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Geogenic fluoride and arsenic contamination in the groundwater environments in Tanzania

Prosun Bhattacharya (1), Fina Lesafi (2), Regina Filemon (2), Fanuel Ligate (2), Julian Ijumulana (3), and Felix Mtalo (2)

(1) KTH-International Groundwater Arsenic Research Group, Department of Sustainable Development, Environmental Science and Engineering, KTH Royal Institute of Technology, Stockholm, Sweden (prosun@kth.se),, (2) Department of Water Resource Engineering, University of Dar es Salaam, P. O. Box 35131 Dar es Salaam, Tanzania., (3) College of Engineering and Technology, University of Dar es Salaam, Box 35131, Dar es Salaam, Tanzania (magezijulian@yahoo.co.uk)

Adequate, safe and accessible drinking water is an important aspect to human health worldwide. Understanding this importance, the Tanzanian Government has initiated a number of programmes to ensure access to high quality water by the citizens. However, elevated concentration of geochemical pollutants in many drinking water sources pose a serious challenge to water suppliers and users in the country. Fluoride is a widespread drinking water contaminant of geogenic origin occuring in both surface- and groundwater around volcanic mountains and many parts within the East African Rift Valley in regions including Arusha (10 mg/L), Shinyanga (2.9 mg/L) and Singida (1.8 mg/L). An estimated 90% of the population living along the Rift Valley region are affected by dental or skeletal fluorosis and bone crippling because of long term exposure to very high levels of fluoride in drinking water sources. In the mining areas within Lake Victoria basin, groundwater wit elevated concentrations of arsenic has been discovered over an extended area. Most of these geochemical and naturally occurring drinking water pollutants are patchy with uncertainities in their spatial and temporal distribution patterns. The adverse health effects of skin disorder and cancer due to an elevated As concentration are reported from the North Mara gold and Geita mining areas in the Lake Victoria basin. About 30% of the water sources used for drinking in Tanzania exceed the WHO guideline values of fluoride (1.5 mg/L) and arsenic (10 μg/L).

There is a scarcity of baseline information on the water quality data especially on geogenic contaminants in the groundwater and surface water as potable sources. This information is crucial in exploring sources of safe drinking water aquifers, associated human health risks of fluoride and arsenic pollution. using Laboratory based studies during the past two decades have shown promising results on the removal of fluoride and arsenic using locally available adsorbent materials such as pumice, bauxite, ferralsols and bone char. Developing innovative technologies, pilot-scale implementation and scaling-up water purification based on the locally available adsorbents is thus necessary to safeguard the public health for communities exposed to high levels of fluoride and arsenic in drinking water.