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Effect of filling stations and toxic waste dumps on the karstified marble aquifer in Lusaka

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Problem Statement Water forms the basis of life and is an essential pre-requisite for any socio-economic development and growth. Currently in Zambia, groundwater has increasingly become more accessible and comparatively cheap source of water supply for drinking, agriculture and industry. In Lusaka, this water is won from thick and extensive sequences of marbles that have been differentially dissolved to yield a system of interconnected solution channels. However, the presence of these features poses several potential hazards to the city's groundwater stores (aquifers) arising from different human activities. Since 1964, Lusaka has experienced rapid growth of population, which has increased the rates of urbanisation in the city. In turn, this has outstripped the rate of provision of basic essential needs and social services including housing, water supplies and waste disposal facilities. The problem of housing has been solved by relegating most of the population to high-density areas, which are characterised by overcrowding and poor water supply and sanitation services. Many households rely on hand-dug wells for water their supply, and on-site sanitation to dispose of their excreta. On-site sanitation has created the potential for aquifer pollution and a heightening of acute diarrhoeal diseases among the city's population that rely on these sources for their water supplies. In addition to problems arising from on-site sanitation, the city has experienced a proliferation of filling stations, some of which have not been serviced in a long time. Because of age, some of them may have leaks, which dissipate fuel to the surrounding ground. Further, disposal of solid and toxic wastes has been into the same available dumpsites without any exception. The presence of solution channels in the Lusaka marbles promotes unhindered percolation of contaminants, which eliminates natural attenuation of pollutants through natural

filtration and dilution, making the aquifer very vulnerable to pollution. The nature of these wastes poses great risk for toxic pollution and chronic health problems as some of these pollutants may be carcinogenic. Objective To assess the temporal and spatial distribution of organic and chemical parameters in groundwater arising from fuel stations and toxic waste dumps in Lusaka. Methodology Mapping of potential sources of pollution, water sampling and quality analyses for chronic disease-causing parameters and creation of a GIS database to integrate, store, analyse and display data sets. Results First sampling campaign is envisaged this December and results should be available to share with the scientific community during the time of the meeting. Conclusion Since the chronic impact of toxic pollution may take long before they become fully apparent, establishment of an early warning monitoring system offers great potential for early indications of possible ailments that may arise thereof, thereby allowing for timely institution of corrective measures. This would defray potentially huge medical expenditure and permit the country's attainment of some water-related and health MDGs and WSSD targets.