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A REVIEW ON EFFECTIVE WATER DISTRIBUTION AND WASTE MANAGEMENT OF WATER SUPPLY

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ABSTRACT
The paper reviews in brief about various water distribution methods and waste management of water supplies. Different case studies about waste water management and water supplies have been studied and reviewed especially in the Indian geographic context to find out what has already been done and what could be done in future.

INTRODUCTION
This project is a part of Survey to be carried out by EST Department of Shivaji University, in order to assess the present water distribution system of University. This project covers the university's water supply system including the supply network, all types of waste, water storage tank (all underground tanks), elevated storage reservoir (ESR), pumping system, waste water storage tanks (septic tank) and water distribution. This project also aims to find out the drawbacks of present system and give some recommendations to accommodate the future increase in demand for water in a sustainable manner and avoid upcoming water management problems in future. Shivaji University is doing such a holy work of Nation building and imparting quality education. It is a public education university located in Kolhapur, Maharashtra. The campus has more than 54 major buildings with a combined area of 37156353.32 square feet (853.787 acres). The campus of university is huge and is divided into various departments, hostels and quarter's right from ancient history to recent development in nanoscience, biotechnology and various other subjects are thought in this university. As a result the number of students learning in this university is increasing day by day. With the increasing number of students the demand of water is also increasing at high alarming rates. This has caused to the rise of water scarcity problem in university campus. The intensity of this scarcity is so acute that sometimes there is severe shortage of potable water. The water supply network of Shivaji University is very complex and old. Many of the major water lines running in the campus were laid at the time of establishment of the institute. Since, then numerous minor and major changes have taken place in the network. But, the primary source of drinking water still remains the Kolhapur Municipal Corporation (KMC) pipeline. This water is used for various purposes in the campus by various uses - residential, hostels, academic and hospitality uses, laboratory uses, used for landscaping/gardening, for construction, fire purposes, etc.
Water is one of the important sources to the sustain life and has long been suspected of being the source of much human illness. Source of surface water and ground water have become increasingly contaminated due to increased industrial and agricultural activity. Water is known to contain large number of chemical element, the interaction of both physical and chemical properties of water play a significant role in composition, distribution, and abundance of aquatic community. Characteristics of water bodies influence the quality of water individually and in combination with various pollutants, thereby influencing the biota there in.
Kolhapur city is prominent city of south western Maharashtra is rapidly emerging as a leading industrial and commercial centre. The development of city created directly or indirectly a number of water quality problem .The city once supported to have 40 small and large lakes is presently left with only few. Lakes in Shivaji University campus are the sole source of water gardening, laboratory use for various department and hostels from the campus and these lakes has potential to sustain variety of biota.

LITERATURE REVIEW:

CASE STUDIES:

Nagpur- City-wide Public- Private Partnership for water supply

This case profiles the initiative of Nagpur Municipal Corporation (NMC) to implement a 25-year Public-Private Partnership (PPP) project for provision of continuous water supply on a city-wide scale. It offers vital lessons and insights for other cities seeking ways to transform their water supply service delivery by emphasizing the need for holistic planning and an integrated set of actions for implementing city-scale PPPs and highlights the need for institutional clarity, balanced contractual arrangements, political/administrative commitment, rigorous stakeholder engagement and consumer communication processes, and provides some insights for sequencing of tariff reform.

Surat - Formation of a Non-Revenue Water (NRW) cell

One of the pioneering initiatives of the Surat Municipal Corporation (SMC) was the setting up of an NRW cell as an institutional response for tackling non-revenue water. This case elaborates the activities and positive outcomes for creating accountability and early enthusiasm leading to the tangible results of leakage mapping exercise carried out by NRW cell of SMC. Following the initial leakage mapping exercise, the number of leakages was reduced by 30% annually in all zones.

Pimpri - Chinchwad - SLB connect pilot

The case traces the implementation of a pilot project under the SLB Connect program in Pimpri-Chinchwad Municipal Corporation (PCMC) in collaboration with Water Sanitation Program (WSP), World Bank. The SLB connect pilot at PCMC provides a window into the possibilities of addressing the challenge of citizen engagement through use of ICT tools, provides a very replicable approach to effective citizen engagement and demonstrates that effective engagement can be achieved by leveraging the relatively high mobile tele-densities in Indian cities and use of the same to support both data collection and information dissemination.

Bangalore - Bulk metering with intelligent operating system

While some of the Indian water utilities have implemented stand-alone monitoring of systems through facility level SCADA systems, initiatives to implement mechanisms for system wide control, analysis and monitoring have been limited. The case discusses the initiative of the Bangalore Water Supply and Sewerage Board (BWSSB) for implementing two related initiatives namely installation of bulk meters and development of a software application to capture and track information from these bulk meters for monitoring and regulating the water supply system.

Pimpri-Chinchwad - Helium-based Leak detection pilot

For the Pimpri Chinchwad Municipal Corporation (PCMC), leakages and technical losses in its distribution system were a major constraint in shifting to continuous supply. With technical support from Suez Environment India Limited, PCMC initiated a pilot project in 2012 for a helium gas based leak detection program which identified 132 leaks in the 20 km pilot study. The leak detection program enabled PCMC to take a structured approach to address service delivery improvements in the pilot zone and demonstrate the potential for positive impacts when technology and use of external expertise are combined with a systematic and structured plan with clear objectives.

Jalandhar - Sewerage project

The Municipal Corporation of Jalandhar (MCJ) and Punjab Water Supply and Sewerage Board (PWSSB) implemented a sewerage project with funding under the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). This case profiled the first phase of Jalandhar's sewerage system implemented under UIDSSMT which resulted in the provision of 13,000 sewerage connections covering a population of 100,000 with safe sanitation and sewerage coverage and resultant implications of reduction in pollution load.

Trichy - Community managed toilet complexes
Tiruchirappalli Municipal Corporation's (TMC) focus on leveraging support of Self-Help Groups (SHG) to build local ownership and involve local community in addressing the challenge of universal sanitation coverage is noteworthy. The case documents the successful transformation of 213 slums out of a total of 285 slums into Open Defecation free slums in its efforts to meet its goal of becoming Open defecation free by 2015.

Nanded - Community-led Total Sanitation
Following the City Sanitation Plan, Nanded-Waghala Municipal Corporation (NWMC) with poor sanitation facilities and over 20% of its population resorting to open defecation, initiated a Community-led Total Sanitation (CLTS) project that sought to put communities in charge and accountable for the process and use their capacity to improve the status of sanitation. With a spending of less than 1% of its budget on sanitation, NWMC managed to achieve fairly positive impacts through its community led approach.

Tirupur Water Supply and Sanitation Project
The success of the Tirupur PPP project depends entirely on the off take of the water by the industries and indirectly, it actually discourages water recycling through full treatment of wastewater. Water is a precious resource and the emphasis ought to be on sustainable use and conservation. The present design of the project, on the contrary, encourages further expansion of the water market and copious use through discounted pricing strategies. There is a need to limit consumption, fix higher responsibility on the polluters and prioritize equitable distribution of the resource. The Tirupur Water Supply and Sanitation project represents a classic case of reductionist engineering, sidelining sustainable water use planning and conservation efforts.

Sanjay Rode, (2010) studied sustainable drinking water supply in Pune Metropolitan region. The demand of drinking water is continuously increasing in the Pune Metropolitan Region. Growth of rapid urbanization, population, commercial units, institutions, IT and BT and township planning are the major factors. Supply of drinking water is planned according to the growth of population but the coverage and equitable distribution of water is low. Water loss during transmission and distribution is also higher. Private sector participation is most urgent need to reduce water leakages, improve the coverage and equitable distribution of water in Pune Metropolitan Region. Restructuring tariff will improve the water use and reduce wastage.

Pooja Prasad and Milind Sohoni (2011) studied Sugave Water Scheme. The goal of this project, undertaken by CTARA, IIT Bombay, is to understand the challenges faced by this scheme from technical, social, operational and organisational standpoints. The Sarpanch of Borivali Gram Panchayat, which is one of the largest beneficiaries of the scheme, requested CTARA to advise their people in the capacity of a social as well as technical organisation to ensure that the scheme is completed successfully and run in a sustainable manner. In this light, students and faculty from CTARA have studied the history of the scheme, performed site visits, interviewed villagers, organised multi-stakeholder meetings and conducted technical simulations to analyse various aspects of this scheme.

Gaurav Dwivedi and Makarand Purohit (2009) studied Privatized Industrial Water Supply In Dewas. The study tries to analyse the present situation in terms of service delivery by the private concessionaire to the industries, the earlier claims for promoting the project, problems faced by industries and the rural population in enroute villages after the implementation, the status of water resources in the area, and the emerging conflicts around water in the region. The study also tries to throw light on some of the important contractual clauses of the concession agreement and the obligations of the private concessionaire which it has not been able to fulfill. It also shows that despite the failures in execution the private concessionaire has demanded post-contractual changes from MPSIDC like tariff hikes and extension of concession contract. The study also deals with some of the issues of water conflicts that have been developing in the

region due to the higher priority given to industrial water supply rather than domestic water use, despite water scarcity suffered by the people in both urban and rural areas.

COMMENTS ON LITERATURE REVIEW

The case studies and research papers reviewed here has established different facts about existing water management methods, difficulties in achieving efficiency and successful cases to overcome these difficulties in particular.

Strategies and methodologies researched in the review are as follows,

1. Public-Private Partnership (PPP) project for provision of continuous water supply on a city-wide scale
2. Setting up of an NRW cell as an institutional response for tackling non-revenue water.
3. Citizen engagement through use of ICT tools.
4. Installation of bulk meters and development of a software application to capture and track information from these bulk meters for monitoring and regulating the water supply system.
5. Helium gas based leak detection program.
6. Provision of sewerage connections with safe sanitation and sewerage coverage and resultant implications of reduction in pollution load.
7. Leveraging support of Self-Help Groups (SHG) to build local ownership and involve local community.
8. Community-led Total Sanitation (CLTS).

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