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# Editorial: Emerging trends on adaptive capacity and water security measures under a looming climate change threat

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## Editorial on the Research Topic

### Emerging trends on adaptive capacity and water security measures under a looming climate change threat

Water security issues compounded by climate change have become a serious threat to human wellbeing and economic development. Water could be a limiting factor for human survival and development especially in semi-arid and arid regions where the resource is limited and climate change could have an adverse impact on its quality and quantity (Ololade et al., 2021). A lack of coping mechanisms and means of adapting to disruptive changes to the norm can have a devastating consequence especially among vulnerable populations (Schilling et al., 2020). In this context an attempt is made to present a single volume of peer-reviewed articles on emerging trends on adaptive capacity and water security measures under different contexts and scenarios.

This Research Topic presents some of the findings on how implementation of policies and practices could help in reducing the insecurities associated with water and climate on different scales and in different contexts. After a careful peer review process, six papers with significant empirical findings were accepted for publication.

Awazi conducted a study that identifies extreme weather events that precipitates water insecurity among market gardeners and the role played by irrigation in enhancing their adaptation to water insecurity through a semi-structured questionnaire distributed to households in Cameroon. Different extreme weather events inducing water scarcity/insecurity including rising temperatures, extreme sunshine, scanty and erratic rainfall, and prolonged dry spells were identified. Household income, age of market gardeners, educational level, farm size, number of farm plots, among others influenced the market gardeners' practice of irrigation as an adaptation measure. Favorable policies that promote irrigation practice by market gardeners in the face of climate change as an adaptation measure to reduce crop failure and improve their living conditions was proposed.

[Palamuleni et al.](#) similarly investigated behavioral responses related to implementing water conservation strategies by surveying 72 managers at a university where average water utilization exceeds sectoral water conservation strategies put forth by the regional water sanitation department. They found that water conservation awareness is more prevalent among females than males. Reasons proposed for this behavioral gender difference include past experiences of water scarcity held by women, water requirements for personal female hygiene, and inconveniences in collecting water. To meet Sustainable Development Goal #6 on water and sanitation, they suggest that behavioral changes, education, and policy development to reduce water wastage in the workplace should incorporate awareness of gender differences in water conservation related actions.

Gender inclusiveness in the adoption of water conservation was also found to play a role in the [Bessah et al.](#) study on factors affecting farmer's decision to harvest rainwater for maize production in Ghana. The results show that rainwater harvesting is very low as a water conservation strategy among farmers with different rainfall harvesting techniques reported. The paper ends with an emphasis that climate change awareness, weather information and agriculture extension services to maize farmers will aid the adoption of rainwater harvesting as an adaptation strategy for maize farmers in Ghana.

[Calverley and Walther](#) focus on Cape Town in South Africa as an important case study showcasing causes and solutions to water security. They found no direct relationship between rainfall and dam levels, which highlights how water security is a complex social-hydrological issue with a need to focus on supply and demand. Their paper also emphasizes equity when it comes to access to clean water, as their work in Cape Town shows a disproportionate financial burden of water on low-income communities.

The final two papers in this special issue are review papers. [Agodzo et al.](#) presented a review of water resources in Ghana in changing climatic and anthropogenic stresses. It includes the status of water resources in terms of water availability, storage in reservoirs, water uses, and associated issues such as floods, droughts, climate, and environment. Both consumptive and non-consumptive water uses and their trends in the changing climate are presented. Furthermore, the paper includes a comprehensive summary of the existing legal and institutional landscape. Finally, potential scenarios of water scarcity in selected major river basins and ways forward for the sustainable development and management of water resources in Ghana are presented.

[Quandt et al.](#) review examine three geographic locations undergoing different water security challenges. Each location varies in terms of scale and local water stressors, from the county scale in semi-arid California, the city scale in arid Cape Town, and the country-wide scale in monsoonal Bangladesh. The adaptation strategies employed for surface and groundwater of two counties in California shows the impact of legislation in water conservation. These legislative acts are the Quantification Settlement Agreement and Sustainable Groundwater Management Act. Cape Town was

able to avoid Day Zero drought incidents by implementing a series of adaptive policies including integrated urban water management strategy and water allocation based on community wide decision-making tools. In Bangladesh where water quantity is not as critical an issue as water quality, of the 5 million tube wells analyzed to examine arsenic contamination, the best adaptation strategies suggested by the National Policy for Arsenic Mitigation included household filtration and implementation of low-cost field test kits to reduce population exposure to arsenic.

In summary, adaptation strategies should consider mitigating factors based on the context where water insecurity issues arise. The understanding of these factors would help in shaping policies that support relevant identified adaptation approaches toward enhancement of water security for different end users. Identification of the type of extreme events due to climate change in each context and the population being impacted by these events would go a long way to determine the approach that should be taken.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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