

# This Chemistry Professor's Fight for Arsenic-free Water in Villages of Assam is Slowly Bearing Fruit

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**Professor Robin Dutta's low-cost filter technology, called Arsiron Nilogon, is available for free as a DIY (do-it-yourself) method for removing arsenic and fluoride from groundwater.**



'Give a man a fish and he will eat for a day. Teach a man how to fish and he will eat for his life.'

For Robin Dutta, professor of chemical sciences at the Tezpur University, arsenic-free water for consumption is more than a science project. His two-decade-old endeavour to free groundwater from arsenic is a service to society and a sense of his own contribution for Assam and India.

"Most Indian scientists, use national funds but work on foreign issues, publish in foreign journals and implement results outside too. As a young scientist, I was motivated to work for my people, in my land," Dutta told News18.

From when he began work on fluoride contamination in 1999 to this dry summer of 2019, a lot has changed. His patented low-cost filter technology, called Arsiron Nilogon, is now available for free as a DIY (do-it-yourself) method for removing arsenic and fluoride from groundwater.

"I am from a village which has seen 29 cancer deaths since 1975, the first being my elder brother. I also lost my father, uncle, next-door neighbour and my closest childhood friend to cancer. Till 2006, we did not know that all of us were consuming arsenic-contaminated water in the village," said Dutta.

Years later, however, perhaps his happiest take-away from his 20-year-old project was when schools in Assam's Golaghat district asked students to build the Arsiron Nilogon as a science project.



*A school unit.*

## **Slow Poison**

Dutta found his initial impetus to work on groundwater contamination during the 1999 Lok Sabha election when political parties in Assam attempted to politicise health problems and deformities.

"At the turn of a new century, it was disheartening to find no affordable solution for the poor who are actually affected by fluoride and arsenic. Cancer due to arsenic-contaminated water may occur after 10-20 years. It is like slow poison," he said.

In Assam, arsenic has been detected in 24 of the 33 districts in the state. Found only in the aquifer, an underground layer of water-bearing permeable rock, the amount of arsenic in water, however, varies from place to place in the state.

According to the World Health Organisation (WHO), a maximum of 10 ppb (part per billion) or 0.01 mg/litre of arsenic, and 1 mg/litre of fluoride in drinking water is safe. However, the global health body also states that presence of arsenic even as low as 0.17 ppb can cause cancer.

Long-term consumption of groundwater arsenic can lead to chronic poisoning, causing diseases like cancer, bronchitis, diabetes, bone marrow depression and cardiovascular diseases.

With lack of public awareness and scientific study, arsenic contamination risks the lives of 2.912 million people in Assam.

### Scientific Tricks for Clean Water

The Arsiron Nilogon was developed by Dutta and his team as an affordable water treatment filter suitable for rural application in 2010. The filter treats contaminated water with small quantities of cooking soda, potassium permanganate and ferric chloride. "It's a simple scientific trick," he said.

The professor's main target was to achieve high arsenic and fluoride removal efficiency, while also keep the technology cost-efficient. The technology was named after this dual goal. Arsiron stands for 'arsenic and iron' and Nilogon means removal in Assamese.



*A big household unit.*

Results showed the technology was able to bring down arsenic content from as high as 1,000 ppb to single digits — below the WHO's recommended level or even zero. Using no electricity, heavy capital or recurring cost, the Arsiron Nilogon provided clean water for consumption.

The technology can be used in three forms or units. The household unit of 20 litre can be made out of two plastic bucket wherein the second bucket acts as a sand-gravel filter. Small community units of 200 litre or larger can be build out of two plastic drums or RCC tanks.

The recurring cost of the chemicals used in this technology is as low as 0.5 paisa per litre, Rs 0.5 per 100 litre or Rs 500 per 1,00,000 litre of water. The total cost of installing a unit is Rs 400 for 20-litre household unit, Rs 1,440 for 200-litre community unit and Rs 3,700 for 500-litre community unit. A special 40-litre unit for schools can be installed for only Rs 550.

### Community Impact

Dutta's efforts to bridge the gap between the assumed roles of a water scientist and a water activist have borne fruit. His team from the university has helped install 2,000 units at the household level and 200 units of 500 litre each at the community level across Assam.

His technology is available to everyone at no cost and is being used by a number of NGOs to treat water in the state. "No unit once installed has had to stop or suffered problems," said Dutta.

Dutta and his team has trained more than 2,000 personnel to install these units. "We have trained NGOs, school teachers, villagers, public health department officials and chemists among others. We have trained people in every zilla of Assam. School teachers, especially, are highly enthusiastic," he said.

As more and more schools adopt this technology, train teachers and ask students to build Arsiron Nilogon as science projects, Dutta is nothing but satisfied with the way things have taken shape. He intends to make the technology available even to industries.

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