

Can treated dug wells be used as a safe water source in Old Dhaka of Bangladesh? A Water quality assessment study

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Dug wells are installed at shallow depths and are largely located in sands, gravels and other interspaces through which precipitation infiltrates into the underground aquifers due to gravity. Dug wells were mentioned as early as in 1968 as a source of drinking water for Dhaka dwellers. The study area is situated in densely populated Old Dhaka, Bangladesh, covering an area of 4.9 mi² and lies towards the northern bank of the Buriganga river. Thirty six dug well water samples were collected from different old houses along three transects (from river to study area) and four Buriganga river water samples were collected at four different river-ghats (boat terminals) during both dry (April, 2010) and wet (September, 2010) seasons. The depth of these dug wells vary from 3.45 m to 16 m with an average depth of 10 m. Water levels in the dug wells have both seasonal and diurnal fluctuations. In dry period, bad odor comes out from dug wells, and appears to be dark in color. More than 50% dug well and 25% Buriganga river water samples were contaminated as concentration levels of Ca²⁺, Mg²⁺, K⁺, Fe²⁺ and Mn²⁺ exceeded the drinking water quality standard limits of World Health Organization (WHO, 2004), Department of Environment, Bangladesh (DOE, 1997) and United States Environmental Protection Agency (USEPA, 1995). The hydrochemical facies analyses of both dug well and Buriganga river water samples demonstrate they are Ca²⁺-HCO₃⁻ type. It has not been deciphered whether the dug wells are being recharged from surface water flowing directly into the well or groundwater that has recharged via riverbank filtration and is a possible source of contamination. If the dug well water is protected from anthropogenic pollution (since they are in more controlled environment), the shallow groundwater in this part of Dhaka city could be an alternative perennial source of water for daily household purposes especially during the dry seasons when water scarcity is major problem. Thus, it is necessary to ensure the proper maintenance and monitoring of these historical dug wells by the concerned authorities and improving our understanding of sources of contamination and recharge to the dug wells.