

Water Use, Livelihoods, and Sustainability: Analysing Blue Water Footprints in Smallholder Vegetable Production in Northern Ghana

Susanna Mwinkum TANTUOYIR^{a, b, c}

^a Department of Environmental Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

^b Department of Agricultural Engineering, Institute of Technology, Hawassa University, Hawassa, Ethiopia

^c Department of Environment and Resource Studies, University of Business and Integrated Development Studies, Wa, Ghana



Orcid ID: <https://orcid.org/0009-0004-0796-8505>

Email Address: stantuoyir24@st.ubids.edu.gh

Tel: +233545864193

Introduction

Millions of African smallholders depend on rain-fed agriculture and natural resources, making them highly exposed to droughts, erratic rainfall, and heat.

Smallholder vegetable production in Northern Ghana is highly dependent on irrigation using water (surface and groundwater).

Increasing water scarcity, climate variability, and prolonged droughts threaten agricultural productivity and rural livelihoods.

Blue water is essential for sustaining vegetable production, food security, and household incomes in water-stressed environments.

Existing evidence primarily examines water use, livelihoods, or sustainability independently, with limited integration across these domains.

A comprehensive synthesis is needed to inform evidence-based policies for sustainable water management and climate-resilient agriculture, to achieve SDG2 and 4 by 2030.

Blue Water Footprint Review in Northern Ghana



Results Cont'd

Institutional and Policy Environment

- Weak governance
- Limited institutional coordination
- Address equitable water allocation

Market and Financial Factors

- Limited investment for improved irrigation technologies
- Price volatility
- Limited access to farmer credit

Behavioural Factors

- Pro conservation attitudes
- Strong social norms influenced irrigation decisions
- Farmers' risk perceptions influence water-management practices.

Conclusions

Blue water is fundamental to sustain smallholder vegetable production for rural livelihoods in Northern Ghana.

Sustainable water management requires integrated approaches that combine improved water accounting, equitable governance, financial inclusion, market support, and behavioural interventions.

Context-specific and locally adapted irrigation strategies are essential for improving water-use efficiency and strengthening livelihood resilience under climate variability.

This review provides guidance for policy, practice, and future research on sustainable water resource management in Northern Ghana and similar water-stressed regions.

Policy Opportunities

- Strengthen integrated water governance.
- Invest in climate-smart irrigation technologies.
- Improve financial inclusion and market access for smallholder farmers.
- Promote standardized water accounting and cross-sector planning.

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Acknowledgement

The author gratefully acknowledges the mentorship and academic support

- SustainFood Network Water-Energy-Food (WEF) Nexus
- Michigan State University (MSU)
- Pennsylvania State University (PSU)
- Stockholm Environment Institute (SEI)

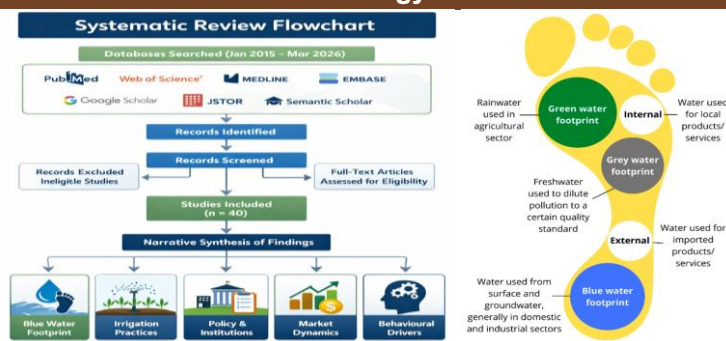


Objectives

This review aimed to:

- Synthesise evidence on blue water use in smallholder vegetable production.
- Examine links between water use, livelihoods, energy and sustainability.
- Identify factors influencing irrigation, energy and water-management decisions.
- Generate evidence to inform policy and sustainable agricultural practice.

Methodology



Results

Blue Water Footprint Assessment

- Considerable methodological variation was identified across studies.
- Consumptive-use approaches provided more accurate estimates than withdrawal-based methods.
- Standardized water accounting remains limited across studies.

Irrigation Practices

- Manual irrigation remains the dominant method.
- Fuel-powered pumps are widely used.
- Solar-powered irrigation is emerging, but adoption is limited.
- Manual irrigation predominates in Nandom, Lawra, and Wa East Districts of Ghana