


**Contact:** Executive Editor, Shrishti Eco-Research Institute, B-106, Devgiri, Opp. P. L. Deshpande Garden, Near Ganesh Mala, Pune – 411 030. India. Phone: 91-20-24253773 /Telefax: 91-20-66206539

Website: www.seriecotech.com Email: seri_news@yahoo.co.in

**Point for discussion this month** **River Policy and its importance**



## Eternal Words

To put your hands in a river is to feel the chords that bind the earth together.

*- Barry Lopez, author*

Only when the last tree is cut, only when the last river is polluted, only when the last fish is caught, will they realise that you can't eat money.

*~ Native American proverb*

A walk amongst nature, whether by the sea, river, hill, valley, meadow or wood, works wonders for the human spirit.

*~ unattributable*

Dear Readers,

Greetings!

It's monsoon in India. Most of the states are having adequate rains but some states are on the verge of drought. During every drought people start talking about the conservation and management of water and all those talks are washed away in next heavy downpour.

India being agriculture driven economy should develop vision for water management and must have action plans and road map for the same. Distribution of precious, fresh surface water for irrigation, domestic and industrial use should be well planned and properly executed to overcome cycle of uneven rains and its blow on the economy.

In this issue we are discussing about the status of surface fresh water bodies in India. Many of the rivers in India are under the threat of pollution either due to domestic waste water discharges or industrial discharges. Many perennial rivers carry only sewage after monsoon. This changed urban water cycle is showing drastic effects on the precious ground water table. These polluted Indian rivers are waiting for ICU treatment for revival and regeneration.

In many reports on Ganga it has already pointed out that Ganga is mainly polluted due to domestic waste from her catchment. Like Ganga, many other rivers are facing the same situation. Decentralized, natural treatment of domestic waste is the solution as GAP I (Ganga Action Plan I) has demonstrated the failure of centralized sewage treatment plants of state of art technology installed in areas along the banks of Ganga. The electricity required and the skilled labour to maintain the mechanical parts of the treatment units are the main problems keeping the huge investment idle.

Installing more STPs without assessing the existing one won't serve the purpose.

India needs a well defined, well constructed river policy to improve the health of our dying rivers. In a country where rivers are worshiped and have given the status of "Mother" we should have more concerned about our rivers and should be more focused in our actions.

Thanking you

Chief Editor

## Sewage Water Killing the Indian Rivers

India is blessed with rich natural sources of water in the form of numerous rivers and lakes. The country has rightly been referred to as the "Land of Rivers" and the people worship the rivers as gods and goddesses. But what is ironical is that in spite of our profound respect and reverence for our rivers, we are not able to maintain their purity, cleanliness and eco health. In urban areas water is used from river, stream, well and lakes for domestic and industrial use. Almost 80% of water which is used for domestic purpose, comes back as a wastewater. In most of cases the untreated wastewater either sinks into the ground as a potential pollutant of ground water or is discharged into natural drainage system causing pollution in downstream areas.

Urbanization and changing food habits have changed the characteristics of domestic wastewater drastically. Use of cosmetics, antibiotics, soaps and detergents have increased the level of micro pollutants in domestic waste water which are very difficult to treat. When such toxic substances get access to fresh water body the aquatic ecosystem comes under stress.

*Images showing Sewage discharge in to the river*

Drinking or potable water is right of every human being. In India, for potable water majority of population is dependent on surface waters. Discharge of sewage or partially treated domestic waste into rivers means playing with human health. Healthy environment tends to stronger economy. Failure of STP means to deteriorating environment as well as loss of economy.

Treatment of sewage is essential however; the degree of treatment required will vary according to the end use of treated water. Thus, a very high degree of treatment will be required if the effluent is discharged in a water body used for fishery or upstream of an abstraction point for water supply. A lower level of treatment may be acceptable for discharges to be used for irrigation or to coastal waters where there is rapid dilution and dispersion.

Sewage is treated at its generation, known as "decentralized" system or even an "on-site" system (in septic tanks, biofilters or aerobic treatment systems). Alternatively, sewage can be collected and transported by a network of pipes and pump stations to a municipal treatment plant. This is called a "centralized" system. Although the terms "decentralized" and "centralized" are relative. For this reason, the terms "semi-decentralized" and "semi-centralized" are also being used (Wikipedia)

The report of the study on Performance Evaluation of STPs Funded under National River Conservation Plan of Ministry of Environment and Forests, government of India carried out by Central Pollution Control Board (CPCB) published in August 2013.

The report envisages performance evaluation of 152 STPs spread over 15 states in the country and having total treatment capacity of 4716 MLD. The study revealed that the actual treatment capacity utilization is only 3126 MLD (66%). Out of the 152 STPs, 9 STPs are under construction, 30 STPs are non-operational and performance of 28 STPs is not satisfactory. Out of the 152 STPs, the treated effluent from 49 STPs exceeds the BOD standards and with respect to COD, 07 STPs are violating the general standards of Discharge. 49 STPs are exceeding BOD limit, out of which 12 are in Uttar Pradesh, 14 in Haryana, 6 in Punjab, 3 STPs in Madhya Pradesh and 3 in Tamil Nadu. With respect to COD, 7 STPs are not meeting the limitout of which 06 are in Haryana. 37 STPs are using Upflow Anaerobic Sludge Blanket (UASB) technology. Among them 22 are not confirming to limits and are located in Uttar Pradesh and Haryana.

.The status of STPs in Andhra Pradesh, Bihar, Delhi, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal indicate that maximum Sewage treatment capacity exists in Tamil Nadu (16.9%) followed by Uttar Pradesh (16.4%), Andhra Pradesh (15%), Punjab (14%), West Bengal (10%). Haryana (7%), Maharashtra (6%), Gujarat (4.9%), Madhya Pradesh (3.6%), Bihar (3.4%), Uttarakhand (1.1%), Karnataka (0.9%), Delhi (0.4%) and Goa (0.2%). STPs designed on Trickling filter and Sequential Batch Reactor (SBR) technologies are meeting the standards and having more than 90 % efficiency in terms of BOD removal.

The CPCB survey reports included 35 metropolitan cities, 498 Class- I cities and 225 Class-II towns. As per the Times of India repots, estimated sewage generation from Class-I cities and Class-II towns is 38254.82 MLD, of this only 30% or 11787.38 MLD is being treated. The remaining is disposed directly into water bodies. This disposed sewage polluting three - fourth of the total surface water resources of the country. Survey undertaken by the CPCB and the Center of Science and Environment have come up with some hard facts on river pollution, in terms of statistical figures, which makes it a matter of really serious concern. Out of 445 rivers surveyed, not even quarter of them are fit for bathing.

Installed STPs under the catchment of Ganga river are 64 whereas MoEF has sanctioned 52 STPs. Out of 51 monitored STPs. Total installed capacity of 51 STPs is 1009 MLD and actual utilization is 602 MLD which is 59%. 9 STPS are violating BOD limit and 1 STP exceed COD limit for discharge. 14 STPs are found non operational.

Ganga is considered to be the most polluted river in India (*River Pollution In India- R. S. Phukan*) approximately one billion liters of raw, untreated sewage is dumped in Ganga regularly. Ganga contains 60,000 fecal coliform bacteria per 100 ml, which is a threat to human health. Yamuna has become a garbage dump area with more than 57 % of Delhi's waste thrown into it .Only 55% of Delhi's residents are connected to a proper sewerage system. According to the CSE, around 80% of Yamuna's pollution is due to raw sewage.

## Root cause of the problem

The CPCB report force us to think on the severe issue of river pollution due to domestic sewage. Three major issues we should consider for sustainability of STP.

1. Technology
2. Finances/ funds
3. Auditing

## Technology

Technology is not good or bad but adaptability of the technology to the environment is most important.

State of art technology with all sophisticated features may become failure at some places due to lack of critical environmental or operating conditions. Technology can only be sustainable when it has less foot prints.

Technology transfer also plays major role in the success and sustainability. We need to have proper technology transfer while importing any technology. Before accepting any offer one should see the basic minimum requirements of space, skilled manpower, electrical and chemical requirements for the process and maintenance.

Operation and maintenance of existing plants and sewage pumping stations is also a very neglected field, as nearly 39% plants are not conforming to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams (CPCB, NRCD repot August 2013). STPs are usually run by persons who do not have adequate knowledge of process taking place in the STP. The operational parameters are not regularly analyzed hence the day-to-day variation in performance is not evaluated at most of the STPs. In some processes the simple to treat organic waste is made complicated due to addition of chemicals during the operations. There is need of skilled manpower having competent knowledge of the processes to guide the STP operators to run the STP very effectively.

In number of cities, the existing treatment capacity of STP in one area remains underutilized while a lot of raw sewage is discharged without treatment in the surface water body in another area of same city. Auxiliary power back-up facility is required at all the intermediate (IPS) & main pumping stations (MPS) of all the STPs (CPCB Report Nov.2005).

The major problem India is facing with existing technologies is the hugh requirement of electricity, Skilled labour and no provision for OPEX. Failure of Ganga action plan I (GAP I) is due to these factors only. The need of the hour for developing country like India is waste treatment systems with minimal OPEX and less requirement of skilled labours. Such cost effective systems can lead to sustainable solution to save our precious rivers.

Ecotechnology provides low maintenance, natural technologies for reuse and recycle of the waste water generated by these human settlements. These cost effective technologies reduces space foot print, carbon foot print, and energy foot print leading to sustainable development and economy.

Ecotechnology is a robust natural way of treating waste to transfer it into biogeochemical cycle. Ecological engineering can facilitate restoration and preservation of the environment health for the survival, development and economy of society through the integration of engineering and ecological principles with modernizing trends of market and development.

An assessing mechanism for promising indigenous inventions should be developed to get solutions for indigenous problems. A proper decision support system with representation from society and academics is needed at district level to provide social and technical inputs to the local authority

## SERI's solutions

Through years of experience and research SERI has invented waste water treatment technologies which are ideal for developing countries where electricity and skilled labour is a big problem. Some of the technologies invented and successfully installed by SERI are

**Soil Scape Filter:**

Soil Scape filter is used to treat waste water from point sources of pollution and Green Bridge is used for non point source of pollution. Both technologies mainly work on bioremediation principles.

Soil scape process is a vertical eco-filtration treatment involving filtration of wastewater through biologically activated soil filtration medium supported by sand and gravel. It harnesses the ecological principles of biodegradation, biotransformation and bioconversion at in detritus food chain by treating, transforming and detoxifying the pollutants using solar energy. Bio-fertilizer and treated-ecologically corrected water are the products of this process.

**Green Bridge:**


Green Bridge technology is ecotechnological horizontal filtration - having different physical and biological filters working in combination removes suspended and dissolved impurities of water. It's like a porous dam having locally available materials like stone, sand, soil and specially nurtured non-pathogenic, non-GM and non-hazardous microbial consortia with locally growing marshy plants, either along the river or across the banks. It harnesses the wetland processes lotic water system to degrade, biotransform, bioconvert and detoxify pollution from non-point sources. Treated-ecologically corrected water can be used for irrigation and non-consumptive purposes.

### Finance / funds

At government level finance plays major role in selection of any STP. Major focus sometimes is on finances rather than on process and technicalities. There are many fund raisers at national and international levels. The decision of accepting any technology should not be in the hands of those finance providers. Rather before accepting any financial offer all technicalities of the process should be discussed and conclusions should be made on the basis of adaptability and sustainability of the technology in local conditions.

Funds for domestic wastewater treatment can be generated through Corporate Social Responsibility (CSR). In Swatch Bharat Mission industrial sector is coming forward with funds for building toilet blocks. If waste generated at each block is taken care at the source in decentralized manner then each toilet will be self sufficient for its water requirement.

Government should also provide research funds to invent, develop and assess locally acceptable indigenous technologies to get sustainable solution at affordable cost.

Many a times getting funds for capital investment is easy and affordable to the local government authorities but to make provisions for operational cost becomes difficult. So the STP though having good infrastructure and machinery cannot remain operational to its fullest efficiency for longer time.

Advanced treatment technologies incur higher expenses towards operation and maintenance.

### Auditing

Audit is a first step towards improvement. Financial, technical and social audits are needed to improve the existing facility and to get feedback for future planning.

While investing in new STPs the efficiency of existing one should be checked and goal of 100% efficiency should be achieved through continuous auditing.

Experts' team at state and central level is needed to conduct the technical audit with meticulously developed standard and guidelines. This will help to have check on the maintenance of existing STPs as well as will generate the required data for assessment of technology with respect to local conditions.

Representative from Non Government Organizations (NGO), professors from different reputed universities can also be on expert panel.

We should never forget how much we are dependent on our rivers. It is the river system which provides us with potable water, irrigation, electricity and great source of livelihood for a large majority of people in the country. Restoration of river should be considered as health issue and addressed with most priority as health of millions of people is dependent on the river.

*News Review*

## Once a Life Line Now Serves Death and Diseases

Krishna (Locally called Krishini), a tributary of Hindon river, originates at Saharanpur and confluences with Hindoo at Barnawa in Baghpat, while flowing through Muzzaffarnagar, Shamali, Meerat (UP). The river stretch is 130 Km with 51 cusecs non monsoon flow and 5000 cusecs monsoon. A clean river before two – three decades is now severely polluted and serving death and diseases.

Photo – Hindustan Times

As per Hindustan Times report, the major culprit for this is the discharges of toxic effluents from sugar, distillery and dairy industries along its 130 km stretch. The water quality is so frightening that it can neither be used for domestic purpose by the locals nor for drinking by the cattle.

Around a decade ago the river was receiving plenty of fresh water from its catchment due to which the pollutants were diluted and such a sever toxicity was not observed irrespective of the waste water discharges from the industries. But now the catchment of the river has been changed and the natural flow of the river has almost dried up. The river is flowing as waste water drain. The villagers along the bank of this river are forced to use ground water to tackle their domestic water needs. The scenario is becoming worst day by day as prolonged discharges of Industrial toxic effluent detoriated the most precious groundwater resource also. Hand pumps in this river stretch are now flushing yellow, contaminated water. This has resulted in rise in skin diseases, lung infection, abdominal disorder and cancer. The death due to cancer has increased over last two years. This has affected village economy severely. The villagers are almost driven to bankruptcy in order to treat the illnesses caused due to contaminated drinking water by toxic pesticides and heavy metals.

To protest against apathy of the government towards conserving and protecting natural water resource, the villagers are taking extreme steps such as boycotting elections, refusing government schemes like polio immunization, voter card preparation, etc.

The situation came to light when in May this year, Dr. Chandraveer Singh, a retired senior scientist at Haryana Pollution Control Board and resident of Daha village, sent some samples of the Krishna River for testing to SIMA Labs, an entity recognized by Ministry of Environment and Forests, and UP Pollution Control Board. The results were disturbing. The total suspended solids in the river water were found to be 7500 mg per liter as against the permissible 200 mg. The presence of sulfide was 285 mg per liter as against the permissible 2 mg and iron was 38 mg as against 3 mg. extremely high levels of mercury and lead were also found. “Industrial units in western UP, mainly sugar and paper mills and slaughterhouses release effluents in the river,” said Dr. Singh, who travelled 80 villages along the banks of the Krishna, Kali and Hindon in Saharanpur, Baghpat, Muzaffarnagar, Shamli and Meerut districts, and found incidence of similar health problems, though in varying degrees. According to Dr. Singh, The State Pollution Control Board and the Chief Medical Officer are yet to act on the issue.

Krishna represents many such small and large rivers in India which are victims of urbanization and industrialization. Along with major rivers like Ganga, Yamuna, Sataluj, small tributaries like Krishna, Kali, etc. are losing their ecological health due to domestic and industrial pollution. Integrated River Basin management and well defined river policy can save these and many more rivers form the ill effects of human activities. Decentralized sewage treatment and stringent standards for industrial discharges will effectively reduce the pollution loads on our surface water bodies. Political willingness, defined responsibility and well planned execution road map is necessary to answer the cry of our motherly rivers.

- OXO - OXO -