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**Phosphorus removal from a small wastewater stream
using 'Kabook' in the bio geo filter**

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Nutrient enrichment of natural water systems due to wastewater disposal is a critical issue in Sri Lanka. The Diyawanna Oya water system which includes the Kirulapone Canal, is an important water resource in the Colombo metropolitan area. However it is polluted due to haphazard wastewater disposal practices of the surrounding communities. One of the streams, connected to the Kirulapone Canal, flows across the premises of the Open University of Sri Lanka (OUSL), carrying wastewater from a neighboring community. Therefore, it was decided to purify wastewater in this stream to an acceptable quality by using natural environment functions before it flows into the Kirulapone Canal whilst providing a pleasant aesthetic view to the OUSL. The studies showed that the stream water contains a considerable amount of plant nutrients i.e., phosphates and nitrates. Moreover, the phosphate level is higher than the permissible level particularly during the dry season. This study was carried out to design and develop a Bio Geo Filter (BGF) by focusing mainly on the removal of phosphates.

The length of the stream within the OUSL is about 82 m and the entire length was subjected to this treatment. The purification system contains three components, namely the treatment unit, the BGF and the polishing pond. Biological treatment performs in the treatment unit with a 25-minute retention time. The treatment unit was designed with a dam across the stream. This unit treats the streamwater and controls the flow. Hydrological, geotechnical and structural features of the treatment unit were designed considering in-situ data. The BGF contains three main components such as, 1) an impermeable clay layer at the bottom, 2) a geo/bed material which helps adsorption and supports roots 3) vegetation above the surface which takes up nutrients from the wastewater. The BGF was designed with three cells each having a retention time of 20 minutes and a surface area of 63 m². Kabook is to be used as the bed material of the BGF. Phosphate removal of Kabook is about 50 % for a retention time of 20 minutes and about 80 % for a retention time of 1 hour. The polishing pond was placed downstream relative to the BGF to visualize the condition of treated stream water before it enters the Kirulapone Canal. The complete purification system was able to reduce the pollutant concentrations below the permissible level during the dry season, when pollutant concentrations are usually high, and to withstand harmful impacts at high tide flow during the wet season.