





TREATMENT OF SEWAGE THROUGH NATURAL AND SUSTAINABLE SIBF SYSTEM

Introduction:

India has about 18% of the world population but only 4% of the world's renewable water resources. The following table shows how the per capita water availability is decreasing year by year.

Per capita water availability in India

Year	Population (Million)	Per capita water Availability (m^3/year)
1951	361	5177
1955	395	4732
1991	846	2209
2001	1027	1820
2025	1394	1341
2050	1640	1140

Source: Government of India, 2009.

The situation (based on the average requirement of water for various purposes) is considered as water stress condition when the per capita water availability ranges from 1000 to 1700 m³ per year and it is considered water scarcity when the availability reduces to 1000 m³ per year. By 2020, most of the Indian States will have reached the water stress condition and water scarcity condition by 2025. This implies that water which is a basic necessity for living is a scarce natural resource that has to be conserved.

Wastewater treatment and reuse on a larger scale can alleviate the water scarcity problem along with rain water harvesting. In India, the scenario with reference to water pollution is pathetic. The main source of water pollution is the untreated sewage which is discharged from cities, towns and villages across all over the country. Out of about 38000 million liter per day of sewage generated, the treatment capacity exists for only about 12000 million liter per day i.e., about 30% only. Thus, there is a huge gap between sewage generation and sewage treatment. Also, as per CPCB survey report, nearly 39% of the treatment plants do not conform to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams since the operation and maintenance of existing plants is not satisfactory. Since the sewage is let untreated into the water bodies, it also results in loss of nutrients which could have been utilized in agriculture. It is estimated that irrigation with sewage or sewage mixed with industrial effluents results in saving of 25 to 50 per cent of N and P fertilizer and leads to 15-27% higher crop productivity, over the normal waters.

Hence, considering the above scenario, there is an urgent need for efficient water resource management through better **water use efficiency** and **waste water recycling**. Generally, the sewage is transported to one end of the city and then treated. Thus, there is more expenditure required for the sewerage system along with sewage pumping stations. The ideal treatment can be done in a decentralized way. The treatment facilities should be set-up close to the sites of sewage generation. The treated water can be reused for non-potable uses in the same or nearby area where the sewage is generated. Hence, proper and planned wastewater treatment not only makes ecological sense but also economical one as the treated water can be reused.

Wastewater treatment options:

For municipal sewage, the most commonly adopted treatment technology in Class I cities is the Activated sludge process (ASP) covering 59.5% of total installed capacity. The conventional methods in use like the ASP, SAFF, MBBR, FAB, etc., are energy intensive. These systems have high capital costs and are expensive to operate.

There are many upcoming technologies like decentralized wastewater treatment system (DEWATS), up-flow anaerobic sludge blanket reactor (UASB), rotating biological contactors (RBC), waste stabilization ponds, soil biotechnology (SBT), Phytotrid, etc., being tried for treating the sewage. Apart from these, a proven, effective and natural wastewater treatment system which can be implemented in a de-centralised way is the **Solid Immobilised Bio-Filter (SIBF) system**. A note about the SIBF system along with few case studies has been given in the following pages.

About SIBF system:

SIBF system is a natural method of wastewater treatment based on ecological engineering. The treatment is achieved through the ecosystem developed for the specific requirement. This system has many advantages over the conventional treatment systems.

Salient features of the SIBF system:

- **Ecofriendly treatment system** - Eliminates drawbacks of conventional STP
- **Landscaping** - The total STP looks like a beautiful garden, thus adds to landscaping.
- **Capital cost**- Less than conventional treatment systems
- **Tax benefit - 100% depreciation benefit**
- **Energy conserving** - Saves 80 - 90% of energy costs over conventional treatment methods
- **Easy to operate** - Requires very low operating skill
- **Very low operating cost** –Attributed to low energy and low skill requirement
- **Provides value-addition** – Re-usable treated water at very low operational cost, hence, a practicable approach towards groundwater recharge by using the treated water for gardening / irrigation throughout the year.

Case Study I – SIBF For Hospital Wastewater

Capacity: 4,00,000 litres per day

SIBF system has been set up at Bharati Hospital and Medical College, Sangli. The campus is spread over 67 acres of land and has a big 750 bedded hospital along with allopathic, dental and nursing colleges and hostels. The total wastewater generation from the campus is estimated to be 400m³/day. Presently in phase I, an STP of 400m³/day capacity has been set up. Through the SIBF system, not only is the problem of pollution solved, but in addition, treated water is available for gardening and toilet-flushing throughout the year. The treatment cost works out to Rs. 3/- per 1,000 litres of wastewater treated. There is 95% recovery of the wastewater. Since the treated water is being used, there is a saving in the drinking quality water. The pay-back period works out to 2-3yrs.



SIBF system at Bharati Hospital and Medical College, Sangli



Treated water being reused in the hospital campus at Sangli

Case Study II – SIBF For School Wastewater

Capacity: 10,000 litres per day

GREENERGY SCHOOL is a newly established school in Sangli city. The wastewater is generated from the toilets and washrooms in the school. The school management was interested in implementing green concepts in the premises which shall serve as working models for the children. The treatment helps in keeping the environment pollution free and also the treated water is available for gardening in the school premises.



SIBF system at Greenergy School, Sangli

Conclusion:

There is a water crisis situation in our country which shall worsen if effective action is not taken immediately. Wastewater, if let out untreated into water bodies, causes, pollution and health hazard for human and animal life. **Hence, wastewater treatment serves the dual benefit of pollution abatement as well as recovery of valuable resource i.e., water.** The treated water can be reused for various non-potable purposes, thereby, saving on drinking quality water requirements.

It will be more economical in setting up **decentralized treatment plants** rather than transporting sewage over long distances. Also, reuse of the treated water can help in recharging the ground water which is being highly exploited in the country. All the new townships and big housing schemes in the country should have their own STP and should be encouraged to reuse the treated water in their own premises.

SIBF system is a proven and eco-friendly method of wastewater treatment. The annual O & M cost is very low and also skilled labour is not required for the operation of the SIBF system. The system gives good quality treated water consistently which conforms to the pollution control board norms. Thus, **SIBF system is a reliable, natural and sustainable method for keeping our rivers clean and making the environment green.**

About the Author:



Rahul Babar
Director,
Energy Tech Solutions Pvt. Ltd., Pune

Rahul Babar holds a Masters degree in Environmental Engineering from VJTI, Mumbai University. He is working as Director - Operations in the firm **Energy Tech Solutions Pvt. Ltd.**, based in Pune. The company offers consultancy in waste management and pollution control since the past 18 years. The company has been instrumental in setting up the natural & sustainable wastewater treatment system - SIBF system.