

Missing Water Governance In Periurban South Asia: Impact of
Urbanization and Climate Change

**Water (In)Security and Emerging Conflict:
Missing Links in Water Management
Institutions in Peri-urban Khulna,
Bangladesh**

M. Shah Alam Khan

Professor
Institute of Water and Flood Management,
Bangladesh University of Engineering and Technology

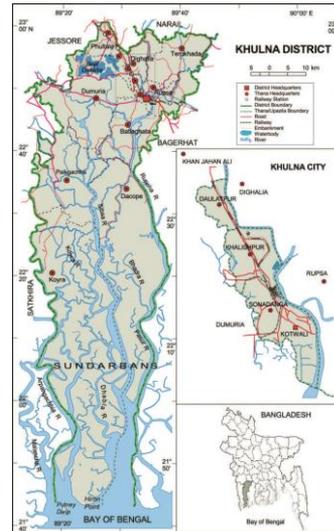
Adaptation Futures 2016 : 10-13 May 2016
Rotterdam, The Netherlands

Outline

- Urbanization, Climate Change and Water Security
- Emerging Conflicts
- Water Management Institutions

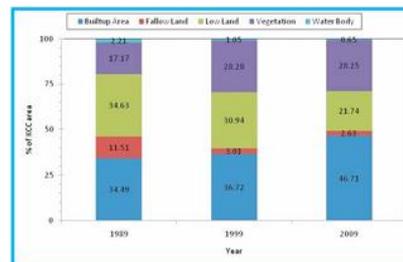
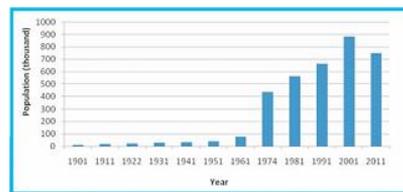
Khulna: Overview

- Khulna is the **third largest** metropolitan city in Bangladesh, bordering with the **Sundarbans**
- One of the five biggest **river ports** in Bangladesh
- Important for its **proximity** to the **second seaport** of the country at Mongla
- Central **urban corridor** of the **southwest** coastal region
- Once known as an **industrial city**
- Gained importance for **shrimp farming and processing**



Khulna: Overview

- City linearly expanded along a **natural levee**
- **Rapid growth** during the **post partition (1947)** and **post liberation (1971)** periods
- **Low lands** and **fallow** lands are **decreasing** whereas the built-up areas are increasing
- Projected that **water bodies** and **low lands** will **reduce** to 3% and 29%, respectively
- **Built-up areas** will **expand** to 33% in 2019



Khan et al., 2016

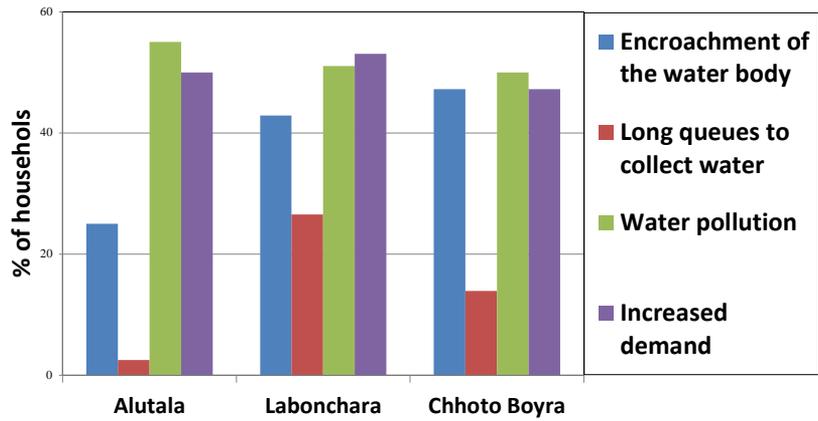
Peri-urban Khulna



Peri-urban Khulna

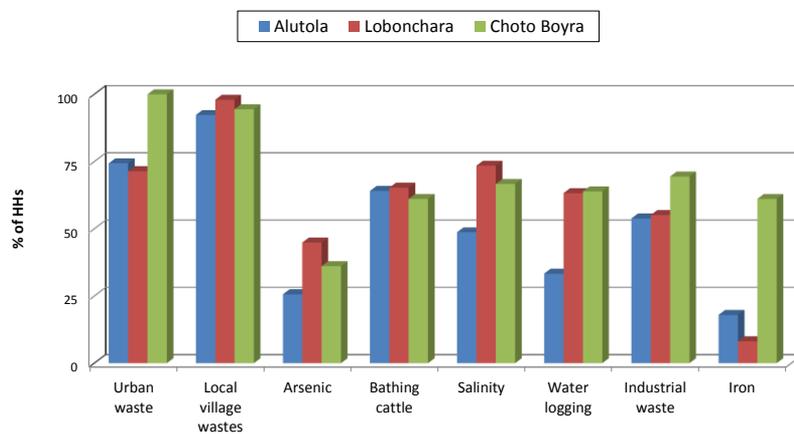


Water Security Issues



Khan et al., 2016

Water Security Issues

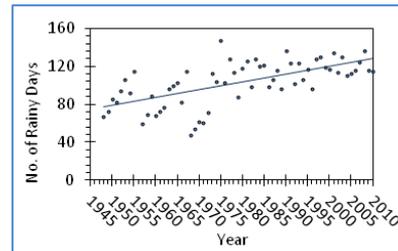
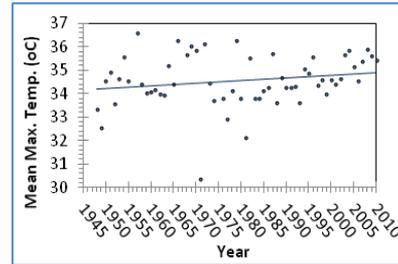


Khan et al., 2016

Climate Change:

Assessing from Observed Data

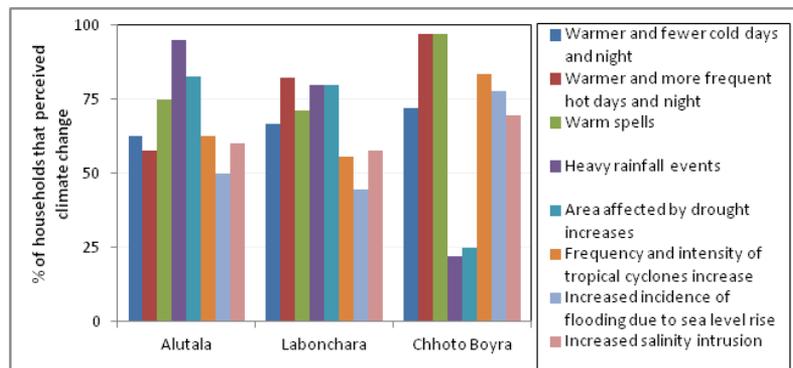
- **Temperature** is rising very fast since 1980
- Number of extremely **cold nights is decreasing** and the **heat index is increasing**
- **Sunshine duration** has a decreasing trend
- **Humidity** has an increasing trend
- **Rainfall** is increasing in terms of both magnitude and number of **rainy days, monsoon is strengthening** toward the later part



Khan et al., 2016

Climate Change:

People's Perception



Khan et al., 2016

Climate Change: Implications for Water Security

- **Changes in rainfall pattern:** irrigation water and crop production
- **Tidal water level and salinity:** agriculture and drinking water
- Temperature rise: work stress and comfort level
- **Groundwater recharge** and changes in the hydrologic cycle
- **Rainfall intensity and temperature:** human health and well-being
- **Frequency and intensity of climatic disasters**

Khan et al., 2016

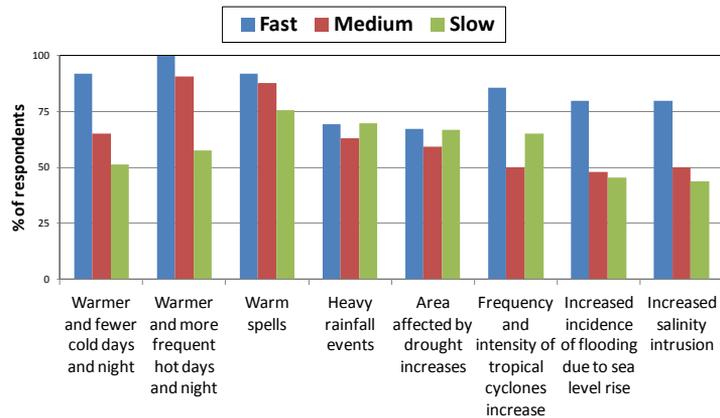
Urbanization and Climate Change: Compounding Stressors

- **Urban flooding** from extreme rainfall
- **Groundwater recharge**
- **Urban heat island** effect and local micro-climate



Khan et al., 2016

Urbanization and Climate Change: Compounding Stressors



Khan et al., 2016

Urbanization Climate change Water security

- **Climate change** and **urbanization** effects, and the **lack in capacity** are aggravating the prevailing water insecurity of the peri-urban communities.
- **Urbanization** is causing **acquisition and conversion** of **agricultural land and water bodies** in the peri-urban areas.
- **Urban wastewater and solid wastes** have degraded the common water bodies such as the Mayur river and the local environment.
- Current **climatic trends and variability** are perceived to have **multi-dimensional effects on water security** in the peri-urban areas, the poorer being more vulnerable to climate change induced hazards and disasters.

Urbanization Climate change Water security

- **Domestic water demand is likely to increase** due to the rising temperature and humidity, particularly during the pre-monsoon season.
- **Increasing river water levels**, accompanied by **more intense rainfall** events, may worsen the **drainage and flooding** problems. Also, more **agricultural lands** may come under **tidal influence**, resulting in an increase in **soil salinity**, changes in the **cropping pattern**, and conversion to **shrimp aquaculture**.

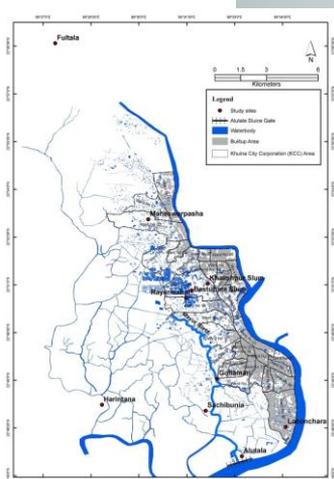
Policy Programs Practices

- The **Master Plan** for the city projects a two-fold increase in the metropolitan area, but there is no clear indication how the **future water demands in the urban and peri-urban areas** will be met.
- Although **adaptation measures** are being planned through the construction of **climate-resilient urban infrastructure** and **augmentation of freshwater supplies** for the **city**, none of these measures addresses the water demand in the **peri-urban areas**.
- **Peri-urban communities** are adapting to their water insecurity through **collective actions**, **water conservation practices**, and changes in **livelihoods and agricultural practices**.

Stressors Water conflict Contestation

- Water insecurity-induced **conflicts** are closely linked with **urbanization, climate change**, and regional and upstream **interventions** in the hydrological systems.
- **Wastewater pollution and solid waste disposal** originate locally due to **urbanization**, while others such as **salinity intrusion and reduced upstream freshwater flow** are the results of **climate change and/or interventions** in the flow regime.
- **Contestation for peri-urban resources** is creating **conflicts** and undermining community resilience. This is evident from the consequences of **urban land development activities**, or **urban elites taking control over peri-urban water resources**.

Alutala Regulator : Emerging Conflict



Alutala Regulator : Emerging Conflict

- **Constructed during 1982-85** by Bangladesh Water Development Board (**BWDB**) as part of Khulna city protection embankment system.
- Now, **operation** of the regulator is being seen as a **burden** (i.e. budget allocation for operation and maintenance, administrative/political pressure, etc) by BWDB.
- **Operation is handed over** to Khulna City Corporation (**KCC**). Major **maintenance work** is still under the jurisdiction of **BWDB**.

Courtesy: Prof. Rezaur Rahman, BUET

Alutala Regulator : Emerging Conflict

Origin of Conflict

- **Disconnection** of **Mayur** river from its outfall **Rupsha** river.
- **Protection of the city** is the main concern, **no consideration** of the interests of **peri-urban** communities.
- River **water pollution** due to the dumping of **urban wastes** in Mayur river.
 - Amplified due to the regulator.
 - Decreased availability of fish in the Mayur.
 - River water is not suitable for domestic use.

Courtesy: Prof. Rezaur Rahman, BUET

Alutala Regulator : Emerging Conflict

Origin of Conflict

- Creation of **pockets inside the river** for **fish farming** by the local influential (control the gate operation).
- **Inundation** of the lower (downstream) part of the river.
- There is a **committee for gate operation**. However, the process of **decision making** is not representative and claimed to be **corrupted**. There is **no representative from fisherman community** (a major stakeholder). In fact, the gate operation is **controlled by the local influential** and often by means of illegal financial transaction.

Courtesy: Prof. Rezaur Rahman, BUET

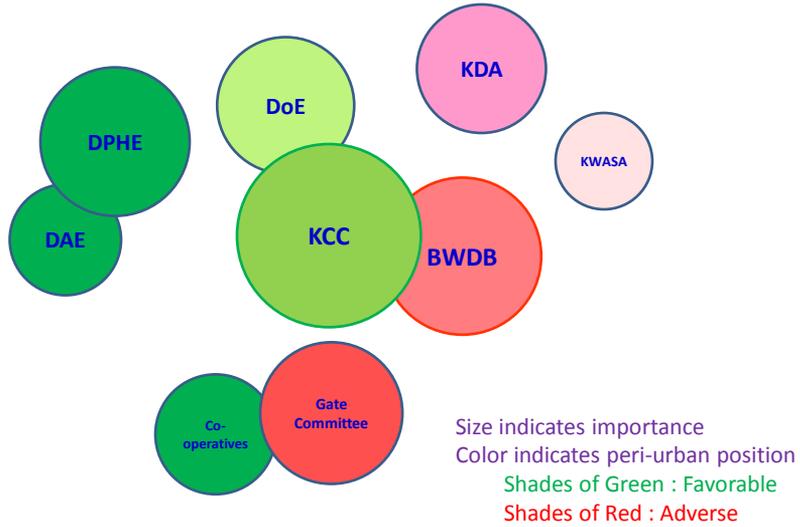
Water Management Institutions

Dominant Actors

- 1) Khulna City Corporation (KCC) : Solid waste and wastewater management, Drainage
- 2) Bangladesh Water Development Board (BWDB) : Salinity control, Gate operation and maintenance
- 3) Khulna Water Supply and Sewerage Authority (KWASA) : Water supply, Wastewater management, Drainage
- 4) Khulna Development Authority (KDA) : Land development planning
- 5) Department of Public Health Engineering (DPHE) : Rural water supply and sanitation
- 6) Department of Agricultural Extension (DAE) : Agricultural information and support
- 7) Department of Environment (DoE) : Water quality management, Environment and ecosystem sustenance
- 8) Community-based Co-operative Organizations (CBO) : Community-based adaptation
- 9) Local gate operation committee : Alutala gate operation

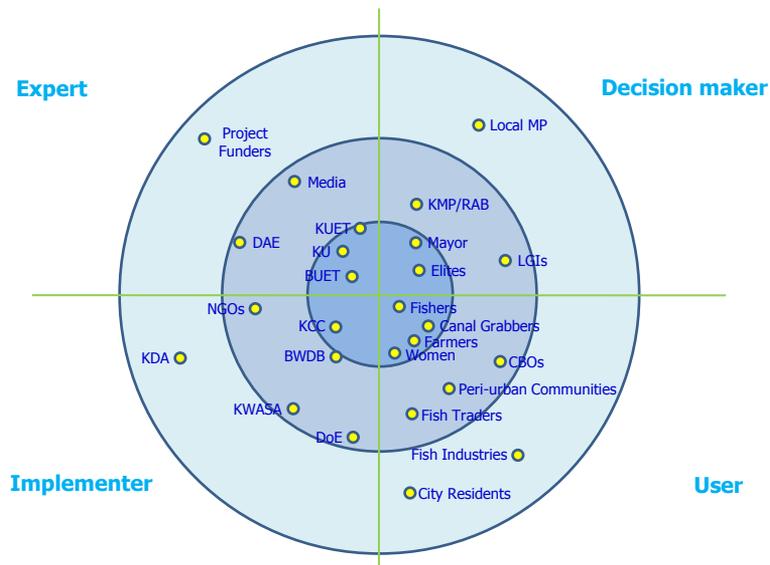
Water Management Institutions

Peri-urban Relations



Water Management Institutions

Stakeholders : Alutala Gate Operation Conflict



Water Management Institutions

Stakeholder Power : Alutala Gate Operation Conflict

		Opposition ←		Saline Fisheries	→ Support	
		Active	Passive	Fence-sitters	Passive	Active
Stakeholder Power	High	Peri-urban Communities, Media	CBOs	Small Fish Farmers, Fishermen	Member of Parliament (MP), KWASA	DPHE, LGIs
	Medium	KDA, KWASA, KMP, RAB	DAE, DoLivestock	Other Govt. Departments	Canal Grabber	Small Shrimp Cultivator
	Low	NGOs	Women	Community People	Shrimp Businessmen	Shrimp Industries

Water Management Institutions

Observations

- Movement, human-chain, protest, etc., by fishing community in association with some NGOs. Initial success in relocating/closing river side slaughter house, tannery, etc.
- Peri-urban communities' demand:
 - At least one gate should be kept open round the year. This will be a win-win situation for all stakeholders.
 - Representative gate operation committee.
 - Transparent and accountable gate operation rules.
 - Another sluice gate in Gallamari (upstream).

Courtesy: Prof. Rezaur Rahman, BUET

Water Management Institutions

Observations

- Sustainability of external interventions without necessary capacity building and ownership is a major concern.
- The problem is being sustained by a few people for mere personal interests.
- Institutional conflicts (e.g. between BWDB and KCC).
- Possible climate change implications.

Courtesy: Prof. Rezaur Rahman, BUET

Thank you