

Nature-Based Solutions for Flood Management and Soil Stabilization in Mbale City, Uganda

Arnold Tigaiza, *Makerere University*

Namara Shannon, *Makerere University*

Shafic Mutegule, *Makerere University*

Emmanuel Balinda, *Makerere University*

Nagawa Bridget Tamale, *Makerere University*

Martin Mujjabi Mukasa, *Ministry of Water and Environment*

Godliver Businge, *Women Climate Centers International*

Comfort Hajra Mukasa, *Makerere University*

John Bosco Isunju, *Makerere University*



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Executive Summary

Background

Urban flooding poses a growing threat to lives, livelihoods, and infrastructure in many rapidly expanding cities across sub-Saharan Africa. In Uganda, Mbale City faces recurrent flooding that has worsened due to deforestation, poor waste management, encroachment on riverbanks, and weak urban planning. Nature-Based Solutions (NBS) - such as tree planting, afforestation, agroforestry, and soil conservation - provide sustainable alternatives for managing floods and enhancing climate resilience. However, little evidence exists on their implementation, acceptance, and effectiveness within this local context. This study sought to document existing NBS practices, assess community perceptions and acceptance, identify facilitators and barriers to implementation, and propose strategies for scaling up sustainable, community-driven flood management interventions.

Methods

The study used a concurrent mixed-methods approach, combining quantitative and qualitative techniques. Surveys were conducted among 481 residents across high-risk flood zones in Mbale City, complemented by six focus group discussions (FGDs), ten key informant interviews (KIIs), and a Photovoice exercise. Quantitative data were analyzed using Stata 17, while qualitative insights were thematically analyzed using Dedoose. Ethical approval and community consent were obtained prior to data collection.

Key Findings

The study revealed that most residents had experienced severe past flooding and anticipated even greater future flood impacts, resulting in a high perception of flood risk. Despite this awareness, knowledge of NBS remained low, with fewer than one-third of respondents demonstrating a high understanding of their functions and benefits. The most recognized and practiced NBS included tree planting, afforestation, agroforestry, crop rotation, and mulching. Over half of respondents expressed acceptance of NBS as viable flood management measures, though acceptance levels varied across socio-demographic groups. Women, younger individuals, and those who had directly experienced flood losses were more likely to support NBS initiatives. Key barriers to NBS implementation included poor waste management, riverbank encroachment, high implementation costs, lack of early warning systems, and weak institutional enforcement. Some participants also expressed doubts about the effectiveness of tree-based solutions, especially in the face of fast-moving floodwaters from Mount Elgon. Conversely, strong community willingness, NGO involvement, recognition of riparian buffers, and a growing demand for expert technical guidance were identified as major facilitators of success.

Recommendations and Implications

To strengthen NBS adoption and sustainability in Mbale City, the study recommends:

1. Institutional Strengthening: Establish and enforce riparian buffer regulations and integrate NBS into city-level land-use planning.
2. Community Empowerment: Form local environmental committees to oversee tree planting, maintenance, and monitoring.
3. Resource Support: Provide free or subsidized seedlings, tools, and training to encourage widespread community participation.
4. Education and Awareness: Conduct targeted sensitization campaigns linking NBS to flood reduction and livelihood improvement.
5. Integration with Infrastructure: Combine NBS with grey infrastructure (bridges, culverts, and drainage systems) to enhance overall flood resilience.

Conclusion

This study demonstrates that Nature-Based Solutions hold strong potential for sustainable flood management and soil stabilization in Mbale City. However, their success depends on addressing socio-economic, institutional, and governance barriers while leveraging community enthusiasm and partnerships. With adequate policy support, technical guidance, and public participation, NBS can serve as a cornerstone for building climate-resilient urban systems in Uganda and similar settings.