

QUICK CORRECTION

Reed Bed Shock Loads With Vortex

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Introduction

We have been setting up reed bed systems for close to two decades. In this journey, we have found that the reed beds are so user-friendly that we never need to revisit our systems once they are properly conceptualized, designed, installed, and commissioned. The operations and maintenance is so simple that it can be managed by simple gardeners. It is indeed so simple that housing societies, orphanages, educational institutes, and townships have been managing reed bed systems from as low as 3,000 liters per day to 15,00,000 liters per day. These are indeed fit-it-and-forget-it systems.

Given in Table 1 are the inlet and outlet characteristics of the reed bed installed for Aquamall Dehradun Ltd. in Dehradun.

Parameter	Inlet	Outlet
pH	7	8.1
TSS	260	34
BOD 3 at 27 deg C ppm	210	8
COD ppm	700	20
TDS	720	740

Table 1

In a newly installed nicely working reed bed system, suddenly, we found the treated water quality was little off the expected values. On probing further,

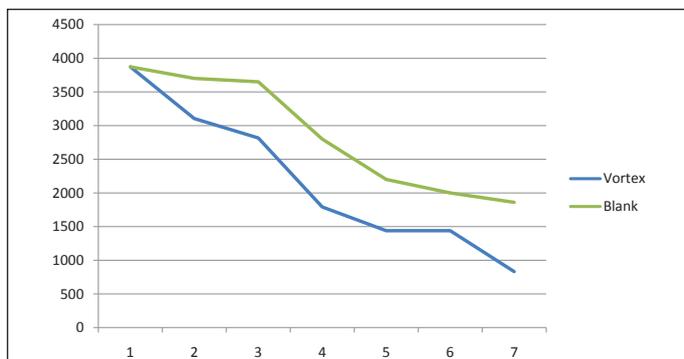


Figure 1: Graph of COD Reduction as a Function of Time With and Without Vortex

we found that the said plant was under maintenance shut down. Usually shutdown periods have lesser water/ sewage loads in many industries. In this case, however, we were finding that the regular operations gave off lesser water and maintenance shut down increased the loads by about 25%. Further, we learnt that the increased load remains so for about a month and that the shutdown maintenance is to be done once every year for 30 days and about 4-5 times a year for a period of one week at a time. This made the total higher than design flow days to be 58 -65 days a year.

This was the time, when we wanted a quick solution to absorb the shock loads for our client. While mulling over the problem, we remembered an experiment that we had carried out earlier just out of curiosity along with Dr. S.R. Kashyap of Eureka Forbes Institute of Environment. It was use of a vortex flow for reducing organics and odors from simulated concentrated canteen wastewater.

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Experimentation was carried out in a lab with concentrated synthetic wastewater. The wastewater was formulated by mixing gram flour, wheat flour, detergent, milk and sugar - the composition of wastewater was such that the COD was 3800 ppm.

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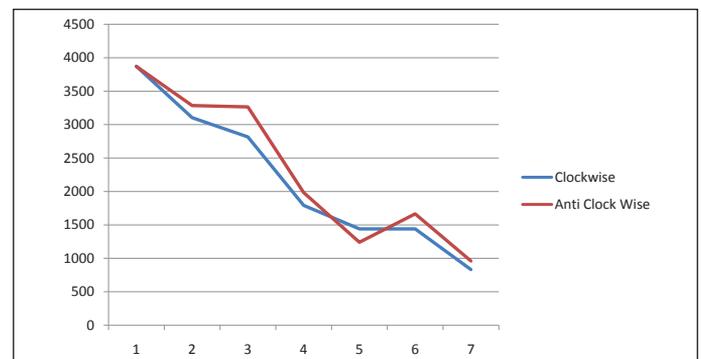


Figure 2: Graph of COD Reduction as a Function of Direction of Movement Within Vortex

This technique can be applied in many situations where there is a need for extra aeration at low costs.



Figure 3: Reed Bed System That Got Overloaded

It was 'vortexed' (aerated through a vortex) in a 6-inch dia 3 ft tall vortex for 7 cycles each of 3 hrs duration with a gap of 2 hrs. Pump used was 0.25 HP. This kept the system in more or less facultative mode. The odors were removed and the water characteristics were improved to a great extent. The results of the study were found to be as given in Figure 1.

There is a general belief amongst various wellness product sellers that the natural flow of water is in anticlockwise direction and that if water is allowed to flow anti clockwise, it regains its natural structure and water is made healthy. In this experiment, we had a chance to study this also.



Figure 4: Vortex Placed on the Polishing Pond Improved the Efficiency

To verify whether the direction of movement of vortex flow, clock wise/ anti clock wise, has any effect on the efficiency, the experiment was repeated in both the directions. However, this did not show any significant difference in the treated water. The results of this study were found to be as given in Figure 2.

With this background knowledge, we set about installing a vortex, on the treated water pond of the reed bed, about which our client were worried. We ran the vortex and re-circulated the excess water into the treated water pond.

The results were greatly relieving. The dour problem vanished, color, suspended particles reduced, and BOD was brought back to normal - within expected range of less than 20 mg/l.

Working of Vortex

A vortex is a device that aerates water using only a pump. This is achieved by pumping water into a hollow tube with a hole in its bottom at the centre. This forces the water to climb up and spiral down causing a swift circular motion. The water on exiting the vortex forms a plume of water. The spiral motion in the tube removes a major portion of gases and volatile compounds thereby reducing odor while the plum below provides aeration to the system.

Way Forward

This technique can be applied in many a situations where there is need for extra aeration at low costs.

Potential in River Rejuvenation

The technique can also be used on the polluted streams and rivers returning back the aeration power of these water bodies. Together with the aeration and improved aquatic life many a streams can be brought back to life with minimal energy and least civil work costs.

About the Authors

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Natural Solutions Co., with office at Mumbai (Maharashtra), provides complete solutions in the field of water management, rainwater management, solid waste management, organic farming and composting.

Eureka Forbes Institute of Environment (EFIE) has been set up by Eureka Forbes with a firm belief that unpolluted water and air is the birthright of every Indian. The institute promotes awareness about conservation and management of natural water and air resources.

To know more about the authors, you can write to us. Your feedback is welcome and should be sent at: mayur@eawater.com. Published letters in each issue will get a one-year complimentary subscription of EverythingAboutWater Magazine.