

**UGC SPONSORED MINOR RESEARCH PROJECT ENTITLED
“PHYTOACCUMULATION OF ELEMENTS IN THE ASSOCIATED
FLORA OF A RIVERINE ECOSYSTEM”**

**Dr. Arathy M. S.(PI), Assistant Professor, Department of Botany, Devaswom Board College,
Thalayolaparambu, Kottayam, Kerala. drartims@gmail.com**

Executive Summary

The actions of settled people gradually damage the natural resources especially our precious water resources. Effluents from human settlements, agricultural and industrial areas pose serious threat to water quality through their discharges. Wastes derived usually from towns and cities reach the water bodies in an untreated way. With the constant inflow of municipal wastes and industrial effluents, most of the rivers and water bodies have become polluted. Intensive exploitation of our water bodies has resulted in the reduction of a number of them together with the deterioration of their quality. Restoring the water quality of our rivers and water bodies has become one of the biggest environmental challenges faced by our country. This crisis must be identified by its magnitude and complexity so that depletion of our resource could be addressed in a proper way.

Riverine ecosystems are one among the various freshwater resources that are easily prone to such changes because a great majority of industries are located either on the banks or near the source. These are important biological systems that sustain innumerable flora and fauna and the release of toxic metals into them may cause hazardous effects. Aquatic macrophytes are the ones that face such a situation in many of the aquatic environments. They are sensitive indicators of water quality and conditions of their habitats.

The environmental contamination with toxic elements is a major issue on a global scale. At low concentrations, the metals cause chronic and sub lethal effects but their persistence in the environment may lead to more toxic condition. The main objectives of the study were to elucidate the accumulation of different elements both macro and micro by the associated macroflora, to identify the plants with greater accumulation capacity and to compare the abundance and distribution pattern of different elements in the associated flora. Since biological methods have been used widely in pollution abatement, screening of this kind may be helpful in

identifying a few macrophytes associated with Muvattupuzha river which can detoxify the polluted waters and hence the study was undertaken.

Macrophytes were collected from three Study sites of Muvattupuzha River for a period of one year and samples were prepared for various analyses. Major elements like sodium and potassium and trace metals such as copper, cadmium and lead that are of biological significance were analysed.

In the present study, *Pandanus* sp. accumulated low concentrations of cadmium and lead at site II and III. In general, the floating plant *Salvinia molesta* registered highest values for copper and lead and submerged species *Cabomba aquatica* recorded high values for copper. Some research studies demonstrated that *Nymphaea* varieties can accumulate heavy metals and consequently, they can be used as hyper accumulators (Lavid *et al.*, 2000). But in the present study, *Nymphaea stellata* was found to absorb the metals in least amounts. Major elements like sodium and potassium were in greater amounts in majority of the plants studied.

Significant differences were obtained for the heavy metal concentration of different macrophytes when statistical analysis was carried out. This suggested that there is species wise difference in the absorption pattern for various metals. The correlation coefficient represented in the correlogram revealed similar coefficients for both cadmium and lead and copper and lead.

Major findings of the study can be summarised as follows:

- A variation in the concentration of different major and micro elements was noticed in all the plants studied.
- The sequence of trace metal abundance was found to be Cu>Pb>Cd in all the macrophytes when the average values were considered.
- Results of accumulation pattern revealed that the macrophytes especially *Cabomba aquatica* and *Salvinia molesta* were found to accumulate heavy metals like copper and cadmium in greater concentrations. Thus they could be recognized as bioaccumulator plants of this particular ecosystem.
- Major elements like sodium and potassium occurred in higher amounts in majority of the plants analysed.

- Presence of higher amounts of micro and macro elements in the associated vegetation indicated their presence in the water body and the study therefore warrants frequent monitoring of these elements in this ecosystem so that adequate control measures could be adopted.
- The plants identified in the present study could be used for their wise utilization in the field of phytoremediation and also in pollution assessment programmes.