

Spatio-temporal analysis of ground water quality in two contrasting districts of the NCT of Delhi

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Abstract: The National Capital Territory (NCT) of Delhi is witnessing urban population growth at a rate and scale unprecedented in recorded history. Delhi mega city today records a total population of 16.7 million (11,297 persons per sq. km) making it one of the top ten most populated cities in the world. All the nine administrative districts in the NCT have very high density of population. Five out of these nine districts feature in the list of top ten most densely populated districts in India. In fact, the North-east district in the NCT is the most densely populated (37,346 persons per sq. km.) among all districts in the country. This rapid population growth is exerting an increasing pressure on the city's natural resources and simultaneously, on its municipalities. At the same time, a prominent feature of urban growth is land-use land cover (LULC) changes. The process of urbanisation remains incomplete without land-use modifications ranging from single-storeyed housing plots to densely populated residential and commercial areas, from open spaces to industrial units, from recreational spaces to institutional areas, from wastelands to slums and unauthorized colonies and so on. The modified LULC due to urbanisation is usually more polluting in terms of water, air and soil. This is also true in the case of urbanisation of Delhi as the city struggles to tackle the problem of environmental pollution.

Water is an essential pre-requisite for supporting the rapidly increasing population of the NCT of Delhi. According to Government reports, there is deficit in drinking water supply due to which there is high dependency on Delhi's ground water resource. The ease of availability of ground water at the very location where it is required has led to its greater exploitation during the ongoing rapid urbanisation of NCT. The present contribution is an attempt to understand the relationship between population pressure, urbanisation and ground water quality within the NCT of Delhi. The most densely populated North-east district and the least densely populated New Delhi district (3,820 persons per sq. km) in the NCT were selected for this study. A spatial and seasonal (dry and wet season) analysis of ground water quality in terms of physico-chemical parameters, cations, anions and heavy metals was carried out in these two districts. Due to large-scale dependency on ground water for drinking purpose, the results obtained were validated against drinking water quality standards (BIS, 1991). Ground water quality shows consistent spatial and seasonal variation in both the districts. The variation is especially remarkable in case of Fluoride (NEd: 0-2.64 mg/l; NDd: 0-3.80 mg/l; NEw: 0-6.60 mg/l and; NDw: 0-2.47 mg/l) and Iron (NEd: 0-2.42 mg/l; NDd: 0-1.30 mg/l; NEw: 0-3.49 mg/l and; NDw: 0-1.86 mg/l). High

variation in Nitrate pollution (0-581.5 mg/l) is observed in North-east district in wet season while interestingly, the New Delhi district shows a similar variation in pollution in the case of Cadmium (0-2.85 mg/l) in the dry season. We conclude with the finding that ground water in both the districts is polluted and the nature of pollution varies with the land-use pattern in each of the two districts under study. LULC modifications, urban pollution and water management policies and practices have an equal role to play in ground water pollution, which needs further understanding.

Keywords: urbanisation, ground water, pollution, NCT of Delhi

Abrrv.: NEd – North-east district (dry season), NDd – New Delhi district (dry season), NEw - North-east district (wet season), NDw – New Delhi (wet season)

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