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Analysis of Water of River Yamuna and Its Tributaries With Reference to Micro-Pollutants Characteristics of Yamuna River Water

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Abstract

Monitored on monthly basis at Palla and impact locations and once in a year (June month) at other locations except Allahabad and locations upstream of Hathnikund. Cadmium & nickel were rarely present in the Yamuna River during study period. Cadmium was observed only twice with a concentration of 0.02 mg/l (at Agra downstream June, 2009) and 0.11 mg/l (at Agra downstream – quarter-stream in March, 2011) whereas nickel was present at all the impact locations during the year 2009, at Mathura (midstream & quarter-stream) and Agra (quarter-stream) in the year 2009 & at Agra (midstream & quarter-stream) in 2010. In the year 2011, this metal was present at all the location except Nizamuddin bridge (midstream). Maximum concentration i.e. 0.21 mg/l of nickel was observed during the month of March, 2009 at Mathura. Both cadmium and nickel were observed in the river either during lean flow period or during early monsoon period. Till the year 2011, the lead was not traceable in Yamuna River.

Keywords: concentration, midstream, quarter-stream, lean flow period.

Introduction

The various water pollutants known are derived from the factors responsible for water pollution such as agricultural and domestic waste, industrial waste (anthropogenicsources), and water from natural (biogenic) Maitera et alsources. These pollutants include: Organic and inorganic materials, salts, nutrients, heavy metals, pesticides, pathogens and heat. Some are biodegradable while some are non-biodegradable. The biodegradable materials are easily oxidized by making use of the dissolved oxygen (DO) in water. The oxygen demanding water soon depletes the DO. As DO drops, fish and other aquatic life are threatened or killed in the extreme case. In this case, the DO may be about 3 mg/l or less. As much as 9.2 mg/l at 25°C is needed for support of aquatic life (Ademoroti, 1996b).

Review of literature

Contamination of streams and rivers by nitrates and phosphates hasbeen observed in many parts of the world. This leads to the process of nutrient enrichment, termed eutrophication, is especially important in ponds and lakes. It is fair to state that nitrates and phosphates are probably the key nutrients in controlling aquatic plant growth (Savita et al., 2011). Adefemi et al. (2007) in their assessment of the physico-chemical of water of Maji dams in Ekiti State Nigeria found that the status of water samples from four major dams in Ekiti was assessed for a period (dry and wet season). Results show that the parameters determined were higher in the dry season than wet season. The statistical analysis revealed that most of the physico-chemical parameters are significantly different except for temperature, conductivity and dissolved solids whose values are lower than the Table value (0.4975 at P = 0.05). The value increased from one year to another. The results are within the maximum allowable limits by USEPA (2009). Ogabiela et al. (2007) in their analysis of tanneryeffluents from Sharada Industrial Estate Kano and physic-chemical parameters of the waste water such as TDS, TSS, and TS. Conductivity, alkalinity, chloride, BOD, COD, sulphide and Cr, were determined using standard methods. The concentrations of parameters were found to be higher than the limits set by the Federal Ministry of Environment for discharge of effluents by the tannery sector. The tannery effluents from the Sharada Industrial Estate pollute the Challawa River in Kano. Ogugbuaja and Kinjir (2009) in their studies of some portions of rivers Benue and Gongola found that rivers Benue/Gongola confluence shows high concentration

levels for some of the trace metals due mainly to increased river load deposition. High human activities at the abattoir rear the shores of river Benue probably led to an increased organic indicator levels obtained with a high negative COD/DO correlation coefficient (r – 0.98) was recorded. Low mineralization ratio (range 0.007 to 0.043) was attributable to sourcing of determined metals from a poorly mineralized area.

Material and method

Micro pollutants were monitored at Palla and impact locations i.e. Nizamuddin Bridge, Agra Canal, Mathura D/s and Agra D/s. Micro pollutants, which were studied regularly includes both heavy metals and pesticides (organo chlorine).

Heavy Metals

Seven heavy metals were monitored on quarterly basis till June, 2009 and afterwards monitored on monthly basis at Palla and impact locations and once in a year (June month) at other locations except Allahabad and locations upstream of Hathnikund. The heavy metals characteristics of Yamuna at selected locations are appended at Annexure-IV. Cadmium & nickel were rarely present in the Yamuna River during study period. Cadmium was observed only twice with a concentration of 0.02 mg/l (at Agra downstream June, 2009) and 0.11 mg/l (at Agra downstream – quarter-stream in March, 2011) whereas nickel was present at all the impact locations during the year 2009, at Mathura (midstream & quarter-stream) and Agra (quarter-stream) in the year 2009 & at Agra (midstream & quarter-stream) in 2010. In the year 2011, this metal was present at all the location except Nizamuddin bridge midstream. Maximum concentration i.e. 0.21 mg/l of nickel was observed during the month of March, 2009 at Mathura. Both cadmium and nickel were observed in the river either during lean flow period or during early monsoon period. Till the year 2011, the lead was not traceable in Yamuna River.

However, during the year 2011, it was observed at Nizamuddin Bridge, Agra Canal and Agra downstream locations. Its maximum concentration i.e. 0.20 mg/l was observed at Nizamuddin bridge quarter stream in August, 2011.Chromium & copper were observed more frequently in River Yamuna at studied locations. Chromium was not traceable at Palla during the year 2009 and 2010 to 2011, whereas at other locations this metal was not traceable during the year 2009 & 2011. Maximum concentration of Chromium 7.91 mg/l was observed in the month of January, 2009 at Agra D/s (midstream). At Palla copper was absent during the year 2010 to 2011 and at Agra d/s (quarterstream) maximum concentration of copper (1.43 mg/l) was observed in February, 2010. During the same year this metal was present in maximum concentration at all the studied locations of Yamuna River. Iron and zinc were generally observed at all the studied locations. Maximum concentration of iron i.e. 78.3 mg/l was observed at Nizamuddin Bridge (quarter-stream) in July, 2009. Iron (on the basis of annual average)
concentration from Palla to Agra d/s was varied from 1.79 mg/l (Palla, 2011) to around 12.00 mg/l (Palla 2009 & Nizamuddin bridge (quarter stream), 2009). The maximum concentration of zinc 1.37 mg/l was observed in June, 2010 at Palla. The average of zinc concentration was in the range of 0.01(Nizamuddin Bridge Midstream, 2011) to 0.54 mg/l (Nizamuddin bridgequarter-stream, 2009). Significant concentration of heavy metals in the Yamuna was generally observed either during the lean flow period or at the onset of monsoon period. These metals generally reached upto the riverthrough flushing from various point and non-point sources. At Palla, which is relatively clean location on the basis of organic pollution, sometimes high concentration of few metals may contributed by various large scale electroplating industries located at Sonepat, upstream town of Palla. At Palla, the riverbed is silty as compared to other locations, which are having organic sludge deposition at riverbed. Silt have very less affinity to adsorb the metals as compared to sludge. This may also be a reason that the metals remain in the water, if flushed into river instead of their

deposition at the riverbed along with the sludge. The mercury, which was studied once in a year (June month) at all the locations, was not traceable in the entire Yamuna stretch during the study period. At all the non-impact locations from Hathnikund to Juhika lead and cadmium was not traceable whereas nickel was traceable once (2011) only at Sonepat with a concentration of 0.04 mg/l. Chromium was also present rarely and observed at Agra upstream and Etawah in the month of June, 2011; at Kalanaur in June, 2010 and at Sonepat in the month of June, 2011. Copper was observed at Etawah in the year 2009 and 2009 and in the locations from Agra upstream to Juhika in the year 2009. This metal in the year 2011 was present at all the non-impact locations except Hathnikund and Juhika. Iron and zinc were present at all the locations. The range of iron at non-impact locations was 0.27 mg/l (Mazawali, 2010 & 2011) to 14.90 (Sonepat 2009). The concentration of zinc metal was observed in the range of 0.01 mg/l (Agra u/s 2009 and Etawah 2010) to 3.61 mg/l (Etawah 2009). The presence of these metals at non-impact locations may be transportation by the early monsoon showers from the non point sources.

Conclusion

The presence of these metals at non-impact locations may be transportation by the early monsoon showers from the non point sources. This may also be a reason that the metals remain in the water, if flushed into river instead of their deposition at the riverbed along with the sludge. The mercury, which was studied once in a year (June month) at all the locations, was not traceable in the entire Yamuna stretch during the study period.

References

- Afsah, S., Laplante, B., Wheeler, D., 1996. "Controlling Industrial Pollution: A New Paradigm", Policy Research Working Paper #1672, Policy Research Department, Environment, Infrastructure and Agriculture Division. World Bank, Washington DC
- Agarwal, H.C., Mittal, P.K., Menon, K.B. and Pillal, M.K.K., 1986. DTT residues in the River Jumuna in Dehli, India. Water, Air, Soil Polhit., 28: 89-104.
- Aleem A, Malik A. Genotoxicity of the Yamuna River water at Okhla (Delhi) India. Ecotoxicol Environ Saf 2011;61:404–12.
- Berner, E.A. and Berner, R.A., 1987. The Global Water Cycle, Geochemistry and Environment. Prentice Hall, Englewood Cliffs, Mich., 397 pp.
- Bishwanath Goldara , Nandini Banerjee, Impact of informal regulation of pollution on water quality in rivers in India Journal of Environmental Management 73 (2011) 117–130
- Brandon C., Homman K. (1995) "The cost of inaction: Valuing the Economy-Wide Cost of Environmental Degradation in India" Asia Environment Division, World Bank, October 17, mimeo.
- Chakrapani, G.J., Subramanian, V., 1990. Preliminary studies on the geo-chemistry of the Mahanadi basin, India. Chemical Geology 81, 241–253.
- Chandra K. River pollution in India: impact on inland fisheries. Ind J Agric Chem 1985;18:123–32
- Chawla G, Viswanathan PN, Devi S. In: Nair PKK, editor. Aquatic flora in relation to water pollution, vol. VII. Glimpses in Plant Research; 1986. p. 100–28.
- Donaldson EM. The pitutary-interrenal axis as an indicator of stress in fish. In: Pickering AD, editor. Stress and fish. New York: Academic Press, 1981. p. 11.
- Drever, J., 1982. The Geochemistry of Natural Waters. Prentice Hall, Engiewood Cliffs, Mich., 388 pp.