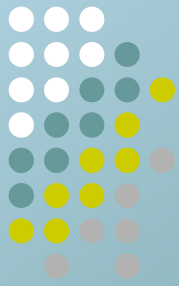


A CASE STUDY ON PARTICIPATORY MANAGEMENT OF FISHPASS IN BANGLADESH



Muhammed A. Bhuiyan

Dept of Water Resources Engg,
Bangladesh U. of Engg & Technology (BUET)
Dhaka, Bangladesh



Introduction

- ❑ **Synchronization** of agriculture, fisheries, environment and stakeholders is prerequisite for progressive development of Water Resources in Bangladesh
 - ❑ In National Water Policy (1999), National Fisheries Policy (1998) and National Environment Policy (1992), emphasis has been given for the **protection of fish diversity**
 - ❑ Aquatic resources and natural environment are **under threat due to changes in floodplain**
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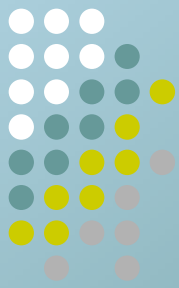
Introduction

Continued

- Fishpass and fish-friendly structure have been introduced in Bangladesh as a **remedy** to these problems
- In NWPo (1999) emphasis has been made to bring **institutional changes for decentralization** of WRM by enhancing the role of local people



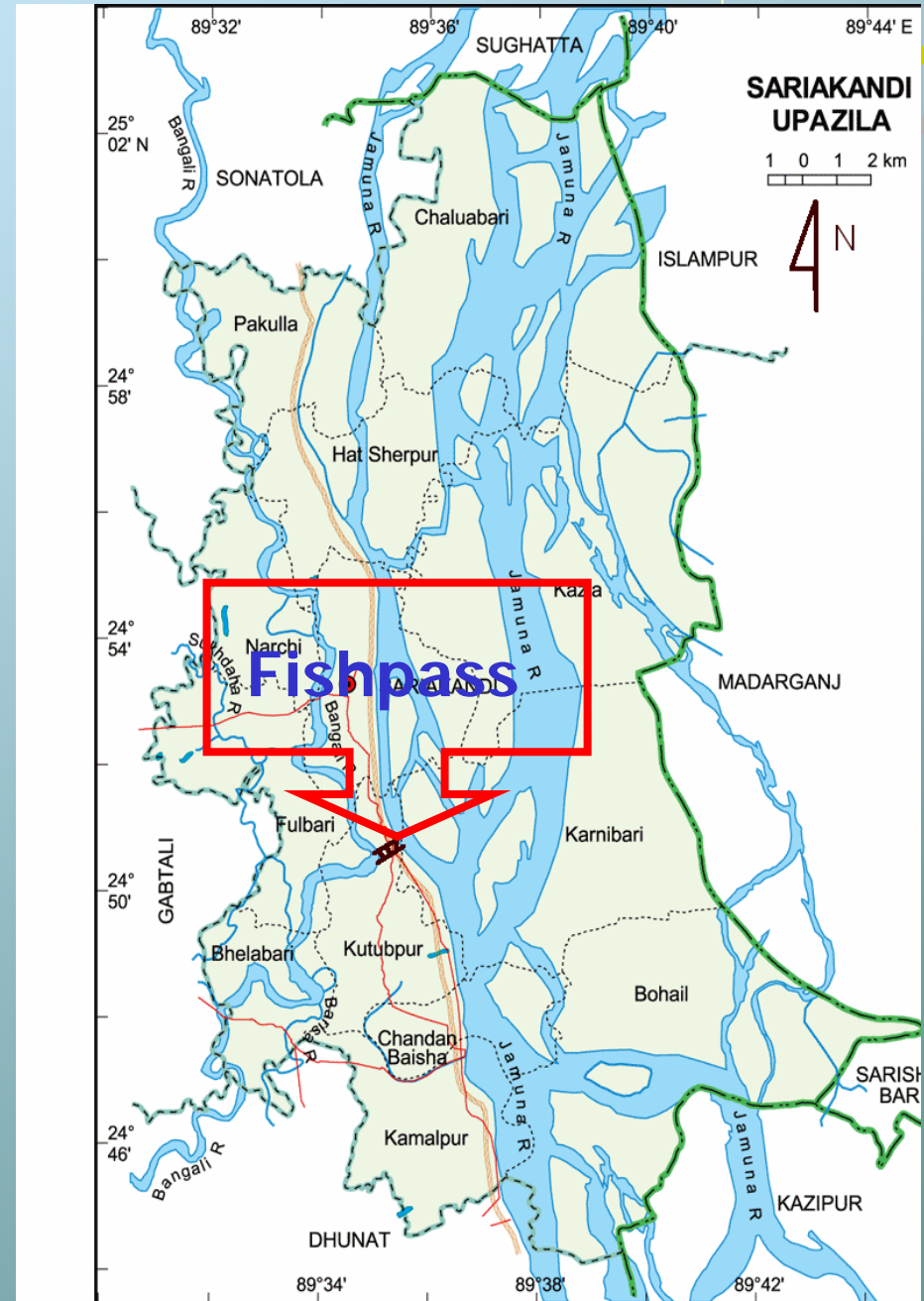
Objectives



- ❑ To identify factors **affecting hydraulics** of fishpass
- ❑ To develop a **beneficiary participatory management model** for operation of the fishpass
- ❑ To **frame an institutional setup** to ensure sustainable management

STUDY AREA

- Sariakandi Fishpass
24°44' - 25°03' N &
89°30' - 89°45' E
- Jamuna on the east &
Bangali on the west
connected by fishpass
- This is the largest fishpass
constructed and operated by
BWDB
- Agriculture & fisheries are
major economic activities



Sariakandi Fishpass



General features

- Vertical slot type structure
- Total length = 92 m
- 3-vents, 16 pools in each vent
- Slot opening $b = 0.7$ m
- Pool: $W = 4.2$ m
 $L = 4.8$ m



Sariakandi Fishpass

Sariakandi Fishpass

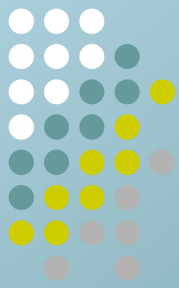


View from Jamuna River side



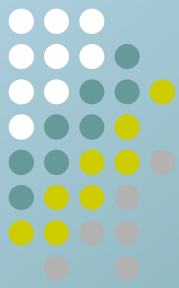
View from Bangali River side

Data Collection (part 1)



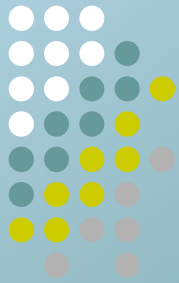
- ❑ **Fish catch data** (number of fisherman, types of gears, fish catches, etc) from TMSS office
- ❑ Calculation of fish **Diversity Index**
- ❑ Velocity measurement inside the pool:
1-D current meter &
3-D Acoustic Doppler Velocimeter (ADV)

Data Collection (part 2)

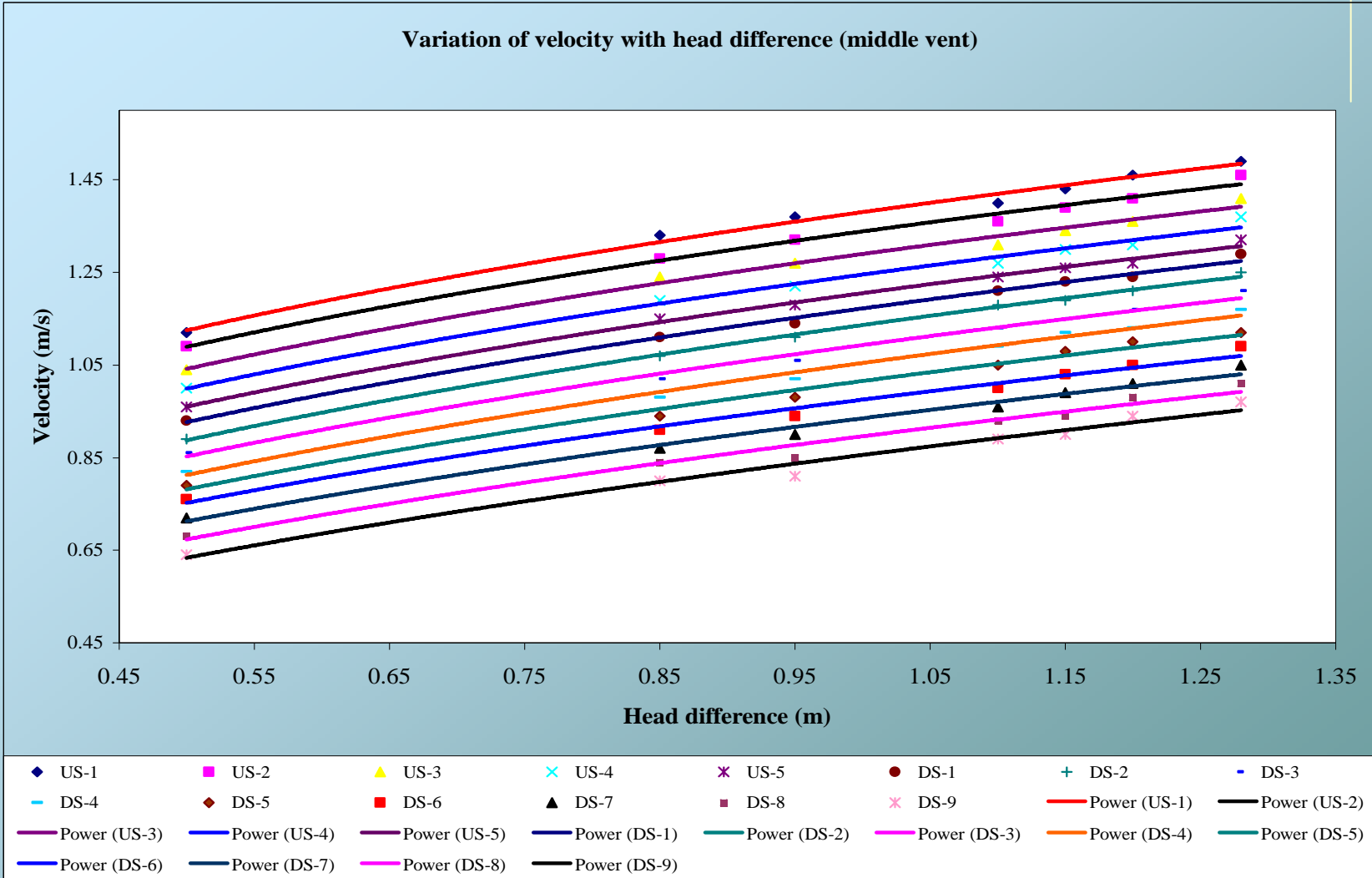


- ❑ Questionnaire Survey (**QS**) in 42 households at 12 directly impacted villages
- ❑ Focus Group Discussion (**FGD**)
- ❑ Key Informant Interview (**KII**)
- ❑ Questionnaire data analyzed by **Frequency Analysis**

Results and Discussions



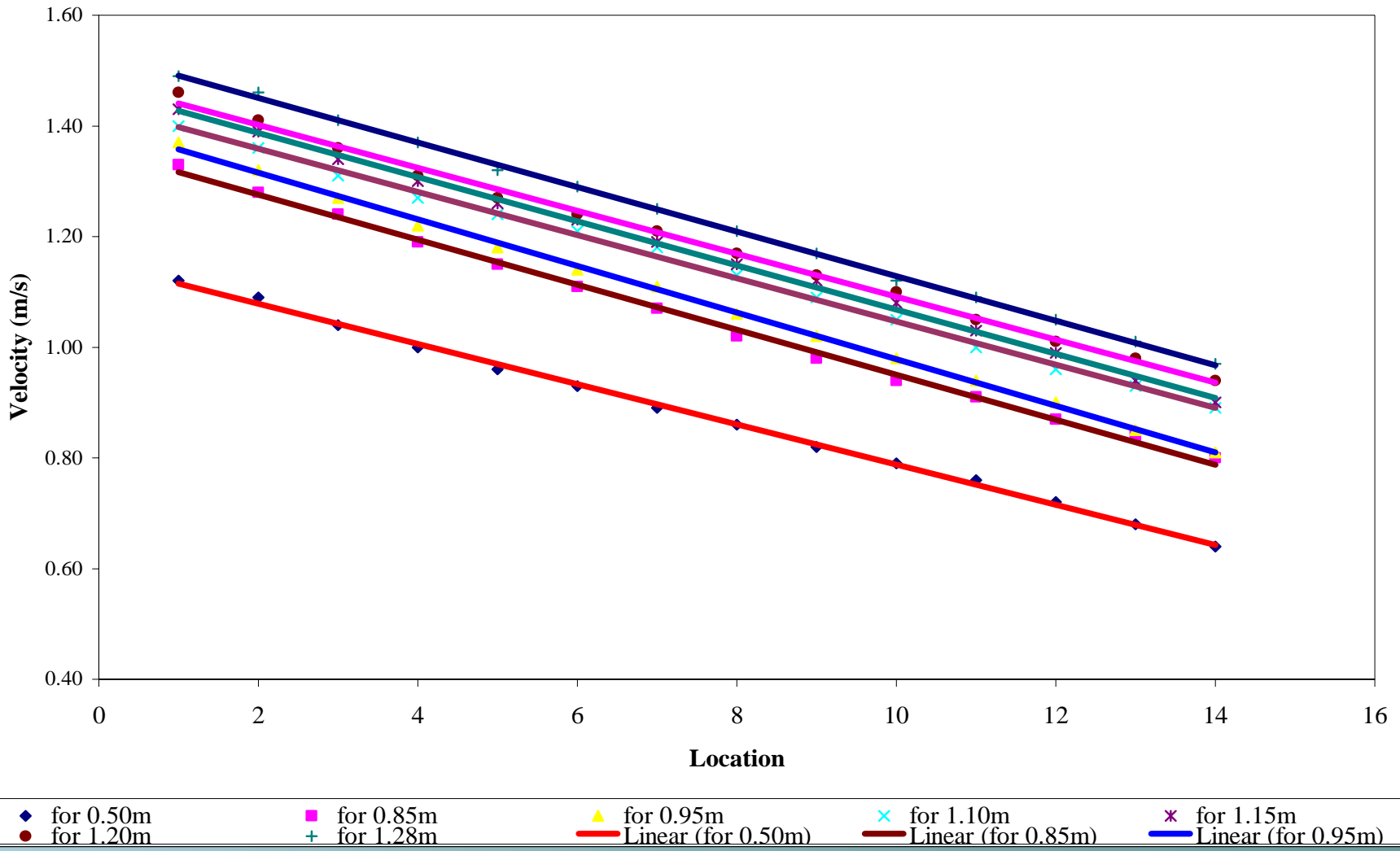
Comparison between measured and theoretical 1-D velocities



Variation of velocities for head differences between u/s and d/s boundaries (middle vent)

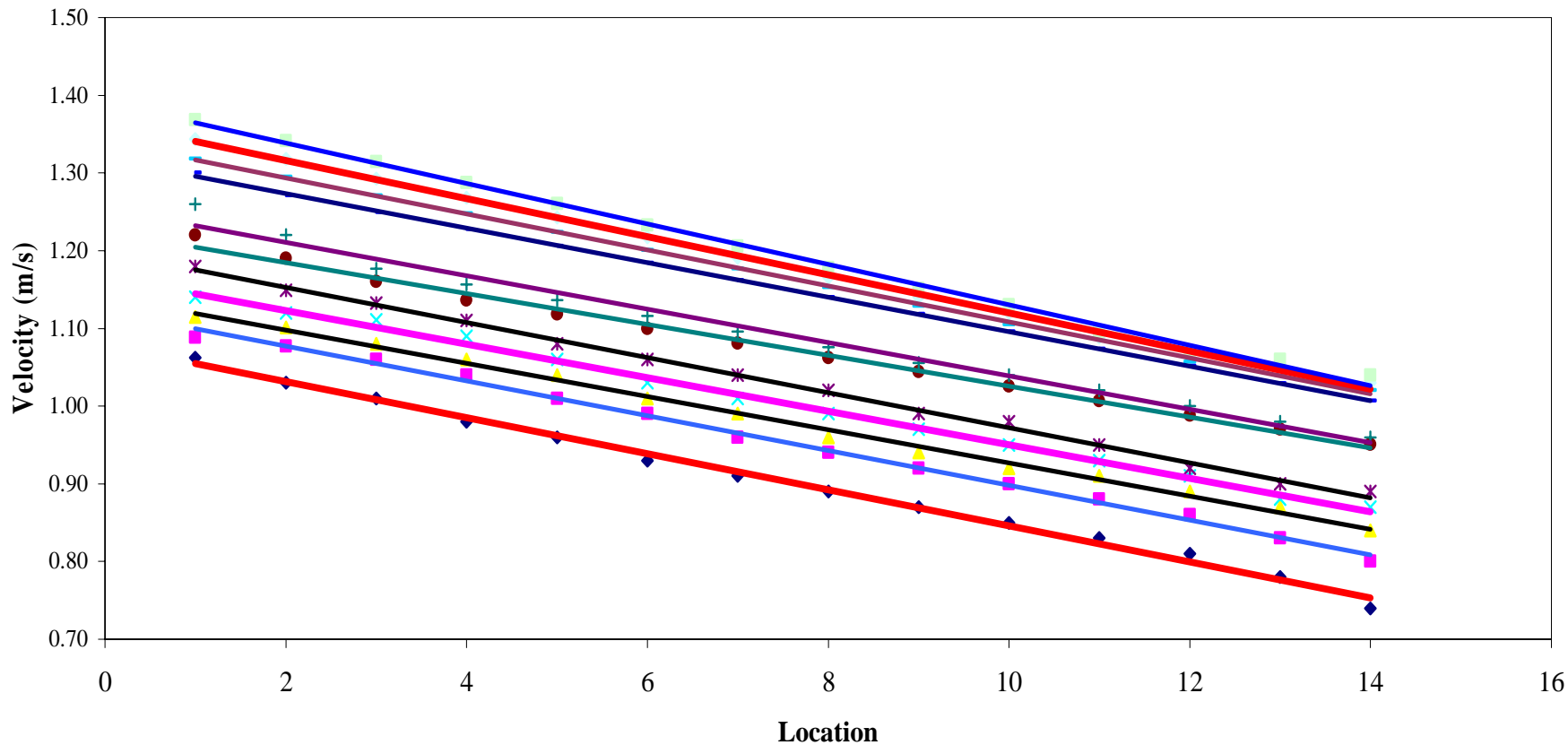


Variation of measured velocity with location (middle vent)



Variation of measured velocities (1-D) along the fishpass length for different head differences (middle vent)

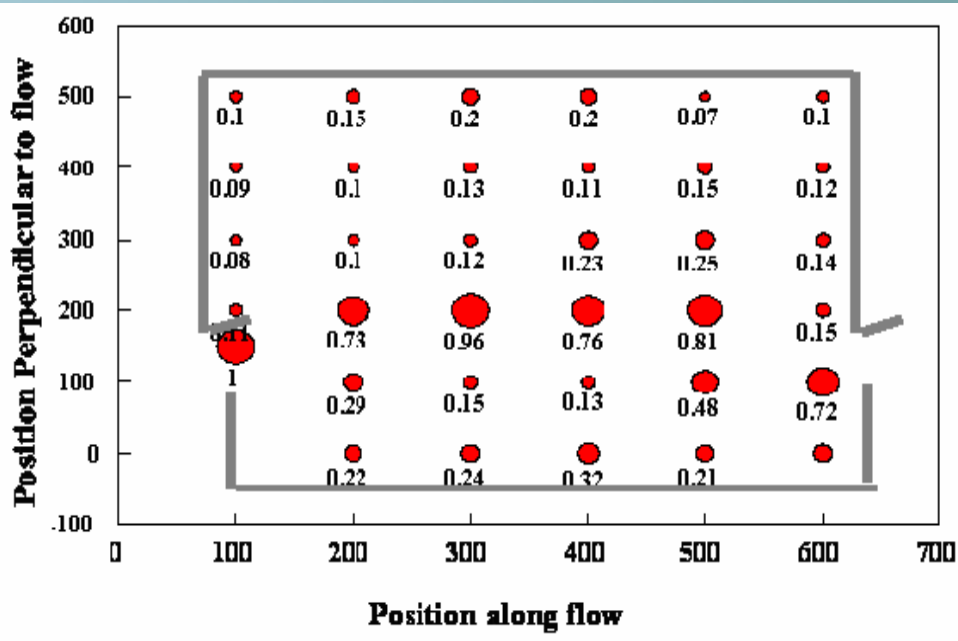
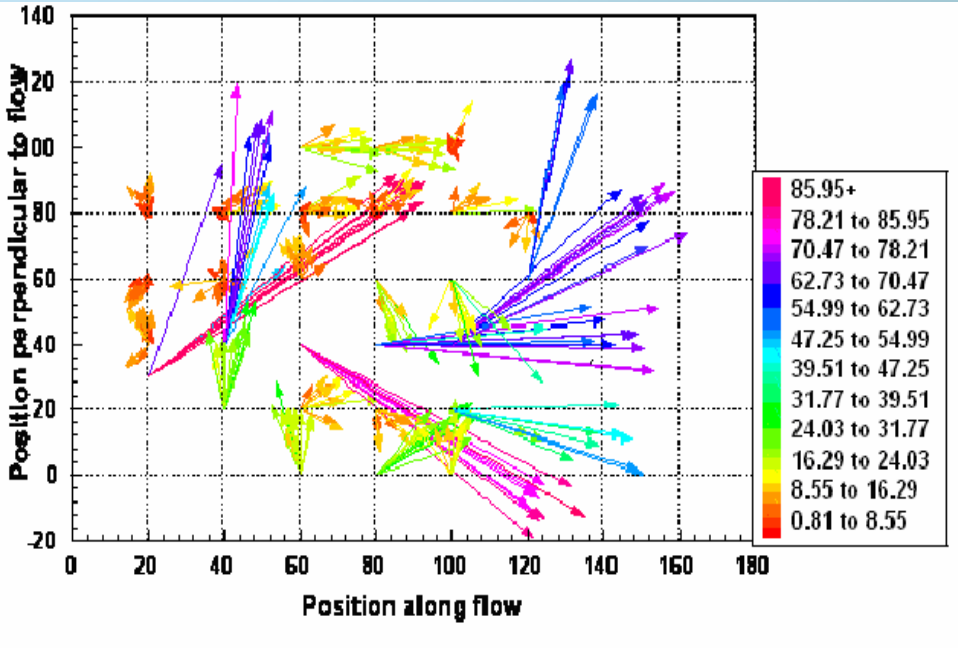
Variation of theoretical velocity with location



Variation of theoretical velocities (1-D) along the fishpass length for different head differences

3-D Acoustic Doppler Velocimeter (ADV) measurements

- ❑ In the transverse direction the velocity reduces faster
- ❑ Recirculation zones are not well developed
- ❑ Velocity components strike side walls & damage fish-eggs & fingerlings
- ❑ Velocity components change its direction randomly
- ❑ Jet forms at the slot

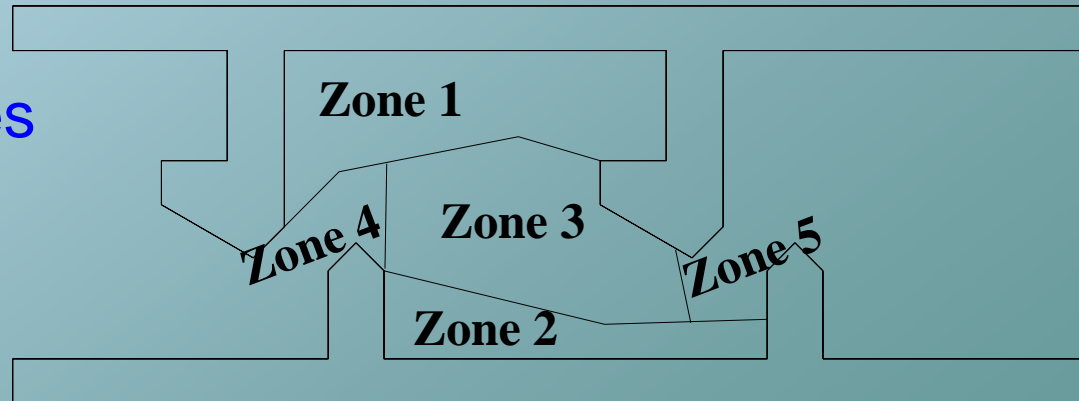
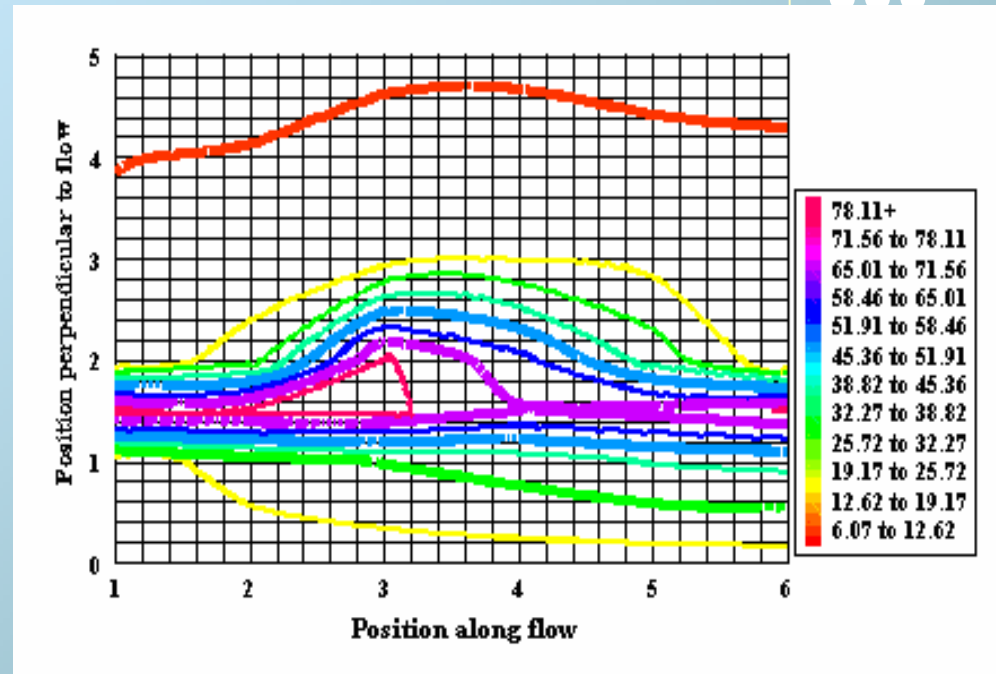


Velocity contours show different velocity zones in the Fishpass

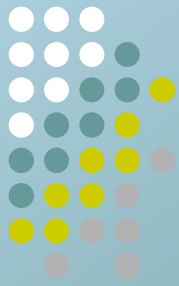
Zone 3 – high velocity

Zones 4 & 5 – jet/shooting velocity

Zones 1 & 2 – resting zones with slow velocity



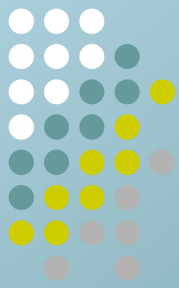
Conclusions



Related to hydraulics

- ❑ The **measured velocities are higher** than cruising and darting speeds of juveniles
- ❑ The recirculation zones are not well developed/closed due to **inadequate pool size**
- ❑ The velocity components strike the side walls and **cause damage** to fish-eggs and fingerlings
- ❑ The **length of the highest velocity zone** at the opening should be designed based on darting speed of fish
- ❑ Desirable pool size is: **length $\geq 10 \times$ (opening length)** and **width $\geq 8 \times$ (opening length)**
for creating closed recirculation zones & proper energy dissipation

Conclusions



Related to impact on fishes

Fish species and diversity indices in Bangali River

	2001	2002	2003	2004
Number of Species	37	41	45	56
Shanon Diversity Index, H'	1.51	2.15	2.5	2.9

$$H' = -\sum_{i=1}^N p_i \ln(p_i)$$

- Significant positive impact on fish production
- Total catch increased about six times
- Many rare species are back
- Threatened species production increased
- Diversity Index is increasing
- Impact on socio-economics positive

Questionnaire survey on existing problems, management & improvement requirement

Management problems

- Lack of co-ordination
- Inadequate law enforcement
- Non-participatory decision making
- Uncertain income opportunity

Perception	Response (N=42)	
	Frequency	Percentage
Beneficiaries awareness about ownership of the structure and management responsibility		
BWDB	38	90%
No idea	4	10%
Satisfaction level on existing management by BWDB		
Satisfied	10	24%
Dissatisfied	32	76%
Improper gate operation during breeding season	31	74%
Inadequate enforcement of laws against illegal fishing	31	74%
No involvement of beneficiaries	21	50%
Difficulties in fish and fish fry passes	4	10%
Improvement of existing management		
Involvement in gate operation		
Beneficiaries	35	83%
DoF	5	12%
BWDB	4	10%
Other/NGO	2	5%
Enforcement of rules & regulations to stop illegal catches		
Beneficiaries groups	35	83%
DoF	31	74%
LGI	23	55%
Local Police Station	23	55%
NGO	14	40%
Involvement of other related agencies/institutions to improve the overall management of the fisheries of the region		
DoF	31	74%
DAE	30	71%
DoC	29	69%
LGI	18	43%
Involvement of elite people for overall management of the fisheries	3	7%
Willingness to participate in management		
No	4	10%
Yes	38	90%
Gate operation in proper time	35	83%
Better control in Bangali River sanctuary management	29	76%
Prevent illegal fish catches	21	50%
Decision related to fund generation and credit support	12	32%
O&M activities	8	21%
Payment of gate operator		
DoF	19	45%
BWDB	17	40%
Beneficiaries	6	14%

Questionnaire survey on existing problems, management & improvement requirement



Solutions suggested

- Beneficiaries participation for **timely gate operation**
- Beneficiaries participation for **removing u/s sedimentation**
- Beneficiaries participation along with LGI/NGO for **preventing illegal fishing**

Perception		Response (N=42) Frequency Percentage	
Existence of problem	Yes (N=35, 83%)		
	Gate operation	35	83%
	Upstream sedimentation	24	57%
	Inside turbulence	14	33%
	Opening of the pools	8	19%
	Fish mortality	6	14%
	Gate leakage	6	14%
	No/No idea (N=7, 17%)		
Remedial measures required	Yes (N=35, 83%)		
	Timely gate operation through beneficiary participation	30	71%
	Help of LGI/NGO for preventing illegal fishing	12	29%
	Beneficiaries participation for removing u/s sedimentations	10	24%
	No solution required/No idea (N=7, 17%)		

Questionnaire survey on existing problems, management & improvement requirement

Perception on management structure

- ❑ **FMG** at bottom & **FMC** at apex level; members should be local stakeholders
- ❑ **PMTAC** for monitoring & technical assistance; other agencies involved

Management structure	Frequency	Percentage
Tire of fishpass management organization		
FMG at the bottom level	38	90%
FMC at the apex level	38	90%
PMTAC for consultation and interagency coordination	36	86%
Eligibility of membership for FMG and FMC		
Fisherman	38	90%
Union Parishad chairman	31	74%
Union Parishad member	29	69%
Woman	27	66%
Farmer	23	57%
Teacher	17	40%
Elites	6	16%
Businessman	6	16%
Landless	3	7%
Member organizations for PMTAC		
BWDB	38	90%
LGI	38	90%
DoF	38	90%
DoC	30	71%
DAE	17	40%
FMC	12	29%
NGO	8	19%
Process of selecting members in FMG and FMC		
Selection by Focal Group Discussion (FGD)	33	79%
Election	1	2%
Registration of the FMGs		
Yes	38	90%
Legal right for enforcement of laws	33	79%
Capacity building through training	33	79%
Government help	29	71%
Involvement of women in management committee		
No	9	21%
Yes	29	69%
Active member	21	50%
Direct decision making	16	38%
Exclusion of any group or organization		
No	19	45%
Yes	19	45%
Club or samiti	16	38%
Political party's supporter	13	31%

Questionnaire survey on existing problems, management & improvement requirement



Delineation of activities

- Gate operation
- Liaison with the PMTAC
- Prevent illegal fishing, rules & regulations implementation
- Minor O&M
- Technical support & training

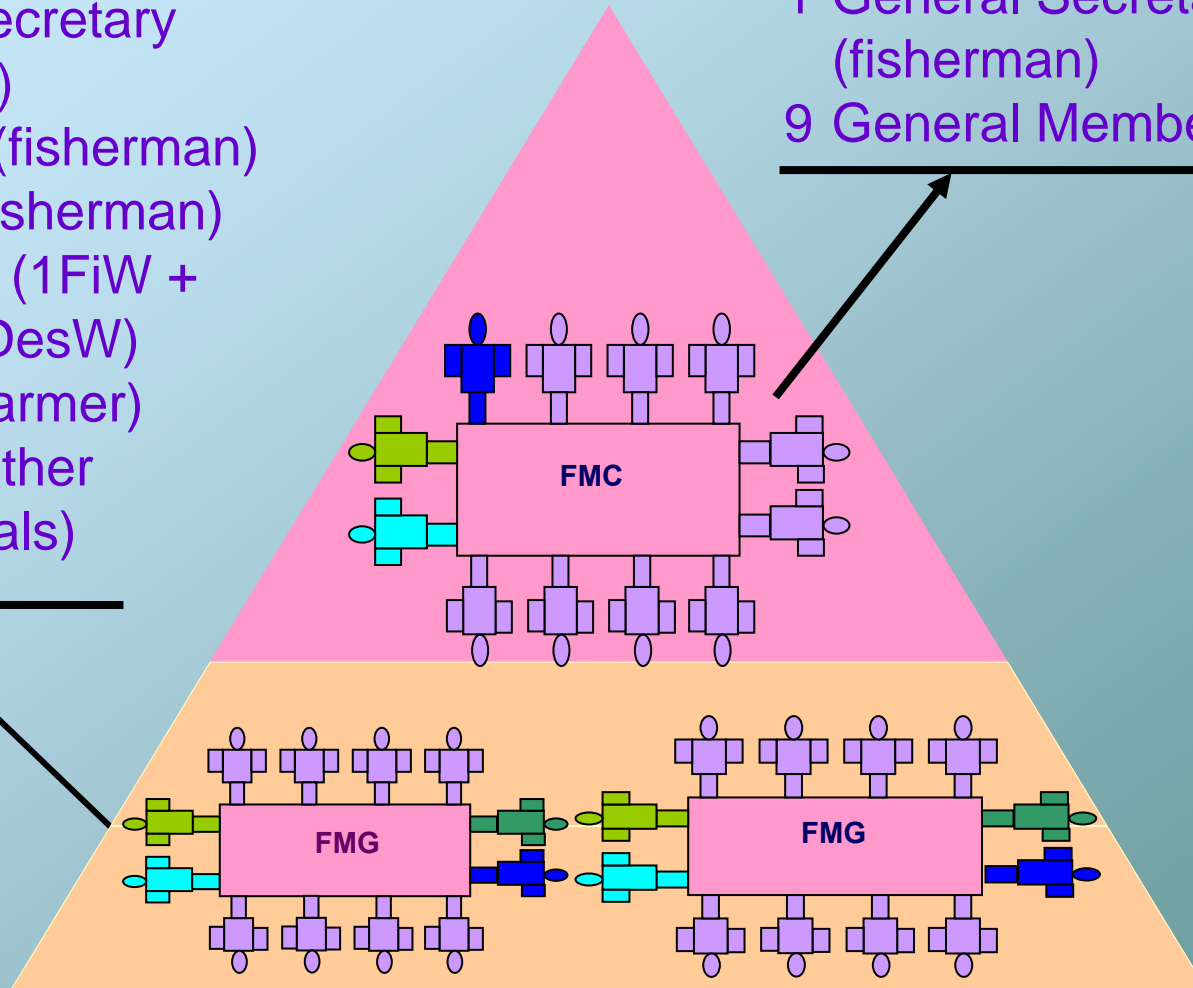
Activities	Frequency	Percentage
Activities of the FMGs and FMC		
Gate operation	38	90%
Prevent illegal fishing	38	90%
Income generating activity	36	86%
Minor O&M activity	36	86%
Meeting	29	70%
Liaison with the PMTAC	21	51%
Raising fund for minor O&M	12	31%
Services of the PMTAC		
Technical support	38	90%
Implementing rules & regulations	38	90%
Training	36	86%
Micro-credit support	37	88%
Forms of conflict may arise		
Monetary	38	90%
Domination	38	90%
Decision making	36	86%
Ways to resolve conflict		
Discussing among member	38	90%
With the help of FMC	36	86%
With the help of PMTAC	36	86%
Actions against rule violation		
Warning	38	90%
Fine	38	90%
Cancellation of membership	36	86%
Prevent illegal catch		
Different types of net banned/seized	38	90%
Warning	34	81%
Fine	34	81%

Composition of FMG

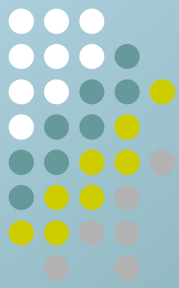
- 1 President (fisherman)
- 1 Vice-President (fisherman)
- 1 General Secretary (fisherman)
- 1 Treasurer (fisherman)
- 2 Member (fisherman)
- 3 Members (1FiW + 1FaW + 1DesW)
- 2 Member (farmer)
- 1 Member (other professionals)

Composition of FMC

- 1 President (fisherman)
- 1 Vice president (open)
- 1 General Secretary (fisherman)
- 9 General Members (open)



Rules and Regulations (20 points)



Composition and Formation (5 points)

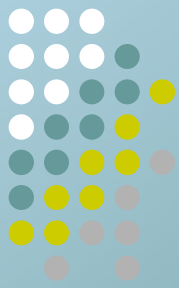
Withdrawal, Removal or Expulsion of Membership (2 points)

Functions and Responsibilities (9 points)

Registration and Legal Framework (2 points)

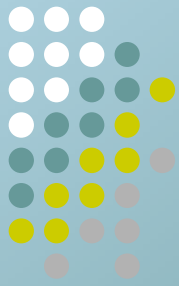
Monitoring (2 points)

Conclusions (continued)



Related to participatory management

- ❑ The management must be replaced by beneficiary participation
- ❑ Participation of beneficiaries is required for timely gate operation, generation of O&M fund, prevent illegal fishing, capacity building, etc
- ❑ Effective law enforcement through collective effort is essential
- ❑ U/s sedimentation has created uncertain income opportunity
- ❑ Participation will ensure **transparency** and will enhance legal binding, accountability & understanding between relevant government agencies & local beneficiaries.
- ❑ Better access of poor traditional fishermen will make the benefit **equitable**.



Thank you.