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SPECIALTY SECTION  
This article was submitted to  
Land, Livelihoods and Food Security,  
a section of the journal  
Frontiers in Sustainable Food Systems

RECEIVED 13 February 2023

ACCEPTED 27 March 2023

PUBLISHED 18 April 2023

## CITATION

Tantoh HB (2023) Editorial: Climate change,  
land, water and food security: perspectives  
from Sub-Saharan Africa.  
*Front. Sustain. Food Syst.* 7:1164983.  
doi: 10.3389/fsufs.2023.1164983

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# Editorial: Climate change, land, water and food security: perspectives from Sub-Saharan Africa

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## KEYWORDS

climate change adaptation, food security, water-land-food security, nexus, Sub-Saharan Africa (SSA), adaptation, rural economies

## Editorial on the Research Topic

### Climate change, land, water and food security: perspectives from Sub-Saharan Africa

The narrative of human civilization is intricately woven around the fabric of environmental factors. Whilst several societies have devised diverse technologies to control their environment and mitigate the negative impact of environmental elements, the confluence of environmental factors continues to be a core issue in the ability of society to thrive. In recent years, climate change, water crisis, land scarcity, and food security have become increasing concerns for academics, political scientists, and the media. These, coupled with the rising population, increasing urbanization, changes in consumption patterns, and industrialization continue to exert enormous pressure on the environment, which further aggravates food insecurity in unprecedented proportions (Biswas and Tortajada, 2019). This has been championed by prominent international organizations in international fora such as the Millennium Development Goals, the Sustainable Development Goals, the Paris Agreement (Paris Climate Accords) of the Intergovernmental Panel on Climate Change (IPCC), and the Global Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) amongst others, advocating for the effective governance of environmental resources to mitigate the effects of the climate crisis and ensure food security. However, forecasts in recent years by international organizations have been grim. For example, climate change is expected to adversely impact the four pillars of food security—availability, access, utilization, and stability [World Economic Forum (WEF), 2022]. Furthermore, the Special Report on Climate Change and Land (SRCCL) acknowledged that ~21%–37% of total greenhouse gas (GHG) emissions are from food systems. Food system emissions comprise emissions from agriculture, land use, storage, transport, packaging, processing, retail, and consumption activities. This editorial explored the intricate interactions between climate change-water-land-food security.

Recent evidence suggests that climate crises adversely affect the global economy, particularly, agriculture, and this has compromised food production in Africa, with serious effects on the livelihood of smallholder farmers [Tantoh et al., 2022; World Economic Forum (WEF), 2022]. Importantly, ownership and access to sufficient arable land in countries like South Africa, Zimbabwe, and Namibia, among others have prevented smallholder farmers from improving food security. Smallholder farmers in South Africa, for example, have access to <2 hectares of land (Lowder et al., 2016).

Furthermore, the adaptation of smallholder farmers to climate change to enable improved livelihood earnings has received inadequate responsiveness from public authorities. Given the diversity of Sub-Saharan Africa, an understanding of the differentiated effects of climate and environmental changes on the water-land-food security nexus on its societies at different stages of development demands critical investigation. This comes with implications for the continent's success in achieving its sustainable development imperatives as espoused by the UN SDGs and the related "Leave No One Behind" agenda, coupled with the African Union's Agenda 2063 "The Africa We Want." This is in light of increasing evidence of climate-induced impacts on land-water-food security, which galvanizes advocacy toward climate justice coupled with addressing loss and damage. Nevertheless, collective measures to address climate change and diverse adaptation strategies are still lacking given the pace and scale of climate impacts. As the final decade of action of the SDGs gains traction, it is imperative to understand the dynamics of local climate and responses to climate variability and changes in the context of the water-land-food security nexus. Given that climate-induced extreme events are expected to increase in frequency and intensity, novel measures are vital and are informed by innovative research.

This editorial comprises findings of the complex interactions between climate change-water-land-food security nexus from different parts of sub-Saharan Africa. Water and land, for example, are central to ensuring effective and productive rural economies. Furthermore, they are vital to ensuring sustainable and productive rural economies. However, women, for example, who are directly responsible for water and food production at the household level, have limited access and restricted formal rights which hinder food security and exacerbate their vulnerability. Gender roles and their implications in climate change-water-land are therefore imperative for food security (Tantoh et al., 2021). Importantly, how the nexus operates in an environment of the increasing climate crisis, which increases the pressure on land, water scarcity, and food insecurity calls for a change that is essential for sustainability (Siakwah and Torto, 2022). Thus, understanding these relationships to enable sustainability requires a purposeful approach to the nexus. This facilitates the comprehension of the multi-level, contradictory, and diverse interests between and across the systems. However, the effects of climate change on food production coupled with growing inconsistencies in local knowledge systems have obliged some farmers to rely on seasonal climate forecasts to make informed decisions. This is because seasonal climate forecasts have improved food production in some rural communities, while others refuse to trust in this local intelligence and ill timing of forecast dissemination. Thus, demystifying the dynamics that hinder the use of seasonal climate forecasts is essential for dismantling the

barriers that undermine the use of seasonal climate forecasts which could obstruct the attainment of the UN SGGs two and five (Ebhuoma, 2022). In the same vein, differentiated agro-climatic zones have greatly influenced crop production and food security among smallholder farmers (Laishram et al., 2022). Numerous adaptation measures that address climate variability and build upon improved land and water management practices have the potential to reinforce resilience in the water-land food security nexus.

The findings and recommendations of these articles are timely and pertinent and should be of interest to our audience.

## Author contributions

HBT: conceptualization, visualization, design of research instruments, and writing original draft.

## Funding

This work is based on the research supported by the National Research Foundation (NRF) of South Africa (Grant Number 138441).

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Author disclaimer

The grant holder acknowledges that the opinions, findings, and conclusions or recommendations expressed in any publication generated by the NRF-supported research are those of the author(s) and that the NRF accepts no responsibility whatsoever in this regard.

## References

- Biswas, A. K., and Tortajada, C. (2019). Water crisis and water wars: myths and realities. *Int. J. Water Resour. Dev.* 35, 727–731. doi: 10.1080/07900627.2019.1636502
- Ebhuoma, E. (2022). Undermining the use of seasonal climate forecasts among farmers in south africa and zimbabwe: implications for the 1st and 2nd sustainable development goals. *Front. Sustain. Food Syst.* doi: 10.3389/fsufs.2022.761195
- Laishram, C., Vashishat, R. K., Sharma, S., Rajkumari, B., Mishra, N., Barwal, P. et al. (2022). Impact of natural farming cropping system on rural households-evidence from solan district of Himachal Pradesh, India. *Front. Sustain. Food Syst.* 6:878015. doi: 10.3389/fsufs.2022.878015
- Lowder, S. K., Scoet, J., and Singh, S. (2016). The number, size, and distribution of farms, smallholder farms, and family farms

worldwide. *World Dev.* 87, 16–29. doi: 10.1016/j.worlddev.2015.10.041

Siakwah, P. and Torto, O. (2022) Analysis of the complexities in the water-energy-food nexus: Ghana's bui dam experience. *Front. Sustain. Food Syst.* 6:734675 doi: 10.3389/fsufs.2022.734675

Tantoh, H. B., McKay, T. J. M., Donkor, E. F. and Simatele M. D. (2021) Gender roles, implications for water, land and food security in a changing climate: a systematic review. *Front. Sustain. Food Syst.* 5. doi: 10.3389/fsufs.2021.707835

Tantoh, H. B., Mokotjomela, T. M., Ebhuoma, E. E., and Donkor, F. K. (2022). Factors preventing smallholder farmers from adapting to climate variability in South Africa: lessons from Capricorn and uMshwati municipalities. *Clim. Res.* 88, 1–11. doi: 10.3354/cr01693

World Economic Forum (WEF) (2022). *The Global Risks Report*. 17th ed. Geneva: World Economic Forum. SBN: 978-2-940631-09-4.