INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

WATER SECTOR WORKSHOP- September 2014

Post – Event Report

Post-Event Report

WATER SECTOR WORKSHOP

MHRD TEQIP KITE EVENT

CDEEP AND CTARA

Indian Institute of Technology, Bombay

September 12, 2014

Under the guidance of: Prof. Milind Sohoni, CSE and CTARA

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Acknowledgement

We want to express our sincere gratitude to The Director, Deans, Faculty members, Heads of department, Staff members and Students who had supported us in making the event successful. We acknowledge with thanks the financial support extended by the MHRD, India for supporting this event under the aegis of the 'Knowledge Innovation Technical Education' initiative under Technical Education Quality Improvement Program (TEQIP).

We gratefully acknowledge the participation of the Collector of Osmanabad, Dr. Prashant Narnaware for his presence and for all the valuable suggestions and insights offered throughout the event.

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We would like to thank all the faculty members from the TEQIP institutions who participated and shared their time, experience and materials for the purpose of the water sector agenda. We would like to sincerely acknowledge the invaluable technical support of all the faculty members of IIT Bombay and for sharing the work done by them.

Lastly, we would like to thank all the individuals and organizations who generously shared their valuable time and participated in the workshop. The result and the outcome of the workshop is a collaborative contribution of all the participants.

A. Introduction

IIT Bombay, under the MHRD-TEQIP-KITE agenda, proposes to create a new and innovative mechanism for collaboration between TEQIP institutions and IIT Bombay. The objective is to (A) develop a state-wide knowledge network of regional institutions working in the drinking water sector and all its components, (B) bridge the gap between class room learning and field exposure in the engineering curricula and (C) provide for well trained professionals in the water sector.

The project aims to develop innovative research and training methods and projects with a focus on urban and rural engineering services. The current project will focus on drinking water and all its forward and backward linkages such as groundwater, surface water, water treatment, delivery systems, socio economic analysis and planning, IT and GIS infrastructure.

In this context, a collaborative workshop with TEQIP institutions and GoM officials was organized on 12th Sept. 2014 at IIT Bombay, to launch the water sector project. Heads and faculty members from 17 TEQIP institutions in Maharashtra participated in the workshop to discuss the modalities in launching the water sector project. The workshop was inaugurated by the heads of CTARA, CDEEP and Civil Engineering department of IIT Bombay.

A presentation series was conducted in the first half of the workshop, highlighting the motivation behind the project followed by academic programs and other initiatives carried out by CTARA. Case studies were presented by the CTARA staff that showcased diverse project initiatives in the sectors of rural water, urban water, water quality, watershed and groundwater.

The second half of the workshop saw faculty members from participating TEQIP institutions, who presented case studies on similar initiatives and projects carried out at their institutions. This was followed by an interactive panel discussion involving speakers from various government agencies including Meetra (GoM), WSSD and UNICEF along with the district collector of Osmanabad who shared their experiences and thoughts on the water sector project. The concluding session of the workshop was focused to address and answer questions and suggestions which allowed the TEQIP institution representatives to share their concerns and queries.

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B. Inauguration

The morning session began with registration of the participants in VMCC. The event was jointly inaugurated by the Head of CDEEP, Prof. Vikram Gadre, Head of Civil Engineering department, Prof. K.V. Krishna Rao and the Head of CTARA, Prof. Rangan Banerjee.

Prof. Gadre inaugurated the event by inviting all the faculty members from the TEQIP institutions of Maharashtra and the officials from GoM who were attending the workshop. Prof. Gadre spoke about the motivation behind organizing this kind of event under the TEQIP program. He also emphasized on the importance of the programs like TEQIP, which are supported by Ministry of Human Resources Development (MHRD), Government of India. He highlighted the need of new and innovative research and collaborations in the development sector and emphasized that the water sector workshop is the first in a series of activities planned under the TEQIP KITE aegis.

(a) Inaugural speech by Heads of department, IIT Bombay

Prof. Rangan Banerjee, Head of CTARA gave a brief introduction to CTARA and the work that students have done as part of their academic course work. He spoke about the development perspective that the course work provides to the students under various sectors including water, energy, rural planning, agriculture etc. He spoke about the 9 week rural field stay that the students are required to do and various other elective courses offered by CTARA under specialized sectors. He also offered a brief introduction to CTARA interfaces with the Rural Technology Action Group, the Technology and Development Solutions Cell and various industrial CSR collaborations. He also mentioned the collaborations that CTARA has with the Parbhani Municipal Corporation, with Karjat, Islampur (Sangli) colleges through TEQIP, with KVIC, GoM and many other interactions with SMEs. Prof Banerjee stressed on the interaction with other engineering colleges in order to carry out research that's makes a difference to rural India in the form of M.Tech programs, PhD sponsors and other continuing education programs that enable joint research in the development sector.

Prof. K.V. Krishna Rao, Head of Civil Engineering department also briefly spoke about the involvement of the civil engineering department in the development sector and with CTARA. He spoke about the projects and the research areas that the students have been involved with and stressed on the need of sustained collaborations and partnerships that will further the joint research in the water sector and other areas of study in the future.


(b) Inaugural speech by Heads of department, IIT Bombay

C. The Program

The TEQIP Water sector workshop was a collaborative meeting where presentations and discussions by CTARA faculty members was held on various case studies , technical presentations were made by research scholars along with presentations made by TEQIP institutions and bureaucrats including the collector of Osmanabad and the head of WSSO, GoM. This was followed by a panel discussion and an interactive session which was headed by Yusuf Kabir, UNICEF along with officials from GoM and other TEQIP institutions. All the experienced faculty members from across participating TEQIP institutions, CTARA faculty members, PhD alumni and current research scholars within CTARA also took part in the discussion. A concise summary of the various activities conducted in the workshop are given below.

During the second half of the event, a questionnaire was distributed to participants for obtaining their feedback. The survey was designed to get feedback on various aspects of the event such as the relevance of the content, the interest of the institution in participating in the water sector project, to assess the clarity of the objective of such a program, to understand the help required by the institution and to gauge the specific area of collaboration expected by the participating institution. There were a total of 10 such questions asking for suggestions to improve future conduct of such workshops.

Responses to the survey were very positive and highly encouraging. The participants appreciated the objective and the idea behind the workshop and expressed their wish to be a part of such events in future. The contents of the invited talks were in line with their expectations, and the workshop provided them an opportunity to interact with their peers from other institutes.

The feedback forms will be uploaded to the webpage (http://www.ctara.iitb.ac.in/water/teqip-iitb-water-2014) in the near future.

Please refer to the appendix to view the program outline.

C.1. Motivation and Objectives of the Water Sector Project - Prof. Milind Sohoni, CTARA, IIT Bombay

The first presentation of the series was given by Prof. Milind Sohoni from CTARA who spoke about the motivation and objectives behind the innovative water sector project. Prof. Sohoni highlighted the key TEQIP objectives that emphasizes on institutions to be geographically relevant, to conduct engineering as an interdisciplinary practice and to carry out demand driven research. The purpose of the talk was to explain the motivation and approach to achieve the TEQIP objectives and the know-how to better deliver the same.

Summary:

Prof. Sohoni's talk was organized into 5 parts which included: (a) the role of university and the interaction with the society, (b) the current status of engineering in India, (c) the importance and relevance of case-studies as an interesting and innovative way to carry out teaching and research and how to develop rigorous case- studies, (d) new job definitions and the importance of new engineers and their roles which will better serve society, and finally, (e) the use of Drinking Water as a vehicle for trying out the above agenda. Prof. Sohoni discussed the virtuous loop of society and university and the importance of knowledge sharing in the public domain. He stated that there is a need for an innovative collaboration between the four entities- government machinery, industry players, the university and society where the entities while competing, should also collaborate to achieve improved societal outcomes such as *sadak, bijli, pani.*

With the above agenda, Prof. Sohoni introduced the water sector project as a structured collaborative project between IIT Bombay and participating TEQIP institutions. The objectives are to (i) strengthen the outcomes of the TEQIP II program, (ii) develop key capacity to undertake relevant research and training in the field of drinking water, (iii) develop a state-wide knowledge network of regional institutions working in the drinking water sector and all its components, (iv) bridge the gap between class room learning and field exposure in the engineering curricula and (v) provide for well trained professionals in the water sector.

Prof. Sohoni explained the three steps for participation which included (i) the institutions interest to participate (ii) the research agenda and (iii) academic programs and regional presence. Finally, he spoke about the support that IIT can offer to help the TEQIP institutions through joint programs on special topics, joint offering of courses, especially project courses in the summers, starting a Case-Study series and selection and publication of good projects, providing coordination help with institute's Technology and Development programs, data sharing, initiating joint projects and networking with colleges and institutions to work with GoM and GoI.

Comments and discussion by TEQIP faculty members:

- Professors raised the subject of patenting as stressed by TEQIP versus the importance of knowledge sharing and information in public domain as shared by Prof. Sohoni in the talk. Prof. Banerjee responded that it will be the professor's choice whether to opt for patenting or to make the information public.

- Rural development on one hand and steel consumption on the other were used as a measure of development by Prof. Sohoni in his talk. In this regard, it was mentioned by the professor that extensive centralization of schemes leads to problems. However, Prof. Sohoni responded to this by stressing that even decentralized schemes have failed largely in the last 5 years and we need to dwell deeper to find better answers to our problems and cannot be anecdotal with the approach.
- It was unanimously suggested that IIT Bombay is a good platform to convey the findings of the workshop to higher authorities and government officials, as the collector was also here and it adds more rigor such initiatives. TEQIP professors felt that the regional colleges pushing for such initiatives is often rendered fruitless and doesn't percolate effectively as opposed to the IITs. In response to this comment, Prof. Sohoni agreed that the elite institutes do have a larger and important role to play and that another workshop will be planned in the summer where CEOs and collectors from various government departments will also be invited to participate.

Comments made by the Collector of Osmanabad:

- The collector spoke largely about the single village scheme failures and mentioned that the reason was largely because most of the Technical service providers (TSPs) for such important projects are appointed by the Gram Sabha, which creates a corrupt nexus of TSPs and Contractors. Most of these TSPs are diploma holders who are inexperienced to deliver quality output and this leads to failure.
- The collector shared that his meetings with Prof. Sohoni and Prof. Bakul Rao on reforming the GR has been crucial and has led to reducing the administration sanction amount for gram sabha from 50 crores to 5 lacs He stressed that centralization to a certain extent is necessary to avoid corruption and mismanagement of funds and he credited CTARA's role in equipping him to convey the message.
- The collector admitted that while we are on Jal Swarajya 2, Jal Swarajya 1 was a great failure and that we failed to get water to the poor. He stated that MJP has failed; Prof. Sohoni interjects to add that MJP is also under great stress and there are only 3 engineers per taluka to run numerous schemes.
- Mr. Gajhbhiye from MEETRA, added that MJP engineers need to be trained efficiently and that traditionally there has been only a single subject in the curriculum of water supply relevant to the drinking water sector which is inadequate and needs to be updated and refined. He stressed that these is serious unavailability of trained people in the field of water supply and sanitations, and Access links to Prof Sohoni' presentation. You may refer to the link (http://www.ctara.iitb.ac.in/water/teqipworkshop/teqipwelcome.pdf) to view Prof. Sohoni's presentation and the link to the video can be accessed at (http://www.cdeep.iitb.ac.in/teqip_vdo.php?playfile=water_sector_sohoni&eid=5)


C.2. Water: A regional view - Pooja Prasad, PhD student, CTARA, IIT Bombay

The second talk was about the water sector, which was presented by Pooja Prasad, a PhD student of CTARA, IIT Bombay. The purpose of the talk was to explain the water sector in a regional context. Pooja's talk was aimed to set the stage for the case studies in the water sector that was presented in the subsequent sessions of the workshop.

Summary:

The focus of the presentation was to set the regional perspective and understanding of the realm of urban and rural water supply, with a focus on Maharashtra. Pooja spoke about the concepts of regional water planning and provision, the supply and demand break down, the various planning activities involved in regional water supply schemes along with sample case studies in surface and ground water. This talk sets the basis for the case studies that were to be presented by the CTARA faculty members in the following sessions.

Comments:

The professors from Civil engineering background enquired on the use of MODFLOW for simulation of the various watershed interventions. This will be covered in detail during Hemant's presentation.

D. Case Studies

D.1. Rural Water: Design of Drinking Water Solution for Tanker fed villages in Mokhada Taluka, Thane habitation - Prof. Om Damani, CSE and CTARA, IIT Bombay

This case study particularly focused on rural water supply and its forward and backward linkages including tanker provisioning and the dependence on single village schemes which are largely groundwater based schemes. Prof. Damani explained using the case of tanker fed villages in Thane district and the regional piped water schemes for the district. The study explored surface water based multi village schemes, given the failure of groundwater based schemes. The focus was largely on source sustainability and operational as well as financial sustainability.

Prof. Damani explained the solution based approach to tackle the problem with the use of planning tools such as GIS and various modeling and simulation tools. He spoke about the current focus of MJP (Maharashtra Jeevan Pradhikaran) and the project area chosen was for the cluster of tanker fed villages in Mokhada taluka. He explained the solution adopted which was largely gravity based schemes to minimize the energy costs. Prof. Damani explained the process which was used to gather information from MJP (technical and operational), an innovative tool that was developed – Jaltantra and other tools that were used including EPANET, GIS and Google Earth.

He concluded by showcasing the outcomes of the study through the water conference in Khodala held in May, 2014 where local people were involved in taking the initiative ahead, with the involvement of local MPs and MLAs and the Secretary of the Tribal Development Dpt. (GoM). He emphasized that the scope

of the study must not end with the schemed design, but should also focus on the dissemination of the output with the appropriate stakeholders to maximize the outcome.

Jaltantra – A tool for the design and optimization of piped water supply systems developed in-house by PhD student Nikhil Hooda (http://tinyurl.com/jaltantra)

D.2. Rural Water: Design of watershed intervention for tackling drinking water problem, case study of Mograj habitation - Hemant Belsare, PhD student, CTARA, IIT Bombay

The study was carried out in Mograj, Karjat taluka of Raigad district in Maharashtra. Hemant explained the approach that was adopted from data collection to analysis and finally to modelling the watershed and proposing relevant interventions from the analysis and results. The problem identification and mapping was carried out through interactions with stakeholders in the form of Participatory Rural Appraisal and secondary data collections for understanding the local needs of the area. A preliminary watershed survey to identify the boundary conditions was carried out using GPS to delineate the watershed boundary. Hemant explained how MODFLOW was used to model the watershed and displayed the conceptual model of contour trench that was developed. The result indicating the comparison of heads at different times was highlighted. Hemant's model and simulation showed that contour trenches can be effective in raising the water level in the well during the dry season.

Hemant concluded by emphasizing the significance of basic planning practices of data collection and community interaction, field observations and surveys in predicting the outcomes.

Comments:

Yusuf Kabir from UNICEF raised the subject of productive use of water, where the tribal hamlets use water for other productive needs (animals, kitchen, gardening) and whether the government norm of 40 lpcd was considered in Hemant's study. Hemant responded that the observation from the study showed that tribal families use much more that the designated norm.

D.3. Urban Water Supply: Status report and analysis of Parbhani city's piped water supply scheme - Technology and Development Solutions Cell (TDSC) - Janhvi Doshi and Abhishek Sinha, TDSC, CTARA, IIT Bombay

Janhvi and Abhishek are working with the Technology and Development Solutions Cell of CTARA which was formed in January 2014. TDSC aims to deliver solutions and consultancy outputs for development projects.

Parbhani is a city in Maharashtra with a population of over 315,000. The city's existing piped water supply scheme is under severe strain due to crippling pumping energy costs, substantial leakage and poor cost recovery. Parbhani's residents are receiving piped water only once in 6-10 days. An augmentation scheme is being constructed to meet the additional water demand, and is scheduled to be operational in 2015. The Parbhani Municipal Corporation has signed a MoU with the Technology and Development Solution Cell (TDSC) at CTARA to identify solutions to improve the service levels and energy efficiency of the existing scheme.

Janhvi emphasized on the two basic questions that the PMC Commissioner wants answered i.e. where is all the water going and what needs to be done to reduce pumping energy and repair costs. Based on TDSC's experience, Janhvi highlighted the various internal challenges involved in the project including design challenges, technical and operational hurdles and governance issues. She also spoke about the Parbhani scheme timeline right from 1977 to 2014 and highlighted the external challenges involved in the project which include knowledge management, managing capital and growth and most importantly utilizing government programs which may require new skills and additional jobs.

Key deliverables include identification of major leakages and recommendations to improve energy efficiency and pump operations. TDSC's role also includes helping the PMC absorb the output of their implementation of the Maharashtra Sujal Nirmal Abhiyaan (MSNA) program, in which they hired a private consultant to conduct water and energy audits of the system. This project is currently in progress.

Comments:

Some common questions were about the pipes that were used and if majority of the leakage problem could be with AC pipes. Questions about unauthorized connections were also raised. Prof. Vishal Sardeshpande from CTARA who has been involved closely with the Parbhani project, stated that the project began with the basic water problem, however it evolved into an opportunity for different engineering activities and now stands as an interdisciplinary problem. He also suggested that TEQIP colleges may for a task force to work closely on some of these problems.

Mr. Yusuf Kabir from UNICEF asked if Parbhani was a case of governance issues or technical issue. Prof. Sohoni responded that it is not possible to separate governance from technical problems in such project and that future engineering consultants must be aware of the complexity of the issue faced by cities like Parbhani.

D.4. Water Quality: Studies in Water Quality and Sanitation - Prof. Bakul Rao, CTARA, IIT Bombay

Prof. Bakul Rao gave a talk on the water quality and sanitation studies carried out by CTARA students. The case study was on Warna basin and the talk covered multiple aspects related to quality of water supplied to the people, the inputs from agriculture to drinking water sources, the sanitation scenario influencing the quality of drinking water, the local soil quality influence on water quality, the pollutants and contaminants that get transported in ground water and the agriculture practice related issues such as salinity and water logging. She spoke about the water problem identification tool and the game developed to identify the issues. She also spoke about the various learning and linkages from the study that focused on Sewerage System Design that is specific for rural areas, linking water, sanitation, solid waste and roads plans and implementation (Village Plans), Nutrient-shed approach towards water quality, people's level planning of natural resources and replicability possibilities.

E. Development and Academic Programs - Prof. Puru Kulkarni, CSE and CTARA, IIT Bombay

Prof. Puru Kulkarni is in charge of the Technology and Development Supervised Learning course (TDSL) offered to all the students by CTARA. Undergraduate and graduate students are the primary contributors to CTARA's water projects and research output. Undergraduate students are involved in projects through the TDSL course, while graduate students produce work through CTARA's M.Tech and PhD programs. He explained the specific guidelines for selecting projects that CTARA follows, which are that the projects should:

1. address the core interests of the bottom 80%.
2. focus on basic sectors such as water, energy, healthcare, livelihood, food, public policy etc.
3. provide a deliverable output with concrete outside stakeholder who would be interested in the outcome of the project. These could be NGOs, govt. officials, elected representatives, or even citizen groups.

All the projects offered through TDSL fall under 3 broad categories- Study (TD 390), Analysis (TD 490) and Design (TD 491). Prof. Kulkarni highlighted that TDSL has been passed by the IIT Bombay Senate as a formal academic course, on par with any other credits-course. He mentioned that TDSL is an important part of Institute's presence in the development sector. Prof. Kulkarni explained about the TDSL execution process including the expected deliverables, methodology, schedule, closure and delivery of the projects. He mentioned that the first TDSL offering began in autumn 2009 and there are close to 100 students participating every year.

Prof. Kulkarni raised some important questions for all the participating TEQIP colleges to think about courses like TDSL that be initiated in the colleges through TEQIP. He mentioned that IIT Bombay can help formulate structure and whet projects which can be offered by the TEQIP institutions. He spoke about developing regional knowledge centers who could be work at the taluka level on various issues such as water security status, Ground water level monitoring, Energy audits of public services etc.

Prof. Kulkarni also spoke about applied engineering solutions of TDSL and CTARA that have been published in leading journals.

● Reforming Rural Drinking Water Schemes, The Case of Raigad District in Maharashtra, EPW Pooja Prasad, Vishal Mishra, and Milind Sohoni. Vol - XLIX No. 19, May 10, 2014

● Thermal performance evaluation of a four pan jaggery processing furnace for improvement in energy utilization Vishal R. Sardeshpande, D.J. Shendage, Indu R. Pillai 3rd International Conference on Sustainable Energy and Environmental Protection, 2010

Comments:

Questions were raised on the number of students who have passed through TDSL and the kind of work they are doing currently. However, this has not been tracked currently and would be taken up by CTARA. Yusur Kabir from UNICEF mentioned that there is much time and resource invested in the course and therefore it's important to know the impact of the 100 hours of work. Prof. Sohoni mentioned that universities must give an exposure to filed study and it should be part of the course work.

F. Speech by Dr. Prashant Narnaware, Collector of Osmanabad - Issues in Water supply schemes

The collector of Osmanabad spoke about the problems faced at the district level in implementing water supply schemes. He discussed about the politicization issues and the problems faced in handling contractors in the water supply projects. He mentioned that extensive decentralization of technical and administrative powers is a major issue i.e. even a 12^{th} standard graduate can sometimes be appointed as a technical service provider (TSP) which leads to unscientific design of water supply schemes. He also highlighted the high energy costs incurred due to water lifting, pumping etc. He spoke about the complexity involved in the schemes due to the involvement of multiple stakeholder i.e. 3-5 villages and 10-13 villagers where the inability of all the stakeholders to pay for the scheme lets to the breakdown and failures in implementing the scheme successfully.

The collector suggested ways in which institutions can be involved in carrying out research work for the district administration. Some of these research areas suggested by the collector are mentioned below:

a. Availability and quality of technology used in water supply schemes.
b. Design of gravity based single village and multi village water supply schemes that would lead to improved efficiency in pumping and reduced energy costs.
c. Water resource management- methods to recharge local sources to prevent unnecessary pumping and piping costs

The collector spoke about other aspects involved in water supply including financial issues wherein bulk of the budget goes into water supply, and none of these schemes provide any profit. He spoke about the importance of metering and various O&M measures, ways to reduce water cost, water taxation and recovery. He spoke about distribution systems being weak and the competing demand of water for drinking vs other uses.

The collector also shared his views on water treatment and quality and mentioned that water treatment plants being highly scientific, cannot be operated by local men who lack the training. According to the

collector, water quality has nothing to do with the presence of WTP as most of the times water is just bypassed because of shortage of treatment time.

The collector mentioned that most of the schemes are defunct not because of technical and management problems, but also because of lack of payment by the villagers for the service provided.

Leakage was another major issue which the collector mentioned. He highlighted that more than 50% of the schemes fail due to extensive pipe damage and theft. He stressed on community participation and engagement of local political leaders to increase ownership for these projects.

The collector mentioned that the issues in water supply schemes are largely sociological and interdisciplinary in nature. Prof. Sohoni also stated as institutions and academicians, we need to collectively find ways to engage with government agencies and district administrations to innovatively tackle some of these problems.

G. Presentations by TEQIP Institutions and GoM officials

G.1. Rajarambapu Institute of Technology, Sangli – Prof. Shridhar Kumbhar on Watershed Management in Madgyal, Sangli

The presentation highlighted the process followed in carrying out the watershed management in Madgyal. Prof. Kumbhar explained the steps used to analyze the water resources available in the selected area, the study of socio-economic conditions of the local people, to project the water demand and supply through water budget and finally he presented the suggestions for watershed management techniques. These included Silt removal from the lake and wells, cleaning of the wells, rain water harvesting, building an Underground water tank, perforated pipe system and Farm ponds.

G.2. Government College of Engineering, Aurangabad – Prof. D.G. Regulwar on Multi Objective Fuzzy linear Programming (MOFLP) model for sustainable irrigation planning.

Prof. Regulwar presented a study on Irrigation planning and the problems associated with the area. He explained that the planning process could become complicated, if uncertainty is included in the form of drought and floods, fluctuations in the market price of crops and its yields, non-availability of right type of labor at right time and inflow variation from season to season.

He described that to tackle such kind of vagueness in planning with multiple objectives and the imprecision involved in the parameter values, the fuzzy set theory is considered as an alternative approach. The objective of the study as presented by Prof. Regulwar is to develop optimal operating release policies by maximizing the two objectives viz. releases for irrigation and releases for hydropower generation in a multiple crop environment with multiple criterions on a system of multi-reservoirs. He explained the multiply models that he has adopted as part of the study.

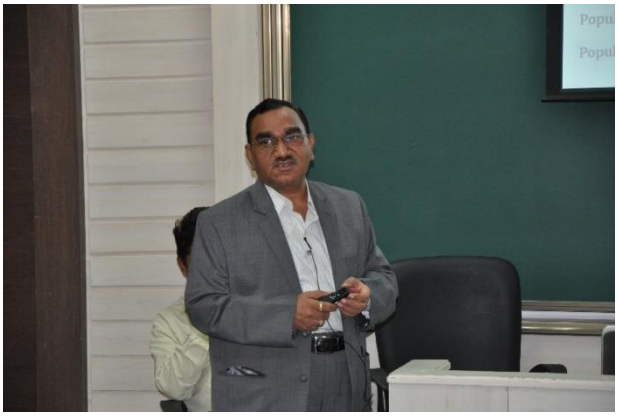
G.3. Water & Sanitation Support Organization, GoM– Director, Mr. B.K. Sawai on Status of Drinking Water Coverage in Maharashtra

The Director of WSSO, GoM, Mr. B.K. Sawai spoke about the status of drinking water coverage in Maharashtra. He presented a breakdown of the coverage for SC/ST/ Minority habitations, the status of coverage as on 1st April 2014 and the population wise coverage status. He also explained the priority for coverage of habitations; In each category habitations with 0% coverage will be given top most priority, where in Coverage means provision within a distance of 100 mtrs from the household from either a public or a community source. He also highlighted the revised norms for providing potable drinking water in rural Areas where under the 12th five year plan, the norm has been revised to 55 lpcd. He also spoke about the NRDWP 2014-15: State Annual Action Plan & Allocation with details of various habitations and schemes. 13162 habitations with 9243 schemes is the present numbers included in AAP. He also gave the break-down of the targeted schemes (3326) and habitation numbers. He also highlighted the various issues faced in NRDWP which include:

- Data Entry on MoDWS IMIS at District Level
- Incomplete Schemes – Delayed Completion for more than 3 years (Around 2000 Schemes). Central Govt. has taken a stand that their funds cannot be utilized for delayed schemes (More than 5 years)
- Delay in Estimate preparation for newly included schemes
- Out of 6900 New Schemes in AAP, only 1200 schemes could be started till date
- Higher OB & Less Expenditure leading to difficulty in getting Central Funds
- Individual HH connections (Out of 8 Lakh, the achievement is only 61000)
- Special Drive for Financial closure of Physically completed schemes to be undertaken
- AG Audit (2008-9, 2009-10) for 10 Districts (Pune , Kolhapur done, Balance Wardha Nagpur, Buldhana, Amaravati, Nashik, Nagar, Aurangabad & Raigad remaining)

Mr Sawai also explained the project initiatives undertaken for installation of solar based dual pumps and rain water harvesting through tanks. He also spoke about Nirmal Bharat Abhiyan (NBA) and the baseline survey and current status of coverage which is 48.04% as per 2012-13 data. He also gave the break-down of the funding pattern and the target that needs to be achieved under NBA. He also spoke about the issues faced in NBA which include:

- Revised Ambitious Targets (2022 to 2019) (Swach Bharat- Swasth Bharat)
- Recurring Changes of Guidelines
- Lack of dedicated Front Line Workers (Like ASHA, AWW, ANM) – Nirmal Doot
- Revival of Defunct Toilets (Funds and Behavioral change)
- O&M of Community Sanitary Complexes & School – Anganwadi Toilets
- Devolution of Funds through Gram Panchayat
- Monitoring Failure at District Level



G.4. Maharashtra Environmental Engineering Training and Research Academy (MEETRA), GoM– Mr. Gajbhiye

Mr Gajbhiye from MEETRA gave a brief talk on the role of MEETRA. He mentioned that MEETRA is a newly constituted autonomous institute, which is under the process of development as "Centre of Excellence" in Water supply and sanitation sector. METRA was erstwhile known as Nashik Research and Training Centre (NRTC) and was a part of the Maharashtra Jevan Pradhikaran (MJP). In the discussion following the presentation, it was noted that the state institutions were not mentioned in the activity plans of MEETRA, whereas collaborations with international institutions were part of the short/medium term goals. The strategy was devised by Deloitte and Mr. Gajbhiye agreed that this was a limitation of the report that Deloitte had produced. Deloitte added that the current setup of MEETRA has certain limitations and hence the role of state institutions hasn't been planned as part of the strategy. Prof. Sohoni stated that state institutions should figure in the plans and Mr. Yusuf Kabir from UNICEF added that this report by Deloitte has not yet been approved by UNICEF. Prof. Sohoni stated that MEETRA being an important knowledge body should make ensure data integrity and make sure that adequate water is supplied and received. It was unanimously suggested by the participants that local colleges, rural institutes must be part of such initiatives and TEQIP colleges can supply valuable case-studies.

H. Panel Discussion:

The second half other workshop post lunch, was kept open for participating TEQIP institutions, government agencies to present and share their work. This was followed by a panel discussion headed by:

Dr. Prashant Narnaware- Collector of Osmanabad district.

Shri B.K. Sawai – Director, Water Supply and Sanitation Department, GoM

Mr. Gajbhiye - Maharashtra Environmental Engineering Training and Research Academy (MEETRA)

Mr. Yusuf Kabir- UNICEF

Prof. Girish Kulkarni, Shivaji University

Prof. N.H. Kulkarini, Nanded College of Engineering

Prof. Sohoni began the discussion with a recap of the three major steps that he ended his talk with which are the interest of the institutions, to arrive at a clear research agenda and lastly to develop academic programs and to strengthen the regional presence of the institution as a knowledge provider.

Comments by Collector of Osmanabad:

The collector suggested that a community of academicians and practitioners can be formulated that could meet at regular intervals and create an action plan that can enable the students to participate, exchange views and design the scope of work for the academic year.

He spoke about the severe shortage of qualified manpower and expertise in the drinking water sector. He emphasized on the urgency of improving the quality of the DPRs that are being produced. He mentioned the requirement of 2 types of manpower: technicians and managers to effectively run the schemes that are constructed which is highly challenging.

He invited the professors to submit proposals to build such high-quality well trained engineers and experts and ways to prevent knowledge drain. He suggested conducting internship programs that can be designed which is multidisciplinary in nature and can involve professors, NGO representatives and bureaucrats. He spoke of his experience as an academician and as a bureaucrat and the role of elite colleges to train faculty members in remote colleges. He offered to connect IIT Bombay to the Marathwada University as an example for such an initiative. He suggested a faculty network to be formed to train and have qualified academicians in the water sector. He spoke about funding research students and PhD aspirants to perform the role of consultants and that it produces better quality results than spending money for consultants to carry out eco-village studies.

He strongly encouraged patents and intellectual property rights, however he also emphasized on the need for producing high quality outputs and reports that cater to the global audience and that can be accessed in the public domain. He spoke about the importance of developing entrepreneurship skills and that the problems of society form a significant avenue for new entrepreneurs.

Comments by Yusuf Kabir, UNICEF

Yusuf Kabir from UNICEF spoke about the huge mandate for water provisioning and the lack of capacity to absorb the huge amount of funding that the sector has been receiving. He spoke about the uniqueness of the water sector being the only area which receives R&D funding when no other sector does, and that the 5% R&D fund has been completely unutilized over the years. He compared the Konkan and western Maharashtra where the norm of 150 lpcd can still be met compared to the Marathwada and Vidharbha regions which are consistently struggling to meet the water demand. He mentioned that an amount of 1200 crores have been allotted Jan Swarajya – II, where the technical design can be outsourced to engineering colleges with support from government agencies. This could be beneficial for the students who can learn from the project.

He also spoke about the lack of quality assurance and the technical reports produced as it's entirely target driven. There is a lack of database match between the various government agencies such NSSO and WSSO. There are no district water security plan made for any districts, there are open ended guidelines which

need interpretation. All these issues in the district can be tackled through knowledge alliance between state and colleges. He suggested that there are 18 districts with serious water problems and 19 colleges, which allows for each college to assist one district.

Comments by Mr B.K. Sawai, Director, WSSO

Mr. Sawai from WSSO mentioned that there are 3 lakh surface water sources that need bacterial and chemical testing multiple times in a year. He stressed on the inadequacy of government lab facilities for getting the samples tested, and the availability of chemical labs in colleges can be hugely beneficial. He also spoke about the lack of trained masons to meet the demand of building 60 lakh toilets. He also spoke about the challenges they face in the management of PWS systems and in training the officials. He spoke about the need of short-term courses (2-3 days) for in-service government officials in handling PWS systems, through which the case-study model can be further developed. Mr. Vasai also spoke about the difficulties in handling rural liquid and solid waste as 76% of rural areas are being provided water supply without a clear method handling the liquid waste. Therefore connecting water quality to health was considered as an important issue.
Prof. Sohoni suggested that the research funding for all the above discussed topics must come from the customer as that would improve accountability and transparency in service delivery.

Prof. N.H. Kulkarni from Nanded college of Engineering suggested that each institute could take up one 'target area' – a task force can be set up between 6-7 institutes. A single engineering college can cater to the need of a few districts. IIT can facilitate the setup of such task forces, especially in sanitation, because sanitation really disturbs water source quality.

In additions to this the issue of skill development typically done by it is was discussed which lack the necessary know-how and require certain hand-holding to develop relevant curricula.

In this regard, Prof. Sohoni suggested if it would be useful for the TEQIP institutions as a collaboration to help and support the ITI's in developing additional courses on water and sanitation, and whether such a study would be relevant. Yusuf Kabir from UNICEF also added that none of the ITI's in Maharashtra have topics that are relevant to drinking water and sanitation sector.

I. Conclusion and way forward

Prof. Sohoni concluded the workshop with an open discussion and it was agreed that the interested TEQIP institutions must come together to develop case studies around 5 key specific areas:

1. Rural regional schemes: operation, design, failure analysis (technical, socioeconomic)
2. Small town/urban water supply systems (2 lakh) (simulation, design, MSNA, GIS)
3. Sanitation planning for large GPs (collect sanitation case studies, including solid waste)
4. Groundwater and watershed management (involve government agencies, GSDA)
5. Water Quality

Tata Institute of Social Sciences also added that they would like to partner and work with the TEQIP institutions on areas that are unrelated to technology and which are focused towards social sciences. Prof. Sohoni agreed to incorporate non-technical institutions in developing the future case-studies.

A feedback form was shared with all the participants and it was agreed that the valuable suggestions, outcomes and responses of all the institutions and government agencies will be shared with the TEQIP institutions.

It was agreed that a series of workshops and seminar series will be planned once there is a definitive plan chalked out based on the comments and suggestions received by the TEQIP institutions. The way forward will be to develop good quality case-studies on the 5 key areas that could be presented in the forthcoming workshops.

References

Links to Resources and Tools

The workshop webpage can be accessed at this link (http://www.ctara.iitb.ac.in/water/teqip-iitb-water-2014). The page contains the schedule for the workshop, Executive Summary of the proposal and the participants list. The page also contains links to all the presentations and case-studies showcased at the workshop by IIT Bombay and by the TEQIP Institutions. The video link to the event shall also be uploaded to this webpage in the near future.

CTARA Water page - Here you can find the bulk of CTARA's work in water – datasets, current projects, past work, tools, manuals and technical resources. www.ctara.ac.in/water

Geospatial Information Science and Engineering (GISE) Lab – GIS can be a power planning tool. CTARA has collaborated with the GISE lab on various projects related to rural drinking water in which GIS has played an important role. http://www.gise.cse.iitb.ac.in/

Appendix - A

Executive Summary

Project Proposal under MHRD-TEQIP-KITE of IIT Bombay

IIT Bombay, under the MHRD-TEQIP-KITE agenda, proposes to create a new and innovative mechanism for collaboration between TEQIP institutions and IIT Bombay. The project aims to develop research and training ***methods and projects*** with a focus on urban and rural engineering services. The current project will focus on **drinking water** and all its forward and backward linkages such as groundwater, surface water, water treatment, delivery systems, socio economic analysis and planning, IT and GIS infrastructure.

OBJECTIVE:

IIT Bombay proposes to undertake a structured collaboration with the TEQIP II institutions to (i) strengthen the outcomes of the TEQIP II program, and (ii) to develop key capacity to undertake relevant research and training in the field of drinking water. The objective is to (A) develop a state-wide knowledge network of regional institutions working in the drinking water sector and all its components, (B) bridge the gap between class room learning and field exposure in the engineering curricula and (C) provide for well trained professionals in the water sector.

METHODOLOGY:

This will primarily be done through the mechanism of structured case-studies and a series of elective courses to enable the development of these case-studies. The set of reports and case studies generated through these projects can be utilized by faculty members for academic and research purposes and also benefit the regional administration. It may eventually set up important collaborations between state agencies, private sector and the TEQIP institutions.

IIT Bombay proposes to own and run a franchise model for interactive learning and training in Technology and Development, coordination on drinking water security and other collaborations under the TEQIP agenda. IIT Bombay will engage with TEQIP institutions in a series of project activities which will be designed in close coordination with the institution. The focus of such interactions will be to conduct training workshops on key knowledge products, research and curricula development, strategic and coordination activities as well as undertake monitoring, assessment and re-alignment activities for improving the implementation and dissemination of the project.

OUTCOME:

The project will provide a unique opportunity for students and faculty members of TEQIP institutions to collaborate with other TEQIP institutions, IIT Bombay and regional stakeholders. This will enable (i) students to be trained in live problems that develop their research, design and analytical skills, (ii) faculty members to forge innovative and sustained partnerships and collaborations with IIT Bombay and regional stakeholders through live research and (iii) regional stakeholders to access skilled man-power.

With the coordination and training support from IIT Bombay, the TEQIP institutions in Maharashtra will be involved in devising an innovative supplementary curriculum for engineering students. Such a course will aid the colleges in creating standard knowledge products that will evolve from their own areas of research.

The overall outcome is to enable the institution to work as a regional knowledge resource in a vibrant partnership with all the stake-holders. It should create new jobs which meet student aspirations, institution mandates and also development needs of the future.

CONDUCT:

The project will be executed by IIT Bombay over a duration of 3 years. We have identified key resources and outlined their responsibilities for effective implementation of this project. The project will be led by a PI who will be a faculty member from IIT Bombay. The Program coordinator and the Outreach manager will be responsible for interactions with all TEQIP institutions and stakeholders as well as organizing key events such as workshops and trainings. The Research associates will assist students (UG, PG and PhD students) in the design and execution of the sub projects, research, organizing case studies, developing reports, thesis and structured project work. Majority of the course work will involve UG and PG students who will carry out the technical work and participate in inter-disciplinary projects across project institutions and IIT Bombay.

Appendix – B

List of Participants

TEQIP INSTITUTIONS, MAHARASHTRA			
Sr No	**College**	**List of Participants**	**Attendee numbers**
1	Department of Technology, Shivaji University, Kolhapur	1. Dr. Girish S. Kulkarni 2. Mr. Shrikant. M. Bhosale 3. Prof. A.K. Sahoo	**3**
2	Government College of Engineering, Aurangabad	1. Dr. P.A.Sadgir, Associate Professor, Department of Civil Engineering 2. Prof. Sunil Hirekhan, TEQIP Coordinator 3. Dr. D.G.Regulwar, Associate Professor, Department of Civil Engineering	**3**
3	G.H. Raisoni College of Engineering, Nagpur	1. Dr. P.B.Nagarnaik,Deputy Director and Academic Head TEQIP II, 2.Prof.P.J.Wadhai,Associate Professor in Civil Engineering Department	**2**
4	Rajarambapu Institutes of Technology, Sakhrale	1. Prof. P.P. Deshpande 2. Prof. S. S. Kumbhar 3. Prof. Sushma Kulkarni	**3**
6	BVB's Sardar Patel College of Engineering, Mumbai	1. Dr. Ajaykumar R. Kambekar, Faculty, Dpt. Of Civil Eng.	**1**
7	Government College of Engineering, Karad	1. Prof. M.B. Kumthekar Prof. & Head Civil Dept. and TEQIP Coordinator and 2. Prof. A.B. Landage	**2**
8	Government College of Engineering, Jalgaon	1. Prof. Ms V.R.Saraf, Assistant Professor, Dpt. Of Civil Engineering 2. Prof. U.N.Shete, Assistant Professor, Dpt. Of Mechanical Engineering	**2**
9	Bharati Vidyapeeth University, College of Engineering, Pune	1. Dr. V. S. Sohoni 2. Dr. M. R. Gidde 3. Prof. S. M. Jadhav	**3**
10	Shri Guru Govind Singh Institutes of Engineering & Technology, Nanded	1. Professor M.L. Waikar, Head, Department of Civil and Water Management Engg. 2. Dr. N. H. Kulkarni, Associate Professor, Department of Civil and Water Management Engg.	**2**
11	Walchand College Of Engineering, Sangli	1. Prof. Narayan Marathe, 2. Prof. S.N. Kulkarni 3. Prof. S.D. Nirmale	**3**
12	Government College of Engineering, Amravati	1. Prof R.K. Rai	**1**

14	Veermata Jijabai Technology Institutes, Mumbai	1. Dr.Prashant P.Bhave, Head, Civil & Env. Engg Dept, VJTI 2. Dr.A.S.Wayal, Asso. Prof. Civil & Env. Engg Dept, VJTI 3. Prof.J.S.Main, Asso. Prof., Civil & Env. Engg. Dept, VJTI	**3**
16	University Institute of Chemical Technology NMU, Jalgaon	1. Prof. S.A. Raut, Ass. Professor 2. Pro. A.K. Goswami, Ass. Professor	**2**
17	Govt College Of Engineering, Pune	1. Prof. Pratap Raval 2. Dr Mohite	**2**
18	Institute of Chemical Technology, Mumbai	1. Dr. P.R. Nemade	**1**
19	**Visvesvaraya National Institute of Technology, Nagpur**	1. Prof. Peshve 2. Prof. Tembhurkar	**2**
		TOTAL TEQIP PARTICIPANTS + VNIT	**35**
IIT BOMBAY			
20	Prof. V.M. Gadre	Head, CDEEP	**1**
21	Prof. Rangan Banerjee	Head, CTARA	**1**
22	Prof. K.V. Krishna Rao	Head, Civil Engineering	**1**
23	Prof. Milind Sohoni	CSE and CTARA	**1**
24	Prof. Puru Kulkarni	CSE and CTARA	**1**
25	Prof. Priya Jadhav	CTARA	**1**
26	Prof. Bakul Rao	CTARA	**1**
27	Prof. Om Damani	CSE and CTARA	**1**
28	Prof. Anand Rao	CTARA	**1**
29	Prof. Vishal Sardeshpande	CTARA	**1**
		IIT Bombay Faculty Members	**10**
GoM officials and others			
30	Dr. Prashant Narnaware	Collector, Osmanabad	**1**
31	Yusuf Kabir	Water, Sanitation, Hygiene (WASH) Officer. DRR & Emergency Focal Point, UNICEF Maharashtra	**1**

32	Mr. Tangadpalliwar	Maharashtra Environmental Engineering Training and Research Academy, GoM	**1**
33	Mr. Gajbhiye	Maharashtra Environmental Engineering Training and Research Academy, GoM	**1**
35	Prof. Rupesh M Parthe	Konkan Gyanpeeth College of Engineering, Karjat	**1**
36	Mr. Pranjal Deekshit	Tata Institute of Social Sciences	**1**
37	Shri. Hashmi	RSPMU	**1**
38	Shri. B.K. Sawai	Director, WSSO	**1**
		Total GoM Officials and Others	**8**
		TOTAL PARTICIPANTS	**53**

Appendix – C

Schedule: *TEQIP-IITB Workshop on the Water Sector*

Venue: *12th September 2014 at VMCC Seminar Room 2*

Time	**Topic**	**Notes**
8:45am-9:20am	Tea, Introductions, TA/DA cell	Foyer VMCC
9:20am-9:45am	Welcome	Head, CTARA, Head, Civil and Head, CDEEP
9:45am-10:15am	Motivation and Objectives of the Water Sector Project	Milind Sohoni
10:15am-10:45am	Project-based academic programs and research.	Puru Kulkarni
10:45am-11:15am	Tea Break and Q&A	Foyer VMCC
11:15am-11:45	Introduction to the Water and Sanitation Sector	Pooja Prasad
11:45am-12:45pm	Case Studies in (I) Rural Water Supply, (II) Urban Water Supply,(III) Watershed and Groundwater, and (IV)Water Quality and Sanitation.	Various staff
12:45pm-1:15pm	Discussion and Q&A	
1:15pm-2:00pm	Lunch	Foyer VMCC
2:00pm-2:30pm	GoM programs in WSSD	Various participants
2:30pm-3:15pm	Case Studies from other institutions	
3:15pm-3:45pm	Coffee + Discussions	Foyer VMCC
3:45pm-5:00pm	The Way Ahead	
5:00pm-5:30pm	Feedback and Wrapping Up	

Appendix – D

Logistics and Expenses

Sr. No	Item	Bill No./ Receipt no.	DD/Cash/Cheque no.	Date	Amount
1.	MTNL guest house	75	Cheque	09/09/14	38427
2.	TA/ DA	--	Cash	12/09/14	98947
3.	Gulmohar	Rec No: 1573	Cash	15/09/14	24933
4.	Kits- Bags	4794	Cash	16/09/14	13572
5.	Banner	248	Cash	11/09/2014	450
6.	Stationary	369	Cash	11/09/2014	330
7.	Stationary	360	Cash	10/09/2014	570
8.	Printing	1055	Cash	11/09/2014	3200
9.	Printing	3973	Cash	04/09/2014	94
10.	Stationary	4125	Cash	04/09/2014	55
11.	Printing	4202	Cash	09/09/2014	70
12.	Stationary	4215	Cash	10/09/2014	333
13.	Tinku decorator	044	Cash	15/02/2014	2248
14.	Revenue stamp	Attached	Cash	10/09/2014	50
15	Honorarium	Attached	Cash	15/09/2014	1250
16	Conveyance	Attached	Cash	15/09/2014	120
17	**Total**				**184649**
18	**Cash returned**				**15351**
19	**Final Total**				**200000**