

## Sensor network to map and predict pollution in Godavari

The Ganga may be the focus of the government's river-cleaning efforts, but a group of U.S. researchers is working on a system to map undulating pollution trends in the Godavari, India's second longest river.

Using a mix of methods, including satellite-monitoring, traversing stretches of the river to collect water samples and using special sensors to measure bacterial and chemical pollution, the researchers are trying to develop a cost-effective forecast system.

The team's long-term objective is to be able to inform State officials and citizens of a probable spike in, say, levels of dangerous microbes or effluents, similar to weather and air pollution forecasts. That apart, said Anup Malani, Professor of the University of Chicago Law School, it is to be able to access "raw data" that could be used to inform the efficacy of a proposed faecal sludge treatment plant and whether behavioural interventions — including incentives or punishments — to restrict activities that pollute the river could actually work. "We've had debates with town planners who told us that all the pollution gets washed away... Is that true? We need to find out," Mr. Malani, who is also co-founder of the International Innovation Corps, told *The Hindu*. "That would help us know whether interventions are needed only up-river or along various stretches."

The project started eight months ago and has so far identified two "hotspots" of pollution, which Mr. Malani declined to reveal, saying he would first inform the Andhra Pradesh government about them. The sampling exercise, being done along a portion of the 1,400-km river spanning Rajamundhry (East Godavari district) and Kovvur, Narsapur and Palakol (all in West Godavari), measures parameters such as total dissolved salts, nitrate, pH, temperature, turbidity and electrical conductivity. These are relayed to a website called Thoreau, a wireless sensing network maintained at the University of Chicago to map environmental parameters, for analysis. Some river attributes such as microbial levels require to be measured in laboratories, though the team hopes eventually to be able to use low-cost sensors that measure them, too, in real time.

"Through cloud-based data collection and real-time mapping systems, the research and implementation teams intend to demonstrate the importance and value of detecting and anticipating pollutants that enter the river in the form of human waste, organic materials, and chemical contaminants," the University of Chicago research team said in a statement.

The exercise is part of a Bill and Melinda Gates Foundation project to support the programme of the Administrative Staff College of India (ASCI) to provide city-wide sanitation improvements in urban Andhra Pradesh. Sensors to monitor river pollution are an emerging technological approach in India.

In April, Ashutosh Sharma, Secretary, Department of Science and Technology (DST), said 40 proposals to make the sensors (to monitor river and environmental pollution) had come in, and two would be short-listed soon. Intel, which will make the chips powering the devices, and the DST will split a 35-crore investment.

Says BJP will campaign against corruption, law and order problems and lack of development work in Himachal Pradesh

The process of holding the requisite Board Meetings and Shareholder Meetings has been completed in phases in September 2017.

Ruben George is staying at Ram Nath Kovind's house at Kalyanpur, near Kanpur

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