

Performance Assessment of Decentralized Wastewater Treatment Plant Based On Natural Treatment Technology for domestic sewage treatment

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Extended Abstract

Now-a-days, a large amount of wastewater is being generated from cities and travels very long distances from their point of generation to their point of treatment i.e. conventional centralized wastewater treatment plants (CCWTPs) which in turn results into several operational troubles due to heavy mechanized systems, also the large CCWTPs are sometimes even unable to handle these large volumes of wastewater being generated and the wastewater is either partially treated or sometimes may be even disposed of directly without any treatment into the water bodies, thus causing environmental problems. To overcome these operational troubles of heavy mechanized CCWTPs, there is a need for on spot, safe and complete treatment of wastewater generated from various residential areas and areas such as holiday homes, industries, resorts etc. These days, it is being felt and in fact, several municipal corporations have already started requiring the proposed residential/ commercial/the industrial projects (i.e. where a CCWTP is not there or not working or does not functions properly or where there is a scarcity of fresh water supply) to take care of their waste water within their premises, so that the effluent can be reused for a variety of non-potable uses including agriculture, irrigation, landscaping, surface storages, domestic uses, commercial uses, urban uses, environmental and recreational uses and industrial applications, and hence the fresh water demand of the area can be reduced. So, there's a need to design some specific units for some specific social needs and assess them and verify that they are capable for not only treating the waste water but also can recycle the associated resources. Hence, there is a scope of decentralized / on-site treatment of sewage which forms the basis for the research/innovation being proposed in this study.

In view of that and considering the above requirements, for residential areas a Decentralized Wastewater Treatment plant (DWTP) (completely based on natural treatment technology to avoid heavy mechanized systems as in CCWTPs), was developed and deployed at Indian Institute of Technology Bombay (IIT Bombay) campus, Mumbai, Maharashtra, India, to assess and evaluate its efficacy in long run. The system was deployed at the sewage pumping station of the campus for having a continuous 24 hours sewage flow into the system. The reactor configuration consists of Anaerobic, facultative, Aerobic tank as pre-treatment unit followed by planted gravel bed as a post treatment unit in series. The system was first operated in the start-up phase that means it is first feeded with different sewage strengths before running it in the full sewage strength condition.

Results of the start-up phase indicated that the system was very efficient/effective in treatment of wastewater. The COD of the final effluent was found to be 29.8 mg/l, BOD was 2.4 mg/l, turbidity was 0.85 NTU, nitrate concentration was 8.8 mg/l, while the phosphate concentration was 9.9 mg/l, and nearly all the parameters except phosphate concentration have very well met the reuse standards as per the Indian Standards. And now it is being further operating at main operational phase having full sewage strength.

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