Why recycling water makes a good socio-economic case for municipalities, specially in water stressed areas?

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Hyderabad is the capital of the newly formed state of Telangana. Hyderabad is a land-locked riverine city located 548m above mean sea level and the sixth largest urban agglomeration in India, with a metropolitan population of 7.75 million. It has evolved into a hub of information technology and has witnessed rapid expansion due to an industrial boom and increased trade opportunities. The city population has in the last decades grown at a rate of 30% and its slum population has increased from17% in 2001 to 32% in 2011. It houses second largest number of people per household after Kolkata among major cities in India.

Water system of Hyderabad

It has a rolling terrain and it is estimated that more than 90% of the water in Hyderabad rolls towards river Musi by gravity. Musi River, which carries most of the city's treated and untreated sewage, runs about 20 kms within the city limits, and passes downstream through a length of about 150 kms before joining the River Krishna. Musi is a non- perennial river, which today functions mainly as a sewerage carrier. However, Hyderabad is historically blessed with a large network of interconnected natural and manmade lakes which support the hydrology of the city. Currently, Hyderabad has over 200 lakes which are not operating optimally due to climate change and urban sprawl.

So, how does Hyderabad meet's its water requirement? 70 to 80% of the city water is sourced from rivers like Krishna and Godavari which are located more than 100 km away from the city. While remaining water requirement is met through underground water either through bore wells or tankers brining bore well water to the consumer. This means that to meet future water demands of the rapidly growing financial hub of Telangana, the

government is continuously working to large scale projects which bring piped water to the city from 100's of km from Krishna or Godavari.

Let's look at the sewerage system of the city. In Hyderabad, only 55% of the city is covered by the sewerage network. Due to the limited sewerage treatment facilities, the rest of the waste is discharged untreated into the river, which means approximately 700MLD of water is treated and nearly same quantity of water goes untreated into the river. This mixed wastewater is used by of the area in and around Hyderabad for cultivation. As per the study conducted in major cities in India, this is the largest area under sewerage cultivation. However, waste-water recycling is only 3%. Currently, the recycled wastewater is used primarily by only one bulk consumer (i.e. Rajiv Gandhi International Airport).

This leads to fresh water being used for nearly all the activities in the city of Hyderabad. Considering, that Hyderabad is located in semi-arid region and in one of the 9 most water stressed states in India there is severe pressure on fresh water resources available to Hyderabad.

Climate change is not making it any easy for Hyderabad for the obvious reasons of changing rainfall and heat pattern in the city and the region. Hyderabad has in the last decade experienced situation where the water supplies were close to the brink. So the question in hand is a. Is brining water more and more water from far of sources the only solution b. Is it economically the best solution? Certainly not!

A small analysis has been conducted to estimate the possibilities of wastewater recycling in the city and the broad economics of this system.

City treats about 710 MLD of the sewerage and intends to set up STP to treat another 600 MLD of its wastewater through 10 decentralized STPs. The city faces a current water deficit of about 300 MLD. The Outcome 3 of the project activity intends to increase the wastewater usage to 28% from the 580 MLD of wastewater planned to be treated under the project. As per, Central Pollution control board (CPCB) of India's revised norms for discharge of wastewater into water bodies and land disposal BOD and COD should be not more than 10mg/l and 50 mg/l respectively. In view of the above, it is likely that the proposed STPs in the city will adopt tertiary treatment practices.

Thus, after tertiary treatment the option is either to let all the treated water find its way into river Musi or to recycle this water.

Recycling options and challenges

Recycling water to the residential areas involves several challenges like- Dual piping system is essential in recycling/ reuse of water by existing household whereas Most of the old or existing infrastructure does not have this system, installation of such system by individual households will be a costly and tedious task and above all the social bias in using recycled water in residential areas is likely to be very high. Mitigating the bias will be a challenge.

The other option is to use recycled water in industrial parks/areas and institutions spread across the city. The bias in applying water to these uses is expected to be lesser than in residential areas. It was found that each of the 10 STPs wastewater can be supplied to one or two industrial parks and institutions. Together these have the capacity to absorb 164MLD of treated wastewater i.e. 28% water recycling can be achieved.

Transportation of sewerage in controlled and labelled tankers from crowded locations will add to several challenges like adding large number of sewerage carrying tankers, adding to traffic woes and attracting public bias on recycled water. So, the option is to construct a pipeline for carrying recycled water to these supply areas which are 10-20 km from the proposed STPs and make provision for sump at the destination. From the sumps the recycled water can be carried to short distances of 1-2km by tankers.

Is it cost effective? Yes. The initial work suggests that cost of recycling and distributing 1MLD of treated wastewater will be about INR 1 crore per MLD. Whereas it costs INR 45to produce 1KL of water in Hyderabad. It will save equivalent amount of freshwater uptake. This implies that water board save INR 270 crore by recycling this water instead of letting it into river, leave apart the saving achieved due to delay in investment in new water uptake infrastructure, as this will contribute to about 17% of the new water supply schemes capacity (i.e. 172MGD of Godavari water phase II scheme).

The social benefit is also enormous as the water available for slum population which receives water supply every alternate day will be sufficient i.e. 150MLD per day. The other positive intangible impacts that it will have are climatic resilience of urban water system, meeting the National Water Policy requirements, SDG requirements etc.

The approach just needs thinking and going beyond the regular, not for environment alone but for socio-economic benefit of recycling to municipalizations.

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