

Anthropogenic and climate change effect on seawater intrusion in Dar Es Salaam coastal aquifer



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ABSTRACT

This paper presents the first results of a study carried in the framework of the EU co-funded project “Adapting to Climate Change in coastal Dar Es Salaam” in order to evaluate the population vulnerability to Climate Change effects with reference to seawater intrusion phenomenon.

The rapid urbanization that has taken place in Dar es Salaam over the past 20 years has resulted in a significant increase in the anthropogenic pressure (qualitative and quantitative) on the coastal aquifer, causing a raise in the groundwater salinization processes, due both to seawater intrusion and pollutants leakage (civil, agricultural and industrial). Recent estimates show an actual water demand for the Dar inhabitants of about 410,000 m³/d, with a supply from groundwater raised from 18,000 m³/d in 2000 to the current 50,000 m³/d.

Meanwhile seawater intrusion could also be amplified in medium and long term by the expected consequences of CC. The analysis of meteorological data for the past forty six years (1961 to 2007) show a general decrease of rainfall amount and a general raising trend on the temperature series, with a consequent loss on the related aquifer recharge flowing through the outcrops sand formation which dominate in great part of the region. Moreover, groundwater withdrawals lower the piezometric surface and raise the saltwater-freshwater interface.

Using more than 10 years of hydrogeological and geochemical data collected on a monitoring network of about 90 boreholes distributed in the Dar Es Salaam coastal area, this work assesses the effects of climate and anthropogenic factors on seawater intrusion in Dar coastal aquifer, a really important but still widely unexplored issue that is one of the CC effects on groundwater resources.