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Resilience of Urban Water Supply Systems to Climate Change in Cameroonian Cities

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Abstract

Climate change and rapid urbanization have increased pressure on fragile water supply systems in Sub-Saharan Africa. Despite reliable rainfall that recharges surface and groundwater systems, urban water crisis has escalated in Cameroonian cities. Drawing insights from the city of Bamenda, the water supply system has proven resilient, despite lapses in water governance. There has been diversification of water supply system to supplement the main water distribution company (CAMWATER) through community water systems and individual efforts, such as drilling of private wells and boreholes. Despite these efforts, water scarcity has remained the order of the day. It is recommended that watersheds and wetlands be protected through Nature-based Solutions and Ecosystem-based Adaptations to ensure sustainability.
Keywords: adaptation, scarcity, water security, vulnerability

Introduction

Climate change affects water supply systems in multiple ways, with complex spatio-temporal patterns, feedback and interactions between physical and human processes (Bates et al., 2008). These effects are already adding challenges to sustainable water resources management, which are already under severe pressure in many regions of the world and subject to high climate variability and extreme weather events (Stewart et al., 2020). The main effects of climate change on water resources include accessibility, availability, quality and quantity of water for basic human needs (water security), threatening the effective enjoyment of the human rights to water and sanitation. Although the effects can be highly individual at the local scale (Intergovernmental Panel on Climate Change-IPCC, 2019), current trends and future projections indicate major shifts in climate, and more extreme weather events in many parts of the world (IPCC, 2014). It is therefore paramount that water resources managers consider the potential impacts of a changing climate when planning for water resources development in urban areas of sub-Saharan Africa and other parts of the world.

Materials and methods

Data was collected using a household questionnaire, where the sampled population were asked to identify their domestic water sources and coping mechanism during water scarcity. Climatic data were collected from the Regional Meteorological Service.

Results and concluding remarks

Rainfall in Bamenda increases from the onset of the wet season to a peak in July to September and gradually drops as the dry season sets in. The lowest rainfall is recorded from December to March. From 1963-1972, rainfall had an excess of 26.39 mm and has been declining over time. Between 1973-1982, the rainfall had dropped by 13.59 mm and 2.98 mm from 1983-1992. Since 1993, Bamenda has witnessed rainfall deficits (-1 mm from 1993-2002, -12.9 mm from 2003-2012 and -41.5 mm from 2013-2019). The average rainfall declined from 1963-2019 is -2.07 mm (Tume, 2021).

Sources of water in Bamenda are public taps, streams, private taps, boreholes, protected springs, protected wells and unprotected springs. The sampled neighbourhoods have at least one of the water sources, meaning that water is relatively accessible. The most accessible water sources are public taps, streams, private taps in homes and unprotected springs (at watersheds). The population gets water through head portage, wheelbarrow, cars and private water lines in households.

Water accessibility in terms of distance to the nearest water point is related to water security. Water security is the sustainable access, on a watershed scale, to adequate quantities of water of acceptable quality, to ensure human and ecosystems health (Norman et al., 2010). It is a multi-dimensional concept that recognizes that sufficient good quality water is needed for social, economic and cultural uses while, at the same time, adequate water is required to sustain and enhance important ecosystem functions. In another perspective, water security is the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN-Water, 2018). In Bamenda, the majority of the people cover distances of less than 50 m water points.

Both climate and water management require mechanisms for oversight and coordination. Sectoral fragmentation and bureaucratic competition may pose serious challenges for the integration across scales. This calls for greater public participation to discuss and manage climate risk; building adaptive capacities at multiple levels; and prioritizing risk reduction for socially vulnerable groups. Upscaling Nature-based Solution (NbS) and Ecosystem-based Adaptation (EbA) are central to achieving the 2030 Agenda for Sustainable Development. Sustainable water security will not be achieved through business-as-usual approaches. NBS work with nature instead of against it, and thereby provide an essential means to move beyond business-as-usual to escalate social, economic and hydrological efficiency gains in water resources management. NBS show particular promise in achieving progress towards sustainable food production, improved human settlements, access to water supply and sanitation services, and water-related disaster risk reduction. They can also help to respond to the impacts of climate change on water resources.

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