



SERInews

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

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**National and international collaborative
efforts for water sector**

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Eternal Words

"The nation behaves well if it treats its natural resources as assets which it must turn over to the next generation increased, and not impair, in value."

— Theodore Roosevelt

When one tugs at a single thing in nature, he finds it attached to the rest of the world.

~John Muir

We have lost sight of the dependence we have on nature in economics.

- Tony Juniper, sustainability and environment adviser (2013)

The environment is not as 'cheap as chips', it's priceless and we all have a part to play in protecting it

- David Dickinson (TV celebrity)

Dear Readers,

Cover photo is of beautiful Athirapally waterfall which is set to lose its naturalness to hydro-power project. It is one of the beautiful sites in western ghats. Western Ghats is on the conservation agenda of Government. Once again, in the Athirapally power project of KSEB, it is needed to understand the spread of corona of its negative impacts and the economics of mitigation measures and possibility of integrating it with regional growth. Three levels of decision making - local, regional and national need to evaluate the significance of the project at each level to evaluate its socio-economic contribution for long term sustainability of human systems and ecosystems. There is necessity to go beyond bureaucratic and judicial checklists by staging the platform for scientific monitoring and engineering solutions to various issues with the contributions by local experts and societal wisdom.

Ecotechnological treatment systems perform continuously and give satisfaction of investment for wastewater purification. One of the best example is the soil scape filter - vertical ecofiltration system installed in Jaipur's small scale dyeing unit. The system is treating not only wash water (containing detergents) but highly coloured water making them suitable for recycling. The outlet BOD result is amazing - less than 2 mg/L. Ms. Brigitte Singh deserves the appreciation for her meticulous caring for routine operations of these grey water and coloured water treatment systems. If you care for the "pollution-eating-ecosystem" then it can provide you clean water from any type of industrial wastewaters. It's a "PROCESS" which treats the water and not the "INFRASTRUCTURE", well-demonstrated by Ms. Brigitte Singh.

SERI being partner in the European Union - DST, GOI sponsored NaWaTech consortium, Sandeep Joshi, Environment Technologist was part of Indian delegation went to Barcelona to discuss about the natural water systems and treatment technologies. He contributed to compendium of technologies being published as a basic document to disseminate information about the various treatment systems to be used for residential complexes, bungalows, commercial establishments etc. A brief on his visit is given in this issue.

WISH YOU VERY HAPPY PROSPEROUS & ECO-FRIENDLY NEW YEAR 2014!

Thank you,

Chief Editor

163 mw hydro power project at the Athirapally Waterfalls in Kerala

- Compiled by Pallavi Patil

The Kerala State Electricity Board has proposed to build 163 MW capacity hydropower project at the Athirapally water falls on the Chalakudy River, Kerala. The Union Ministry of Environment and Forest has sanctioned clearance for this proposed project on July 19, 2007 but environmentalist are against this project because it will result in enormous destruction of the riparian ecosystem. The proposed dam will affect 138.6 hector of forestland and livelihood of tribal families depending on the forest and river. Also a stretch of 28.5 hectares of riparian forest falls under the submergence area while it will reduce or dry up the water-flow of Athirapally waterfall which harnesses ecology and tourism in this area.

Before construction of any big/small dam on river its impact assessment/analysis should be done in a scientific way otherwise it will pose threat to present ecology as well as economy. Prior to clearance it is mandatory to conduct public hearing as well as EIA study but NGOs are claiming that there wasn't any EIA study or public hearing for this project.

In 1998, Athirapally hydro-power project got clearance from Ministry of Environment and Forests (MoEF) without public hearing . So in October 2001, Kerala high Court directed Kerala State Electricity Board and MoEF to follow all procedures for Environment Clearances. Public hearing was held in February 2002, in which it was observed that local communities and environmentalist are against the project. But on the basis of a report prepared by EIA agency -Water and Power Consultancy Services (India) Ltd. (WAPCOS), MoEF sanctioned clearance to the project in February 2005. In March 2006, Kerala High Court cancelled the clearance and directed to reorganize public hearing. The court ordered the authority to publish the report and public hearing details. On directives of court public hearing is held on 15 June 2012.

The Western Ghats Ecology Expert Panel (WGEEP),led by Mr. Gadgil, constituted by Union Ministry of Environment and Forests to suggest conservation measures for Western Ghats has rejected this proposal.

The sub-committee of the Experts Appraisal Committee for River valley and hydroelectricity project visited the proposed Athirapally dam site in April 2007 which concluded that income source of people living in Athirapally mostly depends on the tourism, it can be agitated. This issue has not been addressed / highlighted by KSEB into the report.



MoEF has decided to declare a major part of the Western Ghats (about 60,000 sq km) as an ecologically sensitive area (ESA) therefore industrial activity like mining, quarrying, and setting of thermal power plant and industries might not be permitted into the Western Ghats. That's why once again the Athirappilly hydroelectric project was rejected by MoEF.

The dam is proposed on the Chalakudy River which is 5th largest river in Kerala with 144 kms length. The Chalakudy River is a tributary of the Periyar River and originates in the Anamalai region of Tamil Nadu. The famous Athirapally and Vazhachal waterfalls are situated on this river. Athirapally waterfall is situated at 1000ft MSL and falling from a height of 80 fts. It is largest waterfall in the state.

The proposed dam will be about 5 kilometres upstream of Athirapally Falls and 400 metres upstream of Vazhachal Falls. Already six dams for power generation and one dam for irrigation has been developed on this river.

Ministry gave clearance to this hydro-power project with a set of conditions which mostly includes maintaining water-flow over Athirapally waterfall, plugging of irrigation channels from the river, anti-poaching measures, sustainable measures for tribal families in the area and set up monitoring committee to record post ecological changes that arises due to setting up of this dam etc. The clearance has limited the functioning of dams only for 4 hours (7 pm to 11 pm) for power generation mostly during driest month i.e. from February 1 to May 31 every year.

Forest cover in Kerala is declining day by day, in 1900 forest cover was 44.4 % and in 1983 it came down to 14.7% while recent study shows that it is just 9% now. The proposed dam will affect a stretch of 28.5 hectares of riparian forest falls under the

submergence area which is the home of Endangered fauna species like tiger, Asiatic elephant, Great Indian Hornbill, Malabar Giant Squirrel, Gaur, Lion Tailed Macaque, Nilgiri Langur, and rarest and highly endangered Cochin Forest Cane turtle (*Heosemys silvatica*) etc. and unique niche specific riparian forests. The elephant corridor between the Parambikulam Sanctuary and the Pooyamkutty forests will also be affected as large area will be submerged.

The annual report of the National Bureau of Fish Genetic Resources, Lucknow, states that Chalakudy has the richest diversity of aquatic ecology among the rivers in the country. EIA studies done for this project, has not covered the impact on the ecology due to submergence of the riparian forests at this 200-300 MSL altitude in the entire Western Ghats.

The reduced river flow will have impact on more than 5 lakhs people from different panchayaties and municipalities depending on the river for drinking, irrigation and livelihood purposes. The scenic beauty of the place attracts more than 6 lakhs people every year to visit Athirappilly waterfalls. The reduced water flow will severely affect the tourism industry and the economy based on it. Hundreds of tribal mostly 'Kedar tribes' which is endemic tribes are situated in this river basin. If their livelihood, which mostly depends on the river and forest, is affected the tribal settlements will be at risk.

Since the river has tremendous turbulence the average electricity generation will be less as compare to capacity of the power plant. Based on the stream data of the last 22 years, some experts (People's School of Energy, a research team of engineers from Kannur) have studied and calculated that only 20% of power will be generated during the period from December to May. But KSEB is assured on viability of the project and is expecting production of the electricity in the range of 98 and 604 million units (MU). KSEB proposes to release 6.23 m³/s of water in April-May and 7.62 m³/s of water from September to March to avoid drying up of Athirapally waterfalls. To generate electricity effectively flow of about 130 cumec for 4-5 hrs is required which may cause problems for downstream irrigation projects.

As per the local civil engineer, studying hydrology of the river, during monsoon maximum flow of river water is about 102 cumecs which reduces up to 14-15 cumec in the dry months like March and April. If water flow is further reduced up to 7.65 cumec then waterfall will not be seen anymore.

From SERI's Desk

Achievement of performance by small textile unit in Jaipur using Ecotechnology based treatment system

In the water scare state of Rajasthan, a textile unit at Jaipur run by Ms. Brigitte Singh is taking help of natural technology to treat the dye and detergent wastewater and purify it to the extent that the treated water has drinking water characteristics. SERI team has pleasure in designing and commissioning this plant in 2006, almost 7-8 years back! This treatment system is running at its full efficiency and has shown consistency in the outlet parameters since conception. This system is based on the vertical ecotechnological filtration – Soil Scape Filter – system and designed for 10 KLD capacities.

Our expert Sandeep Joshi, ecotechnological system designer and planner visited and audited the system last month. The third party analysis results of treated water shows that BOD is less than 2 while COD is less than 40. This is achieved without any chemical addition or extensive use of electricity. No sludge is generated while treating the waste.

This textile wastewater mostly contains dye pigmentation and detergents. The color reduction in the two-stage filtration system is consistently more than 90-95% and



also dyes and pigments are treated considerably up to 95% COD reduction.

This has enable the dying unit to 100% recycle the treated water for the dye preparation and thus save on the fresh water demand.

The wastewater treatment system is truly zero pollution discharge system. We appreciate the meticulously routine operations and maintenance is supervised by the owner, Ms. Brigitte Singh, herself.

Indian Woman Association Conference

The Indian Women Scientists' Association (IWSA), Pune Branch organized a three day conference on "Current Trends in Science and Technology (CTST)" on 28th November to 30th November 2013 in University of Pune.

IWSA is a non-profit organization which thrives to promote the scientific attitude in the society through women scientists. The main aim of this conference was to provide a multidisciplinary platform where latest trends in Science and Technology could be presented and discussed from varied backgrounds researchers to expose and discuss innovative theories, methodologies, tools and applications.



Due to the accelerating industrial developments and changes in human lifestyle and activities, disposal of inadequately treated waste water streams are creating grave environmental problems. This session was chaired by Dr. N. S. Rajurkar, HOD, Environment Dept. University of Pune. Dr. A. D. Patwardhan, presented current conventional methods, technologies used to treat sewage and industrial wastewater. He also discussed different treatment methods with their limitations.

Mrs. Sayali Joshi, CEO, SERI presented her views on 'current trends in waste water technologies'. She pointed out the importance of blue and gray water economy running hand in hand and its impact on rural and urban economy. Ecotechnology is one of such indispensable tools to evolve wastewater technologies which are less area, energy intensive and require less routine maintenance. She presented how ecotechnology can useful for lake and river restoration and industrial wastewater. She presented case study of the eco-restoration of Ahar river project by using Ecotechnology – Green Bridge – system and its Socio-Economic-Health impacts on surrounding communities and their lifestyle. Advanced ecological technologies out compete mechanistic systems with respect to energy consumption and treated water quality.

NaWaTech – Mid-term Meeting

Barcelona, November 26-29, 2013

Sandeep Joshi, Environment Technologist and Impact Analyst of Shrishti Eco-Research Institute (SERI) participated in mid-term meeting of NaWaTech project at Barcelona, Spain during 26-29, November 2013. Natural Water systems and treatment Technologies - NaWaTech – an international consortium is constituted by 7 different organizations from India led by Department of Science and Technology (DST), Central Government, and 7 organizations from 5 different European countries. The key objective of NaWaTech is to evolve strategy to cope with water shortages in urbanized areas in India. From India, with him Dr. Pawan Labhsetwar, HOD Water Treatment Division, NEERI, Nagpur, Mr. Dayanand Panse, Chairman, Ecosan Foundation (India), Mrs. Shrividya Satish and Mr. Prashant Mahagaonkar also participated in the meeting.

Various urban pressures such as population growth, urbanization, industrialization, climate change and consequently increase in water consumption are impacting water resources in India. To manage water scarcity in urban areas, there is a need for techno-economic-management reforms in conventional end-of-pipe water services. Main objective of the project is to develop a NaWaTech system which uses an integrated water management approach. This integrated approach includes - (i) interventions over the entire urban water cycle (wherever applicable); (ii) optimization of water use by reusing wastewater and preventing pollution of freshwater source (reduction in freshwater demand); (iii) prioritization of small-scale natural and technical systems, which are flexible, cost-effective and require low operation and maintenance (to make these systems user-friendly). Natural water systems for example constructed wetlands, bank filtration and storage via soil aquifer treatment and bank filtration, will be demonstrated with adaptation protocol. Methodology of technology adaptation is being evolved with practical on-site pilots to be adjudged by the user and visitors. The attempt is to optimize use of different urban water sources by treating water through a modular natural system considering the characteristics and degree of pollution of the different water sources as well as the different requirements for different usages.

Objectives of NaWaTech

1. To assess the technical, financial and environmental potential (and applicability) of natural water treatment technologies to cope with water shortages in urbanized areas in India.
2. To enhance (& to develop) the natural water treatment systems for the production of recycled water (from wastewater) to supplement water sources

considering extreme climatic conditions and highly & widely varying pollutions loads (e.g. monsoon floods).

3. To disseminate, exploit, and ensure the take-up in practice and mainstreaming of NaWaTech activities and output by key stakeholders (e.g. end-users, SMEs and service providers, decision makers) and to develop technical guidelines, tools, and manuals for design, implementation and operation and maintenance as well as policy briefs.
4. To ensure the interest and potential benefits to SMEs by supporting the development of a local market of natural water treatment and storage technologies, and facilitating the local SMEs by organizing training and capacity building workshops. Ensure the participation of local SMEs in the implementation phase of the project itself (learning by doing).
5. To create an enabling institutional environment in order to allow the take-up in practice and mainstreaming of the results (e.g. align NaWaTech initiatives with existing urban water plans, strategies and policies).
6. To establish foundations of a long-term cooperation between EU and India in water technologies as part of the Strategic Forum for International Science and Technology Cooperation (SFIC) and establishing bridgeheads among research institutions and ensure the take up of the NaWaTech approach in educational curricula.

Proceedings of the meeting

The meeting was convened by GEMMA - Group of Environmental Engineering and Microbiology at Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia (UPC) C/ Jordi Girona 1-3, Building D1, 08034 Barcelona during Nov. 26 – 29, 2013. Representatives of 7 European organizations including Joan Garcia and Anna Garfi of GEMMA, UPC, Barcelona, Günter Langergraber, professor and Sandra Nicolics, research scholar of University of Natural Resources and Life Sciences (BOKU), Vienna, Pillar Zapata of Bioazul, Málaga (Spain), Fabio Masi of IRIDRA, Firenze (Italy), Merlen of Kre_Ta, Berlin, Johannes Heeb and Leonellha Barreto Dillon of Seecon international GmbH, and Lucia Doyle of ttz-Bremerhaven.

On 26th November, meeting started with warm welcome by Head of the Department Joan Garcia followed by review of the work and research plans with the outcomes achieved in last year. Then the test sites of Amanora Park and COEP Hostel with stream treatment in Pune were discussed thoroughly. First two sites were presented by Mrs. Shrividya of ESF with Fabio Masi of IRIDRA. Sandeep Joshi of SERI presented the site evaluation studies for the stream treatment and concluded that the site of Ambil Stream near Indradhanushya (Rainbow) Museum (of Pune Municipal Corporation) was most suitable for eco-filtration bank treatment

technique. He highlighted the challenges at the site including solid waste dumping on the banks.

On 27th November, pilot units of constructed wetland on the terrace of the department were observed. It's operations were explained by Joan Garcia. There was slightest yellow tinge to treated water. There was interesting unit of algal pond for bioremediation of sewage. One of department's teams is working on developing a concept of generating electricity from aerobic-anaerobic treatment of wastewater. Dr. Pawan Labhsetwar presented the test sites of NIT Garden and Central Railway in Nagpur supported by IRIDRA and Bioazul. Different tasks were discussed including preparation of technical notes for SMEs and end-users.

On 28th November, constructed wetland site implemented in Mediterranean climate region of Spain was visited. It is located between newly constructed international airport and under-construction harbor. It is developed in the delta region of Llobregat – a channelized river. It receives about 20 million liters per week secondary treated wastewater from city STP. Lots of ducks and aquatic birds were observed in the open water area of the constructed wetland. Then at the meeting venue, in the after lunch session, work packages of business opportunities and integration of NaWaTech in business plans were discussed.

On 29th November, PhD student Cristina Avila presented her work on constructed wetlands and Perez – Foguet presented the environmental management tools for decision making in the basin with mining activities in international workshop organized in the civil engineering department.

Overall it was good experience to know the advances in the natural water treatment systems and sharing the Indian experiences of success of SERI's some the projects.

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