

## FISH FARMING SURVEY

Dear respondent,

This survey is meant to collect data for scientific research to contribute to the available literature on how to improve the productivity of fish farming in the Rwenzori region. The study intends to answer questions related to the status of production in fish farms (farm inputs, outputs), perceptions of fish farmers, water quality management, and other facilitating services that enhance productivity in fish farming. The study aims at understanding the drivers of the existing aquaculture productivity pathways as well as the level of awareness, attitude, and practice regarding the importance of water quality management in fish farming.

All information obtained from the respondents will be handled with a very high degree of confidentiality and that is why we shall use Farmer IDs instead of the names. No information shall be obtained to hurt the respondent or to be used against him/her in the courts of law. Furthermore, participation in the survey is voluntary, so feel free to inform the enumerator in case you do not feel comfortable participating in the survey.

If you agree to participate in this survey, kindly provide honest and reliable information to each question.

Would you like to participate in this survey? Yes ☐ No ☐

Date: \_\_\_\_\_

If the respondent answers **NO** to the above question, please do not proceed with the interview

Enumerator's Name \_\_\_\_\_

District \_\_\_\_\_ GPS COORDINATES \_\_\_\_\_

Village \_\_\_\_\_ Sub-county \_\_\_\_\_

Altitude \_\_\_\_\_

Farmer ID \_\_\_\_\_ Farmer's contact \_\_\_\_\_

Time started \_\_\_\_\_ Time ended \_\_\_\_\_

## SECTION 1.0: FARM AND FARMER CHARACTERISTICS

1.	What is the name of your company/farm/institution?	
2.	In which category does your company/farm/institute belong? <i>(Tick one of the following)</i>	
		<b>Code</b>
	1= Individual fish farm	
	2= Private sector /Company	
	3= Government Agency/parastatal	
	4= University/training institute/College	
	5= Research institute/center	
	6= Civil society/Association/Group	
	7=International Development Agencies	
	8=Non-governmental Organization	
	9= Other .....	

	QUESTION	CODE	ANSWER
3.	Sex of the respondent	<u>1= Male</u> <u>2=Female</u>	
4.	Age of the respondent	Enter Number	
5.	What is the highest educational level obtained by the respondent?	1= No formal education 2=Primary education level 3= Secondary education level 4=Tertiary education level 5= Others please specify	
6.	How many members actively participate in fish farming (group)?		

7. How many of them are in the following age groups?

Age group	Number of members in the age group	
	Male	Female
15-24		
25-34		
35-44		
45-54		
>55		

8. What is your average monthly income (Shs)\_\_\_\_\_?

9. Approximately how much of your total income is from selling farmed fish?

1= Almost all

2= Most of it

3= About a half

4= Less than half

5= A quarter

6= Less than quarter

7= None

Please specify the amount \_\_\_\_\_

**10. Which other activities contribute to part of your income?**

Activity	Code
1= Crop husbandry 2= Animal husbandry 3= Salary earner 4= Casual worker 5= Business 6= Fishing 7= Others (please specify) 9= None	

**11.** How much land do you own? \_\_\_\_\_ (acres)

**12.** How much land do you rent? \_\_\_\_\_ (acres)

**13.** Land allocation

Purpose of the land	Number of Acres
Fish farm	
Other livestock production	
Forestry	
Crop Production	
Rented out to others	
Other (Specify)	

<b>14.</b>	How long have you been in fish farming?	Years	
<b>15.</b>	How many fish production cycles have you completed?	Number	
<b>16.</b>	Approximately how much of your harvest goes to market?	1= Almost all 2= Most of it 3= About half 4= Less than half 5= None	

<b>17.</b>	What fish culture methods do you use at your fish farm?			
	<b>Culture method</b>	<b>Specific types (tick)</b>		
	1= Monoculture	<input type="checkbox"/>	Single-sex	<input type="checkbox"/> Mixed-sex
	2= Polyculture	<input type="checkbox"/>		

<b>18.</b>	What fish production activities are you involved in at your farm? <i>(Tick all that apply)</i> .		
		<b>Code</b>	
	1= Grow-out aquaculture		
	2= Hatchery		
	3= Recreation		
	4= Other (please specify)		

**SECTION 2.0: FISH PRODUCTIVITY** *(In this section, information about productivity/yield and production characteristics/factors of the previous complete fish production cycle will be collected).*

Fish species and code	Aquaculture facility				Feed	How long was the production cycle (months)?	The average size of harvested fish	How much did you produce	Did you sell fish from the last production cycle 1=yes 2=NO (skip to next fish species)	If yes, Sales of fish	
code	Culture facility	Size(m <sup>2</sup> or m <sup>3</sup> )	Depth Min/Max	Number of facilities	Feed type code			Quantity (kg)		Quantity (kg)	How much did you receive in a sale? (Ugx)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
<b>Fish species codes (1)</b> 1=Nile tilapia 2=African catfish 3=Mirror Carp 4= Other (please specify)	<b>Culture facility codes (2)</b> 1=Earthen Ponds 2= Lined ponds 3= Concrete tanks 4= Plastic tanks 5=Cages 6= Other (please specify)				<b>Feed types (6)</b> 1= Commercial extruded floating pellets 2= Commercial sinking pellets 3= Homemade feed 4= Vegetables 5= Food scraps 6= Green water /fertilization 7= No feeding 8= Other (Please specify)						

13. Do you change the water during a production cycle? ☐ Yes ☐ No

14. If No why?

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How much of the total volume do you exchange (refill) in each culture facility?

Culture facility	15. Water exchange frequency	16. Water exchange/refill ratio (%)

**SECTION 3.0: WATER AVAILABILITY & QUALITY MANAGEMENT** (*In this section, information about the water source, quantity, and quality will be collected*).

1.	What is/are the main source(s) of water for the fish farm? ( <i>Tick all that apply</i> )		Code
	1=Rainfall		
	2=Underground/well		
	3=Stream/River		
	4=Lake		
	5=Swamp		
	6=Municipal/piped water		
	7=Seepage from the water table		
8=Other .....			

2.	In your opinion, what water-related aspects are more important in fish farming?		Code
	1= Water quantity		
	2= Water quality		
3= Both are equally important			

**3.0.1 Water quantity & source reliability** (*The responses to this subsection will be used to assess the reliability of water resources for fish farming*).

3.	Does the water source normally supply enough water to permit you to practice fish culture all year round?	1= YES (skip to 38) 2= NO	
4.	If no, indicate the months when the water supply is insufficient.		

5.	What is your solution to the problem of water shortage?	1= Reservoir 2= Alternative water Source (please specify) 3= Abandon production 4= Other (please specify)	
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### SECTION 3.1: KNOWLEDGE, PERCEPTIONS, & PRACTICE ON WATER QUALITY MANAGEMENT

#### SECTION 3.1.1: KNOWLEDGE & AWARENESS ABOUT WATER QUALITY *(The responses to this section will be used to assess the knowledge of farmers about water quality monitoring & management).*

1. What is good water quality for fish farming?

	Code
1= Very clear /transparent	
2= Visibly clean	
3=Green water	
4= With favorable water parameters (pH, DO, Temperature, Ammonia, turbidity, etc) for fish	
5= Other (please specify)	

2. What is bad water quality for fish farming?

	Code
1= Unclear	
2= Visibly dirty	
3= Badly colored	
4= With unfavorable water parameters (pH, DO, Temperature, Ammonia, turbidity, etc) for fish	
5=Other (please specify)	

3. Where have you heard about water quality? Tick as many as you feel apply:

1= Television		8= Government agencies	
2= Radio		9= CBO training	
3= Newspapers		10= Friends/ family/fellow fish farmer	
4= Internet		11= Local council	
5= Specialist publications/academic journals		12= Fisheries/extension officer	
6= School/ college/ university		13= Others (Specify)	
7= Never heard of it			

4. Which of these are important water quality parameters in fish farming?

1= Oxygen		7= Temperature	
2= Colour		8= pH	
3= Plankton /green		9= Total alkalinity	
4= Odour		10= Total hardness	
5= Turbidity		11= None of the above	
6= Ammonia		12= Other (please specify)	

5. Does water quality influence fish production? ☐ Yes ☐ No (If no skip to 7)

6. How does water quality influence fish production?

	Code
1= Affects appetite of fish	
2= Affects health of fish	
3= Affects the growth rate of fish	
4= Other (please specify)	
5= None of the above	

7. Does water quality dictate the fish species you can rear? (If no, skip to 9)

☐ Yes ☐ No

8. How does water quality dictate the species one can rear?

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9. When should water quality in the culture facility be tested?

	Code
1= When fish are sick	
2= When refuse to eat	
3= Whenever a technical person comes around	
4= Never	
5= Regularly (please specify when)	
6= Other (please specify)	

10. What causes water quality to deteriorate?

	Code
1= Excretion by fish	
2= Adding feeds	
3= Activities upstream	
4= Adding chemicals or treatments	
5= None of the above	
6= Other (please specify)	

11. Does the quality of fish feed influence water quality?

☐ Yes ☐ No (Skip to 13)

12. How does the quality of feed influence water quality?

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13. What can be done to prevent water quality from deteriorating?

Code
1= Water exchange
2= Good feed management
3= Proper water quality monitoring & management
4= Nothing
5= Others (please specify)

14. How can poor water quality in fish farming systems be rectified?

Code
1= Remove the fish
2= Good feed management (stop feeding)
3= Employ water quality management techniques (aeration, biofilters, etc.)
4= Liming
5= Water exchange
6= Nothing can be done
7= Other (please specify)

15. What kind of fish farming systems are more likely to experience poor water quality?

Code
1= Tanks
2= Cages
3= Ponds
4= All the above
5= None of the above
6= Other (please specify)

16. In your opinion, does farming of fish cause water pollution? (If no skip to 18)

☐ Yes ☐ No

17. How does fish farming cause water pollution?

Code
1= Excretion products of fish
2= Uneaten food products
3= Chemicals used in aquaculture (antibiotics, hormones)
4= None of the above
5= Other (please specify)

18. Is it necessary to treat water before releasing it back into the environment? (if no skip to 20)

☐ Yes ☐ No

19. Why is it necessary to treat fish farm effluent before releasing it back to the environment?

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20. Is it necessary to keep records of water quality? (If no, skip to the next section).

☐ Yes ☐ No



21. Why is it necessary to keep records of water quality?

	Code
1= For future reference in terms of problems	
2= For comparisons	
3= For management purposes	
4= Other (please specify)	

**SECTION 3.1.2 PERCEPTIONS TOWARDS WATER QUALITY MONITORING & MANAGEMENT** *(The responses to this section will be used to assess the attitude of farmers towards water quality monitoring & management).*

	1=Strongly agree, 2=Agree, 3=Undecided, 4=Disagree, 5=Strongly disagree	Code
1.	Determining the quality of water before setting up a fish farm is important.	
2.	Activities upstream can influence the quality of water at a fish farm.	
3.	Good water quality is important for the success of a fish farm.	
4.	It is not necessary to manage and monitor water quality at a fish farm.	
5.	It is necessary to monitor the quality of water in my fish farm.	
6.	It is necessary to determine the quality of water before using it for fish farming.	
7.	It is necessary to manage the quality of water at a fish farm.	
8.	Feeding fish influences the quality of water.	
9.	Feeding management is important for ensuring good water quality.	
10.	It is necessary to keep records of water quality at a farm.	
11.	Proper water quality management can improve fish production at a fish farm.	
12.	Investing in managing the quality of water at a fish farm is necessary.	
13.	Investing in managing water quality is very expensive.	
14.	Water quality changes at a fish farm impact fish production.	
15.	Water quality at a fish farm can deteriorate at any point in time.	
16.	It is necessary to treat farm effluent before releasing it to the environment.	
17.	Untreated fish farm effluents can harm the environment.	

**SECTION 3.1.3: PRACTICE OF WATER QUALITY MONITORING & MANAGEMENT** *(The responses to this subsection will be used to assess the level of practice of water quality monitoring & management among fish farms).*

	Question	Code	Response
1.	Did you carry out a quality test of your water source before setting up the fish farm?	1=Yes 2 =No	
2.	Do you monitor water quality at your fish farm?	1 =Yes 2 =No	
3.	Did you consider the water quality when selecting which fish species to culture?	1=Yes 2=No	
4.	What water quality management techniques do you use at your fish farm?	1=Biofilter 2=Mechanical filtration 3=Fertilization 4=Water exchange 5=Heating 6=Liming 7=Aeration 8=Other (specify) 9=None	

5.	Which of these water quality parameters do you monitor?	1=Dissolved Oxygen 2=pH 3=Ammonia 4=Temperature 5=Turbidity 6=Total Alkalinity 8=Other..... 9=None	
6.	Which of these water quality testing kits/methods do you own at your farm?	1=Oxygen meter 2=pH meter 3=Ammonia testing kits 4=Temperature meter/Thermometer 5=Turbidity meter 6=Secchi disk 7=Conductivity meter 8=Observing fish behavior 9=Other..... 10=None	
7.	How often do you monitor these water quality parameters?	1=Always 2=Often 3=Sometimes 4=Rarely 5=Never	
8.	Do you keep records of water quality?	1=Yes 2=No	
9.	Which of the following effluent treatment techniques do you use at your farm?	1=Artificial wetland 2=Treatment ponds 3=Biofilter 4=None 5=Other.....	

### 3.1.4 Incidences of water quality problems

1.	Do you notice changes in water quality?	1=YES (continue below) 2=NO (skip to section 4)	
2.	If yes (in Question 1) please specify the water quality issue(s).		
3.	When are these water quality changes experienced?	1=Rainy season 2=Sunny season 3=Anytime 4=Other (Specify)	
4.	What remedies were used to rectify the water quality?		
5.	Have you experienced any fish losses due to bad water quality?	1=YES 2=NO	

**SECTION 4.0: IMPACT OF MICROCLIMATE ON FISH PRODUCTION** *(The responses to this subsection will be used in complement to CHIRPS satellite data to assess the impacts of microclimate on the productivity of smallholder fish farms).*

	Question	Code	Response
1.	Did you consider the temperature of the region before starting fish farming?	1=Yes 2 =No	
2.	Did you consider the temperature of the region when selecting which fish species to rear?	1=Yes 2 =No	
3.	Did you consider the rainfall of the region before starting fish farming?	1=Yes 2 =No	
4.	Did you consider the rainfall of the region when selecting which fish species to rear?	1 =Yes 2 =No	
5.	Have you ever experienced any fish losses due to climatic hazards?	1=Yes 2=No	
6.	Which of these climatic hazards has led to fish losses at your farm in the past?	1=Floods 2=Poor water turbidity 3=Drought 4=Very high temperatures 5=Very low temperatures 6=Mudslides 7=None of the above 8=Other (specify)	
7.	How often have you faced such hazards?	1=Never 2=Rarely 3=Neutral 4=Frequently 5=Very frequently	
8.	In which season do you usually experience these hazards?	1=Dry season 2=Wet season 3=Both dry & wet season 4=Other .....	

9. What are your remedies to the climate hazard(s) identified? (Question 6)

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10. In your opinion, does climate have an impact on fish production at your farm?

☐ Yes ☐ No

11. If yes, how does climate impact fish production at your farm?

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**SECTION 5.0: CURRENT BARRIERS AFFECTING FISH FARMING** (*The responses to this section will be used to identify barriers that affect fish farming production and development*).

Indicate your level of agreement or disagreement with the following statements:

	<b>1 =Strongly Disagree, 2 =Disagree, 3 =Neutral, 4=Agree, 5=Strongly Agree</b>	
1.	Access to fingerlings	
2.	Price of fingerlings	
3.	The quality of fingerlings	
4.	Fish don't grow to a large enough size	
5.	The fish takes a long time to grow	
6.	Access to fish feed	
7.	Price of fish feed	
8.	The quality of fish feed	
9.	Fish diseases	
10.	The selling price of fish in markets	
11.	Access to fish markets	
12.	The farm is located in a remote location	
13.	Some people here do not eat fish because of their culture	
14.	Access to sufficient supplies of water	
15.	Water quality during certain seasons of the year (during the rainy season)	
16.	Access to fish farming information	
17.	Limited support from the extension personnel (fisheries officer)	
18.	Limited access to credit services	
19.	Access to skilled labour services	
20.	Skilled labour is expensive	
21.	Security (theft)	
22.	Fish escapes ( <b>please specify when</b> )	
23.	Predators of fish ( <b>please specify</b> )	
24.	Fish die ( <b>please specify cause</b> )	
25.	Farmed fish is less delicious than wild-caught fish	
26.	Fish farming is a highly risky practice	
27.	Fish farming is an economically viable and profitable activity	
28.	I would encourage my friends and family to participate in fish farming	
29.	I have a good feeling about fish farming	
30.	Other activities are more profitable than fish farming	
31.	Other reasons (please specify...)	

Thank you for your participation in this survey!