

## Ground Water Quality and Pollution Status in National Capital Territory, Delhi

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Ground water plays an important role as an essential and vital component of our life support system. The ground water resources are being utilized for drinking, irrigation and industrial purposes. With increasing demand for water in National Capital Territory, Delhi, there is exploitation pressure on ground water resources and growing concern of the deterioration of ground water due to unplanned disposal of effluents, sewage and sewerage.

A collaborative study was conducted by Central Pollution Control Board, Delhi along with Central Ground Water Board, Delhi during February-March, 1998 to assess the ground water quality and its suitability for human consumption. An extensive field survey was undertaken during which 303 ground water samples were collected and analysed from different abstraction structures (hand pumps, tube wells, dug wells, bore wells, etc.) representing various depths and locations in Delhi. Ground water samples were analysed for physico-chemical parameters (including trace metals), bacteriological parameters, organochlorine and organophosphorous pesticides, total organic carbon, etc. The salient findings of the study are as follows.

The ground water has significant nitrate concentration ranging between 0.01 mg/l to 1589 mg/l. About 63% samples have nitrate concentration below 45 mg/l, while 18.8% samples have nitrate exceeding the prescribed Bureau of Indian Standards permissible limit (100mg/l). The most affected blocks are Najafgarh, Kanjhawala and some parts of City block.

The fluoride concentration exceeds the Bureau of Indian Standards prescribed permissible limit (1.5mg/l) in 27.4% of ground water, and its concentration ranges between 0.12 mg/l to 12.52 mg/l. The most affected areas include western and central parts of Najafgarh block and north and southeast parts of Kanjhawala block.

The total dissolved solids concentration varies from 165 mg/l to 8540 mg/l, and about 21% of ground water samples violate the permissible limit. The ground water of Najafgarh, Kanjhawala and Alipur blocks show higher concentration of total dissolved solids.

The bacteriological studies indicate the presence of faecal coliform in 5.95% of the samples, while total coliform is present in 57.99% of ground water samples. Total coliforms and faecal coliform are mostly present in water drawn from hand pumps. Inadequate maintenance of hand pumps and unhygienic conditions around the structure may be responsible for this. The most affected blocks are City block, Shahadra block and Najafgarh block.

The violation of trace metal limits has been: chromium, lead and cadmium in 8.82%, 0.53% and 0.49% of ground water samples respectively, while the concentration of iron exceeds the limits in 33.33% samples. The concentration of copper and zinc are found well below the prescribed limit. The violation of nickel limit could not be assessed as no prescribed permissible limit is available. The trace metal problem is more observed in City and Najafgarh blocks.

The presence of pesticides has been recorded in a large number of ground water samples but their concentration is well below the prescribed World Health Organization, 1996 permissible limits. Dieldrin and aldrin pesticides have violated permissible limits in 12 and 3 ground water samples respectively, while concentration of total BHC and total DDT are found to be well within the limits. There are no guidelines available for total endosulfan.

Based on overall impact of physico-chemical characteristics including heavy metals, about 45.5% ground water samples out of total 303 have been found unsuitable for drinking, either due to nitrate, fluoride, trace metals, total dissolved solids, or due to synergistic effects of some or all of these. The block wise sequence of overall deterioration of ground water quality is Kanjhawala block > Najafgarh block > City block > Alipur block > Mehrauli block > Shahadra block.

The probable causes of ground water deterioration in National Capital Territory, Delhi are natural hydro-geological conditions, overpopulation of Delhi, over exploitation of ground water, lack of rainfall harvesting for recharge of ground water, improper disposal of sewage and industrial waste water, improper disposal of municipal and industrial solid waste, and also lack of public awareness.

*This article was provided courtesy of D. K. Banerjee, PhD, Contributing Editor to Environmental Practice.*

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