Converting waste water into fertiliser for leafier cities

The quality of human water management has a decisive impact on the biodiversity of natural habitats. And vice versa, since ecosystems also have the capacity to purify water with their myriad micro and macro-organisms.

Open sewer, Rufisque, Senegal.

In 2014, a report published by the World Bank warned that water treatment plants alone will not be sufficient to process the waste water of a rapidly-growing global population. These facilities are too costly to build, and their capacity is soon exhausted. The World Bank instead stressed the importance of developing alternative approaches to managing the waste water produced by cities, particularly in the global South.

This call was taken up by the eco-hydrologists at IRD, who decided to take the autonomous filtration systems used by small rural communities in France since the 1970s, and to adapt them to contexts defined by their extreme population density. These systems, known as "vertical planted filters," are composed of large, sealed tubs filled with gravel and planted with a variety of vegetation. They are capable of mineralising the organic matter found in domestic waste water, meaning that the water itself can be safely discharged into the natural environment. The problem is that these systems take up room: 1.2 to 2m² per user, space which is simply not available in densely-populated urban settlements.

Nevertheless, in tropical climes the natural processes of mineralisation operate more rapidly, simply on account of the air temperature. At these latitudes, the surface area required for each residential user falls to 0.8m². By optimising the way in which the plants, invertebrates and microbiome contribute to the mineralisation of organic matter, the

··· Researchers have reworked a fifty-year-old autonomous filtration solution to allow for the reuse of domestic waste water, reducing water consumption in the process ···

Example of a vertical planted filter for processing domestic waste water, with outflow directly into the river, France.

researchers hope to cut this surface-per-user ratio in half. A promising start indeed, with all signs indicating that automating the system which refills the tubs with waste water could slash the required space to as little as 0.2m² per user.

Furthermore, managing the flow of waste water to the filter also makes it possible to produce water enriched with nitrates, suitable for use as fertiliser for green spaces and urban farms. This could be a real boon in many African cities, where waste water could be used to create new parks which would help to cool and clean the air, putting soil quality and biodiversity at the heart of sustainable urban development. With these goals in mind, researchers have launched pilot schemes at the universities of Hanoi (Vietnam) and Saint-Louis (Senegal). In Senegal, planted filters are connected and monitored remotely by sensors, taking the perfection of these "old systems of the future" to the next level.

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