

Appendices

Appendix 1: Smallholder Farmers' Survey

Smallholder Farmers' Perception and Adaptation to Climate Change in the Lake Victoria Basin, Kenya: A Mixed-Method Approach

Dear respondents,

Thank you for your interest in participating in this survey. You are about to participate in a study on “**Smallholder Farmers' Perception and Adaptation to Climate Change in the Lake Victoria Basin, Kenya: A Mixed-Method Approach**”. This research is part of Lilian Wanyonyi's PhD study on building resilience of smallholder farmers in Lake Victoria Basin, Kenya. Your contribution will ultimately help improve scientific research and enhance smallholder farming amid climate change. For questions, please contact lilian.wanyonyi@uantwerpen.be. You will need about 20-30 minutes to complete the entire survey. Don't hesitate to ask questions if something is unclear.

Consent form.

I hereby confirm that I have been informed about the study and have received a copy of the "Information for Participants" and am now turning to the consent form. I have read and understood the information. The researcher has provided me with sufficient information regarding the conditions and duration of the study, as well as its effect.

I understand that I may discontinue my participation in this study at any time after informing the researcher, without any harm to me. I am aware of the purpose for which the data I provide will be collected, processed and used in the context of this study and that it will be kept confidential.

I consent to the collection, processing and use of this data as described in the participant information sheet. I voluntarily consent to participate and cooperate in this study

- ☐ Yes, I do consent
- ☐ No, I do not consent

Section A: Demographic Data

1. Which county do you come from?

- ☐ Kakamega
- ☐ Siaya
- ☐ Transnzoia

2. What is the gender of the household head?

- ☐ Male
- ☐ Female

3. What is your current age?

4. What is your marital status?

- ☐ Never married
- ☐ Divorced
- ☐ Widowed
- ☐ Married

5. What is the size of your household?

6. What is your monthly average household income from farming activities?

- ☐ <5000
- ☐ 5,000-10,000
- ☐ 10,001-20,000
- ☐ 20,001-30,000
- ☐ 30,001-40,000
- ☐ >40,000

7. What is the level of education you have completed?

- ☐ No formal education
- ☐ Primary school
- ☐ Secondary school
- ☐ Tertiary level

8. Is farming your primary source of income?

- ☐ Yes
- ☐ No

9. Can you elaborate on your answer as to why you chose this option?

Section B: Land Characteristics

1. What is the size of your (farm) land in hectares?

2. What is the nature of your land ownership?

☐

Inheritance

☐

Renting

☐

Purchasing

☐

Other (specify)

3. For how many years have you been farming?

4. Which type of farming do you practice?

☐

Crop farming

☐

Livestock Farming

☐

Fish farming

☐

Mixed Farming

5. Which of the following statements best explains the various crop(s) on your farm?

	I was growing three years ago	I am growing now	Not growing anymore	Will grow in the future
Maize	☐	☐	☐	☐
Sorghum	☐	☐	☐	☐
Millet	☐	☐	☐	☐
Beans	☐	☐	☐	☐
Potatoes	☐	☐	☐	☐
Tomatoes	☐	☐	☐	☐
Kales	☐	☐	☐	☐
Cassava	☐	☐	☐	☐
Groundnuts	☐	☐	☐	☐
Other	☐	☐	☐	☐

6. What were the reasons for your changing of some crops above?

- ☐ I changed because the new variety has higher yields
- ☐ I changed because the new yield matures faster
- ☐ I changed because the new yield has more market value
- ☐ I changed because the new variety is drought-resistant
- ☐ I changed because the new variety provides more nutrients
- ☐ I changed because the new variety is pest-resistant
- ☐ I changed because of a reduction in farm size
- ☐ I changed because of the availability of labour
- ☐ I changed because the new variety has short maturity
- ☐ Others (specify)

7. Do you keep livestock?

- ☐ Yes
- ☐ No

8. How many heads of the following livestock do you have?

- ☐ Cattle
- ☐ Goats
- ☐ Poultry
- ☐ Sheep
- ☐ Others (specify)

9. Do you get cash from livestock farming?

☐ Yes

☐ No

10. Do you have any off-farm income?

☐ Yes

☐ No

11. What are your sources of off-farm income? Multiple answers apply

☐ Non-agriculture self-employment

☐ Non-agriculture wage labour

☐ Salaried worker

☐ Retired

☐ Others (specify)

12. Do you invest your off-farm income in agricultural activities?

☐ Yes

☐ No

Section C: Access to services

1. Are you a member of any local community co-operatives or groups?

☐ Yes

☐ No

2. Were any of these groups initiated by your community?

☐ Yes

☐ No

4. Why do you (or a household member) belong to this group? Multiple answers apply

- ☐ Input provision
- ☐ Improve access to facilities
- ☐ Improve link to markets
- ☐ Peer support
- ☐ Sharing experiences
- ☐ Meet other farmers
- ☐ Meet experts (e.g. researchers)
- ☐ Learning/training; testing new practices
- ☐ Access to information (markets, weather)
- ☐ Other (specify

5. To what extent does your participation in these groups provide useful knowledge to improve your farming?

- ☐ Not at all
- ☐ A little
- ☐ Average
- ☐ A lot
- ☐ Completely

6. In the past seasons, did you access credit services for your farming practices?

- ☐ Yes
- ☐ No

7. What are your preferred sources of credit services? (Please rank the sources given)

- ☐ Micro-Finance institutions
- ☐ Banks
- ☐ SACCO
- ☐ Chamas
- ☐ Farm related business
- ☐ Mobile money lenders
- ☐ Family members
- ☐ Friend

8. If you need to borrow money to buy fertilizer, seed, and other inputs for crop production how likely is it that you will be able to borrow money from your likely sources of credit?

- ☐ Extremely likely (about 100%)
- ☐ Quite likely (about 75%)
- ☐ Neither likely or unlikely (about 50%)
- ☐ Quite unlikely (about 25%)

9. How far is the market from your farm/house?

10. Do you participate in farmer training?

- ☐ Yes
- ☐ No

11. What is the frequency of your participation?

- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ Annually

12. Do you have access to extension services?

☐ Yes

☐ No

13. Which stakeholders are involved in extension services?

☐ Government officials

☐ NGOs

☐ Farmer groups

☐ Others(specify)

14. What is the frequency of the extension services in a month?

15. Do you have access to an all-weather road network?

☐ Yes

☐ No

16. Are household goods (e.g. crops, livestock, land) insured against loss or damage?

☐ Yes

☐ No

17. Who is providing the insurance for your farming activities?

☐ Insurance company

☐ Financial institution

☐ NGO

☐ Government

☐ Cooperatives/farmers' associations

☐ Others

18. Why have you not purchased farming insurance for your farming?

- ☐ No need for insurance/have enough money or assets
- ☐ Cultural beliefs/superstitions
- ☐ Not aware of any
- ☐ Don't understand how insurance work
- ☐ Lack of funds to buy one
- ☐ Previous bad experience
- ☐ Insurance is not available
- ☐ Others

Section D: Climate Change Perception

1. Are you aware of climate change?

- ☐ Yes
- ☐ No

2. Do you perceive the statement that 'climate change is happening?' Please pick one response below

- ☐ I don't believe the statement
- ☐ I have a lower level of belief in the statement
- ☐ The statement might be true
- ☐ I believe the statement
- ☐ I strongly believe the statement

3. Is there any awareness made in your community on climate change?

- ☐ Yes
- ☐ No

4. Please indicate the extent to which you perceive changes over the past years with the following indicators of climate change.

	Increase	Decrease	No change	Don't know	Unpredictable
Changes in temperatures	☐	☐	☐	☐	☐
Changes in the amount of rainfall	☐	☐	☐	☐	☐
Increased warm days	☐	☐	☐	☐	☐
Changes in Rainy days	☐	☐	☐	☐	☐
Increase in drought	☐	☐	☐	☐	☐
Increase in floods	☐	☐	☐	☐	☐
Reduction in crop yields	☐	☐	☐	☐	☐
Changes in diseases and pests	☐	☐	☐	☐	☐
Changes in water availability	☐	☐	☐	☐	☐
Changes in water quality	☐	☐	☐	☐	☐

5. What is your perception of the causes of climate change? Multiple answers apply

- ☐ Cutting down trees
- ☐ Punishment from God
- ☐ Natural courses
- ☐ Sign of the end times
- ☐ Burning of bushes
- ☐ Destruction of atmospheric composition
- ☐ Burning of fuel
- ☐ Urbanization
- ☐ The western world effect

6. What impact has climate change had on your agricultural production? Multiple answers possible

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
My crop yields have decreased	☐	☐	☐	☐	☐
I have witnessed an increase in pests and diseases	☐	☐	☐	☐	☐
It has reduced the soil fertility of my farm	☐	☐	☐	☐	☐
It has led to water shortages	☐	☐	☐	☐	☐
Others (specify	☐	☐	☐	☐	☐

7. Do you receive climate-related information?

- ☐ Yes
- ☐ No

8. What is your source of information on climate change? Please drag and drop the items on your left to the right in order of their significance to you.

Most important	Moderately important	Least important
Electronic media such as TV, radio and phones	Electronic media such as TV, radio and phones	Electronic media such as TV, radio and phones
Input shop supplier	Input shop supplier	Input shop supplier
Friends/Relatives/Neighbours	Friends/Relatives/Neighbours	Friends/Relatives/Neighbours
Own observation	Own observation	Own observation
Local groups/gatherings/meetings	Local groups/gatherings/meetings	Local groups/gatherings/meetings
Traditional/indigenous knowledge	Traditional/indigenous knowledge	Traditional/indigenous knowledge
NGOs project officers	NGOs project officers	NGOs project officers
Government agricultural extensions	Government agricultural extensions	Government agricultural extensions
Demonstration plot	Demonstration plot	Demonstration plot
Farmer field day/agricultural show	Farmer field day/agricultural show	Farmer field day/agricultural show

9. On average, how useful was the information received from the first most important source?

- ☐ Useless
☐ Not very useful
☐ useful
☐ Very useful

10. Which climate change information do you receive on seasonal weather changes? Multiple answers apply

- ☐ Rainfall
☐ Droughts
☐ Wind
☐ Heat Waves
☐ Hailstorms
☐ Thunderstorms
☐ Others (specify)

11. Which response do you take when you receive seasonal weather forecast information? (Multiple answers apply)

☐

Land preparation

☐

Change of crop type

☐

Change of crop variety

☐

Changing types of inputs

☐

Water harvesting

☐

Others (specify)

Section E: Climate Change Adaptation and Barriers

1. Please rate the degree of adoption of the following climate change adaptation strategies in your farming activities from the past, present and future

[illegible]

2. How do you feel about the following dimensions as barriers to your adaptation options? Please circle the relevant responses

	Not a barrier (1)	Moderately a barrier (2)	Significant barrier (3)
Shortage of labour	☐	☐	☐
Shortage of farmland	☐	☐	☐
Traditional beliefs /practices	☐	☐	☐
High cost of fertiliser and other farm inputs	☐	☐	☐
Non-accessibility to credit services	☐	☐	☐
Inability to access government subsidies	☐	☐	☐
High cost of irrigation facilities	☐	☐	☐
Low-income levels		☐	☐
Uncertainty of weather patterns	☐	☐	☐
Soil fertility for crops on the farms	☐	☐	☐
Lack of crop insurance services	☐	☐	☐
Land ownership/ tenure	☐	☐	☐
Lack of contact with agricultural extension services	☐	☐	☐
Inaccessibility to agricultural markets	☐	☐	☐
Lack of information on weather and climate	☐	☐	☐

End of survey

APPENDIX 2: Focus Group Discussions

Smallholder Farmers' Perception and Adaptation to Climate Change in the Lake Victoria Basin, Kenya: A Mixed-Method Approach

County Sub-County Date

Number of Respondents

Instructions

1. Introduce the research team and allow participants to briefly introduce themselves.
2. Clearly explain the aim of the study.
3. Read and translate the consent form where necessary to participants before they fill it out. Emphasise that participation is voluntary
4. Assure participants that their information will remain confidential and will be used only for research.
5. Set some ground rules for the discussions (respect everyone's views, one person speaks at a time, no right or wrong answers, stay on topic, phones on silent. Etc)
6. Ask if there are any questions, then begin the discussion.

Focused Group Discussion Guide

Section A: Background information

1. For how long have you been practising farming? Probe: Length of time in years/size of land/ownership of the land/types of crops/ types of farming/, labour, types and number of livestock

Section B: Awareness of Climate Change

2. Have you noticed any changes in the climate over the years? Probe: rainfall, temperatures, droughts and winds
3. What do you think is causing these changes?
4. What does climate change mean to you?
5. How do you feel about these changes? Probe: temporary or long-term.

Section C: Impact on Farming

6. How have these changes in climate change affected your farming? Probe: crops, livestock, yields, seasons.
7. What are the main challenges you face because of these changes?

Section D: Knowledge on Climate Change Adaptation

8. Have you changed your farming activities as a result of these changes?
9. Have you used any way(s) to adapt to the above-mentioned climate change risks? Probe for both on-farm and off-farm practices and benefits
10. What factors motivate or discourage you from adopting new practices? Probe on drivers for adoption and disadoption.

Section E: Access to services

11. Do you receive any information about climate change? Probe: Sources/stakeholders /frequency of dissemination.

12. Do you receive extension services or training on your farming practices? Probe on sources/stakeholders, frequency, and areas covered.
13. Which is your nearest market where you sell your surplus food produce and buy farm inputs and or equipment? Probe: the distance and accessibility.
14. Do you belong to any farmer groups or cooperatives? probe: benefits, challenges.
15. Do you have access to credit or insurance? Probe: sources, usefulness, challenges.

Section F: Outcomes and livelihoods

16. How has the adaptation of the above strategies improved your livelihood? Probe on (food security, income, wealth and poverty levels, etc)

Section G: Future outlook

17. What do you think farming will look like in future?
18. What are your future requirements for you to be climate resilient? Probe: What would you need in future to better cope or adapt to the current climate change scenario on your farm?
19. Which advice could you give to your fellow smallholder farmers in the face of the changing climate?

Appendix 2: Ethical Clearance Certificate

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Ref No: 637533	Date of Issue: 25/April/2023
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