

Studies on the role of metallic pollution in riverine ecosystem

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Asian Journal of Environmental Science (June to November, 2009) Vol. 4 No. 1 : 92-94

SUMMARY

The present study was exclusively aimed to study the role of metallic pollution in riverine ecosystem on phytoplankton health. The concentration of metals in river water and in algal population were recorded at four sites viz., Kalichabad ghat (S₁), Hanuman ghat (S₂), Achala devi ghat (S₃) and Ram ghat (S₄). Site S₂ and S₃ were the mixing zone where effluents were discharged into the river while S₁ and S₄ were up and down stream of the river. There was an increasing trend of metal concentration in river water from S₁ to S₃ and decreased at S₄. The concentrations of metals were found to be higher at S₃ which showed a direct correlation with river water metal concentration. Metal concentration in river water and algal cells were found higher in summer season followed by winter and rainy seasons. In the present observation, there was high metallic level in river water at effluent mixing zone, which directly correlates with metal concentration in algal cells which may significantly reduce the biotic community and trophic level in riverine ecosystem.

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Key words :

Metallic pollution,
Riverine
ecosystem, Algae,
trophic level

The river ecosystem is unique in its basic characteristics due to short residence time of water and changing boundary conditions throughout the length. Thus, each section of the river is unique for study purposes. The high concentrations of toxic metals not only pollute the river water but also jeopardise the aquatic biota. The concentration and distribution pattern of metal within ecosystem is especially important. Metals and metalloids are ubiquitous. Industrial effluents are the prime source of heavy metal concentration in aquatic body environment. Metals are an unique class of toxicants since they cannot be broken down to non-toxic forms. Once the ecosystem is contaminated by them, they remain a potential threat for many years because of their extreme persistence, high toxicity and tendency of bioaccumulation (Verma, 1990).

Most of the Indian rivers are polluted to a great extent by domestic sewage and industrial wastes (Ajmal, *et al.*, 1985; Anawar and Siddiqui, 1988; Shukla *et al.*, 1989; Singh and Mishra, 2007; Chanu and Devi, 2008). Reports are available on studies of heavy metals in water, plankton, sediment and animal tissues (Ayyadurai and Krishnasamy, 1989; Roy and David, 2002).

Jaunpur representing southeastern part of U.P. and lies 42.6°E longitude and 25.7°E latitude embracing an area of nearly 4038km². A preliminary survey of the river Gomati at Jaunpur showed that there was several points

of interest. An average width of the river is 120 meters. It divides the city into two halves. The objective of the present work is to study the role of metallic pollution in riverine ecosystem in order to estimate the health implication and to maintain the aquatic biota.

MATERIALS AND METHODS

Water samples and algal populations were randomly collected at four sampling sites (*viz.*, Kalichabad ghat (S₁); Hanuman ghat (S₂), Achala Devi ghat (S₃) and Ramghat (S₄), the confluence of sewage discharge point. Samples were taken at a distance of about 3 meter inside the river from the bank and depth of about 0.20 meter in the second week of each month and brought to the laboratory for the analysis of various metals. Algal population was dried and crushed to powder form for the analysis of heavy metal in cells. Known weight of the algae was digested in Kjeldahl flask with conc. HNO₃. Samples were then treated with perchloric acid and digestion continued till the end of white fumes. The samples were filtered and estimated according to APHA (1989).

RESULTS AND DISCUSSION

Monthly variation in heavy metal concentration in river water and algae, at different sampling sites were observed. The heavy metal concentration was found to be considerably varied with maximum occurrence

Accepted :
May, 2009