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AFFORDABLE WATER SUPPLY AND SANITATION

Algae removal by roughing filter

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ANURADHAPURA SACRD CITY water supply scheme consists of an aerator, slow sand filters and a chlorination system. The source is a large irrigation tank, Tissa Wewa, situated close to the treatment plant. Frequent filter blockages and the bad odour of the filtered water are two major problems during this treatment. In an earlier study it was revealed that the predominant planktonic algae in the Tissa Wewa tank was Synedra sp. a pennate diatom which was present in association with a small number of cynobacteria and green algae. The accumulation of the silicified frustules of these diatoms blocks the filters and cause bad odour in filtered water. A pilot scale horizontal flow roughing filter was used to study the possibility of using a HRF to reduce the concentration of Synedra entering the slow sand filters. The reduction in the number of algae as well as the colour and turbidity were monitored. There was a marked reduction in the count of Synedra when pilot scale of HRF was used. Therefore a HRF can be used for pretreatment to reduce algae concentration in raw water. However, additional measures such as aeration should be employed to remove odour as this method does not guarantee odour removal.

Introduction

In an earlier study (Kulasooriya et. al. 1993) it was found that the raw water of the Anuradhapura Scared city water supply scheme contains a high count of algae (Synendra which is a filter blocking type (Standard method for examination of water and wastewater, algae colour plates, 1985). High turbidity in raw water is another reason for frequent filter blockages in this scheme. However turbidity can be removed by using a horizontal flow roughing filter (HRF). Therefore an experimental model of a HRF was used to observe the change of algae count, colour and turbidity at different stages of the HRF.

Method

The experimental filter had 3 compartments (1m long) filled with filter media of 3 different sizes. The filter media used was granite. The filter was operated at a flow rate of 1.5 m / hr and the algae count, turbidity and colour were monitored at different points, namely the inlet, outlet and at two other points as shown in Figure 1.

Results and discussion

In the studies carried out in 1993, it has been reported that the highest count of algae at the intake was $191x10^3$ and lowest was 1. By comparing the operational records of the existing slow sand filters and algal counts at the intake, the slow sand filters can be operated satisfactorily when the Algal count is below $20x10^3$ and turbidity below 15 FTU. According to the test results (Figure 2 and Figure 4),

Dimensions in millimeters

Figure 1. Longitudinal section of experimental filter

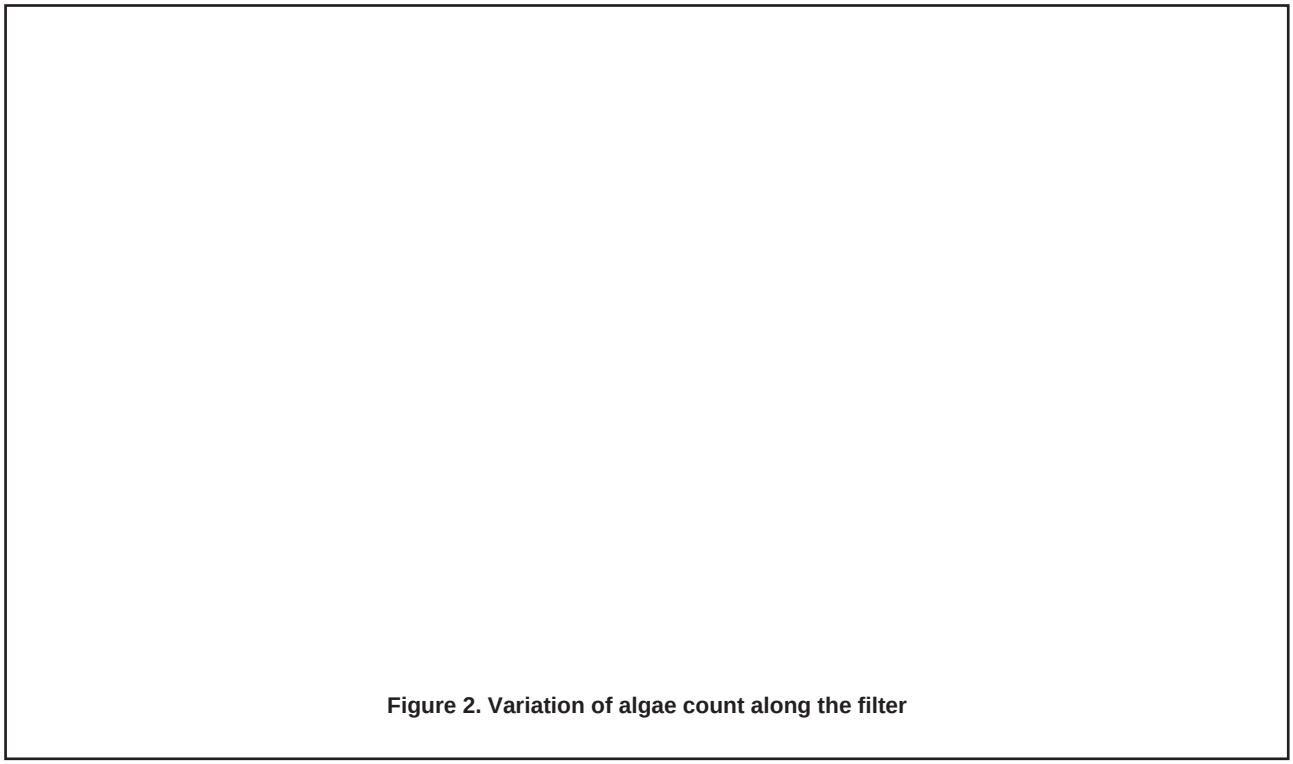

Figure 2. Variation of algae count along the filter

Algal count and the turbidity are well below $20x10^3$ and 15 respectively. Figure 2 shows that with a higher count of algae in raw water the rate of reduction in the count is high. The filter could be tested up to the maximum Algal count of $55x10^3$ and up to a turbidity count of 23 FTU. The results are within the safe limits for proper operation of slow sand filters. The length of the horizontal flow roughing filters used for water treatment is longer than the experimental filter. Therefore better results can be expected from the actual filters. In this method as the algae is collected inside the filter, formation of bad odour cannot be avoided. Therefore an odour removal system like aeration should be introduced. It was also noted that a remarkable reduction in colour also could be achieved by his process. The commonly used filter media in Sri Lanka is pebbles collected from river beds. Since granite is less expensive and readily available, granite was used in this experiment.

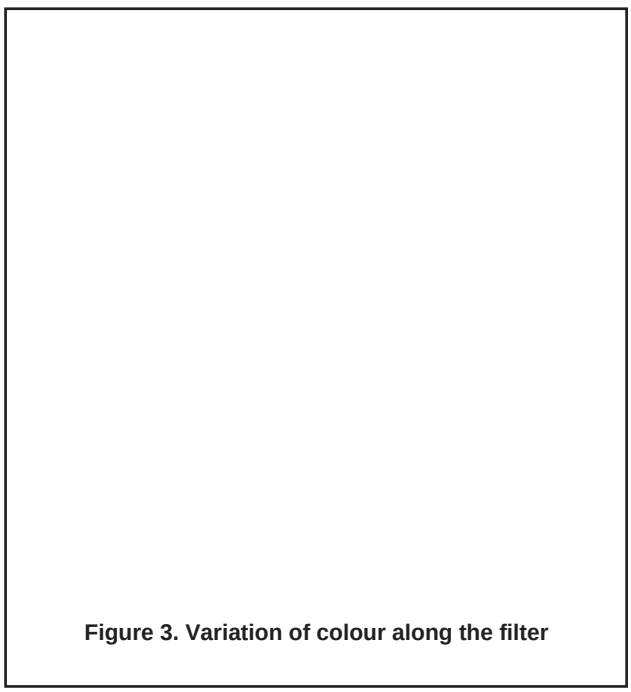

Figure 3. Variation of colour along the filter

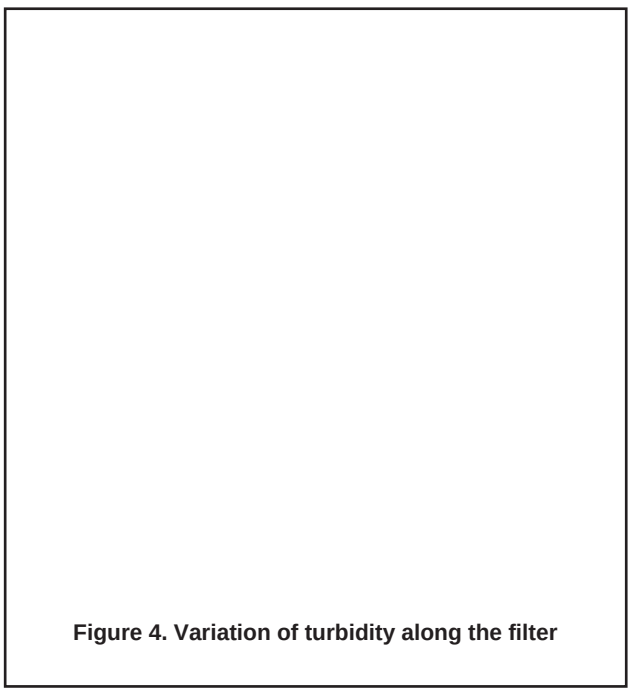

Figure 4. Variation of turbidity along the filter

Conclusion

Horizontal flow roughing filters with an odour removal system like aeration can be used for pretreatment when synedra is present in raw water.

Acknowledgement

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