RESEARCH PAPER:

Trace metals distribution in soil of Singarva lake, Ahmedabad, Gujarat

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SUMMARY

Ahmedabad is unique in the whole of India in matter of environmental neatness and flourishing conditions and it is superior to other cites in the excellence of its monuments. Ahmedabad Urban Development Authority (AUDA) proposes to undertake work for revival, development of catchments areas and beautification of few lakes and under the present project .of this Singarva lake is considered as one of the most important irrigation and drinking water resources. During drought period the water level decreased and the concentrations of the most Addition to some trace metals (Fe^+, Mn^+, Zn^+, Pb^+,Cr^+,Ni^+,Hg^+). The results values of the estimated through lake during monthly analysis of the January-2009 to December -2009. Soil gets polluted due to dumping of waste. Solid waste is garbage, refuse, sludge and other discarded materials (Including solids, liquids and contained gases) resulting from industrial, commercial mining and agricultural operations, and from community operations. The soil samples were taken from Singarva Lake of Ahmedabad to assess the soil quality.

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Key Words :
Trace, AUDA , Soil, Singarva lake

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Singarva lake, circuitous man-made bansins, has been formed by the fracture and extract rocks. The lake, inland closed basins, receive their water from the ground and seepage waters. It occupies the area between Latitudes E. 72°.68949 ' and N. 23°.02320' the lake surface areas 5675.0 m^3. The lake bansins , man-made are located in the Ahmedabad-Godhra National Highway No-8 and Nr, Kathwada GIDC Area in Ahmedabad.

Soil is derived from the Latin word "Solum" which means earthly material in which plant growth takes place. Soil is a natural body consisting of layers (soil horizons) of mineral constituents of variable thicknesses, which differ from the parent materials in their morphological, physical, chemical, and mineralogical characteristics. It is composed of particles of broken rock that have been altered by chemical and environmental processes that include weathering and erosion. Soil is essential for survival of the living world, especially for human population. Soil is a dynamic medium made up of minerals, organic matter, water, air and living creatures including bacteria and earthworms. It was formed and is forever changing due to physical factors; the parent material, time, the climate, the organisms present(Upadhyaya *et al.,* 2010).

The contamination of soil, sediment resource and biota by heavy metals is one of the major concern especially in many industrialized countries because of their toxicity persistence and bioaccumulation (Iken *et al.,* 2003).

The aim of the present study is to determine the spatial and temporal distribution of addition to (Fe^+, Mn^+, Zn^+, Pb^+,Cr^+,Ni^+,Hg^+) in soil and sediment of Singarva lake during January-2009 to December-2009 of drought period to assess the environmental status of the soil-sediment of Singarva Lake, Ahmedabad.

EXPERIMENTAL METHODOLOGY

The present study was done during drought period (January 2009 to December

2009), Bottom sediment were collected by means of a tubular sampler of the scoop type that allowed taking about 15cm deep samples. Samples were air-dried , crused ,sieved (2.0 mm sieves), stored in plastic containers. The soil and sediment sample were collected during monthly interval of drought period. Different point were selected along Singarva lake, Ahmedabad.

Determination of Fe^+,Mn^+,Ni^+, Zn^+, Pb^+, Cr^+, and Hg^+:

Weighed 0.5-1.0 g sample of air dried soil in digestion tube and added 3 ml conc. HNO_3 Digested on electrically heated block for 1 hr at 145^0 C. then added 4 ml of $HClO_4$ and heated it to 240^0 C for to further one hour, cooled and filtered through Whatman No. 42 filter paper and madeup to 50 ml volume,Determined Fe^+, Mn^+, Zn^+, Pb^+,Cr^+,Ni^+ and Hg^+, by stand method (APHA-1998) .

EXPERIMENTAL FINDINGS AND DISCUSSION

The trace characteristics of the Singarva Lake sediment and soil parameters are considered as the most important principles in the identification of the nature, quality and type of the water (fresh, brackish or saline) for the aquatic ecosystem (Abdo, 2005).

Trace metals in sediment:

The analysis of heavy metals in the sediment permits detection of pollutants that may be either absent or may be in low concentrations in the water column (Binning and Baird, 2001). The accumulation of metals from the overlying water to the sediment is dependent on a number of external environmental factors such a pH, EC, the ionic strength, anthropogenic input, the type and concentration of organic and inorganic ligands and the available surface area for adsorption caused by variation in grain size distribution (Awfolu *et al.,* 2005).

The determination of trace elements in Singarva Lake sediment during January-2009 to December-2009 of drought period revealed that Fe^+, Mn^+, Zn^+, Pb^+,Cr^+,Ni^+ and Hg^+ were detected as present in Table 1.

The monthly variation in the of sediment like Fe^+, Mn^+, Zn^+, Pb^+,Cr^+,Ni^+ and Hg^+ concentration. Large quantities of Fe^+,Mn^+,Pb^+,Hg^+ and Zn^+ have accumulated at the sediment interface (within the top 5 cm from the surface (Nikolas, 2004).

Pb^+ content of soil samples from the highest concentration of lead in soil was recorded 48.3 ppm of July 2009. The lowest concentration in soil was recorded to 2.6 ppm of October 2009.

Cr^+ content of soil samples from the highest concentration of chromium in soil was recorded (0.010 ppm) of June 2009. The lowest concentration in soil was recorded to 0.099 ppm of July 2009. Mn^+ content of soil samples from the highest concentration of manganese in soil was recorded 0.012 ppm of December 2009. The lowest concentration in soil was recorded to 8.20 ppm of January 2009.

Hg^+ content of soil samples from the highest concentration of mercury in soil was recorded 0.1 ppm of July and August 2009 (Table 1). The lowest concentration in soil was recorded to 3.6 ppm of October 2009. Ni^+ content of soil samples from the highest concentration of nickel in soil was recorded to 0.01 ppm of October 2009. The lowest concentration in soil was recorded to 1.5 ppm of March 2009.

Fe^+ content of soil samples from the highest concentration of Iron in soil was recorded 0.11 ppm of October 2009. The lowest concentration in soil was recorded to 48.0 ppm of July 2009. Zn^+ content of soil samples from the highest concentration of zinc in soil was recorded 1.5 ppm of February and November 2009. The lowest concentration in soil was recorded to 9.9 ppm of July 2009.during drought period at all samples (Table 1). Similar study was conducted by El-Hadad (2005).

The heavy metals concentrations of Zn^+, Ni^+, Pb^+,Cr^+,Fe^+,Hg^+ and Mn^+ from the Singarva lake sediment compared with the probable-effects-level (PEL) guidelines for toxic biological effects established by USEPA, (1997), sediment-quality guidelines cited by Salomons and Förstner (1984), and USPHS (1997).

Table 1 : Determination of trace element in Singarva Lake

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Pb (ppm)	22.1	26.3	18.3	22.4	26.5	28.4	48.3	9.3	12.3	2.6	22.3	21.3
Cr(ppm)	0.078	0.027	0.099	0.025	0.026	0.010	0.025	0.012	0.025	0.026	0.078	0.018
Mn(ppm)	8.20	5.6	5.0	5.3	7.3	8.9	0.6	0.8	0.03	0.06	1.2	0.012
Hg (ppm)	0.12	0.18	0.13	0.26	0.20	0.8	0.1	0.1	1.1	3.6	0.3	0.45
Ni(ppm)	0.7	0.7	1.5	1.1	0.1	0.1	0.1	0.0	0.6	0.01	0.1	0.1
Fe (ppm)	44.16	48.0	8.3	7.90	20.18	20.12	27.3	12.33	0.55	0.11	0.4	0.7
Zn(ppm)	8.20	1.5	1.6	7.3	6.6	6.8	9.9	3.6	3.4	4.6	1.5	2.1

Conclusion:

It can be concluded that, the sediment quality, trace parameters were slightly increased especially Lead, Mercury, Menganese, Iron and Zinc during drought period. The point discharged of sewage, solid waste, soil get polluted due to dumping of waste and agricultural oprationons as source of pollution in the Singarva lake. The order of detected trace elements in soil and sediment was arranged from high to low concentrations as: > Cr^{+} > Ni^{+} > Mg^{+} > Hg^{+} >Mn^{+} >Cl^{-} >Zn^{+} > Fe^{+} and Pb^{+} . The correlation coefficient showed that the strong inter-relationships among physical, chemical and trace metal concentrations measured in the Singarva lake soil and sediment.

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