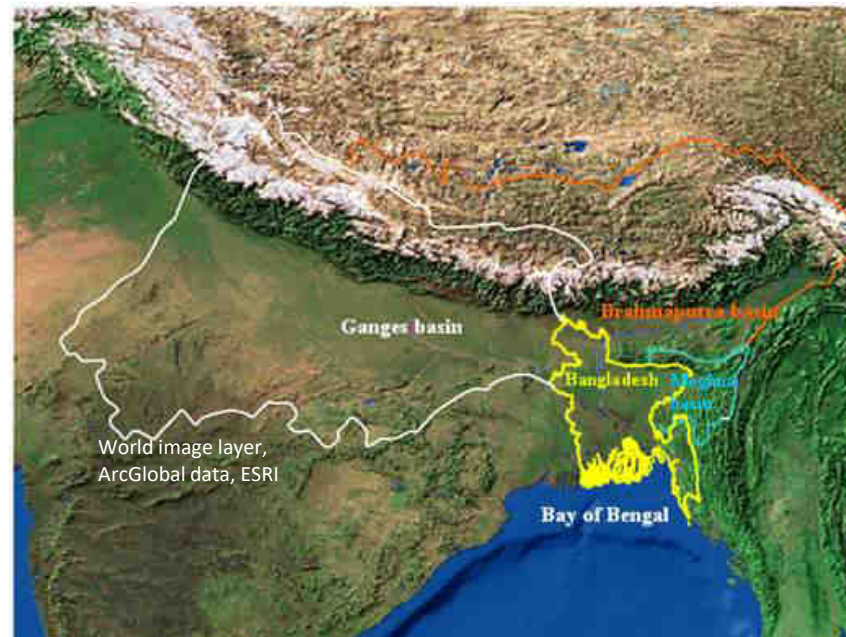


# Urbanising Watershed: What Lessons Dhaka Offers to Face Challenges



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# The Ganges-Brahmaputra-Meghna Basins

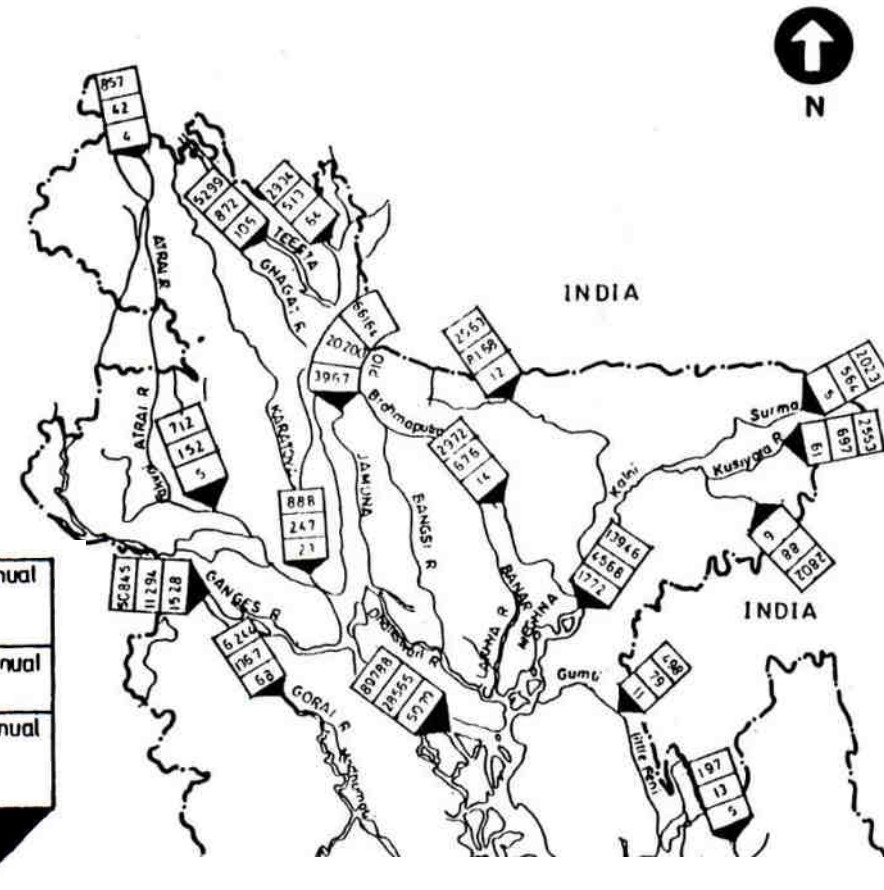
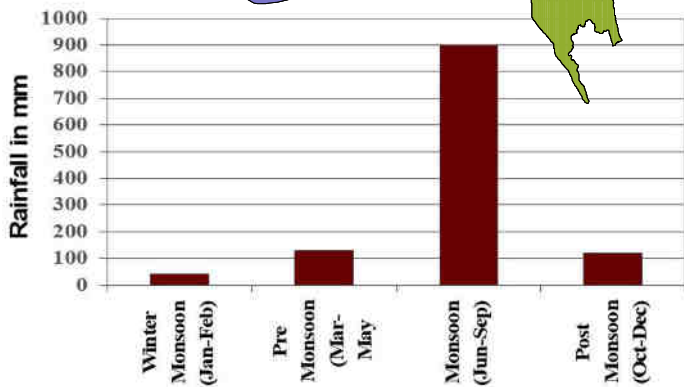
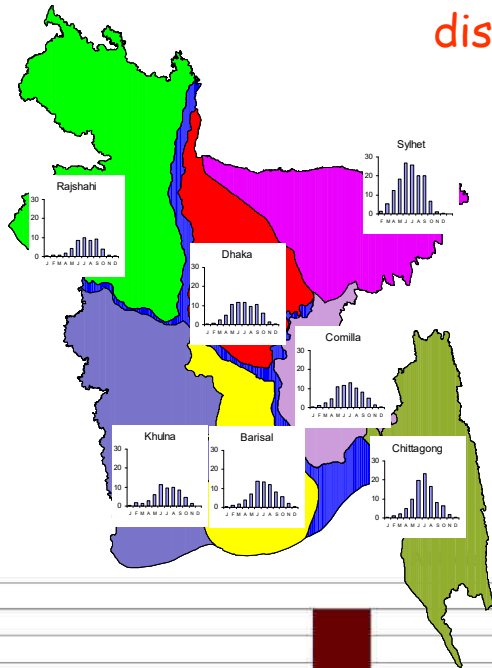


Country	Ganges basin		Brahmaputra basin		Meghna basin	
	Basin area (1000 km <sup>2</sup> )	Percentage of total area	Basin area (1000 km <sup>2</sup> )	Percentage of total area	Basin area (1000 km <sup>2</sup> )	Percentage of total area
China	33	3	293	50		
Nepal	140	13				
Bhutan			45	8		
India	861	80	195	34	49	58
Bangladesh	46	4	47	8	36	42
<b>Total</b>	<b>1,080</b>	<b>100</b>	<b>580</b>	<b>100</b>	<b>85</b>	<b>100</b>

*Source:* Rangachari and Verghese (2001); Pun (2004).

# Unique hydro-meteorological system

Inequality of temporal and spatial distribution of precipitation, Flow







# What Happens when a Bottom-catchment Urbanism Continues IGNORING CATCHMENT FEATURES?



## LAND

*Wetland Reduction for Urban Growth*

*Rapidly Expanding Informal Settlements*

## WATER

*Flood*

*Surface Water Contamination*

*Ground Water Table Depletion and Water Scarcity*

## AIR

*PM<sub>2.5</sub> - 2<sup>nd</sup> in world*

*PM<sub>10</sub> Increasing*

*Tot Mortality - Worst*

*Res Mortality - Worst*

*Car Mortality - Worst*

*Hospital Admission - 2<sup>nd</sup> Worst*

## Other Inescapable Challenges

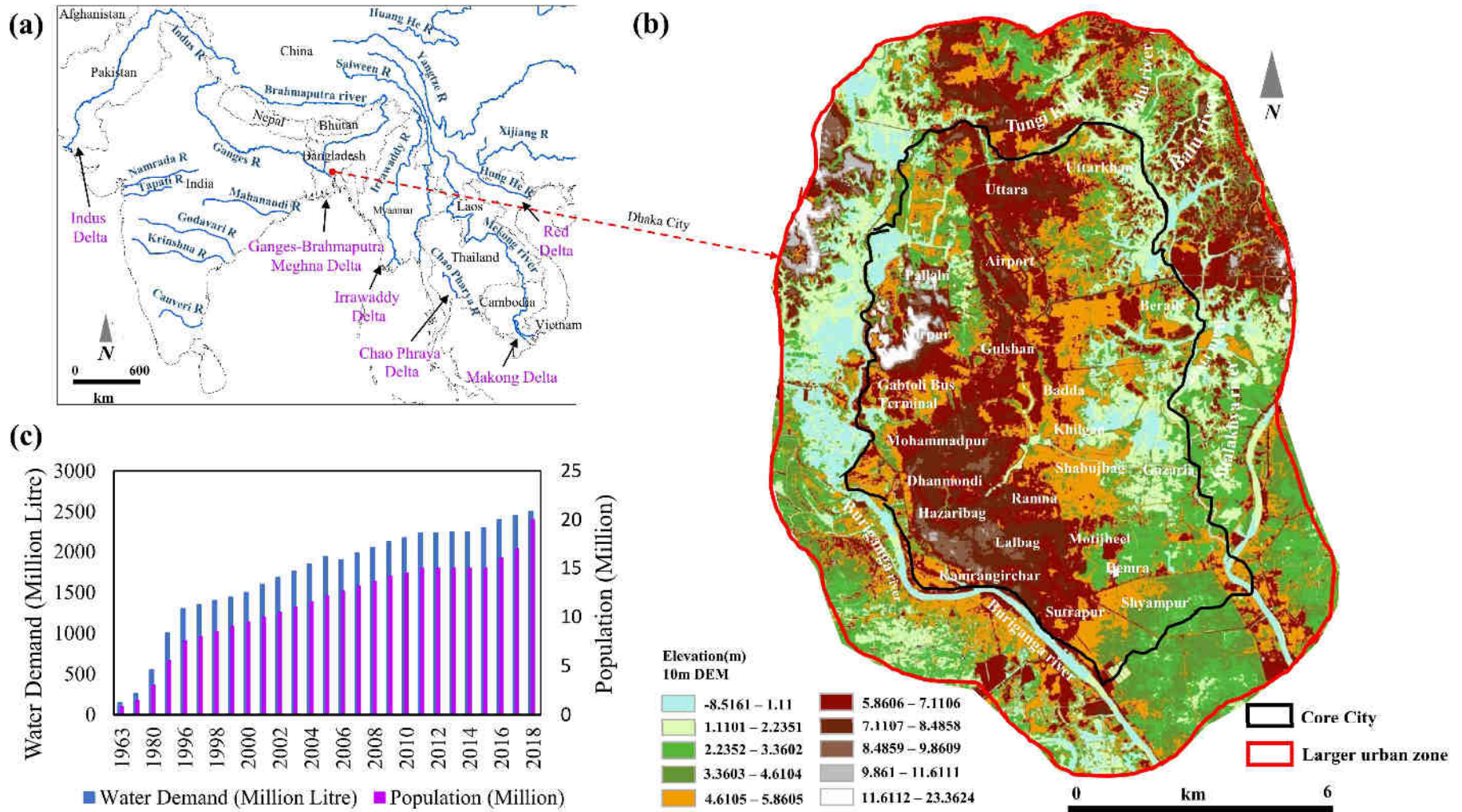
*Traffic Congestion*

*Electricity Deficit*

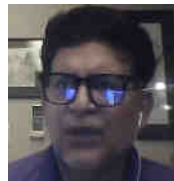
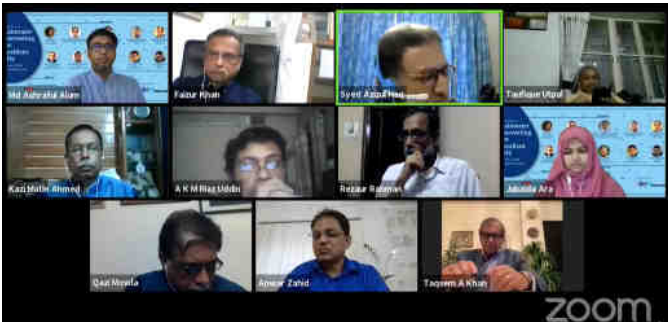
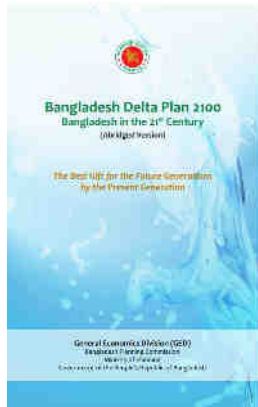
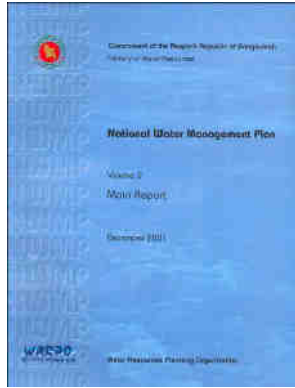
*Urban Heat Island Effect*



# CASE STUDY LOCATION



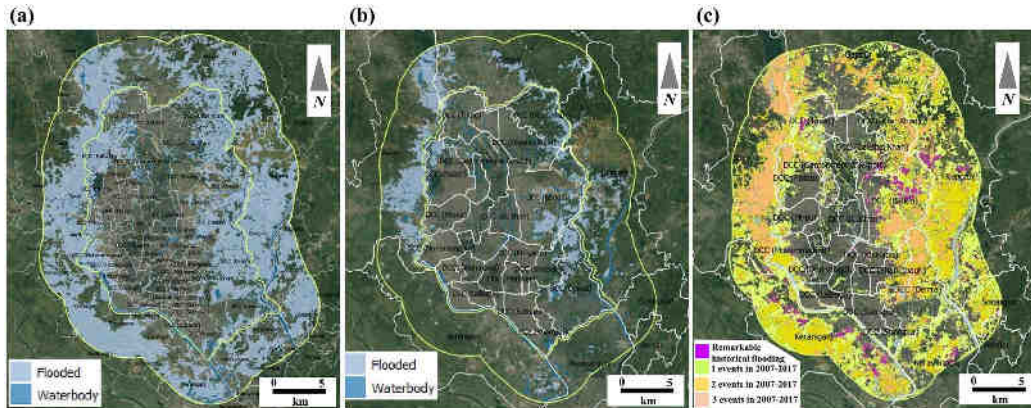
## A Systematic Reviews



Experts	Webinar link
<p>Head of the Wageningen project office, Dhaka, Bangladesh &amp; active member of Delta Alliance.</p> 	<p>River Conservation Club [Producer]. (2020). Webinar: Online river dialogue on Challenges of River Management. [Video]. <a href="https://www.facebook.com/riverconservationclub/videos/1179293015752603">https://www.facebook.com/riverconservationclub/videos/1179293015752603</a></p>
<p>Country Director of Water Aid Bangladesh                      Professor of Institute of Water and Flood Management (IWFM), Bangladesh University of engineering and Technology (BUET)                      Professor, Geology, Dhaka University (DU)                      Professor, Architecture, BUET                      Managing Director of Dhaka WASA                      Managing Director of Building Technology &amp; Ideas Ltd.                      Director of Urban development Directorate                      Chief Town Planner of Chittagong Development Authority                      Director of Bangladesh Water Development Board</p>	<p>RAiN Forum [Producer]. (2020). Webinar: Rainwater Harvesting for Resilient City. [Video]. <a href="https://www.facebook.com/RAiNForum.org/videos/590800654905455/">https://www.facebook.com/RAiNForum.org/videos/590800654905455/</a></p>
<p>Chairperson BRAC (International NGO of Bangladesh)                      Executive Chairman, Power and Participation Research Centre (PPRC) and ARISE Bangladesh Advisory Board Member</p>	<p>BRAC James P Grant School of Public Health [Producer]. (2020). Webinar: COVID-19 Impact on Urban Informal Settlements. [Video]. <a href="https://youtu.be/CxO8SUj-tsQ">https://youtu.be/CxO8SUj-tsQ</a></p>
<p>Professor, IWFM, BUET and a Lead Author on the IPCC's Sixth Assessment Report</p>	<p>The Institution of Engineers Bangladesh Dhaka Centre [Producer]. (2020). Webinar: Technical Discussion Meeting on World Cities Day. [Video]. <a href="https://www.facebook.com/iebdc/videos/379235380056441">https://www.facebook.com/iebdc/videos/379235380056441</a></p>
<p>Joint secretary -Bangladesh Environment Movement                      Chairperson BRAC                      Professor, Water Resources Engineering, BUET                      BAPA (urban activist)                      Researcher, Bangladesh Centre for Advanced Studies (BCAS)                      Professor, Urban and Regional Planning, Jahangirnagar Uni.                      Professor, Political Science, DU                      Head of the Wageningen project office, Dhaka, Bangladesh</p>	<p>A national event on Hydro-social Deltas: Understanding flows of water and people, Dialoguing New Dhaka, organized by IHE-Delft Institute for Water Education, Delft, Netherlands, with Wageningen University and research (WUR), Bangladesh Centre of Advanced Studies (BCAS) and Flood Hazard Research Centre (FHRC) on 19 November 2019</p>



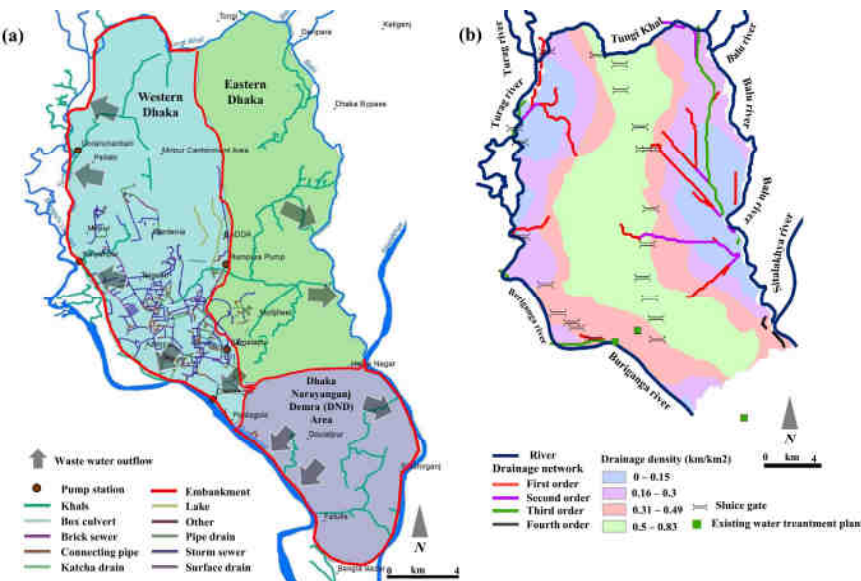
## Flood



## Health risk in Dhaka in the late 1990s/2000 due to Air pollution

Cases	Number per year
Total Mortality	14,700
Respiratory Mortality	2,100
Cardiovascular Mortality	7,000
Hospital Admission	2,100
Chronic obstruction pulmonary disease (COPD)	

## Drainage Congestion

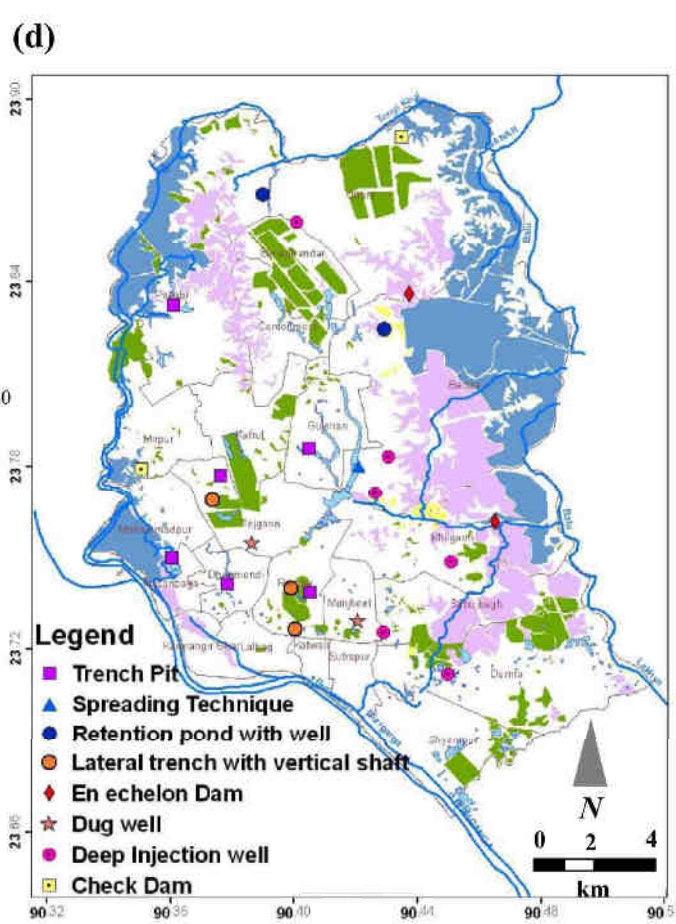
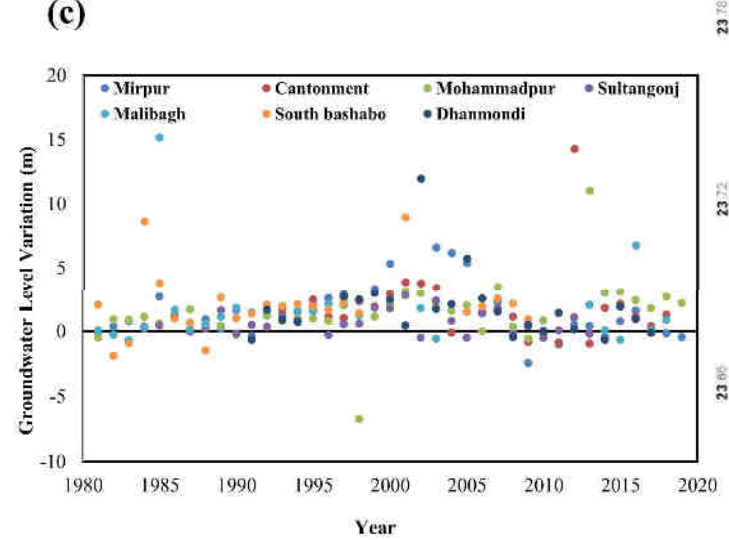
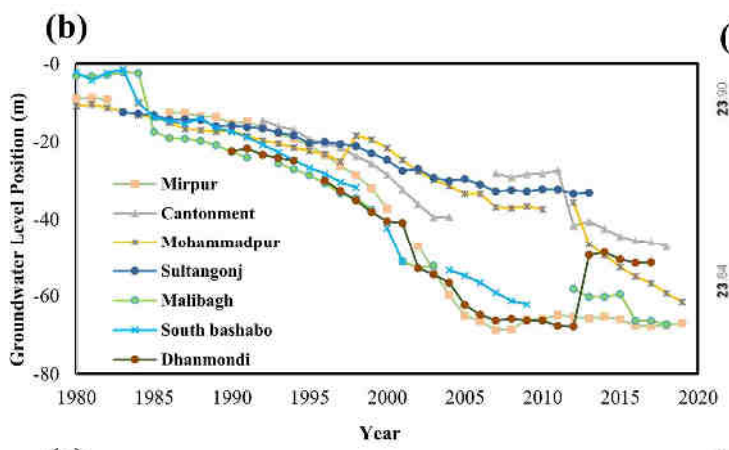
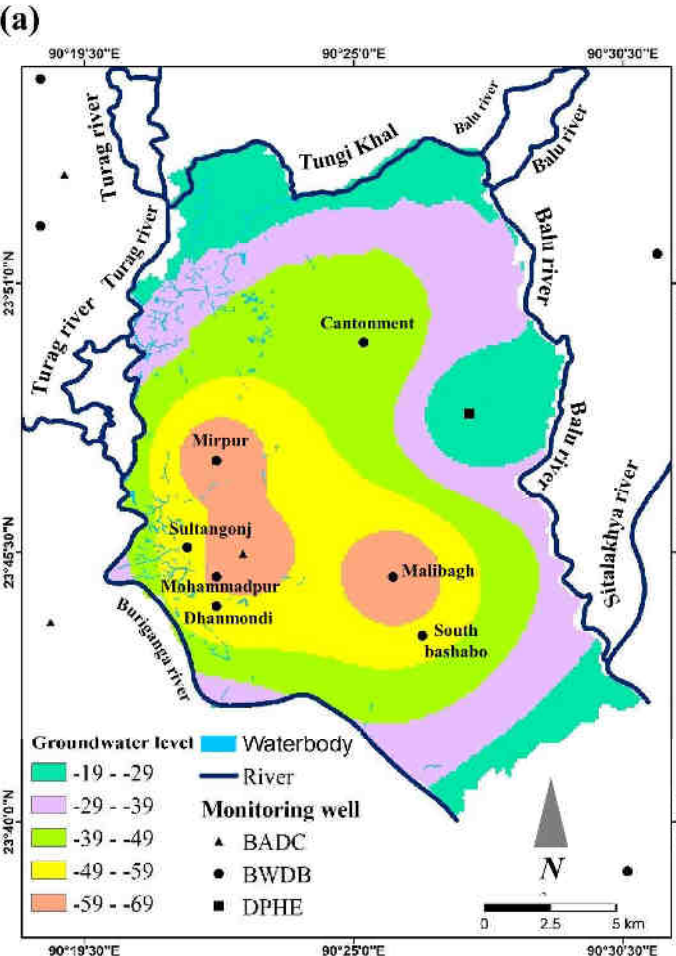


## River Contamination

Parameters	Experimental Range			Standard Acceptable limits	Remarks
	Shitalakshya	Buriganga	Turag		
pH	6.5-8.3	5.9-9.1	4.1-9.8	6.5-9.0	pH values are within the permissible limit except for Buriganga River
EC, $\mu\text{S/cm}$	720 -2321	354.5-2850	555.3-1990	700	The measured EC of Shitalakshya River was below than acceptable range
TDS, mg/L	475 -1180	169 -1260	41-1510	1000	The TDS values of all measured samples fell within the permissible limit of drinking, industrial, and agricultural use.
BOD, mg/L	25.1 -146	38.9-151	42.3-179	0.20	The BOD values obtained in the present study indicated that all the river water is unsuitable for uses
COD, mg/L	14-172	17-185	5-181.7	6	Buriganga River showed the highest COD value.



## Groundwater Depletion



# RECOMMENDATIONS

## POLICY

*Coordinated  
Decentralization*

*Integrated LU planning*

Regulate Eco function

Political Authorities

Digitized Coordination

Blend Top-down and  
bottom-up approach

Consensus based  
implementation

Integrated, inclusive, and  
interconnected policies

Open Source Information

## INTERVENTION

*Sponge City + Green + Blue*

*Slums up-gradation via  
participatory budget*

Water-urbanism

*Citizen Science in Pollution  
Control*

Catalytic converter +Hydro-  
desulphurization in diesel

## RESEARCH

Reconceptualize basin by all

Systematic Study

Formulation of multi-  
objectives planning tools

Advance model study applying  
variable future scenarios

Propose social models

Thank you

