashboard for the District Collector.
- **Future Planning**: To construct a medium-term and long-term scenario and mitigation plans.
- **Collaboration**: To collaborate with RIT and CTARA in the above tasks through funding for projects with precise objectives and deliverables.

The PC will report to the District Collector and collaborate with the Rural Water Supply (RWS), MJP, Minor Irrigation (MI) department and so on. The role of RIT and CTARA will be to assist the DMMC in validation, design alternatives, model building, simulations, sampling and so on. Besides the PC, the DMMC will be manned by project staff as is found useful and which befits the scope of the project as it evolves. The PC will have the following capacities before the project starts:

- GSDA data sets and groundwater modelling. Wells, yield tests, water table and elements of groundwater modelling.
- Watersheds and watershed structures. Maps and topo-sheets. Water balance, use of GIS, layers etc., GIS as a monitoring tool.
- Administrative set-up and roles of various offices. Basic administrative data sets such as census, DDWS and so on.
- PWS schemes, both single-village and regional. Design and analysis, causes of failure. Optimization and simulation.
- Laws and regulations related to groundwater extraction, prepartion of scarcity lists and preparation of demand for tankers, schedules and routes. Optimization.
- Basic tenets of civil works and works through NREGA.
- PRI institutions such as *pani samiti*, various vulnerabilities of class and community, village meetings, role of *gran sewak*, capacities at the village and GP level. Role of TSPs and SOs.

2 Project Execution and Costs

Key project tasks are listed as follows:

- **Establishment.** The establishment of the cell is expected to be on 1st Sept., 2012. This will involve key consultations with the District Collector, a review and site visits.
- **GIS-MIS Installation and Integration**. The set-up of the GIS and integration of the MIS system of the cell with that of the district.
- **Groundwater Modelling**. Adopting the CTARA groundwater and forecast models and their calibration. Making the first scarcity estimations. Updation of these models as the monsoon progresses and as irrigation demands set in and new well data emerges.

- **Historical Analysis**. An analysis of past years–habitations, climate data and tanker lists and schedules.

- **Schemes**. Understanding scheme performance and coverage. Flagging performance issues and improving coverage and reliability. Learnings for future design of schemes.

- **Scarcity Reporting and Verification**. Reviewing habitation-level protocols for recording scarcity. Independent assesments of habitations to ensure better coverage and adequate water.

- **Tanker planning and supply**. Assisting in the logistics of tanker service.

- **Source Planning**. Planning of new sources, source weaknesses and source assignment to regional demand.

- **Repairs and New Assets**. Assisting in identification of engineering works needed, such as tanks, roads and so on. Convergence of watershed activities and NREGA.

- **Monitoring-Infrastructure and Execution**. Providing periodic diagnostics and reports for the District Collector and the people of the district. Ensuring access of all stakeholders to key functionaries and key information.

- **Legal and Administrative Framework**. Studying the appropriate groundwater laws and preparing and putting up cases for judgement.

The project office will consist of the PC and the assistant project coordinator (APC). The APC will be an engineer familar with the district. It is expected that the District Collectorate will arrange for (i) suitable office space and infrastructure such as computers, (ii) suitable clerical help, as and when required, (iii) field travel, and (iv) accomodation and travel for IIT/RIT visitors. **It is further expected that the Collectorate will arrange for the accomodation of the team members or recompense them suitably.**

Heading	Rs. (lakhs) p.m.
PC Salary	0.45
APC salary	0.27
Total	0.72

Besides these on-site costs, we expect RIT and IIT to be supported by Rs. 0.5 lakhs p.m. and Rs. 1.5 lakhs each in consultancy costs. Thus the annual cost of the project will be **Rs. 9.0 lakhs in execution costs** and **Rs. 24.0 lakhs in Research and Support costs**. Besides this, we may budget for taluka staff and research costs at roughly **Rs. 4 lakhs per taluka**. Thus the total costs are expected to be Rs. 70 lakhs per annum.

3 The Expected Outcomes

The key expected outcome is, of course better delivery of drinking water at atleast 20 lpcd for the people of the district. It will hopefully bring new technologies, efficiencies and transparency into the system which may be useful for later years. This will include better protocols for the design of schemes, for civil and watershed works, and the logistics and monitoring of rural water supply systems. It will also initiate a partnership between educational and research institutes with regional administration. All of this would be useful for the administration and people of the district. Besides providing better service to the people of the district, it will also inform both the RIT and IIT about problems needing research and will benefit these institutions greatly.

This would also be a novel development experiment with wide ramifications. If the position of the PC and the cell demonstrate that they can create value exceeding their expenses, then it may be a useful mechanism for bringing new talent into governance, monitoring and design. This would pave the way for a new training for engineers and applied social scientists and indicate avenues for their participation in the development sector.

4 Past Work

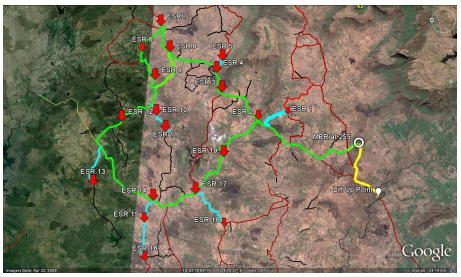
The history of CTARA, IIT Bombay and some related reports are enclosed as a separate document. In the water sector, CTARA has been active in Raigad and Thane district. It has done numerous studies in groundwater modelling, groundwater regulation, analysis of water supply schemes, gram panchayat level reporting, simulations, optimization and feasibility studies. Many of the reports describing this work are available on line at:

`www.cse.iitb.ac.in/~sohoni/TD603`

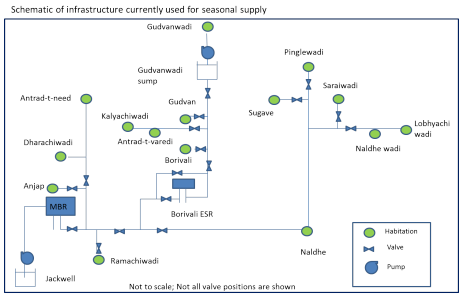
- **The Gudwanwadi Checkdam Project, 2005**: This projectaimed at relieving thedrinkingwater stress of Guwanwadi village in Karjat taluka of Raigad district. An 85m long earthen structure was created with technical inputs from Gangotree, community participation from residents and coordination by CTARA. The project was moderately succesful–the stress relief was for about 4 months. There was increased availability of water till about March, every year.


- **Jal-Swarajya Review, 2007**. This study was in collaboration with TISS and Prayas, Pune. The study visited all the ongoing (roughly 35) Jal-Swarajya projects of Thane district to do an assesment of best practices. These findings were reported partly in student theses at CTARA. Our conclusions were that (i) about a third of the projects had failed, and (ii) groundwater source failure was a major reason for failure, and (iii) source strengthening was not undertaken in most projects.

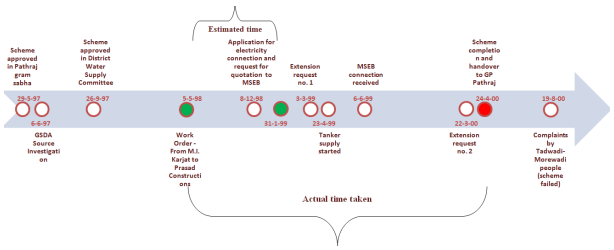
- **North Karjat rural regional scheme: Feasibility Study, 2010**. This study focused on the feasibility of a rural regional scheme supplying drinking water to an area covering about 70 habitations across more than 6 Gram Panchayats with a design population of about 30,000. The source was Pej river. We used innovative optimization techniques and the use of GIS to aid design. We found that for 40 lpcd, the investment cost came to Rs. 2200 per capita while for 200 lpcd it came to Rs. 7500 per capita. The results were presented to local stake-holders including the Tehsildar, Shri Girase, the MLA, Shri Suresh Lad. Six GPs adopted the report in their gram sabhas and presented their demand to MJP.



- **Anjap-Sugave Multi-village scheme analysis, 2011**. This study focused on a poorly performing rural regional scheme, viz., the Anjap-Sugave scheme of Karjat taluka, Raigad district. The study showed that there were several design issues which resulted in poor performance of the scheme. Poor community mobilization and inordinate delays had further complicated the situation. Key assets such as one of the ESRs and the WTP remained incomplete and the other ESR remained untested. These results were presented to all stake-holders inlcuding the CEO, Shri Abhijit Bangar and Minister for Rural Development, Shri Jayant Patil. The study also included a plan for the scheme's revamp. Karjat's Konkan Gyanpeeth College of Engg. (KGCE) followed this up with a review in 2012.

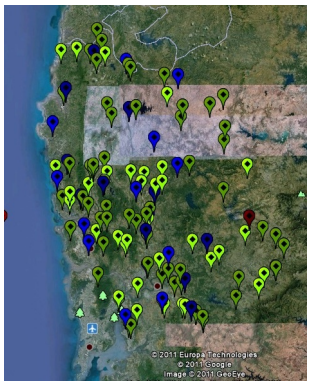


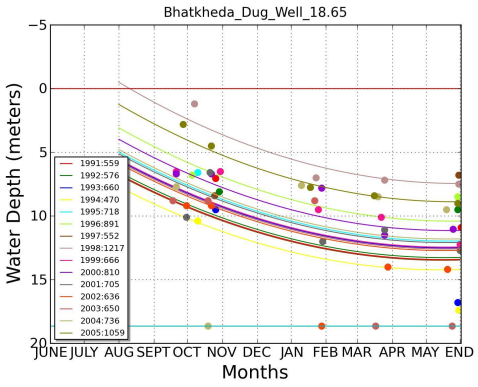
- **Failure analysis of the Tadwadi-Morewadi Single-Village Scheme, 2011**. This work studies the reasons behind the failure of a single-village scheme for two tribal *wadis*. tadwadi and Morewadi are one of the most stressed habitations of the taluka and have been so for decades. We found that the proposed scheme was poorly designed with an obvious error in the height of the ESR. Furthermore, the source well was closer to another wadi which had made a formal representation about this. The ulitmate cause of the failure was that the pump was stolen. Currently, this well now has a huge private well adjacent to it and a bungalow-plot scheme using this water. This now requires an application of the groundwater act.



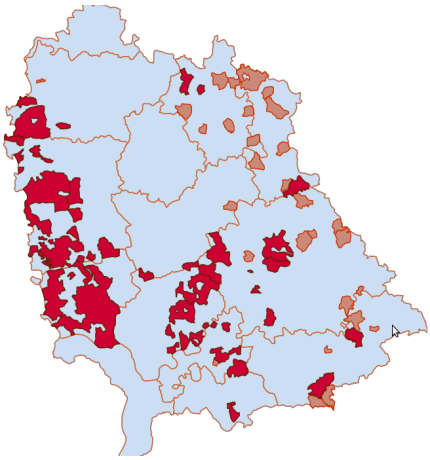
- **Regional Groundwater Modelling based on GSDA datasets, 2012**. This work was in collaboration with GSDA. Based on the observation well data of GSDA, we built groundwater models aimed at predicting groundwater levels at different locations and different times of the year. The study focussed on Thane, Sangli and Latur as example districts. key conclusions were that (i) goodness of fit was more in Thane and Latur than in Sanglis, (ii) the goodness of fit increased substantially when rainfall totals and

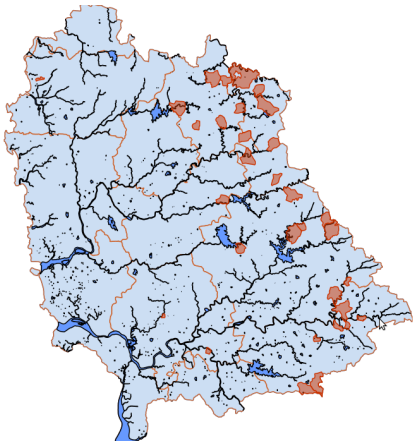
peak rainfalls were also recorded. The study also verified the wisdom of shallow and deep aquifers and the difference in models for dug-wells and bore-wells.



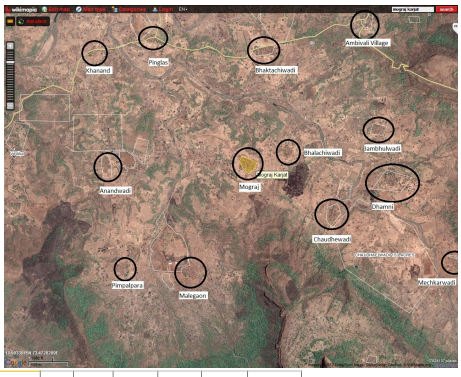


- **Thane District regional analysis of drinking water, 2012**. This study focused on the use of GIS and statistical and data representation techniques to analyse drinkingwater stress. This work was in collaboration with the Thane district administration, and is ongoing. the methodology involved using district adminstration data, ground-truthing it and using GIS and other data to draw conclusions. We saw that Shahpur, and esp. Murbad, showed a higher risk of failure for tribal wadis. We also saw that elevation was a major reason of failure. The second observation was that areas of large investments for PWS and those of stress were largely disjoint. This calls for investments in regional PWSS for areas of Mokhada and Jawhar.





- **Mograj GP level study and data analysis**. This study picked up Mograj GP of Karjat for a deeper analysis. We visited each *wadi* and mapped every water-related asset. On comparing the DDWS dataset with ground observations, we saw grave discrepancies. Most schemes attributed as working were actually non-functional. There were a few conflicts where a clear implementation of groundwater regulations would benefit communities. We developed a *shallow reporting* protocol to aid district administrations and residents in assessing and reporting stress. This part of the work was done with KGCE, Karjat.



	VillageName	HabitationName	SchemeNameDP	SanctionYear	SchemeType	EstimatedCost	DateOfCommencement	sourceTypeCategory	TypeOfSource	locationWaterSource	Satus as per CTARA survey as of March 2012
2	AMBIWADI T	AMBIWADI T-KOTHAL KHALATI	PWSS AMBIVALI	2008-2009	Piped Water Supply Scheme	25.00000	31/03/2009	Surface Water	River		Functional
3		AMBIVALI	PWSS AMBIVALI	2008-2009	Piped Water Supply Scheme	25.00000	31/03/2009	Ground Water	Openwell	near village	Repeated
4	DHAMNI	CHOUDHARIWADI	Chowdhariwadi handpump	2000-2001	Hand Pump	0.35000	14/01/2000	Ground Water	Deep Tubewell	near field	Functional
5		DHAMNI	DHAMANI DUGWELL	2005-2006	DUG WELL	0.35000	01/09/2005	Ground Water	Openwell	in village	Functional
6		MECHKARWADI	MECHKARWADI PWSS	2002-2003	Piped Water Supply Scheme	13.32000	30/05/2003	Ground Water	Openwell	NEAR VILLAGE	Functional
7		MECHKARWADI	MECHKARWADI PWSS	2002-2003	Piped Water Supply Scheme	13.32000	30/05/2003	Ground Water	Openwell	near village	Failed for one wadi
8		PACHKHADAKWADI	DHAMANI DUGWELL	2005-2006	DUG WELL	0.35000	01/09/2005	Ground Water	Openwell	near village	No data
9	KHANAND	BHALAYACHIWADI	BHALYACHIWADI DUGWELL	2005-2006	DUG WELL	2.21000	20/04/2005	Ground Water	Openwell	in wadi	Functional
10		KHANAND	khanand pwss	2008-2009	Piped Water Supply Scheme	12.61000	12/06/2008	Surface Water	Pond		Not working
11		KHANAND	KHANAND VILLAGE TANK	2008-2009	DUG WELL	11.57000	07/12/2008	Ground Water	Openwell	Near village	Seasonal
12	MALEGAON T	JAMBHULWADI	JAMBHULWADI HANDPUMP	2005-2006	Hand Pump	0.35000	20/04/2005	Ground Water	Deep Tubewell	in village	Functional
13		MALEGAON	malegaon pwss	2007-2008	Piped Water Supply Scheme	4.06000	30/03/2008	Ground Water	Openwell		Failed
14	MOGRAJ	ANANDWADI	MOGRAJ ANANDWADI PWSS	2003-2004	Combined Water Supply	6.27000	25/05/2003	Ground Water	Openwell	NEAR FIELD	Failed
15		BHAKTACHIWADI	BHAKTACHIWADI PWSS	2002-2003	Piped Water Supply Scheme	6.26000	30/05/2003	Ground Water	Deep Tubewell	NEAR VILLAGE	Failed
16		MOGRAJ	Mograj	2008-2009	Piped Water Supply Scheme	4.08000	30/03/2009	Ground Water	Openwell	near village	Failed
17		MOGRAJ	MOGRAJ WELL	2008-2009	DUG WELL	4.08000	07/12/2008	Ground Water	Openwell	Near village	Seasonal
18	PIMPALPADA	PIMPALPADA	pimpalpada pwss scheme	2008-2009	Piped Water Supply Scheme	4.44793	31/03/2008	Surface Water	Treated Surface Water		Failed
19		PIMPALPADA	PIMPALPADA WELL	2007-2008	DUG WELL	4.44000	31/03/2008	Ground Water	Openwell		No data
20	PINGLAS	PINGLAS	Pinglas WSS	1998-1999	Piped Water Supply Scheme	43.00000	26/04/2000	Surface Water	River		Failed
21											
22			Source: http://indiawater.gov.in								