

Problem/Research Areas highlighted for Shah Family Global Innovation Lab, Global Engineering Programs and Partnerships, Purdue University

1. Develop Household level greywater management filtration system

Given the target of 100% coverage by 2024, the volume of greywater is likely to increase and therefore there is a dire need of scalable solution. Greywater management in rural households is a major challenge in most cases this drained out into open causing major water logging in rural areas especially in roads and public places. The traditional solution for this has been to use it ground water recharging through to leach pit/ soak pit, although it's done only in few places. It will be useful if a low cost filtration attached with a collection mechanism can be developed which could convert the greywater into use for toilet cleaning/ flushing and other non-drinking domestic purposes.

2. Affordable water meter at scale

India has committed piped Drinking water supply for all by 2024. As per Government data current coverage is 18% in rural India. During the large scale expansion one of the major challenge will be to ensure metering for all household connections which will be important for regulating water usage. Can there be technological solution which can introduce a large scale but affordable and reliable solution for metering especially for rural areas. Currently, pressure based water meter are available in India at a price of INR1000 wherein solutions at a much lower price will be needed. Can we develop sensor based sustainable solution to meet this challenge?

3. Operation and maintenance of piped water supply

Operation and maintenance of piped water supply is a major challenge in scale that India is soon going to face. As a potential technological solution to aid the situation it may be useful to think about sensors that can identify and suggest leakage in the pipeline, overflows or blockage which would support the maintenance team to locate the exact spaces/place where the repair work should focus on. Placing such technologies as part of the installation of piped water supply will be a useful value addition for ensuring proper and economic intervention for operation and maintenance.

4. Develop electronic device /sensor to estimate the ground water recharge with Rain water Harvesting structures (RWH)

In order to address water scarcity, Ministry of Jal Shakti (MoJS), Government of India is launching Jal Shakti Abhiyan (JSA) from 1st July, 2019. It is important to undertake efforts for conservation, restoration, recharge and reuse of water. In this pursuit, WaterAid is participating actively in the Jal Shakti Abhiyan (JSA) along with States/UTs/ Urban Local Bodies (ULBs) to make water conservation measures a Jan Andolan by constructing and demonstrating RWH structures in some of the intervention Districts. The proposed innovation of low cost electronic device/ sensor will support WaterAid in effectively demonstrating the impact of the RWH structures on rise of water level in the intervention areas.

5. Develop sensor to address retrofitting need of Toilets under SBM

While the swachh Bharat Mission has constructed large number of toilets in rural areas. One of the key findings of various studies is potential contamination of ground water due to closeness to the water bodies or water sources. Most of these assumptions are made on estimated vertical or horizontal distance to the water table or water sources. While these estimates are made on standards to know the actual horizontal and vertical distance to water table/ water sources will be very useful in order to understand whether there is a retrofitting need or not. Since a large scale retrofitting initiative has been considered in India, and a significant proportion of the newly build 100 million toilets are indicative of retrofitting requirement based on standards. Such technological solution to understand the actual retrofitting need for the toilet substructure will be helpful in directing the resources only to those structures where retrofitting is essential.

6. Low cost pre- customised / Moulded DEWATS (decentralised waste water treatment system) for rural areas.

There are many experimented DEWATS models used in wastewater management in rural India. Currently all parts of the systems are constructed locally, which results the completed structure not meeting design standards. By studying the models, if some section of the DEWATS system can be prefabricated, where the local masons need only to assemble the well-designed pre moulded parts and does not require high technical skills. With this innovation of low cost pre- customised/ moulded DEWATS model, the challenge of compromising the quality with faulty construction could be overcome. This can also overcome the challenge of lack of technical know-how for construction of DEWATS in rural areas which affects the working of system with desirable quality results.