Application of groundwater residence time tracers and broad screening for micro-organic contaminants in the Indo-Gangetic aquifer system

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Groundwater abstracted from aquifers underlying urban centres across India provide a vital source of domestic water. Abstraction from municipal and private supplies is considerable and growing rapidly with ever increasing demand for water from expanding urban populations. This trend is set to continue. The vulnerability of deeper aquifers (typically >100 m below ground) used for domestic water to contamination migration from often heavily contaminated shallow aquifer systems has not been studies in detail in India. This paper focusses on the occurrence of micro-organic contaminants within sedimentary aquifers beneath urban centres which are intensively pumped for drinking water and domestic use. New preliminary results from a detailed case study undertaken across Varanasi, a city with an estimated population of ca. 1.5 million in Uttar Pradesh. Micro -organic groundwater quality status and evolution with depth is investigated through selection of paired shallow and deep sites across the city. These results are considered within the context of paired groundwater residence time tracers within the top 150m within the sedimentary aquifer system. Groundwater emerging contaminant results are compared with surface water quality from the Ganges which is also used for drinking water supply. Broad screening for >800 micro-organic compounds was undertaken. Age dating tools were employed to constrain and inform a conceptual model of groundwater recharge and contaminant evolution within the sedimentary aquifer system.