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*With you in Pursuit of Sustainable
Management of Finite Water Resources*

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Point for discussion this month ‘Sustainability of Wastewater Treatment
Technologies’
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Shrishti Eco-Research Institute, Pune

Eternal Words

As scientists, many of us have had profound experiences of awe and reverence before the universe. We understand that what is regarded as sacred is more likely to be treated with care and respect. Our planetary home should be so regarded. Efforts to safeguard and cherish the environment need to be infused with a vision of the sacred. At the same time, a much wider and deeper understanding of science and technology is needed. If we do not understand the problem, it is unlikely we will be able to fix it.

Carl Sagan

Dear Readers,

Every month I wait patiently to interact with you. We got very good responses for the last SERInews issue. Many people asked about the details of Green Bridge and its scientific background. In this issue we have tried to give answers to their queries and also you can read about the installations at Anandnagar Nalla on Sinhagad Road, Pune.

We have already learned about the success of Green Bridges at Ahar River, Udaipur. While writing this editorial I have received very encouraging news from Udaipur and I just can't resist sharing it with you. The transparency of the river water has been increased from 6 inches to 14 inches. Scientific study apart, but the farmers having their farms along that stretch of river are now drinking that water and according to them the water quality of their wells/ tube wells has also increased a lot. For us this is just amazing! The scientific references tell us that it takes hundreds of years to control ground water pollution. But in this case it has happened in just few days! This might be the result of reduction in ecotoxicity and increase in biodiversity due to Green Bridges. Now ran away residents of river – turtles – are coming back to river and spotted by locals.

Students of engineering faculty from Udaipur are coming forward to study the phenomenon of Green Bridges in detail. They are considering the parameters like water hydrology DO, Turbidity, etc. The interest of students encourages us because it's a indigenous treatment system and our students must learn the process es for the better water resources for generationnexts .

Cover photograph is of Lake Phewa, Pokhara, Nepal. To discuss the future of more than 5000 such lakes in Nepal Government of Nepal has organised one meeting with ILBM members. It was well-organised programme by the NLDC and its allied organisations of Nepal – The Country of Water Towers – The Himalayas. It was attended by ILEC Chairman, Dr.Nakamura and India representatives Dr. M.S.Kodarkar and Sandeep Joshi.

Thank you,
Chief Editor

From SERI's desk

Green Bridge at Anandnagar Nalla, Pune

Anandnagar Nalla is flowing through the densely populated area of Sinhagad Road in Pune. Its flow is around 10 MLD and it receives domestic waste water from the residential area along its banks. Its stretch is about 2-3 km and finally it pours the waste in the Mutha River.

SERI has done Eco restoration of this stream with Pune Municipal Corporation. As it is flowing through the residential area it is dumped with lots of domestic solid waste. First aim was to reduce the quantity of this by making the people aware and educating them about the consequences. Then cleaning the nalla course to remove already dumped solid waste was a very critical task. Also septic tanks of some societies along the nalla bank were leaking. So there was another job to convince the people to repair the septic tanks. While doing all this awareness work actual implementation work was started side by side in the stream. SERI had surveyed whole stretch of nalla to design the Green Bridge system. While designing the system, parameters like wet and dry weather flow, characteristics of incoming waste water, flow rate, depth of the stream, etc. were considered.



Cleaning of solid waste and debris from the Nalla course



A metal Screen was fitted to trap the solid waste and then Green Bridge was installed. After one Green Bridge, there was considerable reduction in the COD level. When sample was taken after second Green Bridge for analysis, the COD was reduced to 81 mg/l from initial 270mg/l. Local trees, bushes are planted along the banks of the nalla and many species are naturally growing there increasing biodiversity.



Article

Green Bridge Technology: Project Proposition

Introduction

Natural streams, rivers and lakes have their own in-built purification system which is comprised of the winds, natural slopes, stones for biological growth and complex food web help in the purification process. This food web is nothing but utilization of one's waste by another as it's own food. Nature has her own living machinery of detritivorous microbes and other living species to consume wastes. These principles have been harnessed in the treatment of polluted streams.

The scheme involved application of ecological engineering to remove organic and inorganic pollutants from the water and to utilize them as nutrient in the ecological cycles. The Green Bridge is developed using filtration power of cellulose / fibrous material with stones. All the floatable and suspended solids are trapped in this biological bridge and the turbidity of flowing water is reduced. Green plants on the bridges increase the DO level in water, which in turn facilitates the growth of aerobic organisms, which degrade organic pollutants.

Need of the Hour

Pollution control authorities, corporation officers and policy makers - everybody is expressing the urgency of the affordable indigenous pollution control techniques which will improve the quality of environment for the society. Rampantly spreading pollution is defiling our valuable and scarce freshwater resources. The pollution is reaching to the water bodies useful for drinking and irrigation purposes via natural drains and streams making them unfit for any application.

There are about 233 class -I cities in 14 major river basins of India. There population is about 105 crores. These cities have been partially covered with sewerage system - 24% only. Therefore almost 76% of the untreated sewage from these cities reaches to freshwater bodies mainly rivers and lakes. Class -II cities don't have sewerage systems at all for the collection of sewage. Just collection of the sewage is not enough. It should be further purified also. So, all these city wastewaters are naturally taken to the nearby rivers and lakes by nallas and



odhas (streams - natural drains). These natural drains in the cities are serving as sewerage lines.

The contamination of lenticlotic water bodies by sewage and industrial effluents leads to eutrophic conditions, dense growth of a particular aquatic species - Water Hyacinth and finally the blackening of water due to accumulation of organic matter. Thick mats of the water hyacinth reduce the velocity of the river and this becomes the breeding ground for mosquitoes and other nuisance insects. It adds to the problems downstream where the deposited organic matter, undergo anaerobic degradation.

Various techniques like phytoremediation, bioremediation are being used to treat different types of wastes including toxic wastes like phenolics, hydrocarbons, pesticides and even explosives like RDX etc. It has been reported that duckweed ponds in Kolkata are being used for pisciculture. In these ponds the DO level increases multifold from 0 to 15 - 19 mg / L. The reed bed technologies evolved in Germany 1940s. These techniques have been successfully employed for various types of wastewaters including sewage. It is experienced and confirmed that these systems detoxify the substances.

Application of Ecotechnology

Applications of ecological engineering principles, environmental chemistry, microbiology, interactions of organisms and succession of biological communities are very useful to consume organic and inorganic pollutants from the wastewaters and bioconvert them into non-toxic form, finally transferring the elements in the ecological cycles. These eco-transformations, eco-conversions and degradation or bio-utilization of pollutants - nutrients are the part of ecological cycles - biogeochemical cycles. In the ecotechnology, attempt has been made to apply natural flora and fauna in well-designed manner to develop technologies like Green Bridge, Green Lake Eco-Systems, Green channel, biox (biological oxidation) and Stream Eco-Systems.

The successful implementation of the scheme with natural technologies like Green Bridge, Green Lake and Stream Eco-System implied that the ecotechnology can be employed to treat the waste streams coming from the non-point sources. This can be very economical, say capital expenditure can be 5 -

10% of the total for conventional mechanized aerobic and anaerobic treatment systems.

Expected overall results

Pollution Control

- ✓ Solids control : 40 - 80% reduction
- ✓ Pollution Control : COD/BOD reduction - 40-90%
- ✓ Fecal coliforms control : 50 -100% reduction

Increment

- ✓ Dissolved Oxygen : 150% - 1200%
- ✓ Aquatic species : Plants/Plankton - 200% - multifold
Micro-invertebrates - 200% - multifold

- Multifold changes in population of avifauna
- Multifold changes in terrestrial plants along the riverbanks
- Overall odour and mosquito reduction and improvement of river aesthetics
- Health improvement of people
- Overall increment of health status of aquatic life in lentic-lotic system by reduction in ecotoxicity of pollutants
- Ecological control of water hyacinth over the period of time
- Ecological education and demonstration centre for students and tourists

Conclusion

1. Ecotechnological system's capital expenditure is comparable with the annual operational cost of conventional bioremediation systems.
2. Ecotechnological systems can be developed and operated in combination with conventional systems to improve the performance of the latter.

ILBM Experts meeting at Nepal

NLCDC and allied organisations had organized one meeting of ILBM experts in, Pokhara, Nepal to discuss about the deteriorating quality of fresh water bodies in Nepal. Delegates from India, Bhutan and Pakistan attended the meeting.

