Assessment of Some Metals in the Drinking Water of Dal Lake Kashmir

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ABSTRACT
The present study was carried in the famous Dal Lake Kashmir. The Dal Lake is a eutrophic water body and is contaminated due to various inflows directly as well as indirectly. Main source of pollution comes from Dal dwellers and surrounding areas. During present study the metal contamination has been assessed in the drinking water of Dal dwellers. The study showed that there is an increasing trend in the metal contamination in the lake, no doubt still out of danger.

Key Words
Dal Lake, Metal contamination.

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1 Introduction

Adequate water resources for future generations are not only a regional issue but also a global concern. Our country's fresh water wealth is under threat due to variety of natural and human influences. Arsenic, fluoride and heavy metals occur as minor constituents of ground minor constituents including iron and nitrate is of concern as large amount of ground water is abstracted by drilling water-wells both in rural and urban areas for drinking and irrigation purposes. Sixteen states in India - Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Jammu &Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Orissa, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh have already been identified endemic to fluorosis (Mariappan etal., 2000). Arsenic contamination of ground water in eight districts of West Bengal is well documented and more cases are also reported from eastern part of Bihar, Gorakhpur, Balia, Western part of Uttar Pradesh and Chhattisgarh (Singh, 2006). The intensive farming belt of Western U.P., Haryana, Punjab, and parts of Rajasthan, Delhi and West Bengal have been reported to contain high NO3 in groundwater (Malve and Dhage, 1996). The main health risks due to arsenic are considered to be severe poisoning, and carcinogenic, specially, cancer of respiratory system and gastrointestinal tract whereas from fluoride it is fluorosis or bone disease. Similarly, the health effects due to high nitrates and heavy metals in water as well as food uptake of animals and humans are equally significant.

2 Materials and Methods

The water samples were drawn during monsoon (July-Sept) and non-monsoon (Nov-Jan) in the year 2009 and 2010 from 1520 locations of Dal Lake Kashmir. The Sampling points were confined to springs, streams, rivers, bore wells, PHE (Public Health Engineering) supply and dug wells (groundwater and surface water resources)used for drinking purposes. While sampling for groundwater, samples were collected in plastic containers (PVC 250ml) after flushing out the tube wells (minimum 10 minutes) to get the fresh groundwater. Preservative (1:1 HNO3 solution to pH <2, about 3ml L-1 sample) were added to each water samples at the time of sampling and the containers were sealed. These samples were tested for 18physico-chemical parameters like pH, dissolved oxygen (DO), total dissolved solids (TDS),turbidity, fluoride, sulphate, calcium, magnesium, nitrate, bicarbonate and heavy metals like iron, copper, zinc, manganese, cadmium, lead, nickel and arsenic. The samples without preservatives were also collected for analysis of fluoride, nitrate and sulphate.

The physical parameters like pH,

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DO, TDS, and turbidity were tested in the field at the time of sample collection using portable pH meter (Eutech Instrument) and water testing kit (MSElectronics, India). Analysis of cadmium, copper, iron, lead, nickel, zinc, calcium and magnesium was done using Atomic Absorption Spectrophotometer (Perkin Elmer AA200) whereas fluoride and nitrate content in water samples were determined using Ion Selective Electrode(Cyber scan Ion meter). Sulphate content was determined by the extent of turbidity created by precipitated colloidal barium sulphate suspension. Arsenic was analyzed using Atomic Absorption Spectrophotometer with MHS-15(Mercury Hydride Generation System) at 193.7 analytical wavelengths and 0.7 nm slit width. Prereduction was performed with KI solution (KI + Ascorbic acid) in semi concentrated (5 mol L-1)HCl solution. Radiation source was electrode less discharge lamp (EDL) and argon gas and sodium tetraborohydrate were used for hydride generation.

3 Results and Discussion

The problem of chemical contamination in water bodies like nitrate, sulphate, iron, Manganese, zinc and copper may cause several health problems to human beings. These chemical constituents enter into water as solution and cause pollution for surface water and groundwater. The other chemical parameters like nitrate and sulphate are also very important.

4 Observed Seismic Intensity of the Mw 9.0

Fixpected intensity of 4 in the Tokyo region in the twelfth to fifteenth (final) issues (Fig. 2). This was an underestimation. Actual observations reached 5-upper, which is greater than the criterion of the EEW "warning". The underestimation can probably be attributed to the large extent of the later fault rupture. For the northern part of Ibaraki prefecture (around IYASAT), where intensity expected in the first warning (fourth "forecast") was less than 4, the expected intensity rose to 5-lower by the fourteenth "forecast", but it was too late to update the "warning", because it was issued 105 s after the trigger, which is later than the 60 s criteria at which upgrades are stopped.

Nitrates in drinking water as such are not toxic to health and about 85% of ingested nitrates are rapidly adsorbed from gastrointestinal tract in normal healthy individuals and adsorbed nitrates are excreted by the kidneys. But, if the nitrates are converted into nitrites which occur commonly, then toxic effects are encountered and may cause potential health hazards. Drinking water standards (BIS) for nitrate is 45 mg L-1. In Assam and Arunachal Pradesh, the nitrate content was detected to be just above the permissible limit. Nitrate was found below the permissible limit in the rest of the six states of north-eastern region. Sulphate concentration when exceeds more than 200 mg L-1 causes a bitter taste in drinking water. When exceeds its maximum contamination limit (BIS) i.e. 200 mg L-1. Sulphate contents in drinking water of all the northeast states vary in between 0.00 to 126 mg L-1 which is within the permissible level of BIS. The result shows that copper, zinc, nickel, cadmium and lead in ground water exceed the BIS permissible level (>0.05 mg L-1) in Meghalaya. In Mizoram, the concentration of lead (>0.005 mg L-1) was observed to be slightly above the drinking water standards. In Arunachal Pradesh and Meghalaya, cadmium was detected to be slightly above the permissible level (>0.005 mg L-1). In few places in Nagaland, Tripura and Sikkim also, the concentration of cadmium, nickel (except Sikkim) and lead were detected to be slightly above the permissible level of BIS.

5 Conclusion

The arsenic, fluoride, iron, nitrate, cadmium, copper, lead, nickel and zinc were detected at elevated levels in drinking water of north-eastern states. These chemical constituents enter into the water and causes pollution for surface water and groundwater. These metals also destroy ecosystem in which they enter.

References

1. Akoijam. Distribution of fluoride in ground water and pollution of shallow aquifers in parts of Imphal valley, Manipur, India. Chemical Environment Research (1997) 6:301.
2. Aowal AFSA. Design of an iron eliminator for hand tube wells, Journal of IWWA (1981) XIII:65.
3. Malve SP, Dhage SS Nitrate: An environmental pollutant, Everyman's Science (1996) XXXI(5):158-163.
4. Mariappan P, Yegnaraman V, Vasudevan T. Occurrence and removal possibilities of fluoride in ground waters of India Poll Res (2000) 19(2):165-177.
5. Mukherjee AB, Bhattacharya P, Jacks G, Banerjee DM, Ramanathan AL, Mahanta C, Chandra shekharam D, Naidu R. Groundwater Arsenic Contamination in India: Extent and Severity (R Naidu, E Smith, G Owens, P Nadebaum, P Bhattacharya (Eds.), Managing Arsenic in the Environment: From Soil to Human Health. Melbourne, CSIRO Publishing (2006):553-594.
6. Singh AK. Arsenic contamination in groundwater of North Eastern India. (Jain CK, Trivedi RC, Sharma KD (Eds.), Hydrology with focal theme on water quality (pp 255-262). Allied Publishers, New Delhi. Singh, A.K. 2006. Chemistry of arsenic in ground water of Ganges-Brahmaputra river basin, India, Curr Sci (2004) 91(5):1-7.
7. Sushella AK. A Treatise on Fluorosis, Fluorosis Research and Rural Development Foundation, New Delhi (2001):15.

Table 1. Chemical constituents of water samples in north-eastern states of India.

NE State	Nitrate (mg/l)	Sulphate (mg/l)	Iron (mg/l)	Manganese (mg/l)	Copper (mg/l)	Zinc(mg/l)
Dal Lake	02-49.0	0.05-111.1	0.12-85.76	0.01-6.82	N.D.	0.002-5.16