An integrated approach for improving adaptation of smallholder production systems to climate variability: Evidence from horticultural production in Ghana

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Background

- Agriculture in Africa is vulnerable to climate variability and change (Stanturf et al. 2011)
- African countries including Ghana lag the rest of the world in adapting to climatic changes (Ndamani & Watanabe, 2017).
- There is growing appreciation of links between climate change and poverty, which explores how livelihoods might be affected (Ziervogel et al., 2006)
- Comprehensive research approach for enhancing smallholder farmers' decision making in implementing proposed adaptation options from vulnerability studies, given their limited resources to manage their response to climate variability more effectively at the farm level is limited.
- Studies on vulnerability in Ghana have not yet addressed horticulture which forms an important part of total agricultural produce in Ghana (Nyantakyi-Frimpong and Bezner-Kerr 2015)
- There is need for research which combines theoretical insights from livelihood analysis with an appraisal method on gains and losses arising from an investment in adaptation options as an analytical framework for understanding the concept of vulnerability to climate variability for improvement adaptation of smallholder production systems.

Research question and Aim

- **Research question:**

How vulnerable are smallholder producers to climate variability and given limited resources, how can adaptation be improved in Ghana's horticultural production system?

- **Aim:**

To assess vulnerability of smallholder producers to climate variability and economically evaluate adaptation strategies identified for improvement decision-making for sustainable development of horticulture in Ghana.

Research Objectives

- To identify climate exposures in the study area (1980 to 2015).
- To assess vulnerability of smallholder horticulture farmers to climate variability in Ghana
- To identify and prioritize adaptation strategies that could reduce the impact of climate variability on smallholder horticultural production.
- To evaluate the costs and benefits of top five adaptation practices identified for improvement of smallholder farmers' decision making process on adaptation
- To provide policy recommendations in reducing vulnerability and enhancing resilience of smallholder farmers to climate variability in Ghana

Methodology

- Study will be carried out with smallholder farmers involved mainly in seasonal fruits and vegetable crop production at North Tongu and Keta municipalities in the Volta Region of Ghana, West Africa
- Mixed methods approach that combines field surveys using questionnaires, in-depth interviews, focus group discussions and field observations will be employed
- Climate data on daily minimum and maximum temperatures and daily rainfall for the study areas will be obtained from Ghana Meteorological Agency to analyze climatic trends and extreme events
- Participatory exercises including relevant stakeholder engagements will be undertaken during vulnerability assessment to rank, validate and prioritize proposed adaptation strategies
- Cost Benefit Analysis will be used to evaluate the Net Present Value (NPV) and Internal Rate of Return (IRR) for top five practices identified
- Review of literature and other scientific outputs will be explored to examine the effectiveness of existing institutional arrangements and policies for improvement of climate variability and change adaptation



Theoretical and conceptual framework

- Vulnerability concept has been surrounded by debate and extensive from natural hazards discipline (White and Haas, 1975), to more social ecological systems (Blaikie et al., 1994) and sustainable livelihoods framework (Turner et al., 2003).
- Concept of Sustainable Livelihood (SL) involves factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner. (Turner et al., 2003; Scoones, 1998)
- This study integrates Cost Benefit Analysis (CBA) and sustainable livelihoods under the concept of sustainable development to enhance smallholder farmers' decision making in implementing proposed adaptation options given farmers' limited resources (Fig. 1).

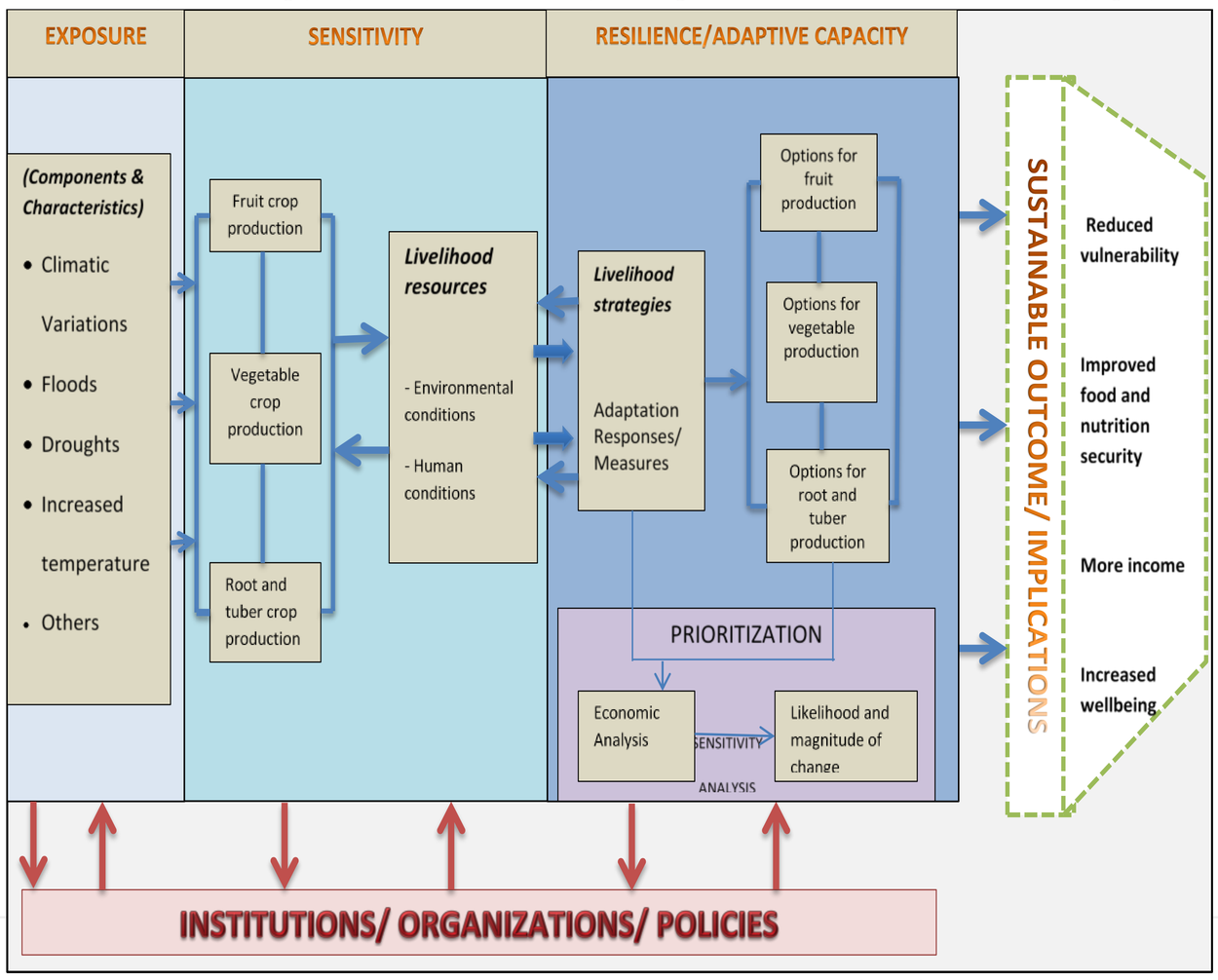

Figure 1: Operational conceptual framework derived from Tuner et al. (2003) and Scoones (1998)

Expected outcomes

- Improve understanding and knowledge on sensitivity of horticultural production to climate variability.
- Improve understanding on potential climate adaptation strategies for smallholder production systems.
- Enhance smallholder farmers' planning and decision-making process to improve adoption of adaptation strategies to improve crop production.
- Contribute to knowledge on the development of integrated assessments to support decision-making on climate change adaptation and sustainable development.
- Direct development initiatives on investment for responding to a changing climate
- Provide guided policy recommendations to promote climate adaptation in horticultural production and mainstream it into agricultural development strategies and plans in Ghana

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