

Every RO filter wastes 74% water: MIT

Vijaysinh Parmar & Ankur Tewari, TNN | Oct 20, 2015, 06.03AM IST

AHMEDABAD: In a water stressed state, an Amdavadi's Reverse Osmosis (RO) water filter wastes a whopping 74 litres of water as 'brine' to recover 26 litres of potable water.

This was revealed in the first ever 'household water filter evaluation for Ahmedabad' study, conducted by Massachusetts Institute of Technology (MIT), led Comprehensive Initiative on Technology Evaluation (CITE).

This is not all, the MIT study also revealed that drinking water parameters like the level of hardness, residual chlorine, and total dissolved solids often exceeded the acceptable limit set by India's own Standard Requirement. While citing examples the study said, "E.coli (bacteria found in feces) was detected in 19% of surface water samples and 68% of groundwater samples, while total coliform (which is bacteria found in soil and gut of animals or feces) was detected in 36% in surface water samples and 81% of groundwater samples.

Given this water scenario, the MIT led team along with IIT Gandhinagar measured various quality parameters in water filter. The study surveyed 246 households in the city, conducted nearly 400 interviews with users, and filter retailers, manufacturers and distributors.

"RO filters tested in the lab could recover just 25-32% potable water. The average recovery rate was 26%. RO systems may be appropriate in areas where groundwater is high in total dissolved solids, hardness, or salinity. Such water treatment may not be efficient or environmentally sustainable for Ahmedabad," says the report.

IIT-Gandhinagar director Sudhir Jain said that 12 IIT-Gn students were part of the research. They collected samples and tested them at a facility in IIM-Ahmedabad.

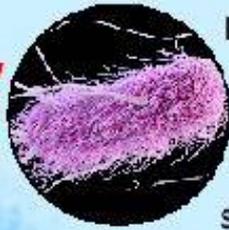
Researchers studied three primary categories of water filters found in households throughout Ahmedabad-conventional particle filters - use of cloth, gravity non-electric filters and reverse osmosis filters - to assess suitability, scalability and sustainability.

"The negative environmental impact of household-level RO filters was really an eye-opener for me," says evaluation leader Susan Murcott, a research affiliate in MIT's Department of Urban Studies and Planning. "Larger-scale RO systems don't produce this high of a proportion of wastewater that we see in RO models designed for households. At the household scale, these systems waste a tremendous amount of water in a water-stressed region like Gujarat," says Murcott.

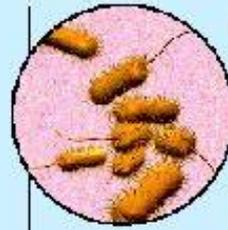
"The poor use saris widely to filter water. We asked whether saris could be redesigned to function properly as a water filter. This creates the challenge of how to design a filter that's low-cost, culturally appropriate, and also effective. Cost is central to everything." says Bishwapriya Sanyal of MIT's Department of Urban Studies and Planning.

WHAT EFFECTS AHMEDABAD WATER QUALITY

Aqua PURITY



E.coli was found in 19% of surface water samples and 68% of groundwater samples



Coliform was detected in 36% in surface water and 81% of groundwater samples

Hardness, residual chlorine and TDS found exceeding safe limits

FAILURE OF FILTER

GRAVITY FILTER

When flow rate falls below 1 litre/hr

RO FILTER

When flow rate falls below 100 ml/min

EFFICIENCY OF FILTERS

USE OF CLOTH

Three kinds of cloth filter were tested. An eight layered cloth filter removed 60% turbidity. But only removed only 20% of E.coli and failed to remove total dissolved solids



MESH/JALI FILTER

The best jali mesh filter reduced turbidity by 5% but it could not remove E.coli bacteria

GRAVITY NON-ELECTRIC FILTERS

Gravity non-electric models could not remove TDS or hardness from water

RO FILTER

It dramatically cut total dissolved solids. All the RO filters cut E.coli by 99.9%



WATER WASTAGE BY RO FILTER

From 100 litres an RO filter recovers just 26 litres and wastes 74 litres

