



Case: Bangladesh Water Management in Flood Control Drainage Systems (FCD)



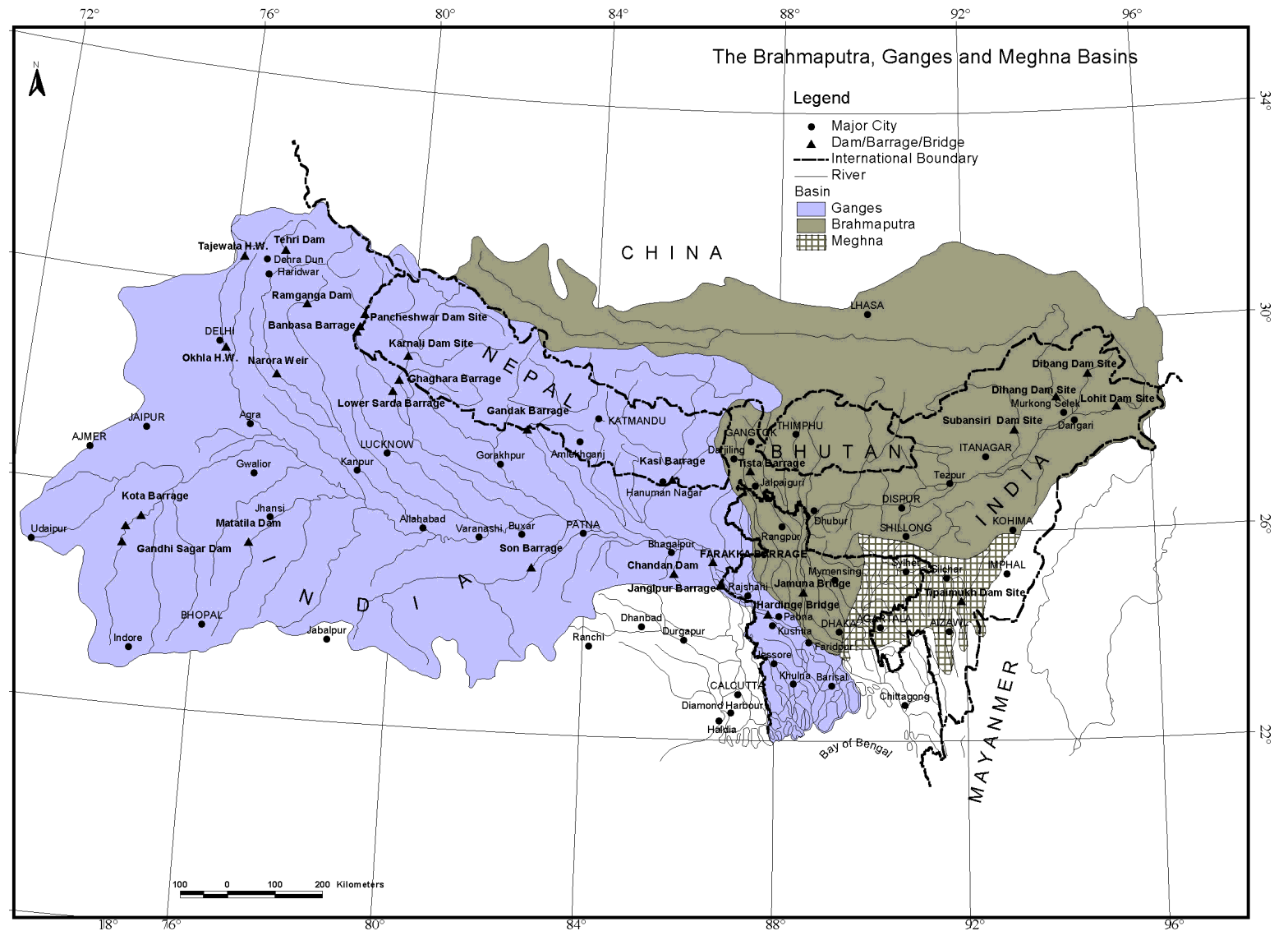
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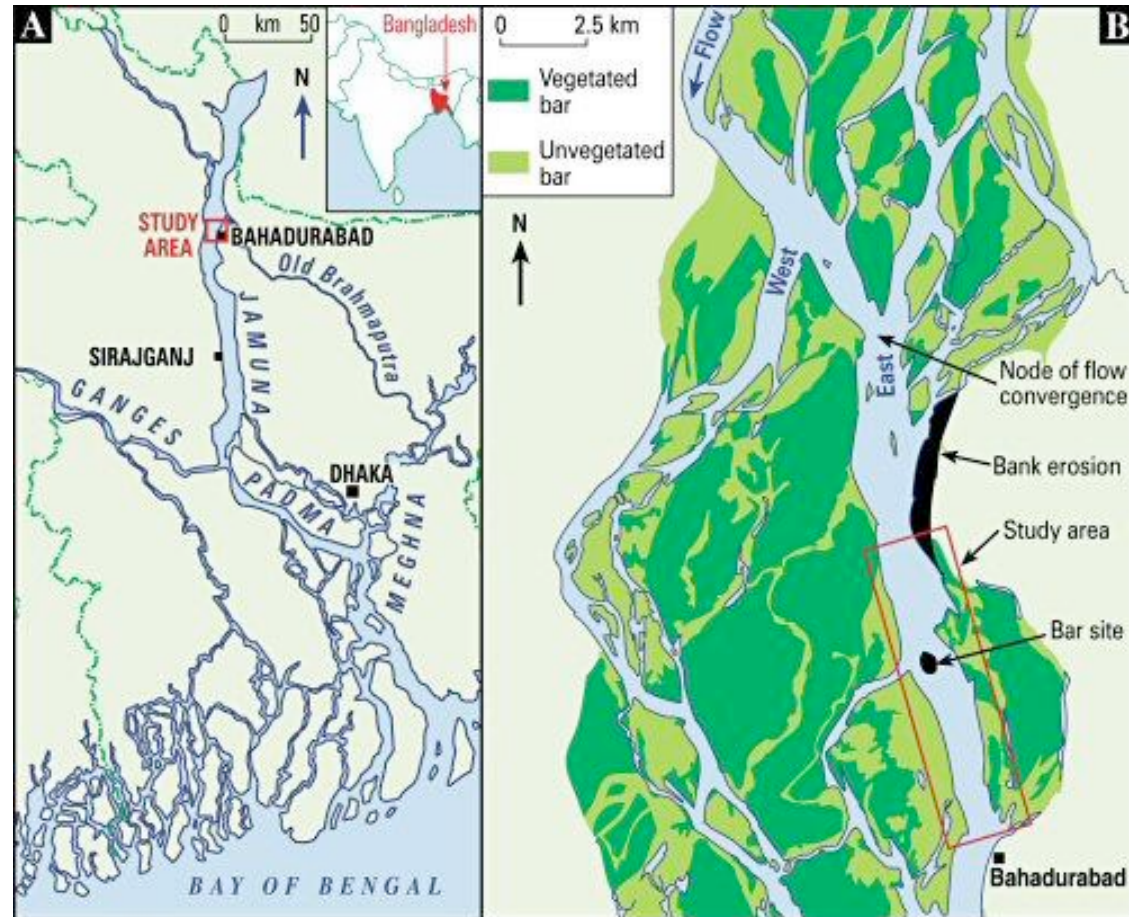


Bangladesh and the River Catchments (NWMP, 2000)



Bangladesh and the River Catchments

800 rivers





The flood based farming system



What are Flood Control Drainage (FCD) Systems? (1)

FCD systems are all the areas in the floodplains of the rivers in Bangladesh and in the coastal plains utilised by humans and containing some or all of the following infrastructure: khals, beels, cross dams, canals, embankments and regulators.



What are Flood Control Drainage (FCD) Systems? (2)

- Most FCD systems are protected against flooding by embankments.
- Often regulators are placed in the embankment to drain khals and to prevent backflow from the river.
- Many inland FCD systems have beels (=oxbow lakes) in their interior, connected to rivers through a network of khals (drains).
- The term FCD suggests only flood control and drainage; however, FCD systems serve many more water management purposes.



Water Management in FCD Systems

- A good understanding of water management in FCD systems is crucial, because 90% of Bangladesh Water Development Board systems (3.3 million ha) are FCD systems.
- Many believe water management in FCD systems is unimportant or insignificant –it is crucial however and often quite intricate and sophisticated

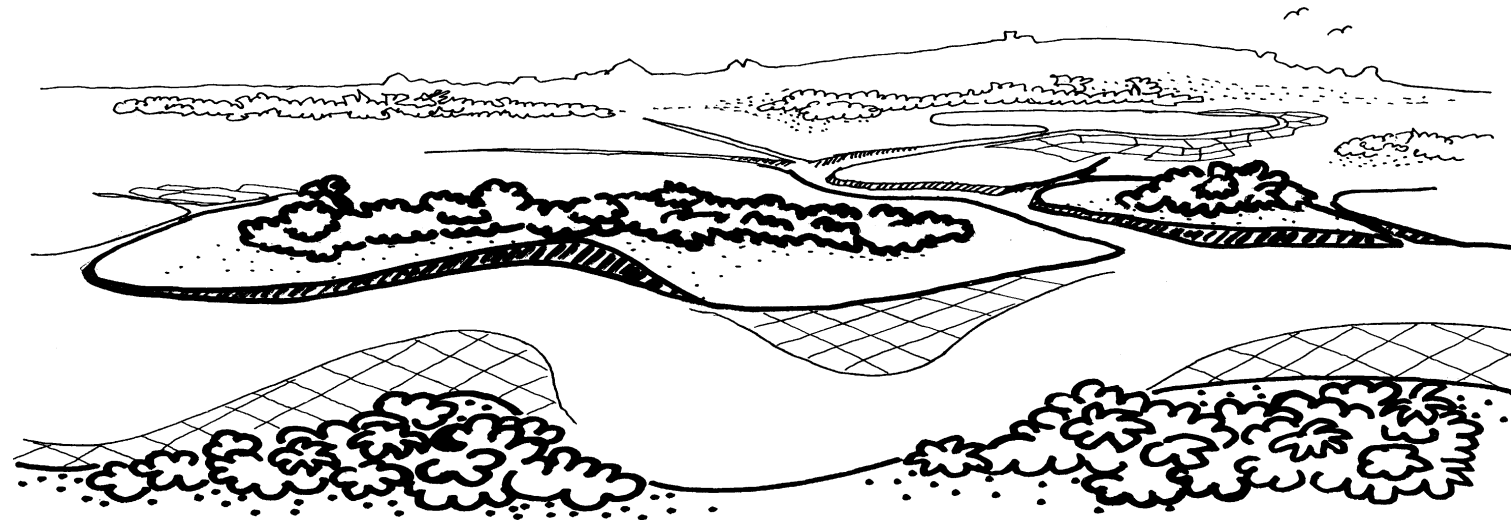


Development Phases FCD Systems

- Phase 1: Unprotected Floodplains
- Phase 2: Flood Protection
- Phase 3: Reduction Drainage Congestion
- Phase 4: Optimising Water Control

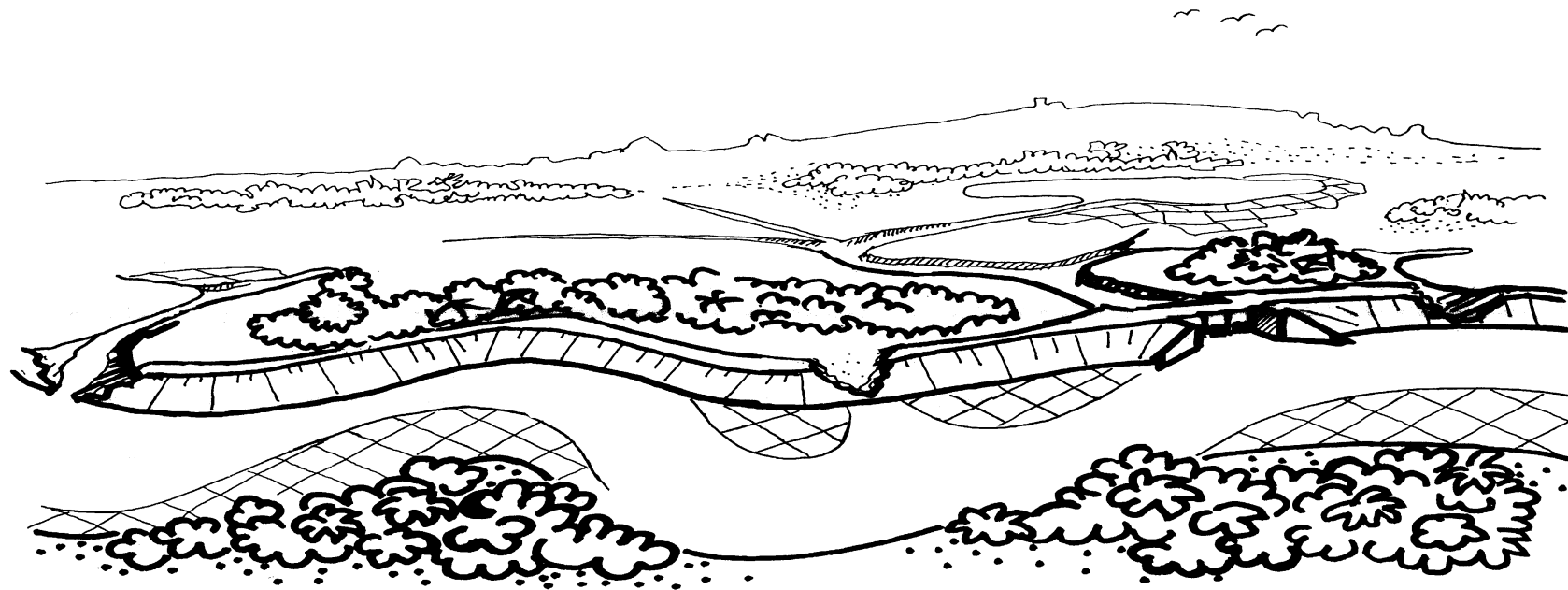
Phase 1: Unprotected Floodplains

- 50% of Bangladesh is floodplains.
- Flood control and drainage practices exist on the unprotected floodplains before government intervention.
- People control water through small embankments, cross dams and drainage canals.



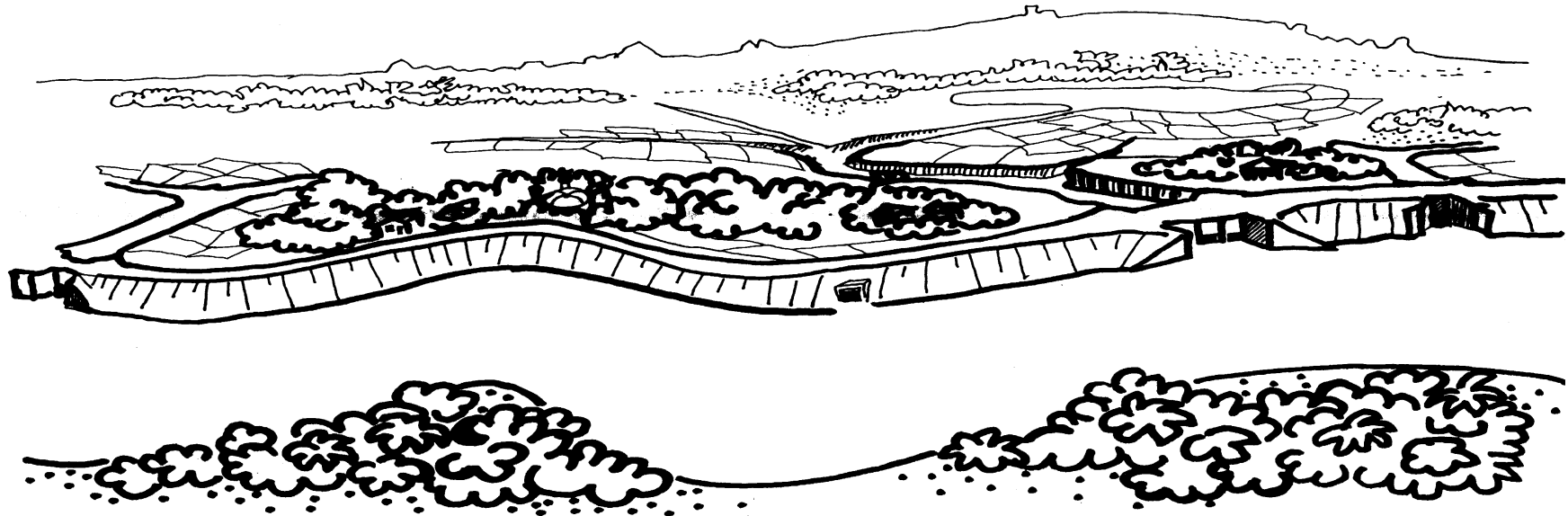
Phase 2: Flood Protection

- Embankment construction is the initial government intervention in the floodplains to increase crop security.
- Construction of main regulators for drainage.
- These interventions provide a degree of protection against external floods, however, drainage problems occur.



Phase 3: Reduction of Drainage Congestion

- Alleviation of drainage impediments.
- Smaller regulators and surface drainage outlets (SDOs) are constructed to open up smaller *khals* and *khalsare* re-excavated.
- Pumped drainage is an alternative for solving drainage problems. Economically not viable, however.



Phase 4: Optimising Water Control

- Water retention becomes more important. Regulators are remodelled with vertical lift gates.
- Water control structures are built in different parts of the system to retain water.
- Low lift pumps start to be used for irrigation.
- Entry of water into the system, during high tide.



Water management objectives and conflicts





Water Management Objectives in FCD Systems

❑ Agricultural Objectives

- Protect standing aus (late dry season rice) against early river floods.
- Reduce salt intrusion.
- Expand the area under aman (wet season rice) by excluding monsoon flood waters.
- Retain water in the system during the post-monsoon.

❑ Other Uses of Water

- Fisheries
- Transport
- Domestic
- Salt production
- Shrimp production
- Livestock



Water Management Objectives

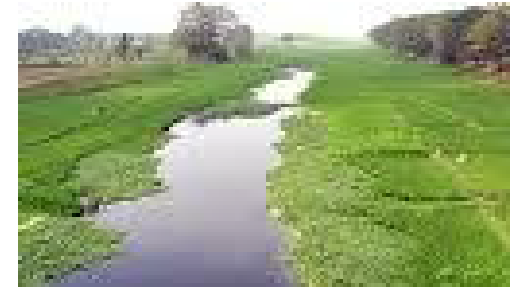
❑ Diverging Objectives in the Agricultural Sector

- Low land farmers demand early drainage at end of monsoon.
- High land farmers demand retention of water in low-lying areas of the system.
- Low land farmers demand retention of water on the high lands.
- High land farmers demand drainage of rainwater and overland flow from their lands.

❑ Specific Objectives

- Pump owners
- Project Affected People (PAP)

Water Management Conflicts



❑ Multitude of water management objectives leads to conflicts:

- fisheries vs. agriculture: fishermen require high water levels from the start of the monsoon, while farmers require low water levels to harvest their aus crop and to grow aman;
- high land vs. low land in beel lakes: high land farmers want to retain water in the beel during the dry season for Low Lift Pump irrigation while farmers with land in the beel want to drain the beel so that they can cultivate;
- high land vs. low land in general: draining the high land = drowning the low land. In the wet season, high land farmers drain their land thereby flooding the low land. During the dry season, they demand water retention in low-lying areas. Low land farmers aim at drainage during the wet season and cultivation during dry season;
- drainage vs. water retention: at some point in time the choice for water retention needs to be made. This generally entails the construction of a cross dam or the closing of a gate. Intervening too early may cause flood damage by the last storms of the season, too late will reduce the volume of water retained;







Flood Control and Water Conveyance Function

- FCD systems consist of two clearly distinguishable components:
 - The flood protection component, consisting of embankments.
 - The water conveyance system, consisting of khals and canals with water control structures.
- The term WM-Block refers to an independent unit of the water conveyance component (one khal with its associated regulator). FCD systems are built up of a number of WM-Blocks.
- The stakeholders in a WM-Block can be identified fairly easily, and their (dis-) benefits reasonably well assessed.



Flood Protection Function

- The flood protection component encompasses all the WM Blocks and other protected areas (homesteads, etc.).
- Stakeholders with contradicting stakes in the water conveyance component may benefit equally from the flood protection component.
- People not having any stake in the water conveyance component may greatly benefit from the flood protection component.



Contested Infrastructure: Embankments

- Embankments
- Regulators
- Khals, Beels
- Flood protection services provided by embankments highly valued by inhabitants of FCD systems, although large loss in open water capture fisheries mentioned
- Embankment cuts (a.k.a public cuts, the “ultimate proof” that BWDB constructs bad FCD systems) are a flexible, cost-effective and well-planned operational method.
- Embankments are not contested, except in salt and shrimp areas.



Contested Infrastructure: Regulators

- Main regulators (more than four vents, more than 2,000 ha) are very contested.
- They fulfil a multitude of functions and are the focal point of water management in FCD systems.
- Opening of the gates in the pre-monsoon:
 - Allows rain water to drain out of the system, preventing damage to early *ausas* well as late *boroon* low land. High land farmers want to store water for irrigation or land preparation.
 - Allows the entry of saline water for salt and shrimp production or for fish culture. Detrimental to paddy production.



Contested Infrastructure: Regulators

- Closure of the gates during the monsoon to prevent flooding:
 - Prevents monsoon river flood damage to *ausand aman* crops.
 - Prevents fish from entering into the system from the river.
 - May cause flooding in the system due to accumulated rain water.
- Opening of the gates for flushing during the monsoon:
 - Allows the entry of water with fish fingerlings.
 - Supplies water for *amanon* higher land.
 - Flooding damages *amanon* low land.

Contested Infrastructure: Regulators

- Closing of the gates in the post-monsoon for water retention:
 - Retains water for the flowering of the *amancrop* and for irrigation of the *borocrop*.
 - Reduces fish catch in *khalsand beels*.
 - Retains water for domestic purposes.
 - Makes *borocultivation* in *beels* difficult.
- Opening of the gates in the post monsoon for drainage.
 - Increases fish catch in *khalsand beels*.
 - High land farmers want water retention for irrigation purposes.
 - Drains *beels* for *borocultivation*.
 - Reduces the amount of water retained for domestic purposes.





Contested Infrastructure: Regulators

- In the case of minor regulators, although they provide most of the functions mentioned above, it was found that there was usually a consensus among the stakeholders on how to operate the structure.
- A special case are the salt and shrimp inlets, which frequently create conflicts due to the entry of saline water onto agricultural land.



Contested Infrastructure: Khals

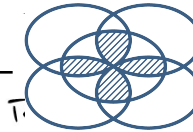
- The term *khal* refers to a natural drainage channel or creek.
- They are the arteries of FCD systems and, together with *beels* and regulators, form the water conveyance systems.
- *Khals* are important for drainage, water storage and water inflow. They are also used for fisheries, agriculture, navigation and domestic use.
- These different functions and uses make their management complex and generates conflicts, especially drainage vs fisheries (wet season) and drainage vs water retention (dry season, cross dams).



A Cross Dam
Erected in a Khal
(Royal Haskoning)



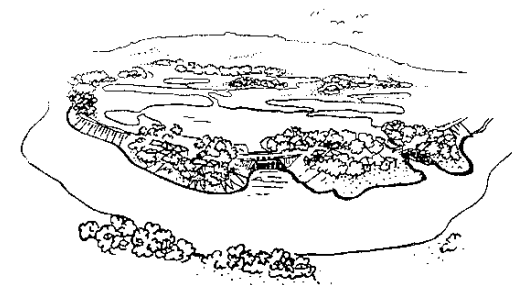
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Contested Infrastructure: Beels

- *Beels* are low-lying depressions in the floodplains that usually contain water throughout the year.
- Very important water bodies for fishing, water storage, flood-recession agriculture and transport.
- Their management is strongly linked with the management of *khals* and regulators.
- Many conflicts over the desired water level between *beel* leaseholders and farmers, fishermen and farmers and between high land and low land farmers.





Deep Flooding in a Beel Area (Royal Haskoning)



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Summary WM in FCD Systems

- Water management abounds in FCD systems.
- Becomes increasingly complex as FCD systems develop.
- Many local initiatives taken to control water (crossdams, embankment cutting, private pipes, pumps, shrimp/salt inlets).
- Water bodies (*khals* and *beels*) used for many different purposes (fishing, water retention, drainage, agriculture, domestic use).
- Water management in FCD systems extremely complex and different from water management in irrigation systems.



Conventional Irrigation Systems vs. FCD Systems

- FCD infrastructure caters for many, often mutually exclusive, demands, while irrigation infrastructure is only for irrigation.
- Irrigation systems are completely man-made and designed for optimal performance. FCD systems are not.
- There are only farmers in irrigation systems, who demand the right amount of water at the right time.
- In FCD systems there are many stakeholders with heterogeneous requirements and demands, to an extent that these are contradictory and mutually exclusive.

Governance –and the role of user management





Local Initiatives in Water Management

- WM-Stakeholders have the technical capacity to design and construct sophisticated and cost-effective hydraulic infrastructure.
- Examples: dykes, contour bunds, irrigation canals, drainage systems, cross dams, shrimp inlets, etc.
- Rural people have a strong "maintenance culture". Many initiatives involve maintenance and rehabilitation of dilapidated water management infrastructure.
- People's water management initiatives are not only linked to agriculture. They are also related to fishing, domestic water supply, salt production, etc.



Local Forms of Organisation

- There are two distinct type of initiatives and organisational practices at the local level;
 - those benefiting a limited number of people, who get together whenever required, but **do not form any permanent organisation.**
 - large initiatives aiming at creating or rehabilitating a public good. **Permanent** organisations may be formed. **Formal** and **informal leaders play key roles.**



Role of Union Parishads (Local Governments)

- Union Parishads are aware and quite responsive to the water management needs of their constituencies.
- They are able to identify and implement relevant water management projects and to mobilise external as well as internal resources.
- Union Parishads have the capacity to, and de facto often do, manage relatively small-scale FCD systems.
- They play key roles in water management conflict resolution.



Mobilisation of Local Resources

- People in rural Bangladesh have the material and organisational capacity to collect, administer and make an optimal use of large amounts of money.
- They develop and implement effective strategies to finance relatively large water management initiatives.
- In case of emergencies, large numbers of people and capital can be mobilised within a very short time.
- The key to successful mobilisation of material resources is local control, transparency, accountability and a cost-effective use of scarce resources.



Bangladesh river erosion, low tide. © 2005 Gary Braasch



Constraints

- Local initiatives should not be idealised.
- Some are purely private initiatives of influential individuals or groups, who have the means and the power to encroach on common resources, thereby excluding other people from access to them.
- Some of them have negative impacts and cause conflict among different categories of stakeholders.
- Some local initiatives -while providing a cost-effective solution to immediate problems of some people-damaged important public infrastructure, putting at risk the security of the local population as a whole.



Conclusions

- The government's problems with O&M of public water management infrastructure will not be solved by turning over all responsibilities to the people.
- More decentralisation of control and authority over the water sector to the local level is essential. But people and local level institutions will continue to need professional, material and technical assistance.
- Local initiatives should no longer be ignored or condemned. They should be monitored and taken into account by those responsible for water management policies and strategies in Bangladesh.



The State and Participatory Water Management

- The WM-Agencies (BWDB and LGED) responsible for water management in Bangladesh have been much criticised and blamed for poor water management in Bangladesh.
- Typical criticisms state that they are corrupt, construction-biased, bureaucratic, politicised and uninterested in water management.
- Although some of these criticisms may be correct in certain cases, it is too simplistic and naïve to think that handing over water management responsibilities to stakeholders will solve all problems.
- Government-bashing will get one nowhere.



Conclusions

- The nature of water management in FCD systems precludes a complete withdrawal of the state from water management.
- Formal policy and procedures, preferably embedded in law, are needed for participatory water management.
- This law should clearly spell out the rights, duties and responsibilities of all concerned, especially the WM-Agency and the WM-Stakeholders.
- The levels of the WM-Agency with whom the stakeholders will interact must have the authority to make decisions and to negotiate.
- They also must be open to scrutiny by the stakeholders' organisations.



Conclusions

- Water management in FCD systems is extremely complex.
- Many water management stakeholders, each with different, often conflicting, water management demands.
- The nature of water management in FCD systems calls for innovative management strategies.
- There should be working partnerships between the Water Board, local government, and users organizations.



Sources

- This presentation is adapted from the workshop Participatory Water Management in Bangladesh, WUR environmental sciences Irrigation and water engineering group (1998)

Other sources:

- P. Wester and J. Bron (1998) COPING WITH WATER Water Management in Flood Control and Drainage Systems in Bangladesh
- Royal Haskoning/ WorldBank (2003) Agricultural Drainage: Towards an Interdisciplinary and Integrated Approach. Bangladesh; a Case of Controlling or Living with Floods?



Current Guidelines

- The formal endorsement of the Guidelines for People's Participation in Water Development Projects (1994) represented a major breakthrough at the time.
- Reviews of the Guidelines concluded that they contain a number of fundamental flaws.
- GPP assumes that water management can be separated from other aspects of livelihood systems.
- GPP lacks a clear delineation of tasks and responsibilities between stakeholders and BWDB.
- There is no clear mandate for the different tiers to undertake the assigned activities.



Regarding Existing Institutions

- There is no tradition of accountable state organisations.
- The mandate of state organisations is often not understood by the rural population.
- Rural civil institutions are not particularly strong.
- Consequently, good working relations between local civil organisations and BWDB/LGED require time to be developed.



Regarding the WM-Agency (BWDB)

- No adjustments have been made to the organisational structure and procedures of the BWDB to facilitate participatory procedures.
- The operational characteristics of government agencies in general and BWDB in particular are not conducive for the participatory roles they are expected to play.
- A Water Management Agency is needed that acts as a mediator between the many conflict of interests in FCD systems.
- If this should be a reformed BWDB or a new organisation is a matter of debate.