Climate change and Population Growth Impacts on Surface water Supply and Demand of Addis Ababa, Ethiopia

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ABSTRACT
Addis Ababa is expected to experience water supply stress as a result of complex interaction of urbanization and climate change. The aim of this study is to investigate water demand and supply prospects for the City of Addis Ababa by applying the Water Evaluation and Planning (WEP) hydrological model and using scenarios of population growth trends and climate change. The result shows that the projected population of Addis Ababa city using high population growth rate (3.3%) will be around 7 million by the year 2039. The climate change projections result under RCP 4.5 and RCP 8.5 scenarios on surface water supply shows that the level of reservoirs volume both at Legedadi/Dire and Gefersa reservoirs will be reduced in the projected years between the years 2023 and 2039. Under the RCP 4.5 scenario with high population growth (3.3%) the unmet water demand is 87.42 million m3 in 2030, 158.38 million m3 in 2035 and 380.72 million m3 in 2037. This indicates that the unmet water demand in both high population growth and the dry climate of RCP 4.5 climate change scenario will lead to severe shortage of water in the city. The most effective management options are water tariff increasing, domestic water use technology efficiency improvement and water harvesting which give satisfactory result in mitigating unmet demand of climate change and population growth in the city.

INTRODUCTION
Water resources are among the most vulnerable as they are directly exposed to climate change1,2. This is important as one of the major limiting factors of economic growth is the relative availability of water3. Urbanization is a crucial element that impacts water resources in terms of both quantity and quality, at different spatial scales around the world4. Growth in population and economic activities as well as improvements in living standards of the population would entail increasing demand for water 5.

DATA
The study includes analysis of water consumption, hydrological information and climate data which is statistically downscaled approach used to generate climate data available at the Worldclim data center. Bias corrected climate model data of NIMR-HadGEM2-AO under a midrange RCP 4.5 scenario and RCP8.5, high emissions scenario was used for the study.

RESULT ON OBSERVED WATER CONSUMPTION, MONTHLY INFLOW AND POPULATION GROWTH IMPACT

IMPACT OF CLIMATE CHANGE ON WATER SUPPLY

SUMMARY

1. The highest volume of unmet water demand is expected to occur under the high population growth and dry climate years that will have big repercussions on water shortages (about 380 million m3 by 2037) in the city.
2. The impact of climate change on water demand and reservoir’s storage volume, will be managed and mitigated by updating water tariffs is suggested as a better option with seasonal water price adjustments and supply measures that consist of upgrading the capacity of existing reservoirs, and constructing new reservoirs.

REFERENCE