

# In India, natural ways to clean up wastewater promise big benefits

April 20 2023, by Helen Massy-Beresford

---



Credit: AI-generated image ([disclaimer](#))

European researchers are working alongside Indian experts to rethink the collection, decontamination and reuse of sewage in the world's most populous country.

Winding its way through the mountains and plains of northern India, the

Ganges River is sacred to the Hindu religion. More prosaically, its water and nutrients are vital to the region's farmland, hundreds of millions of residents and India's economy.

The Ganges is personified as Ganga, the Hindu goddess of purification and forgiveness. But like many rivers around the world, the Ganges is severely polluted, threatening the health of the people who live nearby and the crops they grow.

## Major potential

Two projects are improving the collection, sanitization and reuse of wastewater—an increasingly urgent challenge as climate change puts greater strains on water supplies. Called [PAVITR](#) and [PAVITRA GANGA](#), the two initiatives are part of an [EU-India Water Partnership](#).

PAVITR is using the natural filtering power of trees to turn sewage into a resource. The goal fits with the EU drive towards a [circular economy](#), in which resources get reused instead of discarded.

"With the focus on the circular economy, India has a huge potential," said Mirko Hänel, PAVITR's European coordinator.

PAVITR, which began in 2019 and runs through January 2024, is also an example of a [nature-based solution](#).

The project's use of tree plantations to treat wastewater not only is inspired and supported by nature but will provide local environmental, social and economic benefits.

The team dammed [municipal wastewater](#) in one hectare of land to grow a dense crop of bamboos, willows and poplars. The system works in perfect harmony: the nutrients such as nitrogen and phosphorus in the

wastewater help the trees grow while the bacteria in the roots naturally clean the water.

Analysis shows this natural treatment results in the wastewater meeting the necessary regulations, according to Hänel.

## Welcome returns

The system is cheap to install and operate compared to the high running costs in chemicals and electricity of a standard wastewater treatment plant—and the trees, in addition to cleaning the water, will attract birds, insects and other wildlife.

The Aligarh Muslim University, one of the India-based project partners, has set out to catalogue the species at the site.

The trees and bamboo can be harvested every two to three years, providing a sustainable timber crop to be sold to import-dependent Europe and an income stream for farmers in India. It could also, ideally, replace less sustainable, fossil-fuel-derived construction and manufacturing materials.

No additional fertilization or irrigation is required as the wastewater provides it all. Chemical fertilizer, another increasingly scarce and expensive resource, isn't needed. The root system remains in place, ready to grow again and keep treating the water.

Looking beyond PAVITR, Hänel says efforts will need to focus on [business ideas](#) for moving the system from exploratory research to the commercial market and to more areas along the Ganges as well as other rivers.

## Chemicals clean-up

While PAVITR has focused on standard municipal wastewater, PAVITRA GANGA has been tackling the kind contaminated by [industrial chemicals](#).

Also a five-year initiative running through January 2024, PAVITRA GANGA is looking at how to remove dangerous compounds from insufficiently treated wastewater. The project focuses on wastewater in urban and surrounding—peri-urban—areas, seeking to ensure it can be safely reused to help grow crops.

In the industrial city of Kanpur, which has more than 400 tanneries, sewage plants are unable to cope with the large volumes and with illegal dumping of industrial waste into municipal sewers.

Analysis of the wastewater showed high concentrations of substances such as chromium that can cause cancer.

Unless properly treated, this pollution can contaminate soils, harm the health of farmers and reduce [crop yields](#) if used to irrigate agricultural land, according to Paul Campling, the project coordinator. He's also international business development manager at a Belgian cleantech research organization called VITO.

PAVITRA GANGA aims to find the best technologies to remove harmful compounds from the wastewater so it can be safely reused for crop irrigation.

The team also uses sensors and modeling technologies to monitor and predict the quality of regional water bodies affected by discharged [wastewater](#) and helps [local governments](#) plan safer measures to deal with the natural, untreated water in rivers, lakes and groundwaters.

## Local and global

In Kanpur, the team is piloting a secondary filtration treatment system as well as "polishing" technologies to remove contaminants including chromium.

First, a specific type of membrane filters the sewage by separating it into "permeate," which is water that will be reused, and "retentate," which is the remaining organic matter.

Constructed wetlands then further clean the permeate. A combination of sorbent substances specifically designed to remove pollutants can also be added at this stage. These are known as polishing technologies.

Even the compounds such as chromium can be returned to the [circular economy](#) system if collected in sufficient quantities.

The project's local industry partners have a big role to play, working with a knowledge institute called IIT Kanpur.

"They are testing out the treatment systems in Kanpur and could easily scale these up if they see the benefits," said Campling. "We want to reach the point at which local companies could take the technologies further once the project ends."

The hope is that the approaches become embedded in the industry's decision-making and are recognized by local authorities.

The activities could ultimately yield benefits far beyond Kanpur and India, which [this week](#) overtook China as the world's most populous country.

"If it works well in India, it will probably work well in Africa and South

America too," said Campling.

**More information:**

- [PAVITR](#)
- [PAVITRA GANGA](#)
- [The India-EU Water Partnership \(IEWP\)](#)
- [EU-funded water research and innovation](#)

Provided by Horizon: The EU Research & Innovation Magazine

Citation: In India, natural ways to clean up wastewater promise big benefits (2023, April 20)  
retrieved 25 April 2024 from

<https://phys.org/news/2023-04-india-natural-ways-wastewater-big.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.