

Title: Household water treatment for the removal of contaminants in groundwaters in Hanoi, Vietnam

DO, Thuan an¹ ; TAKIZAWA, Satoshi^{1*} ; KURODA, Keisuke¹ ; HAYASHI, Takeshi² ; TRAN, Viet nga³

¹The University of Tokyo, ²Akita University, ³University of Civil Engineering, Hanoi

Between 2000 and 2025, the urban population in Vietnam is expected to double from 19 million to 40 million. Therefore, urbanization and increasing water demand is one of the most important challenges in Vietnam, especially in Hanoi. At present, Hanoi city relies on groundwater as a main source of water supply, but it is going to shift to the surface water as the demand increases in the near future. However, variation of rainfall, dam construction in the upstream of the Red River and climate change in the near future make the surface water unreliable water source for water supply in Hanoi City. As the extension of water supply coverage is slow, many households still rely on groundwater as their drinking water sources. However, groundwater is contaminated by ammonia, arsenic, iron, bacteria and others. In order to obtain clean drinking and cooking water many households use point-of-use (POU) treatment devices including sand filters, ceramic filters, reverse-osmosis filters, and UV irradiation.

To identify the impact of POU usage to water consumption and water quality, a survey of POU usage in 170 households in six communes in Hanoi was carried out in 2012 and 2013. Water samples were also taken to investigate the treatment efficiency of those POU. As a result of the household survey, it was found that many households in rural and suburban areas have multiple water sources and use them for different purposes, while the urban households use only piped water supply. The result indicated that between 18% and 76% of the households in these communes used POU water treatment devices, of which RO devices accounted for 58%. Groundwater was contaminated by arsenic (max 0.3 mg/L), ammonia (max. 26 mg/L), and manganese (max. 3 mg/L). Although most of the arsenic was As(III) form in groundwater, it was oxidized to As(V) in the sand filters. Thus, RO filtration was found quite effective in removal of arsenic from groundwaters.

Keywords: ammonia, arsenic, household water treatment, MDGs, reverse osmosis device, safe drinking water