

**THE USE OF SLUICE GATES FOR STOCK ENHANCEMENT AND DIVERSIFICATION OF LIVELIHOODS**

**Methodologies for Understanding Institutional, Economic and Social Aspects of Sluice Gate Management**

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## **Objectives**

- Understand the economic role of fish and fishing in the community.
- Understand the social/institutional framework of fisheries, farming and water control.
- Understand the social effects of altered sluice gate operation.
- Understand community expectations/views/hopes for fishing and farming.

## **Outputs**

- Analysis of the information with a view to developing a water management protocol for uptake by local participating communities and institutions.
- Development of a simple dissemination package for non-government organisations or government extension services to promote wider uptake of the protocol.

## **Activities**

- Exploratory field visit to familiarize field workers with project areas.
- Investigation of existing rice farming and fishing institutions both inside and outside compartments around the sluice gates.
- Participatory analysis of community views and expectations with regards to fishing and farming, leading to an understanding of decision-making processes with regards to water control.
- Interactive consultation with participating communities as the information is synthesized and the protocol developed.
- Synthesis of the water control needs of rice farmers and fishers with the new institutional/social data. Liaison with communities to arrive at an acceptable protocol and water management plan for sluice gate management, with a view to increasing livelihood options.
- Create of simple dissemination package.

## **The Research Framework**

- Current socioeconomic environment (Rapid Rural Appraisal and Household Survey).
- Livelihood activities and household decision-making processes (Rapid Rural Appraisal and Household Survey).
- Economic importance of fishing and farming in maintaining livelihoods and strategies to use water resources (Focus Group Discussions, surveys and interviews).
- Understand the institutional aspects of farming, fishing and water management. Assess conflicts between these issues and try to develop conflict resolution mechanisms (Focus Group Discussions and interviews).
- Consult with local level stakeholders, including water management groups, farmers, fishers, fishery management groups, Government officials and non-government organisation representatives (Focus Group Discussions and workshops).

## **Methodological Approach**

The general approach was to understand the socioeconomic and demographic profiles of the two selected study areas. Information on the local economic situation was collected. This included households' capital assets, assets mobility, wealth status, occupational diversity,

cropping pattern changes, the economic role of fishing. These helped place the research within the context of rural Bangladesh. Data collection involved a number of complementary techniques including rapid rural appraisal of villages, household surveys and census, focus group discussions, key informant interviews, case studies and local level workshops.

## Fieldwork Tools

### Rapid Rural Appraisal

Preliminary Rapid Rural Appraisal (RRA) exercises were used in about 57 villages in the two research study areas to obtain a detailed understanding of the livelihood system of villagers, changing resources use patterns after sluice gate construction, and institutional involvement in water management and sluice gate operation. Aims included:

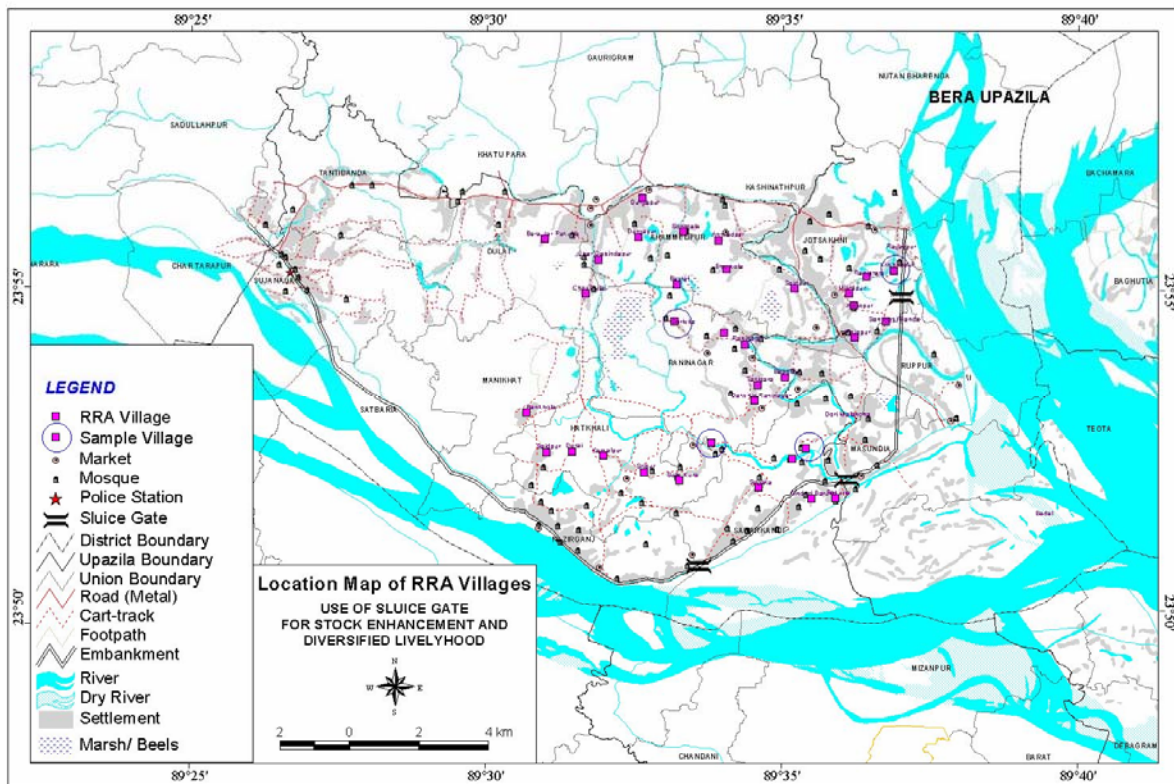
- Selecting study villages.
- Understanding the general background of the livelihood strategies.
- Obtaining basic socio-economic data.
- Mapping resources.
- Assessing institutional aspects of the study areas and community involvement in sluice gate management.

Villages were selected to give a good geographical spread of the study area, and also according to their proximity to the study sluice gates and important beels. This was in order to ensure that key water users (such as fishers and farmers) were included in the research. Different stakeholder groups, including farmers, fishermen, Union Parishad Members and school teachers, were consulted to get information on the physical location of the village, sluice gate water connection, presence of a beel fishery, fishers and the farming community. Based on this information, 34 villages were selected from the Pabna area and 23 villages were selected from the Tangail area for collecting detailed RRA information (see Annex 1). Field researchers visited each of the RRA villages and collected information through interviews with key informants. Several key informants were interviewed simultaneously. The name of RRA villages by Union, Upazila and study site are presented below:

Study Sites	Upazila	Union	RRA Villages
PIRDP	Suzanagar	Sagorkandi	(1) Pukurnia Badhai, (2) Sinduri Burulia, (3) Dubejani, (4) Pukhuria (Satani), (5) Dari Malanchi
		Raninagar	(1) Sharirbhita, (2) Raninagar, (3) Vatikaya, (4) Baghulpur, (5) Badai, (6) Takigara, (7) Bastal, (8) Nakharaj
		Ahmedpur	(1) Durgapur, (2) Vurukulia, (3) Syedpur, (4) Sonatala, (5) Ahmedpur
		Dulai	(1) Char Dulai, (2) Char Gabindapur, (3) Jorpukuria

	Bera	Manikhat	(1) Bankhola
		Suzanagar	(1) Durgapur
		Hatkhali	(1) Syedpur, (2) Duria, (3) Kamalpur, (4) Kashimpur (Sreepur), (5) Sagota, Solakura
		Jatshakini	(1) Mirjapur, (2) Aminpur, (3) Ranigram, (4) Krishnapur
		Ruppur	(1) Sannasi Bndha
CPP	Tangail Sadar	Baghail	(1) Dharer bari, (2) Pichuria, (3) Khordo Jugini, (4) Kathua Jugini, (5) Krishnapur, (6) Konabari
		Danya	(1) Dhitpur, (2) Dharaputia, (3) Panch Kahonia, (4) Danya Shibram, (5) khanpur, (6) Baushia, (7) Danya Chudhuri, (8) Paikpara, (9) Chilabari, (10) Lauajana, (11) Baimail, (12) Chubaria
		Paurashava	(1) Sakrail, (2) Aloa Vabani, (3) Enayetpur, (4) Kagmara (5) Charpara Digholia

**Figure 1: Rapid Rural Appraisal Villages in PIRDP**



### Household Census

An accurate list of households was required to conduct the household survey in order to understand the socioeconomic, livelihood and economic importance of fishing. Therefore, a household census (see Annex 2) was undertaken for selected study villages (six villages). These villages were chosen in order to obtain a variety of elevations relative to the beel and sluice gate. Selected villages also had operational groups of professional farmers and fishers. A total of 1828 households (all those found in the six villages) were interviewed. Census data collected in relation to each household and its members included age, wealth category, assets mobility, sex, primary, and secondary and tertiary employment of households. The survey also collected information on land ownership. The survey helped identify different stakeholders by profession and size of land holding. Census data was used to identify focus group discussion participants according to stakeholder group, and also for selection of household survey respondents from each of the major occupational groups and wealth categories.

### Household Survey

A total of 301 respondents were interviewed from the two study sites. A stratified random sampling technique was used to select survey respondents. Household census information was used for this purpose. Household stratification was done according to the primary occupation of household heads. A proportionate number of households from each of the village were selected for interview. Farmers were divided into two classes: small farmers and large farmers. Small farmers are those with land below 2.5 acres of total household land and large farmers land holding size is more than 2.5 acres. Fishermen were identified as fulltime fishermen (professional fishermen and part-time fishermen). The household survey (see Annex 3) obtained information on:

- Household level socio-economic issues (e.g. family size, age and gender structure, livelihood and economic activities, and capital assets).
- Changing crop cultivation patterns.
- Fishing and food consumption.
- Household level decision-making mechanisms.
- Seasonal variation of the fishing and their economic impact on livelihoods.

### Focus Group Discussions

A total of 33 focus group discussions (FGD) (see Annex 4). were conducted in the two study sites. FGD participants were selected randomly by using household census information. Participants included small farmers, large farmers, sharecroppers, wage labourers, businessmen, women and female household heads, professional fishermen, part-time fishermen, fish traders, boat men, other occupational groups, school/college teachers, local elites, Union Parishad Members and Chairmen, and non-government organization representatives/extension service providers. Focus Group Discussions provided information on:

- Changing patterns of fishing and crop cultivation.
- Seasonal and temporal variations in resource availability.
- Dependency on fish and problems with fisheries.
- Conflict/disagreement within the local community in relation to sluice gate operation.

- Peoples' views how sluice gate management could enhance natural fish stocks inside the project area.

### Open-Ended Interviews

Respondents will be selected in each study site from different stakeholder groups. Open-ended interviews will increase understanding of:

- Existing disagreement and conflict, both at community and institutional levels, regarding decision-making for water management activities.

### Case Studies

Key-informants will be selected in each study site. Informants will be fishers, those who have diversified from fishing as their main occupation, farmers, women and agricultural wage labourers. These case studies will improve understanding of:

- Reasons for changing from fishing as a partial or primary livelihood activity change, and impacts on livelihoods as a result of this change.
- Dependence on the empowered compartments.
- Adapted strategies to ensure livelihood security.

### Observations

Observers recorded changes in sluice gate operations.

### Workshops

Several workshops at village/union level and one or two workshops at Upazila level will be conducted in each study site. In addition to relevant government officials, representatives of all Focus Group Discussions and sluice gate committees will be invited to participate with a view to:

- Sharing key research findings among the participants for further clarification.
- Obtaining feedback from participants.
- Identifying major problems in relation to sluice gate operation for those reliant on different livelihood activities.
- Identifying possible suggestions/strategies for future sluice gate operation, and identifying key institutions whose involvement is necessary for strategy implementation.

**ANNEX 1: RAPID RURAL APPRAISAL**

- 1. Name of Respondent(s)**
- 2. What is the Village Name?**
- 3. Names of all Paras in the villages:**
- 4. Household Related Information**

4.1 How many households does the village contain?

4.2. What religious/ethnic groups are represented and how many households in each?

<b>Religion</b>	<b>Number of Household Heads</b>
Muslim	
Hindu	
Christian	
Buddhist	
Other (specify)	

4.3. What are the main occupational groups and how many household heads are there in each?

<b>Primary Occupation (PO)</b>	<b>Number of Household Heads</b>	<b>How has this PO changed in the last 20 years</b>		
		<b>Increased</b>	<b>Decreased</b>	<b>No change</b>
Agriculture				
Sharecropper				
Wage labour				
Fishing				
Business				
Rickshaw / van pulling				
Service				
Skills (carpenter, electrician, tailoring, weaving, pottery, barber etc.)				
Other (specify)				

4.4. Wealth status of households in the villages

<b>Wealth categories</b>	<b>No. of households</b>	<b>Mobility in the last 20 Years (after sluice gate construction)</b>		
		<b>Increase</b>	<b>Decrease</b>	<b>No change</b>

Very poor				
Poor				
Medium (Madhom)				
Rich				
Very rich				

4.4.1. What are the characteristics that determine very poor households?

4.4.2. What are the characteristics that determine poor households?

4.4.3. What are the characteristics that determine madhom households?

4.4.4. What are the characteristics that determine rich households?

4.4.5. What are the characteristics that determine very rich households?

4.5. Education rate

Level of Education	Percentage
Illiterate	
Up to primary school	
Secondary school	
Above Secondary school	

4.6. What types of dwelling houses are present and how many of each type?

House building material	No. of Houses
Straw	
Corrugated Iron (CI) sheet wall and roof	
Cement and CI roof	
Cement	
Other (specify)	

4.7. Distribution of household (in percentage) by landholding size in the village?

Land holding size (acres)	No. of households
No land	
0.1-0.49	
0.5-1.99	
2.0-4.99	
5.0 and above	

4.8. Is there electricity in the village? Yes / No

## 5. Water Resource base activities and their pattern of changes

5.1. Water body ownership and use rights of the villagers



Water bodies	Total number	Ownership of water bodies		Use of water bodies	
		No. private	No. government	As private	As common property resource
Ponds					
Kua/Ditch/Pagar					
Khal/Nadi					
Beel					
Other (specify)					

- 5.3. Usually, where fishermen go for fishing to earn their livelihood?
- 5.4. Where do subsistence fishermen go for fishing?
- 5.5. Has the size of the Common Property Resource (CPR) water area changed after sluice gate construction?
- Yes / No
- 5.6. If yes, why has the CPR changed?
- 5.7. Has there been a change in fishing activities after sluice gate construction?
- Yes / No
- 5.8. If yes, why have these changes occurred?
- 5.9. Has the flood pattern changed in the village after sluice gate construction?
- 5.10. Has ground water irrigation increased after sluice gate construction?

**6. Major Land use and Agriculture Profile of the village**

- 6.1. Distribution (in %) of major land use types in the village?

Homestead .....  
 Tree and fruit garden .....  
 Agriculture farming .....  
 Waterbodies (pond/ditch/khal/nadi/beel/etc.) ...  
 Roads/embankment .....  
 Others (specify) .....

Total      100%

- 6.2. How has this changed in the last 20 years (after sluice gate construction)?
- 6.3. What are the major crops cultivated in the village?
- 6.4. Has the cropping pattern changed after sluice gate construction?

Yes / No

6.5. How have they changed after sluice gate construction?

**7. Health and Sanitation Profile of the village**

7.1. Distribution of different types of latrines in the village?

7.2. What are the major health problems in the village?

7.3. How have these changed after sluice gate construction?

**8. Food Consumption Profile in the village**

8.1. Name of major cereals and vegetables consumed by local community?

Cereals	Vegetables	Protein
Rice		
Wheat		

8.2. Have consumption patterns changed after sluice gate construction?

Yes / No

8.3. If yes, describe the changes in consumption patterns

8.4. What are major livelihood security problems in the village? (rank them; the most important problem mark with 1 and the least problem mark with 10)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

**9. Institutional Profile of the village**

9.1. Is there any form of institution or programme in the village?

Yes / No

9.2. If yes, describe the names of institutions, their activities and the direct beneficiaries of these activities

<b>Name of institutions</b>	<b>Present activities</b>	<b>Direct beneficiaries</b>
GoB		
NGOs		
Village club		
Professional		
Religious		
Others (specify)		

9.3. Is there any committee member(s) in the village who is involved with water management or who can influence sluice gate operation?

Yes / No

9.4. If yes, what is their name and position on the water management committee?

9.5. How have they become a member of that water management or sluice gate committee?

9.6. Describe wealth status of sluice gate / water management committee members

<b>Wealth status</b>	<b>Sluice gate / water management committee members</b>
Very poor	
Poor	
Medium (Madham)	
Rich	
Very Rich	

9.7. Usually, when does the committee member engage in decision-making?

9.8. Who makes decisions regarding opening or closing the sluice gate?

9.9. How does the committee member participate in any decision-making?

9.10. How do committee decisions affect agricultural production?

9.11. How do committee decisions affect fish production?

9.12. What would be the best way to increase crop and fish production?

9.13. How do committee decisions affect local governance?

9.14. What benefits are you getting from construction of the sluice gate?

9.15. What are the losses / problems you face due to construction of the sluice gate?

9.16. Would you like to provide any suggestion(s) to minimize these problems?

Yes / No

9.17. If yes, describe your suggestion

9.18. Additional comments, if any

**Name of the Interviewer:**

**Date of interview:** .....

**ANNEX 2: HOUSEHOLD SURVEY – HOUSEHOLD HEADS CENSUS FORMAT**

Village:

Union:

Upazilla:

District:

HH SL no.	Name of the household head	Father/husband	Age in years	Sex M/F	Wealth class	HH asset mobility after building of sluice gate	No. of household members		Occupation			Household land (in decimals) by types		
							Male	Female	Primary	Secondary	Tertiary	Homestead	Farming own land	Sharecrop out/lease out/...

**Occupation Code:** 1=Farmer, 2=Fisherman, 3=Wage labourer, 4=Housewife, 5=Business/Service, 6=Rickshaw/Van Puller, 7=Artisan (specify), 8=Others (specify)

**Wealth Class Code:** 1=Very Poor, 2=Poor, 3=Medium/Madham/Majhary, 4=Rich and 5=Very Rich

**Household Asset Status Mobility Code:** 0=Decrease, 1=Same (No change) and 2=Increased



**ANNEX 3: HOUSEHOLD SURVEY – HOUSEHOLD LEVEL SOCIOECONOMIC AND LIVELIHOOD STATUS**

**Interviewer:**..... **Date of Interview:**.....  
**Full name of Household Head (H/H):**..... **Religion:**.....  
**Household serial number:**.....  
**Village:** ..... **Union:**..... **Upazila:**..... **Dist.:** Tangail/Pabna

**Section I: Household Level Socioeconomic and Livelihood Activities**

**Profile of the household head and household members (including permanent servants and non-kin), household livelihoods and resources**

1) Sex, age, marital status, relationship with the H/H, education and major occupation of household head (in first row) and other members in household

Sl. no.	Age (years)	Sex (Male=1 Female=2)	Marital status (use code no.)	Relationship with head	Education age of seven years and above (use code no.)	Major Occupation age between 15 and above (use code no.)
1	HH					
2						
3						
4						
5						
6						
7						
8						
9						
10						

Total number of family members: Male \_\_\_\_\_ Female \_\_\_\_\_  
 Total number of earning members: Male \_\_\_\_\_ Female \_\_\_\_\_

**Marital Status Code number:** Married=1, Unmarried=2, Divorced=3, Widower/Widow=4  
**Education Code number:** No schooling=0, Can sign only=1, Can read=2, Up to class v=3, Up to HSC or equivalent=4 and Degree or above=5  
**Occupation Code number:** Cultivate own land=1, Share cropping=2, Agricultural wage labour=3, Non-agricultural wage labour=4, Fishing=5, Non-salaried service (doctor, Priest, etc.)=6, Mason/carpenter=7, Business/trading =8, Transport worker=9, Service (getting monthly salary)=10, Handicraft/artisan=11, Rickshaw/boat/cart driving=12, Household work=13, Student=14, Unemployed=15, Others (specify)

**Section II: Household Capital Assets**

1. Household land ownership (in decimals - NB one decimal is 0.01 acres)

	Area of Land	Present Value (Tk.)
1) Land Assets		
2) Homestead		
3) Pond/fish pond/ditch (including leased/mortgaged out)		
4) Cultivable land (including leased/mortgaged out)		
5) Fallow lands		
Others (specify)		
Total		

2. House building pattern

	No.	Present Value (Tk.)
1) Pucca (cement roof)		
2) Semi-pucca (floor and wall cement, roof tin/tile)		
3) Kancha (mud/bamboo wall and tin/golpata/straw roof)		
Others (specify)		
Total		

3. Furniture

	Please tick	Present Value (Tk.)
1) Khat/chouki		
2) Almirah		
3) Dressing table		
4) Table		
5) Chair		
6) Sofa-set		
7) Showcase		
8) Bench		
Others (specify)		
Total		

4. Livestock holdings

Livestock types	No.	Present Value (Tk.)
1) Bullock/Cow		
2) Buffalo		
3) Goat/Sheep		
4) Chicken/duck/peg ion		
Other (specify)		
Total		

5. Trees and Plants

	Please tick	Present Value (Tk.)
1) Timber trees (all types total)		
2) Fruit trees (all types total)		
Others		
Total		

6. Household durable assets

	No.	Present Value (Tk.)



1) Hand tube well		
2) Bicycle		
3) Electric fan		
4) Radio/cassette player		
5) TV/VCR/VCP		
6) Sewing machine		
7) Refrigerator		
8) Rickshaw/rickshaw van/push cart		
9) Country boat/engine boat		
Other (specify)		
Total		

7. Traditional farming (present purchased value)

	Please tick	Present Value (Tk.)
1) Plough		
2) Yoke		
3) Leveler		
4) Weeder/achra		
5) Sickle		
6) Spade/khunti		
7) Axe		
Others (specify)		
Total		

8. Modern farm equipments

	No.	Present Value (Tk.)
1) Power tiller		
2) Tube-well (deep and shallow)		
3) Paddle pump		
4) Low lift pump		
5) Thrasher		
Others (specify)		
Total		

9. Fishing equipment

	Please tick	Present Value (Tk.)
1) Jhaki jal/khapla jal		
2) Current jal		
3) Ber jal		
4) Net jal		
5) Push net		
6) Tana jal		
7) Dharma jal		
8) Fishing hook		
9) Bamboo trap		
10) Lift net		
11) Fenced tap		
Others (specify)		
Total		

### **Section III: Changing of Crop Cultivation Patterns (at your family agricultural land)**

1. Describe your cropping pattern in the last year and a year before construction of the sluice gate

Name of crops	Last year cultivated (tick)	Cultivated before sluice gate (tick)	Describe the reason for any change
1) Aush+aman rice (broad cast)			
2) Aman rice (broad cast)			
3) Aman rice Transplant)			
4) Aus rice (broad cast)			
5) Irri (HYV)			
6) Boro (local)			
7) Jute			
8) Cjina			
9) Kawon			
10) Paira			
11) Rai			
12) Wheat			
13) Musur			
14) Mastered			
15) Kalai			
16) Onion			
17) Garlic			
18) Chilli			
19) Winter Vegetables			
Other (specify)			

### **Section IV: Fishing**

1. Do you or your family members catch fish?    Yes    No

2. If yes, where did you go for fishing in the last year and before construction of the sluice gate?

Name of the Fishing ground	Last year fishing (please tick)	Before sluice gate construction (tick)	Status of fish catch (use code no.)
1) Big rivers			
2) Small rivers (Nadi)			
3) Beel/Khal			
4) Kua/ditch			
5) Pond (culture fishery)			
Other (specify)			

**Fish Catch Status code number:** Fish catch remains similar = 0, Fish catch decreased = 1 and Fish catch increased = 2

3. Why did you go fishing (please tick)?

- 1) Only for household consumption
- 2) Only for earning livelihood
- 3) Both for consumption and to sell

4. Do you think fishing is an important economic and livelihood support activity for your family?

Yes                      No

5. If yes, please describe how much economic and livelihood support your family gets from open water fishing?

Description of fish and fish related activities	Taka	% of total annual family income/support
1) Annual income from open water fishing and fish related activities		
2) Total catch by family members for sale (annual)		
3) Total fish catch by family members for consumption		
4) Making open water fishing gear		
5) Fish business		
Other (specify)		

**Section V: Seasonal Variation of Household Fishing and Their Economic Impact on Livelihoods**

1) Your family fishing status by months in the last year (use code no.)											
Baishak	Jaistha	Ashar	Srabon	Bhadra	Ashwien	Kartik	Augra	Poush	Megh	Falgun	Chaitra
2) Your family fishing status by months before sluice gate construction (use code no.)											
Baishak	Jaistha	Ashar	Srabon	Bhadra	Ashwien	Kartik	Augra	Poush	Megh	Falgun	Chaitra

**Involvement of Fishing code number:** No fishing = 0, Low fishing = 1, Medium fishing = 2 and high/peak fishing =3

1. Have you changed your fishing activities since sluice gate construction?

Yes                      No

2. If yes, what changes have you made?

3. Why have these changes occurred?

4. Is there any economic impact on your livelihoods due to a change in fishing activities?

Yes                      No

5. Describe in detail any economic impact on your livelihoods due to a change in your fishing activities

6. Do you think open water fish production can improve without hampering rice production?

Yes                      No

7. If yes, describe how?

**Section VI: Food Consumption**

1. Nowadays, how many meals do you usually take in day?

2. How many meals did you take before construction of the sluice gate?

3. Describe major food (cereal, vegetable, fish etc.) consumption in your family

	Normal meals in a day this year	Meals in a normal day before sluice gate construction
1) Rice		
2) Wheat		
3) Vegetables		
4) Fish		
5) Egg		
6) Milk		
7) Meat		
8) Fruits		
Other (specify)		

4. Have food consumption patterns changed since sluice gate construction?

Yes                      No

5. If yes, describe the reasons for this change in consumption patterns.

6. Have fish consumption patterns changed since sluice gate construction?

Yes                      No

7. If yes, describe the reason for any changes in fish consumption

**Section VII: Household Level Decision-Making**

1. Who takes decisions on family matters and livelihood activities?

2. Who takes decisions regarding your family expenditure?

3. Who takes decisions on changes in your cropping patterns?

4. How do you take decision at the household level? (please tick)

1. Household head takes decisions without consulting anybody
  2. Housewife takes decisions without consulting anybody
  3. Household head takes decisions after discussion with all household members in a meeting
  4. Household head takes decisions after discussion with adult members only
  5. Household head takes decisions after discussion with his/her older family members
  6. Household head takes decisions after discussion with only wife/husband
  7. Household head takes decisions after discussion with relatives
  8. Discussion with local elites
  9. Discussion with religious leaders
  10. Discussion with community leaders
- Others (specify)

**Section VIII: Involvement in Organizations or Professional Groups**

1. Are you or any member of your family involved in any organization or group?

Yes                      No

2. If yes, describe the name of the organization or group

3. Why are you involved in this organization or group?

4. How do you benefit from involvement in the organization or group?

#### **ANNEX 4: FOCUS GROUP DISCUSSION CHECKLIST**

1. Household base occupational changes after sluice gate construction: why and how?
2. Major land use pattern changes, with reasons
3. Major cropping pattern changes, with reasons
4. Fishing pattern changes, with reasons
5. Crop yields and fish production changes; stakeholder benefits and losses
6. Changes in patterns of food consumption; with reasons
7. Changes in livelihood related problems
8. Benefits from institutional changes (government, non-government and local institutions)
9. Role and involvement of local community/local institutions in decision making regarding water management/sluice gate operation and management: who, when, why and how?
10. Problems/conflicts after taking decisions on water management/sluice gate operation and management. Describe in detail
11. What are bottlenecks or problems for improving sluice gate operation and management
12. Suggestions for improving sluice gate management to enhance fish production without damaging rice production
13. Which organizations/institutions need to be involved to implement suggested solutions

#### **Discussion Groups (selected from the census villages and their connected Union Parishods):**

- Small farmers
- Large farmers
- Sharecroppers
- Wage labourers
- Women headed households
- Fishermen
- Businessmen
- Local NGO representatives
- UP Chairmen and Members

**Sector-wise Problems of Existing Sluice Gate Operation and Water Management, Probable Solutions to Reduce Those Problems and Institutions/Actors Requiring Involvement.**

<b>Sectors of Problem</b>	<b>Problems of Existing Sluice Gate Operation and Water Management</b>	<b>Causes of Problem</b>	<b>Probable Solution/Option Requiring Piloting</b>	<b>Relevant Actors</b>
Aus and aman crops: broad cast paddy				
Robi crop cultivation: wheat, potato, onion, garlic etc.				
Wild fish catch				