Schauberger Vortices for wastewater treatment

Wastewater treatment has been in the forefront of research done by Auroville's Centre for Scientific Research, CSR. After having successfully introduced the sustainable DEWATS system (DEcentralized WAstewater Treatment System), CSR is now experimenting with another promising device, a Vortex.

Lars Kostedde with the Vortex trial system at CSR

Just behind the main building of CSR one finds a cascade of ferro-cement basins, fed by amber-green water from two vertical acrylic cylinders. On closer inspection, one sees a vortex spiralling at the centre of the tubes. It is a Vortex in action.

"You surely know what a vortex is," says Lars Kostedde, CSR's water engineer. "We are all familiar with the conical geometry of snail shells, the spiral patterns of stellar galaxies or the funnel shape of cyclones. All form classic vortex spirals. Closer at home you see vortices when you drain the water out of bath tub or when you empty a bottle by shaking it; the water spirals."

Lars comes from Germany, where he studied water science. While looking for a job after submitting his thesis at the University of Pretoria, South Africa, he chanced upon Auroville. "I was delighted to see Auroville's experiments in alternative methods of waste water treatment," he says. Lars joined CSR as a volunteer. "It worked very well, and towards the end I was offered a position as water engineer." It's a work that involves a lot of calculation, data gathering and coming up with the final designs for wastewater treatment plants. Lars designs these systems for individual homes and communities, as well as industrial units.

A vortex at the centre of the acrylic cylinder

"It took the genius of the Austrian forest warden and researcher Viktor Schauberger to discover that vortexes in water lead to self-purification," says Lars. He explains the process. "The centre of the vortex is an air funnel which forms an open tube from the top to the outlet below, so that air can flow either up or down. The vortex generates two kinds of forces: one acts centripetally, moving substances towards the centre; and the other is centrifugal, pushing substances to the outside.

"Schauberger found that these forces could be re-created by designing special flow forms and spiral shaped tubes. Today, his invention has been integrated into traditional wastewater treatment systems to separate liquids and solids, and into drinking water distribution pipelines where it has a quality-improving effect.

"We decided to experiment with the Vortex to improve Auroville's wastewater treatment systems. In collaboration with Jean-François from Coin de Terre, who earlier had worked with Aquadyn, we have further adapted the vortex design with ferro-cement components here at CSR.

"Currently many treatment plants in Auroville use a 'planted filter' – also called a 'root-zone filter'- for treating wastewater. You find them in many communities and behind the Town Hall. These filters have their advantages because they doesn't require electricity but the disadvantage is that they require a lot of space and frequent maintenance. Some places in Auroville do not have the space for such a large planted filter system and it is there that we have installed the Vortex. There are several vortex systems in Auroville in operation now – among them the Centre Guesthouse, Mitra Youth Hostel and the Pavilion of Tibetan Culture. The treated water from the anaerobic filter is pumped through the Vortex before it gets stored underground or in surface water ponds. The vortex system is very effective in eliminating odours.

"Citadines, the new residential complex, has now shown interest in using a second-generation Vortex system which will incorporate a 'nanobubbles venturi' system. The Vortex eliminates odours, but the colour of the water is still grey or green. The nanobubbles system is supposed to make the water clear and colourless."

While experiments are in full swing, a systematic testing of the treated water is the next important step. "We plan to do two tests," says Lars. "One will be chemical and biological analysis done by Auroville's Environmental Monitoring Service. The other will be to test the vitality of the water with the copper-chloride crystallisation process used at Aquadyn. This should reveal the energy patterns of the water." Both tests are planned for the near future.

The Vortex system requires electrical energy to operate. "Ideally the system should work on solar energy," says Lars, "but we decided against it as solar pumps are still very expensive and the electricity consumption of the Vortex system is minimal." When there is a power cut, the system shuts down but reboots automatically when the power comes back.

Lars sees a wide application for vortices in Auroville. "For example, by integrating them in the landscape so they become a kind of water sculpture," he says. "The aesthetic side of a water treatment system can then be very pleasing."

In conversation with Carel

Cold-pressed oil in the Nicobars

At the request of Auroville ecologist Rauf Ali, Aureka has developed a press that will produce coconut milk in large quantities for use in the Nicobar Islands. This will substantially increase the income of the local population.

From left: The traditional way of grating coconut; sedimentation process of extra-virgin coconut oil

PHOTOS RAUF

For Rauf Ali, the 2004 tsunami was personal – four of his colleagues got washed away by the killer wave. "That morning they were camped at the southern end of Great Nicobar, tagging sea turtles. Aceh on Sumatra, where the quake originated, is only 150 km away."

Rauf's connection with the Andamans and Nicobar goes back 21 years, first through Pondicherry University, then through the Andaman & Nicobar Island Environmental Team (ANET), and more recently through FERAL, the Foundation for Ecological Research, Advocacy and Learning of which he is one of the trustees. "The islands are part of the Mergui archipelago off the Burmese coast," he says breaking into an impromptu geography lesson. "It is composed of four main island groups – the Andaman group, Car Nicobar, Nancourie and Great Nicobar.

"The Andaman Islands did not get hit by the tsunami – there were only about 9 deaths, mostly due to falling masonry from the earthquake. Only Little Andaman had a few hundred deaths. The biggest toll was in the Nicobar, where an estimated 7,000 tribals and at least the same number of non-tribals died. Of these, 9,000 must have been on Car Nicobar alone.

"But the relief operation was a mess. A lot of the cash aid got stuck in the Andamans. Everyone suddenly became very rich there – all the petty shopkeepers overnight turned UNICEF consultants. And things that were meant for Nicobar either were stolen or ended up being sold in the market."

Rasu (left) of Aureka and Rauf with the Deegan Press

That was when a cheque arrived in the mail with a note attached, "I trust you – develop something for the tribals." It was from Paul Deegan, the well-known adventurer and mountaineer. "In 2003, I had taken Paul and his team on an expedition to the Car Nicobar," explains Rauf. "When he heard about the tsunami, he had written about his experiences in the Nicobar for the Geographical magazine, and used his fees to help the islanders."

More than 70% of the area of Car Nicobar is covered by coconut. The livelihood and socio-economic status of the people is almost entirely dependent on this crop, but it is grown and harvested in a very basic manner. "Traditionally, virgin coconut oil is made for household use, and copra is exported. The value of virgin coconut oil is about three times that of ordinary coconut oil. But the Nicobarese never exported coconut oil because their traditional method of extraction is elaborate and time-consuming. They gather the coconut which has fallen naturally – no climbing trees to get them! The coconut is grated on the thorny stem of a local plant; milk is squeezed out, and then placed in semi shade for 24 hours. In the end, it separates into three layers – the top layer is virgin coconut oil which they use for their cooking, the middle is water, and the bottom is a sludge…And if you fry this sludge, you get B grade cooking oil – strong smelling and yellow.

"When they use copra, the process is even more cumbersome. They use is two planks with very fine holes drilled in it; they put the copra on one plank and then place the other plank on top and the whole family sits on it for a week! So it is very tedious to make even a litre of oil.

"We from FERAL decided on a project to improve their socio-economic status. The idea came to use this donation to develop a coconut oil press to extract virgin coconut oil which then can be sold directly to businesses, ensuring that all profits flow into the hands of the people who need it most. We developed a prototype and then approached every agency, but nobody was interested in funding just a few machines. Finally, we went to the Science and Society Division of the Ministry of Science and Technology of the Government of India, which sanctioned a 2-year project 'Establishing small scale coconut extraction units at the Nicobar Islands'. The project became operational in April 2008.

"We also wanted to provide commercial coconut graters to the Nicobarese, which grate a coconut in about 45 seconds instead of the usual 8 minutes, but this was not appreciated. Grating is a community activity, all the women sit together, they gossip, they have a good time. The electric grater makes so much noise that they can't talk to each other. So they said, 'We are very happy with the presses, but don't give us graters'."

The final model of the 'Deegan Press' was developed by Rasu at Aureka. It is a simple cylinder with fine holes drilled into the walls. Fresh shredded coconut is placed in the cavity into which a piston driven by a hydraulic press exerts a 20 tonne pressure. This causes the oil to get pressed out. "This is organic extra-virgin cold-pressed coconut oil," explains Rauf. He is confident that it will fetch a price four times that of conventionally-produced coconut oil. Eight presses have now been manufactured. Six have been shipped to Car Nicobar, where a youth group called DOSTI which has representatives from each of the 15 villages in Car Nicobar, will take charge of them. "They will conduct training camps on how to use these machines, and they will own the machines."

Another two machines have already been independently ordered. One machine will go to Middle Andaman and one will remain in Auroville's beach community Eternity, where Ana has successfully experimented with the machine. "For the future development of the project the forest development corporation in Little Andaman has expressed interest in the project. They plan to take over the supply of the machines, the marketing of the oil and everything else."

The Deegan Press is in process of being patented, a so-called 'creative commons patent' which means that anybody can make and use the press. "The only condition will be that if they make any modification for commercial purposes, they have to make those modifications available to the public within a year. The best way to do that is to publish the modifications on the website. "

The project hasn't particularly increased Rauf's status in the Andamans. "I am not very popular with the coconut dealers right now," he laughs. "A lot of their income will now flow into the hands of the Nicobarese."

Priya Sundaravalli