Paper 08
Catchment Management as an Option for Water Quality Improvement

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INTRODUCTION

Catchment management is the best method to improve the water quality and it is also an important part of the solution which relies on the co-operation and participation of farmers, landowners and the Environment Agencies. Water Quality mainly refers to the chemical, biological and physical characteristics of water and its main effect to the human health and natural environment. Generally raw water quality varies with the natural factors as well as human activities.

Water quality data from Hali-Ela water supply scheme was used for this study which is situated in Uva, Sri Lanka. Its geographical coordinates are 6° 57' 0" North and 81° 2' 0" East. Hali-Ela has a conventional type Water treatment plant. Inflow to the plant is from the hilly area of the Hali-Ela. Upper catchment consists of a cultivated area mainly Tea Plantation. People use more fertilizers for those plantations. When considering the life styles of residents in the catchment, most of them do not have necessary sanitary facilities and non point sources are adding pollutants to the stream. These sources can increase the turbidity load adding to the stream. In upper catchment more fertilizer usage can cause higher level of the nitrate inflow to the treatment plant. In the treatment plant, there was no process to remove nitrate and coliforms. This study shows the need for improvements to the catchment management in the water source.

HIGHLIGHTS

- Water quality in inflow and outflow of treatment plant were tested.
- Results show the Nitrate level in inflow (0.042mg/l) is higher than the permissible level (0.01mg/l) for drinking water quality.
- In the treatment plant, there was no process to remove Nitrate.
- By changing upper catchment properties and land use, a solution can be found to these problems of inflow.

METHODOLOGY

Water quality in inflow and outflow of treatment plant were tested. Samples were collected during the month of April 2014. Both rainy and non-rainy days were considered within this month. Physical, biological and chemical tests were carried out which are pH, Colour, Turbidity, Chloride, Nitrate, Nitrite, Phosphates, Alkalinity, Cadmium, Magnesium, Hardness, Fluoride, manganese, Sulphate, Total iron, Electric conductivity, and TDS.

RESULTS

Results shows that all parameters tested are within permissible levels except Nitrate. Nitrate level in inflow (0.042mg/l) is higher than the permissible level (0.01mg/l) of drinking water quality (Figure 01). But in rainy days, color and turbidity levels were higher than the permissible level in both Inflow and Outflow as given in Figure 02 and figure 03. Rainy days were 9th April and 17th April 2014.

CONCLUSION

The inflow nitrate levels are more than the permissible level. In the treatment plant, there was no process to remove nitrite. Therefore outflow Nitrate level should be more than permeable level. The main reason is using excessive fertilizers for the cultivation.

By changing upper catchment properties and land use, a solution can be found to these problems of inflow. People can be made aware about catchment management. Buffer zone can be introduced along the stream and Nitrite, Nitrate, Phosphate and related chemicals can be mitigated. Improved management of pesticides in catchments often produces immediate benefits to water quality. By promoting better storage and handling of pesticides, we can help to minimize them from entering both our surface water and groundwater sources. This has been highly successful and has resulted in rapid improvements in water quality. It may also help to prevent contamination with inflow and reduce the colour and turbidity of water.

Figure 1 show the Nitrate level in the treatment plant within April 2014.

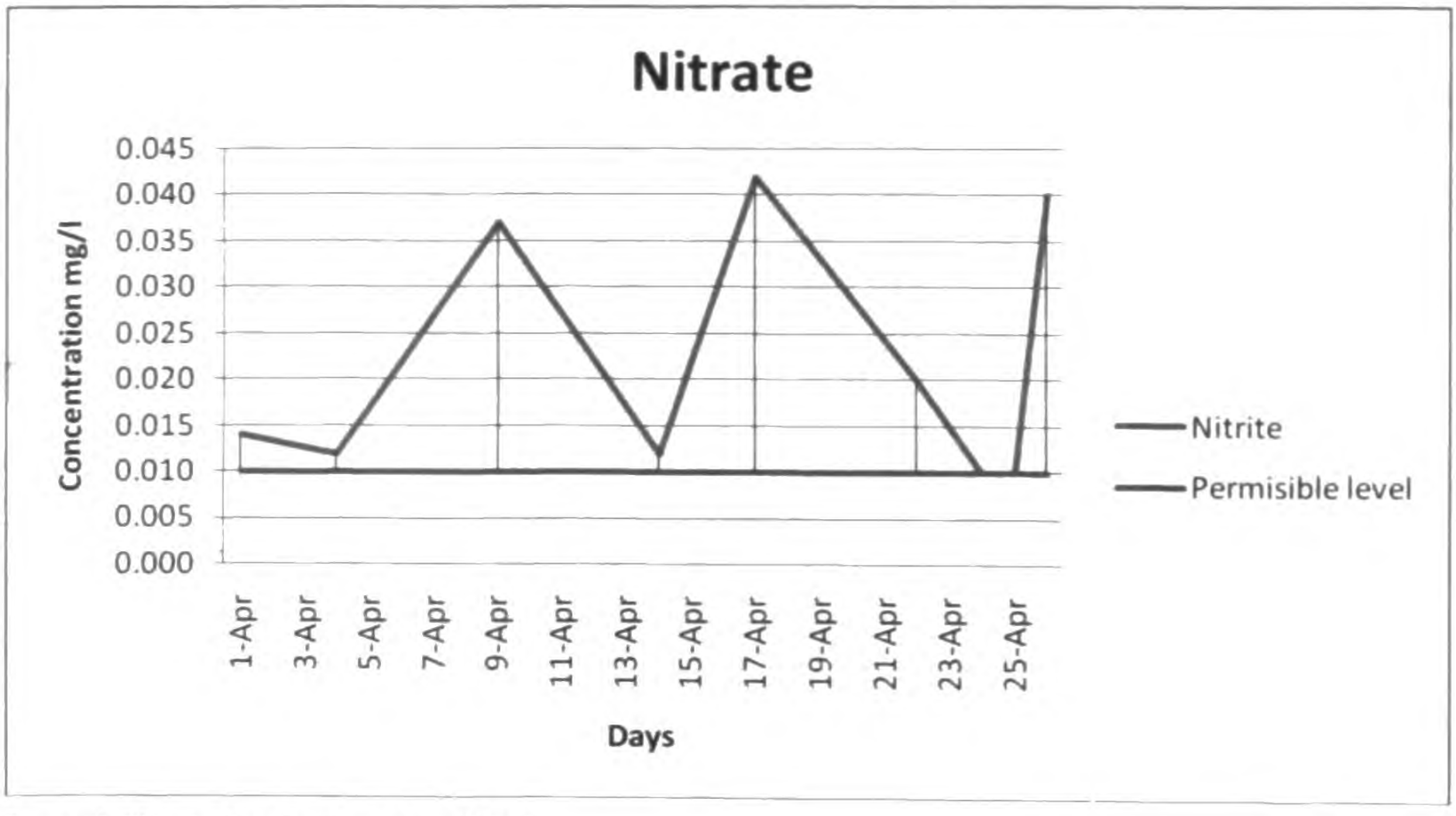

Figure 1: Nitrate Level within April 2014

Figure 2 is the color level of the treatment plant. It shows both raw water and treated water separately.

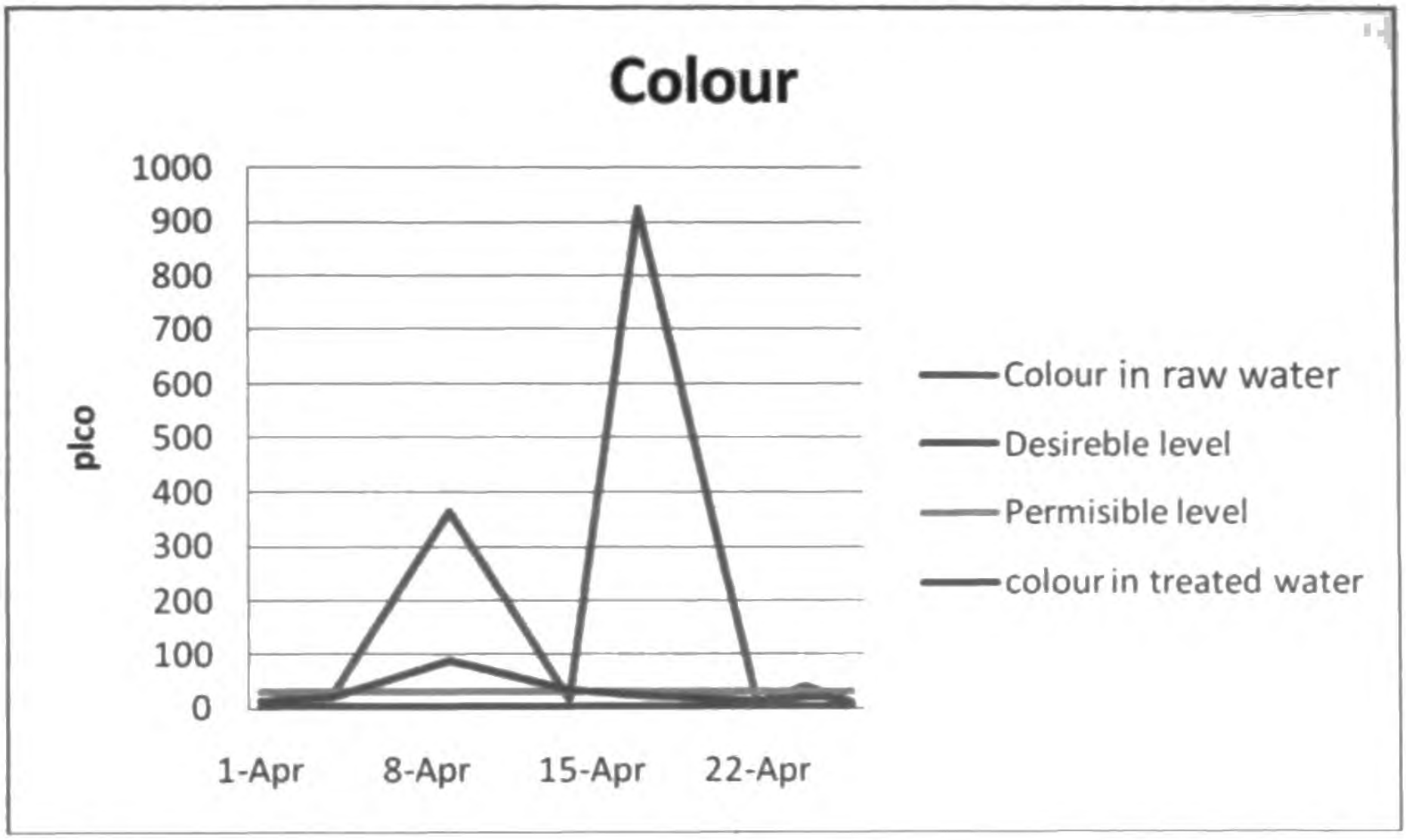

Figure 2: Color level in April 2014

Figure 03 is the Turbidity level of the treatment plant. It shows both Raw water and treated water separately.

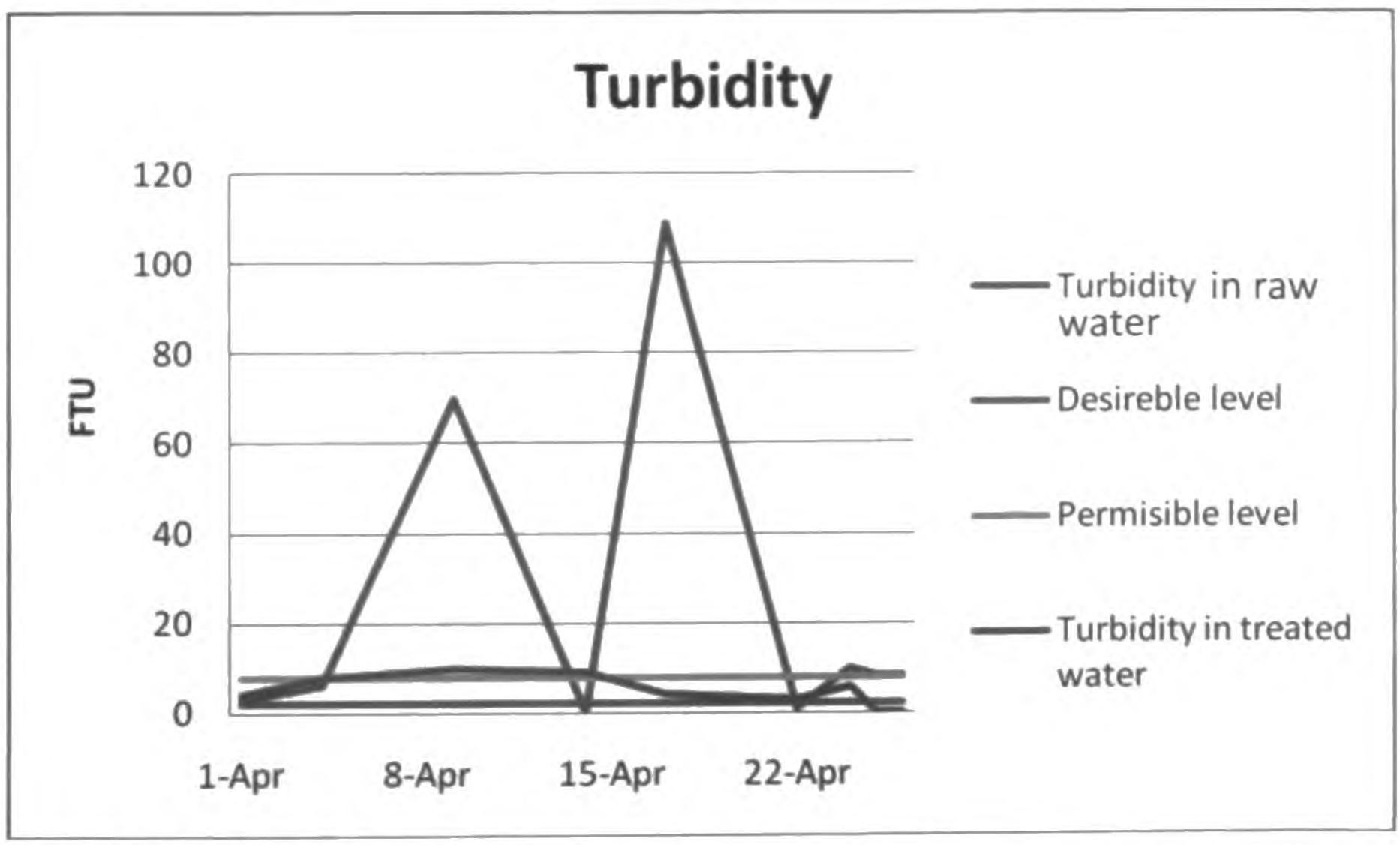

Figure 3:Turbidity level in April 2014