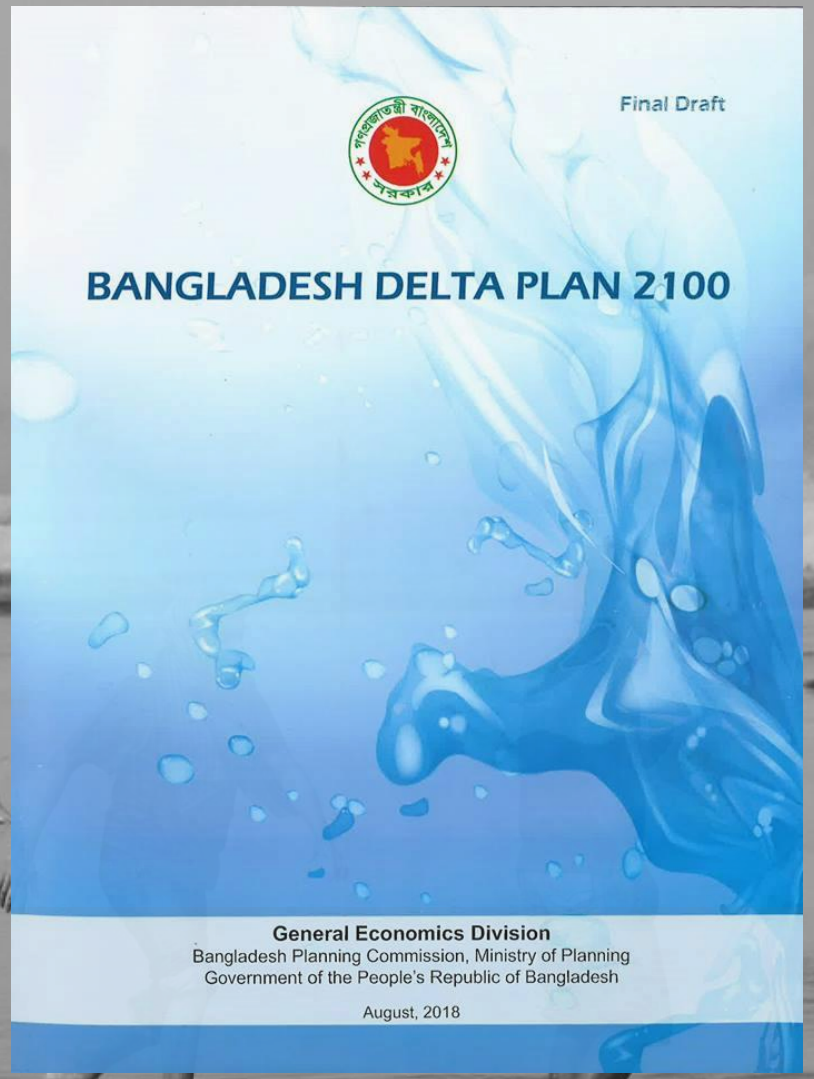
THE BANGLADESH DELTA PLAN

From planning to implementation: the 'real' challenge

20-03-2021

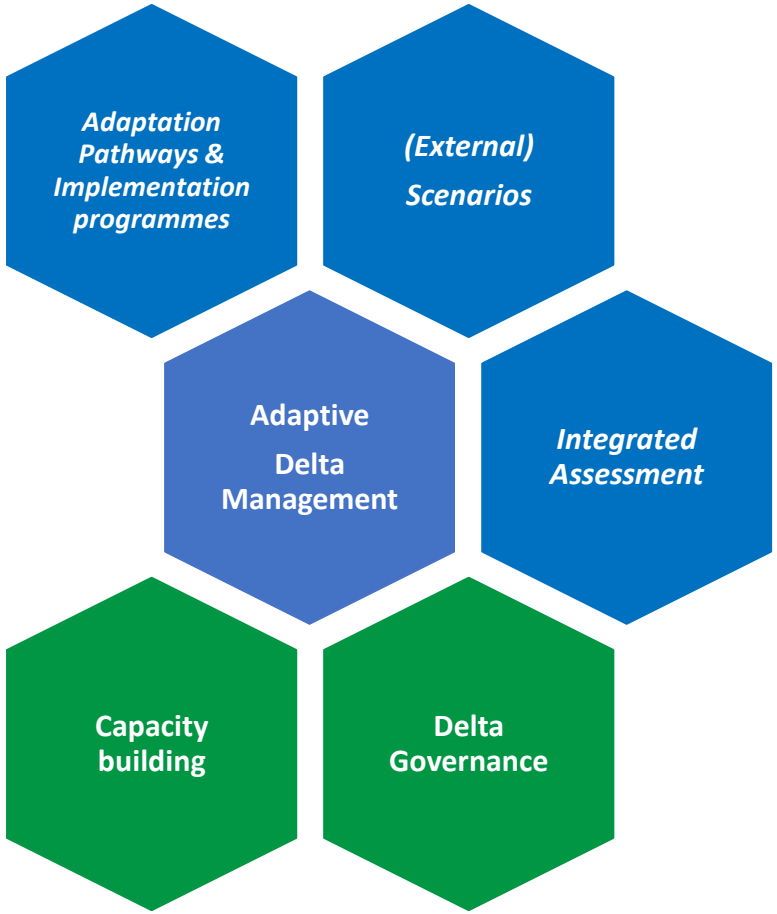
WILLIAM OLIEMANS – SIBDP (DELTARES)



IDENTIFYING RELEVANT GOALS AND STRATEGIES

Topics

- From Delta Goals to Implementation Programme – the Results Development Framework (Volume 1: Strategy) and the Basin approach
- Developing Programmes, Objectives and Performance Targets
- Project Screening and Programme Development
- Integrated Assessment: MCA and Metamodel



Long Term BDP2100 Vision

Achieving a safe, climate resilient and prosperous delta

BDP 2100 Mission

Ensure long-term water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta issues through robust, adaptive and integrated strategies, and equitable water governance

Higher Level Goal 1
Eliminate extreme poverty by 2030

Higher Level Goal 2
Achieve upper middle-income status by 2030

Higher Level Goal 3
Being a prosperous country beyond 2041

Delta Goal 1
Ensure safety from floods and climate change related disasters

Delta Goal 2
Enhance water security and efficiency of water usages

Delta Goal 3
Ensure sustainable and integrated river systems and estuaries management

Delta Goal 4
Conserve and preserve wetlands and ecosystems and promote their wise use

Delta Goal 5
Develop effective institutions and equitable governance for in-country and transboundary water resources management

Delta Goal 6
Achieve optimal and integrated use of land and water resources

THE NATIONAL FLOOD RISK MANAGEMENT STRATEGY

PRIORITY ECONOMIC ZONES

Protecting economic strongholds and critical infrastructure

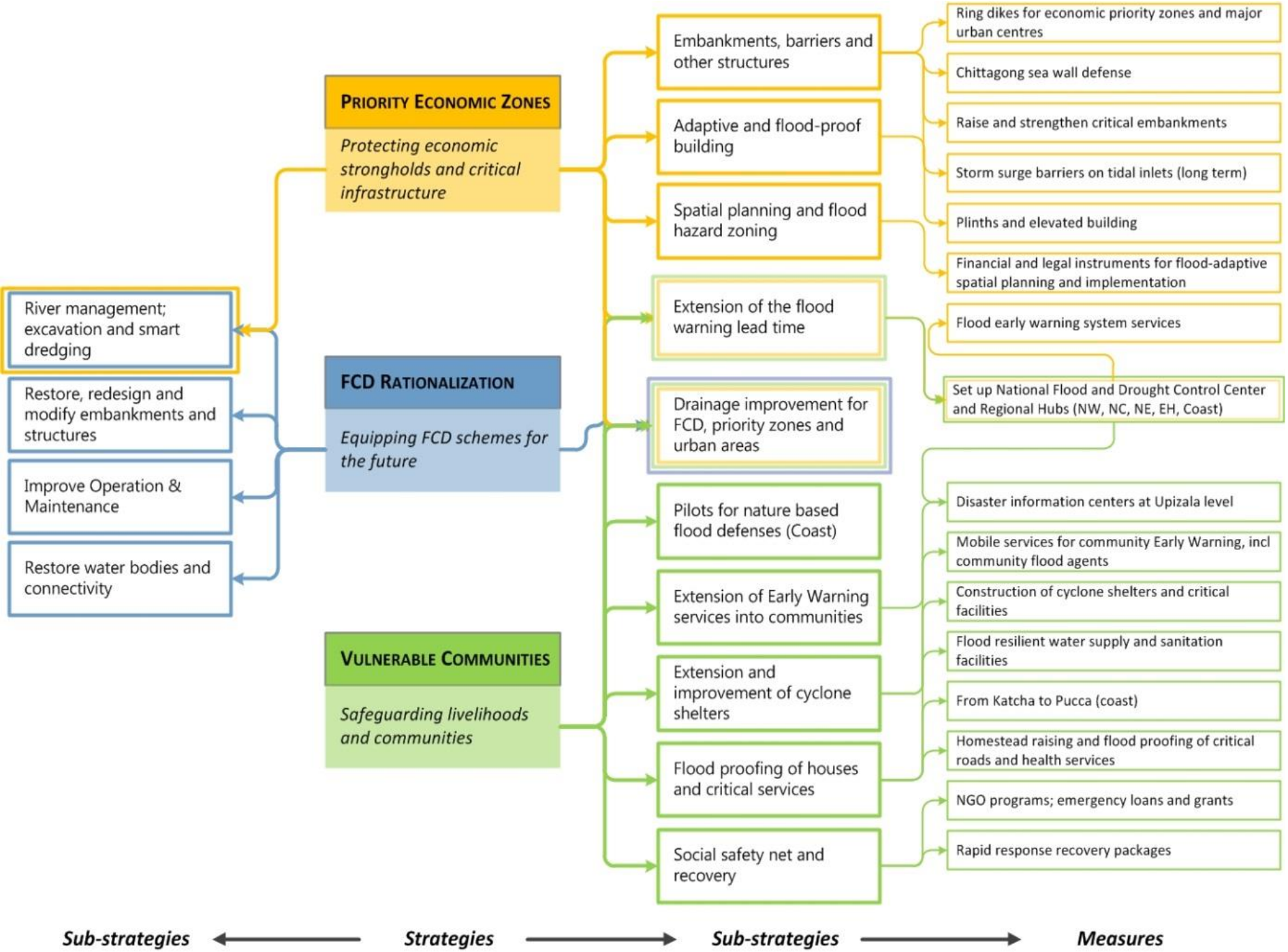
FCD RATIONALIZATION

Equipping FCD schemes for the future

VULNERABLE COMMUNITIES

Safeguarding livelihoods and communities

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)



BDP2100 Flood Risk Management Strategy

THE NATIONAL FRESHWATER STRATEGY

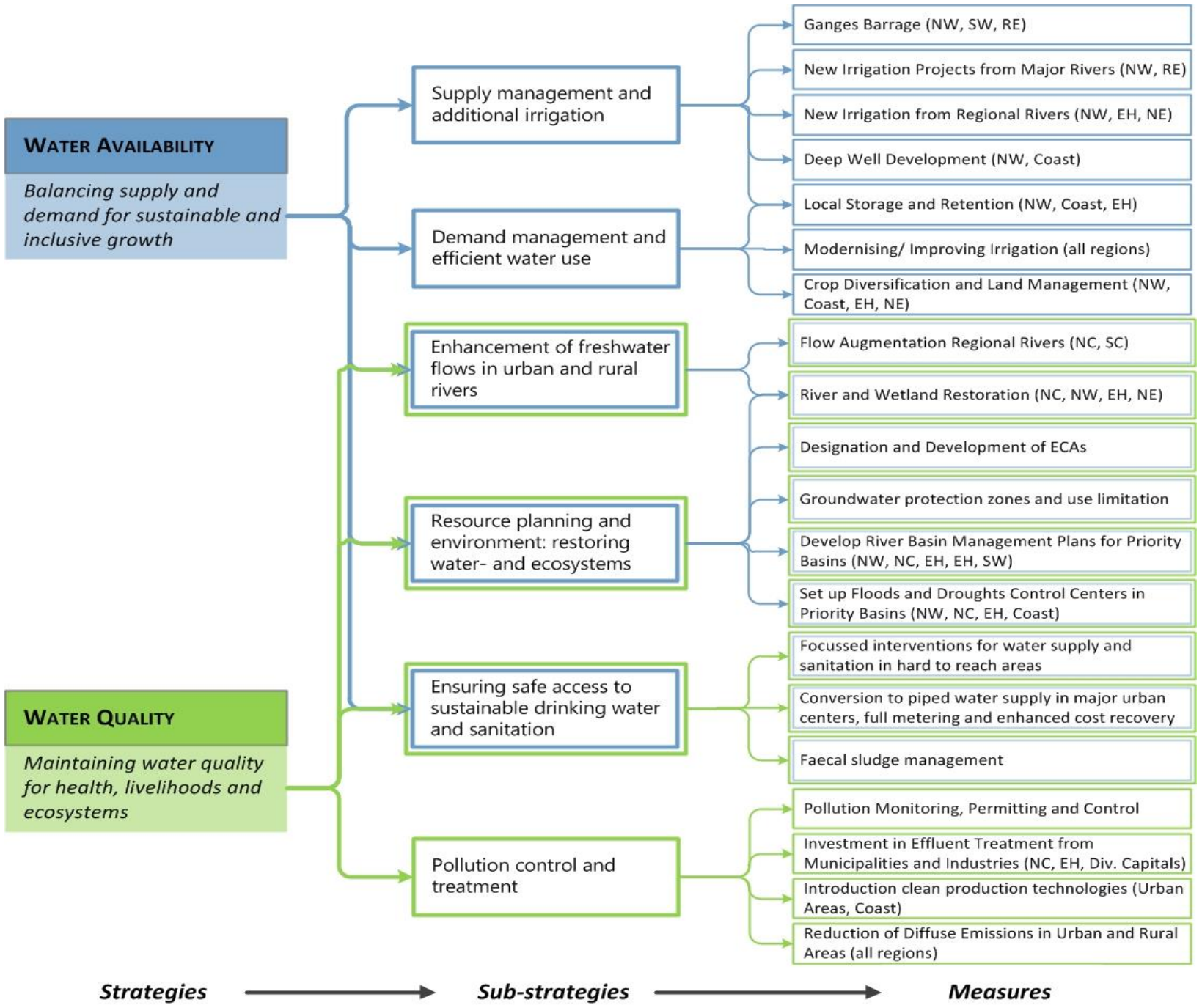
WATER AVAILABILITY

Balancing supply and demand for sustainable and inclusive growth

WATER QUALITY

Maintaining water quality for health, livelihoods and ecosystems

BDP2100 Freshwater Strategy



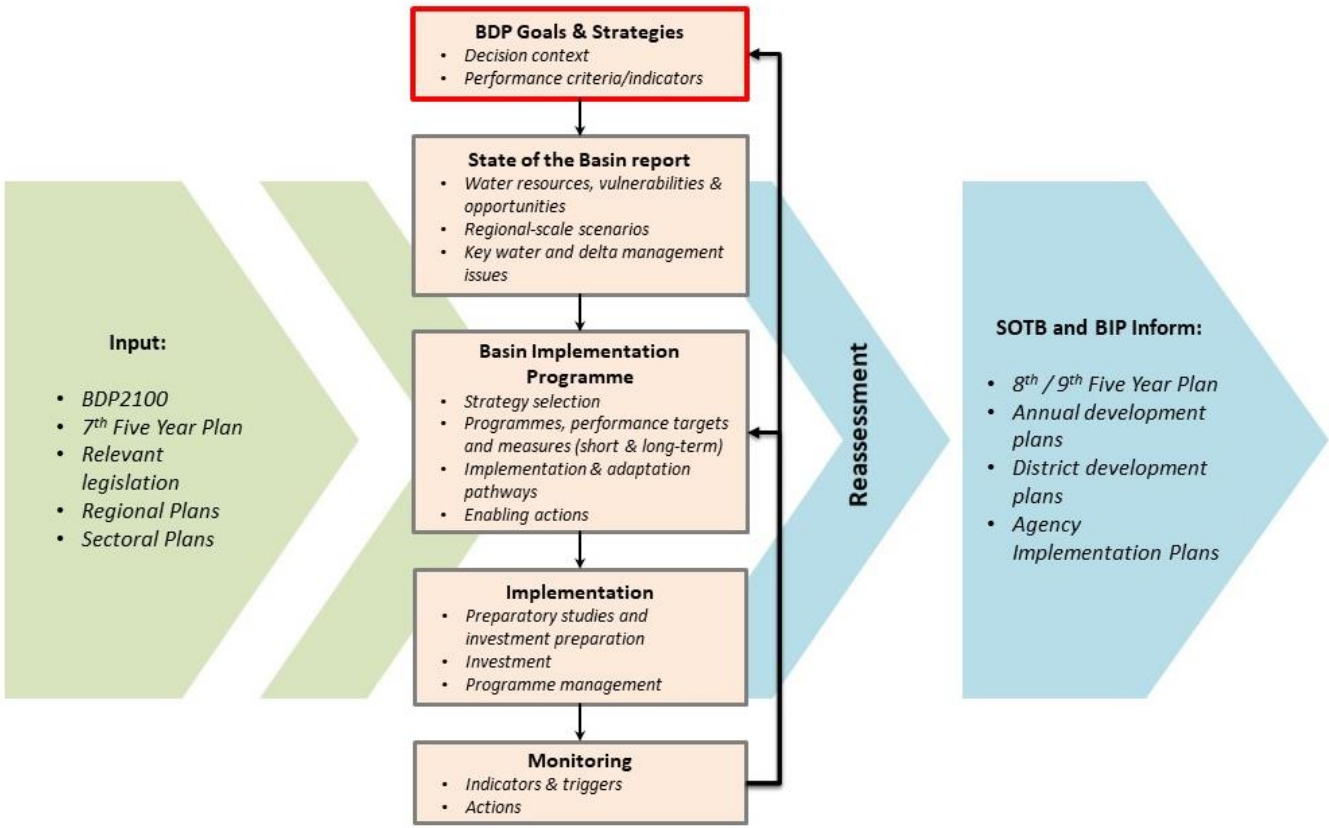
Thematic Strategies

Thematic strategy	Relevance NW		
	H	M	L
Agriculture, Food Security, Nutrition and Livelihoods			
Transboundary Water Management			
Water Supply, Sanitation & Waste Management			
Environment, Ecology & Biodiversity			
Dynamizing Inland Water Transport System			
Sustainable Land Use and Spatial Planning			
Advancing the Blue Economy			
Renewable Energy			
Earthquakes			

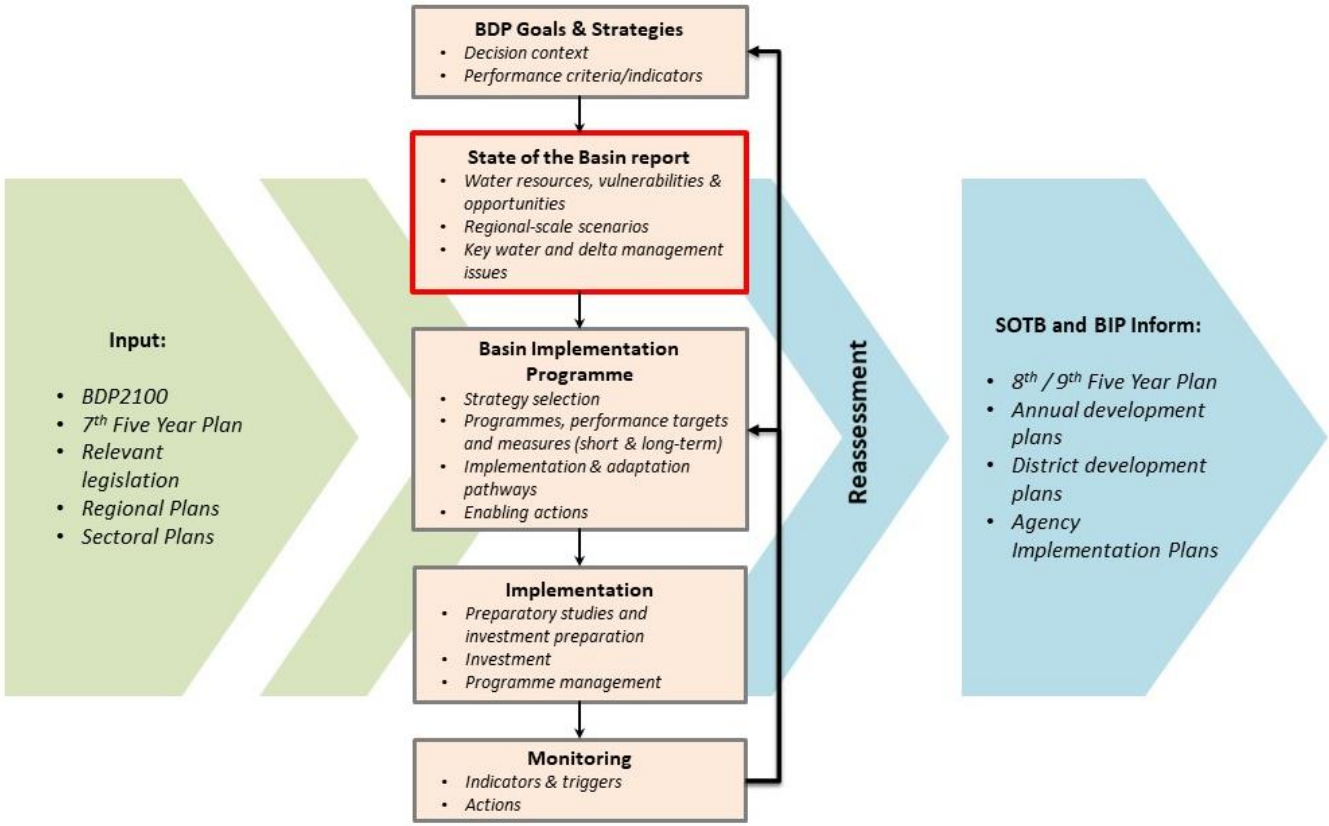
From Goals to Basin Programmes

- Start from the region: key issues and opportunities
- Building on succes, learning from challenges
- ADM: quantifying and assessing vulnerability due to climate change and rapid socio-economic development; MCA and Metamodel
- Listing and identifying projects and opportunities (integration)
- Screening and selecting
- Combining promising projects in programmes -> synergy (holistic)
- Phasing for resilience (adapative approach)
- Putting into practice: Delta Governance

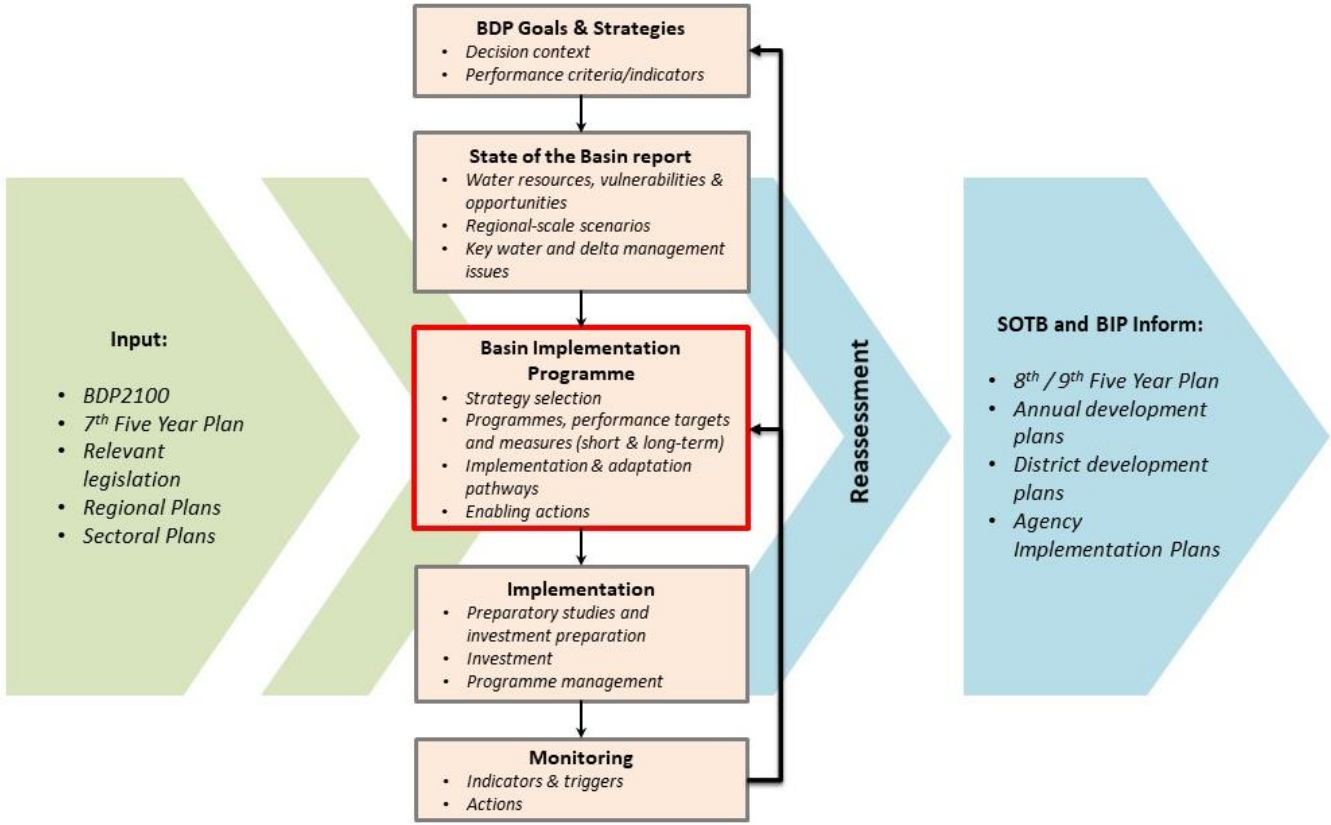
From Goals to Basin Programmes



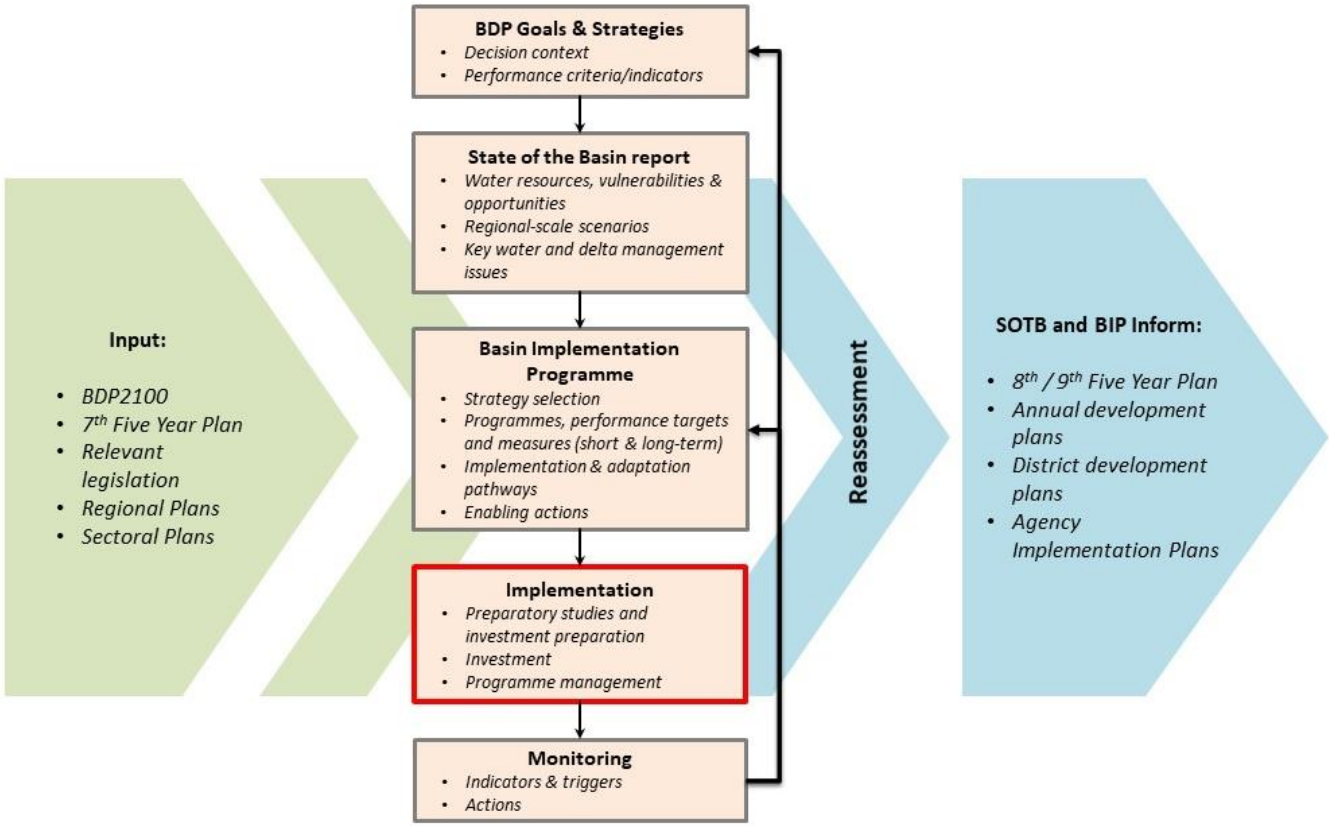
From Goals to Basin Programmes



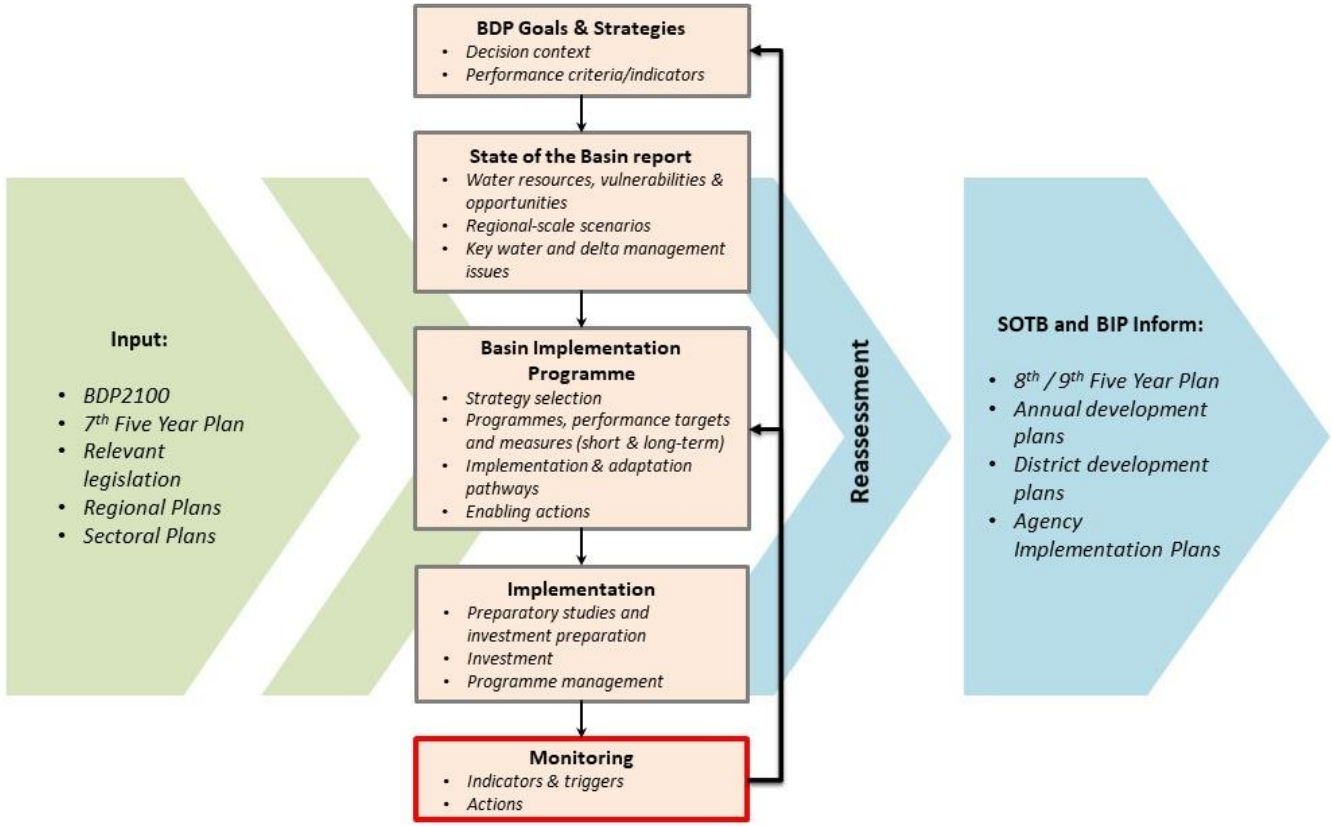
From Goals to Basin Programmes

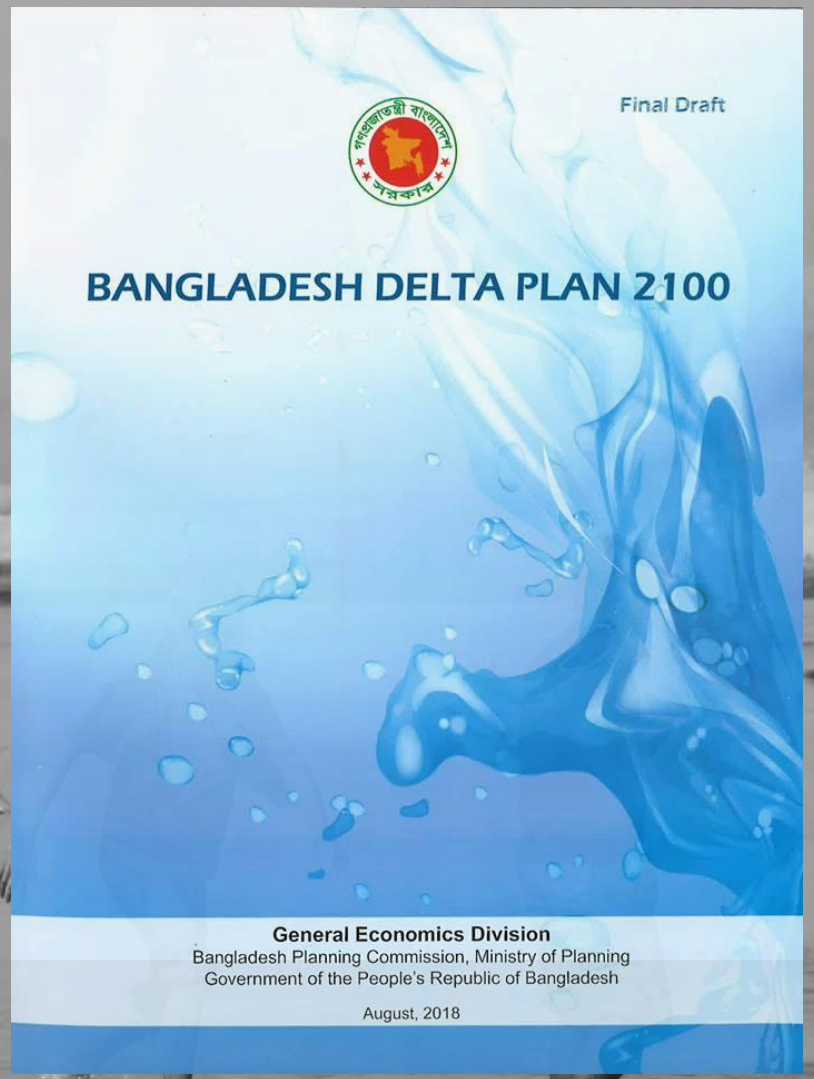


From Goals to Basin Programmes



From Goals to Basin Programmes

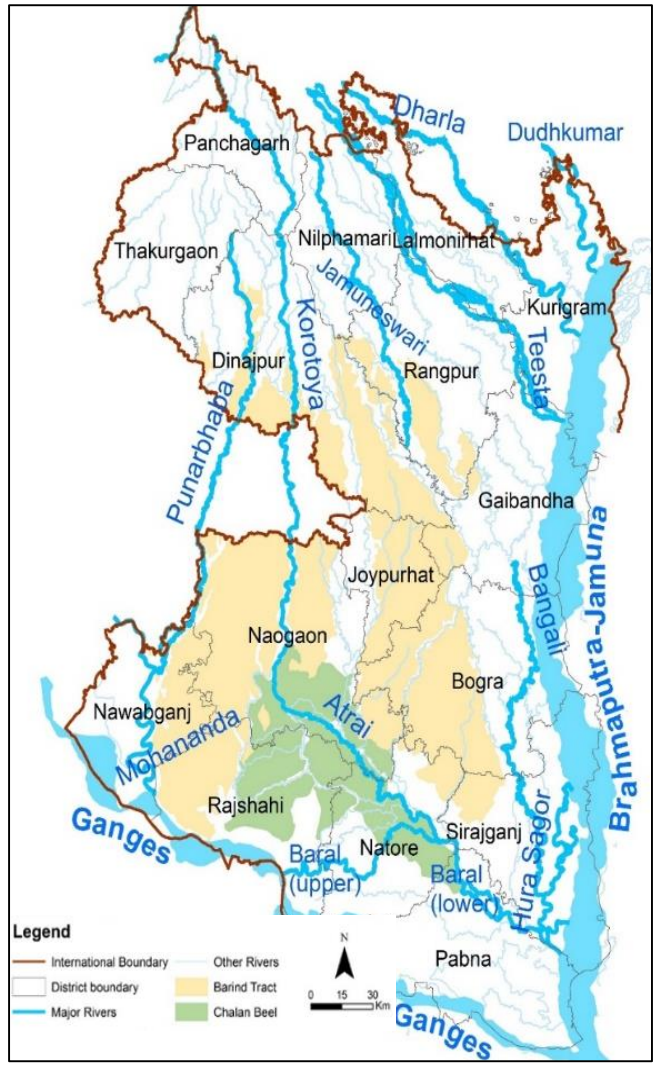




APPLYING ADAPTIVE DELTA MANAGEMENT

NW – key characteristics

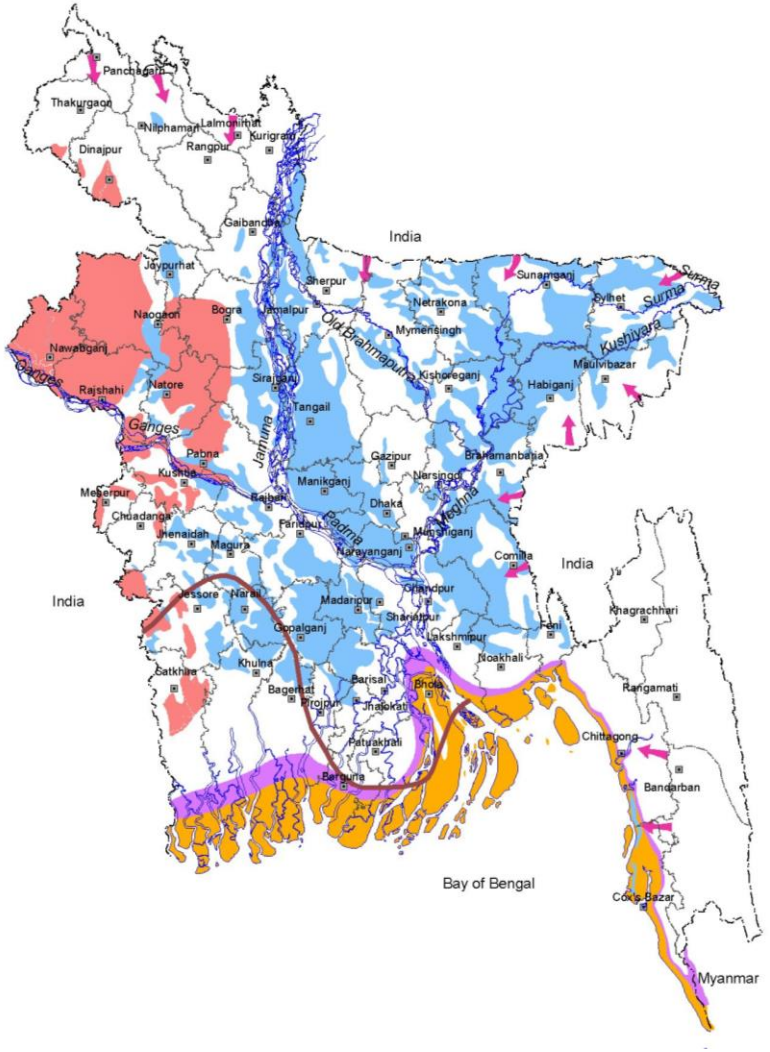
- Drought Hot Spot in the core but high diversity in water resources, socio-economic conditions and production systems
- Rice basket: 55% of Boro and ~30% of Aman
- Great diversity in productivity; fisheries, agriculture, livestock and emerging industry; ample good quality groundwater
- Acces to major rivers and international transport route (to India)
- Moderately growing population and urbanization



Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

NW – key vulnerabilities

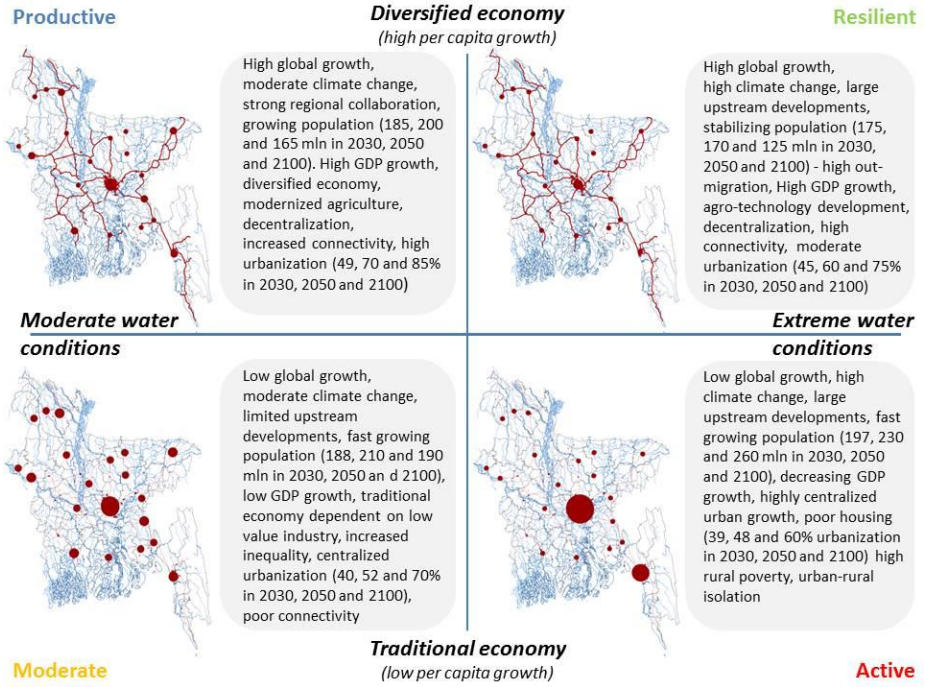
- Drought Hot Spot – variability
- Vulnerable to flooding – drainge congestion: Jamuna outfall, low lying Atrai basin and coincidence of flood events
- Declining groundwater table due to groundwater overabstraction in South Western part of the NW basin
- FCD(I) infrastructure under-performing
- Environmental values under pressure -> wetlands and regional rivers disconnected and drying
- Water quality as emerging issue
- Riverbank erosion Jamuna and to a lessor extent Teesta and Ganges
- Poverty still prevails in hard-to-reach and erosion-prone areas



Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

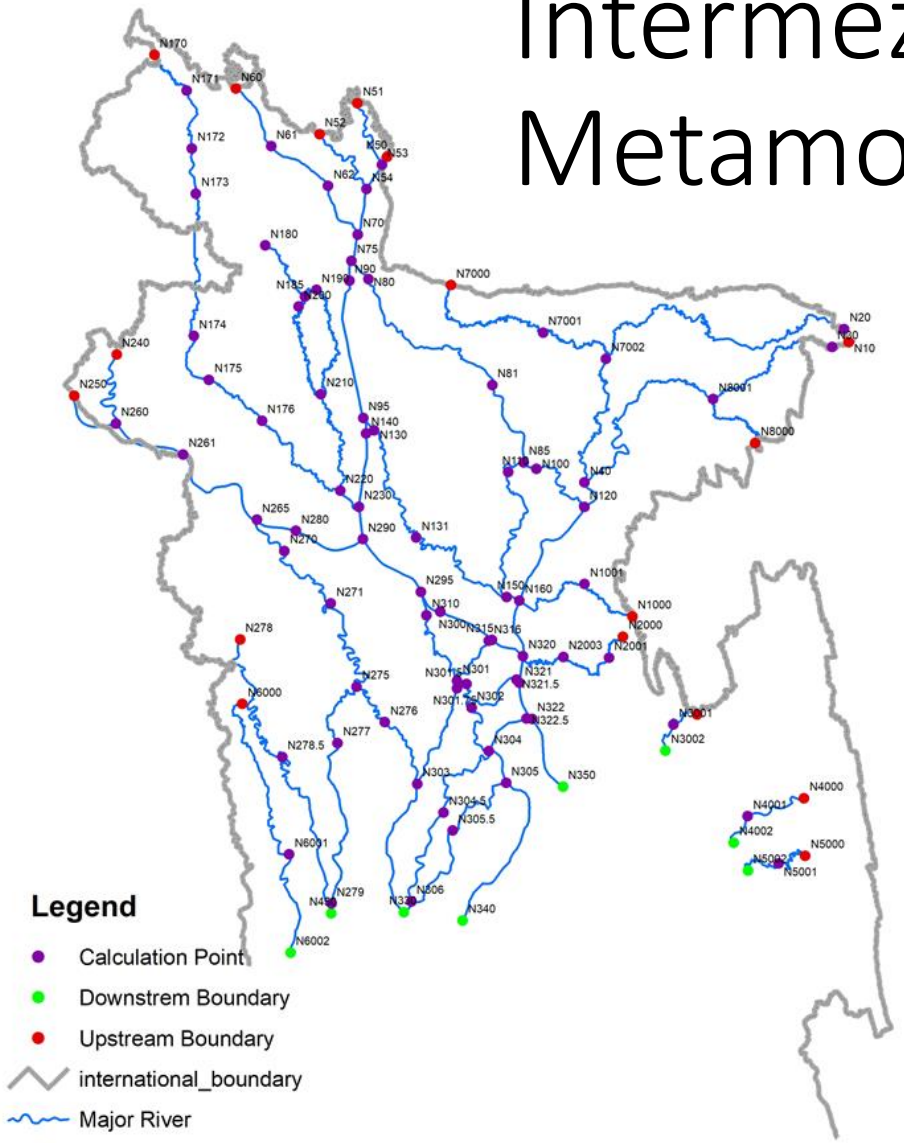
Scenarios and climate change

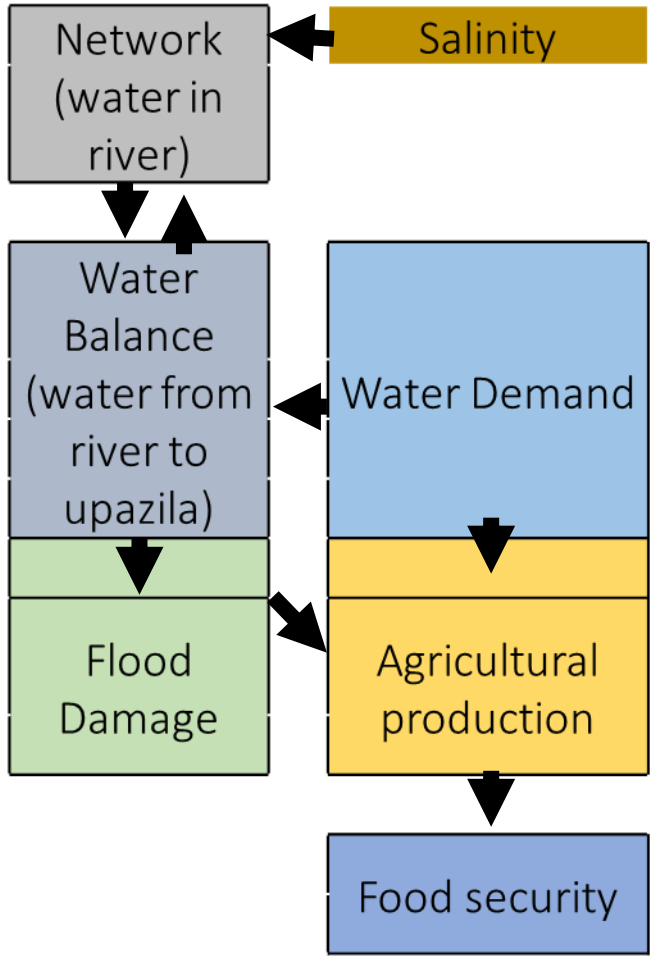
- Climate variability remains important variable at least until 2050 under given scenarios
- In most scenarios increasing rainfaill and slightly increasing evapotranspiration; decreasing deficit and increasing vulnerability to floods and drainage if BDP strategies are not put in place
- Industrialisation and urbanisation follow national trends; higher assets at risk
- Human and industrial water demand remain small compared to agricultural demand; but with higher value per water unit



Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Intermezzo: the Bangladesh Metamodel

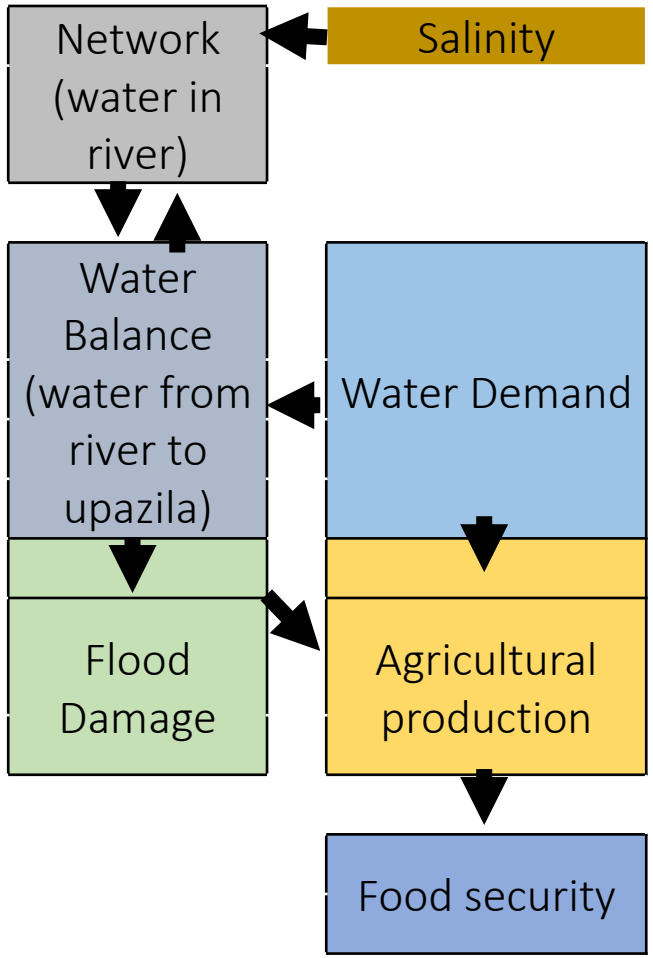




State Indicators	Decision Support Indicators
Environmental flow (m^3/s)*	Annual rainfall damage (Taka)
Dry season river flow (m^3/s)	River navigability (km/class)*
Annual flood extent (km^2)	Rural access to safe drinking water (%)*
Annual flood duration (month)	Habitat area suitable for protective species (km^2)*
Extreme flood extent (km^2)	
Waterlogged area (km^2)	
GWL at end of dry season (m)	
	Flood damage (Taka)
	Poor households affected by droughts, floods and salinity (%)*
	Displaced people due to disasters (%)*
	Rice & fisheries* production (Tonnes)
	Food security for the poor (%)
Area affected by salinity (km2)*	Cost of project implementation (Taka)

* Under development

Metamodel engine module workflow

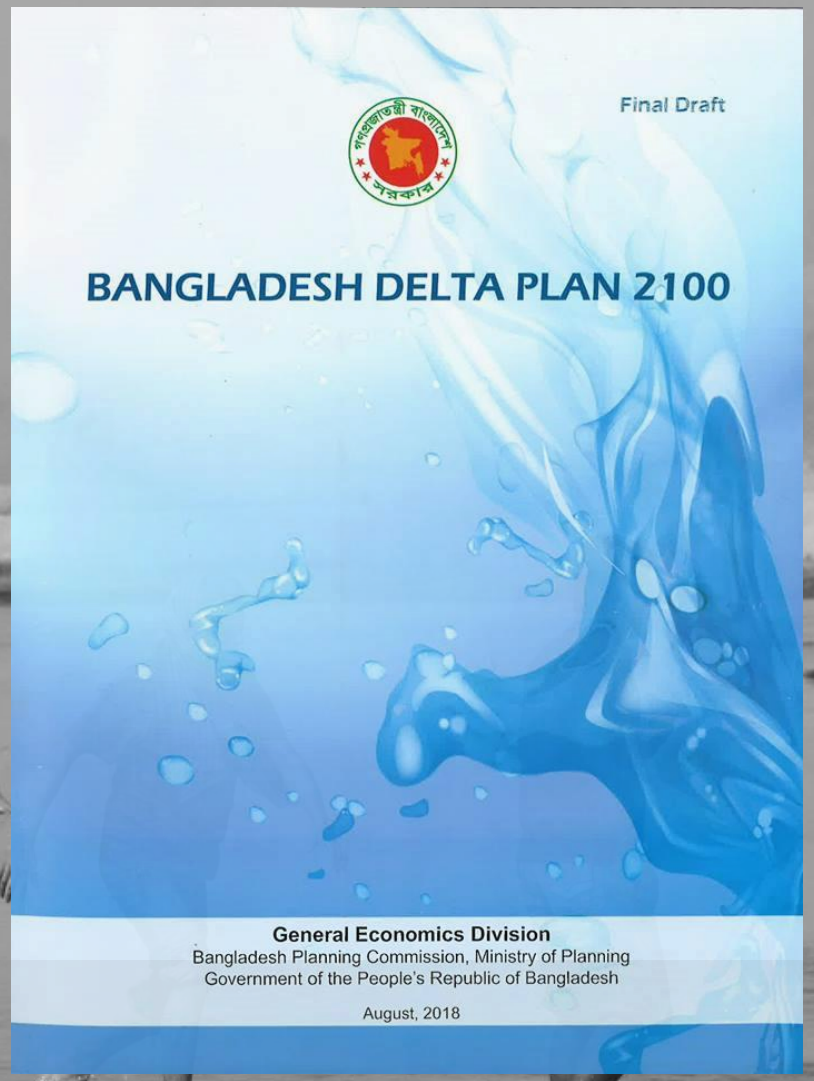


Bangladesh Metamodel

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Indicator	Unit	Current	High CC / Low EC (Active)		Low CC / High EC (Productive)	
		2020	2030	2050	2030	2050
Rice production	Mtonnes / year	10.5	-9 %	-13 %	-1 %	-6 %
Damage due to river and rainfall floods	Cr. BDT / year	18,613	+214 %	+695 %	+59 %	+899 %
Agricultural damage due to river and rainfall floods	Cr. BDT / year	28,144	+46 %	+63 %	+5 %	+30 %
Damage due to river floods	Cr. BDT / year	1,697	+736 %	+2492 %	+283 %	+2185 %
Population affected due to river and rainfall floods	People / year	1,950,126	+179 %	+ 302 %	+24 %	+60 %
Sustainable groundwater use	cm / year	- 6.5	-3	-2	-6	-4
River flood extent	ha / year	225,222	+100 %	+141 %	+53 %	+72 %
Rainfall and river flood extent	ha / year	1,550,219	+19 %	+27 %	+1 %	+13 %

Indicator	Unit	Current	High CC / High EC (Resilient)		Low CC / Low EC (Moderate)	
		2020	2030	2050	2030	2050
Rice production	Mtonnes / year	10.5	-9 %	-13 %	-1 %	-6 %
Damage due to river and rainfall floods	Cr. BDT / year	18,613	+237 %	+1162 %	+46 %	+490 %
Agricultural damage due to river and rainfall floods	Cr. BDT / year	28,144	+46 %	+62 %	+5 %	+30 %
Damage due to river floods	Cr. BDT / year	1,697	+804 %	+4040 %	+253 %	+1237 %
Population affected due to river and rainfall floods	People / year	1,950,126	+147 %	+196 %	+26 %	+123 %
Sustainable groundwater use	cm / year	- 7	-3	-2	-6	-4
River flood extent	ha / year	225,222	+102 %	+143 %	+52 %	+71 %
Rainfall and river flood	ha / year	1,550,219	+19 %	+27 %	+1 %	+13 %



DEVELOPING THE BASIN IMPLEMENTATION PROGRAMME

WHY PROGRAMS??

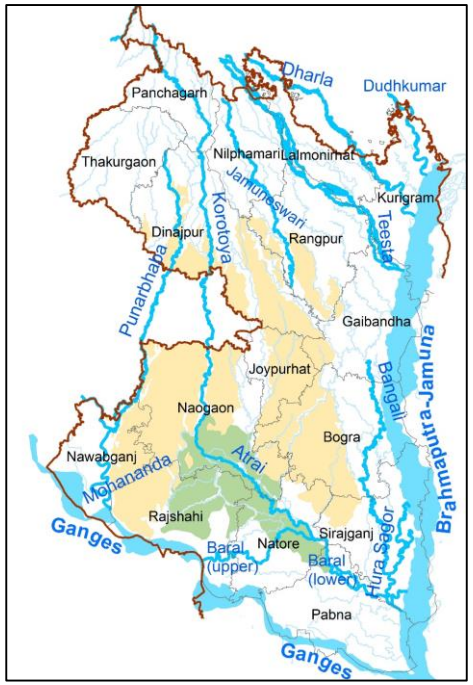
SYNERGY BETWEEN PROJECTS (HOLISTIC)

COOPERATION BETWEEN AGENCIES (PROGRAMME MANAGEMENT)

INTEGRATED APPROACH

North West Implementation Program – BDP 2100

Sub-programs for integrated and adaptive development



Water for Agriculture

Environment and Ecosystems

Flood Risk Management

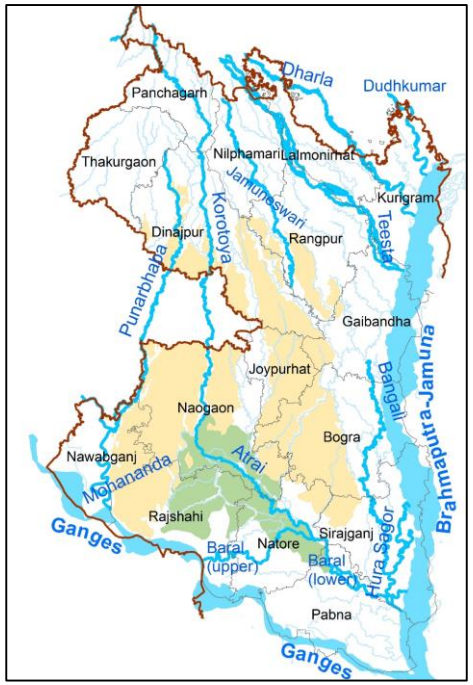
Water Supply & Sanitation

Governance, knowledge & participation

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

North West Implementation Program – BDP 2100

Sub-programs for integrated and adaptive development



Water for Agriculture

Environment and Ecosystems

Flood Risk Management

Water Supply & Sanitation

Governance, knowledge & participation

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Programme Objectives and Performance Targets; example *Environment and Ecosystems*

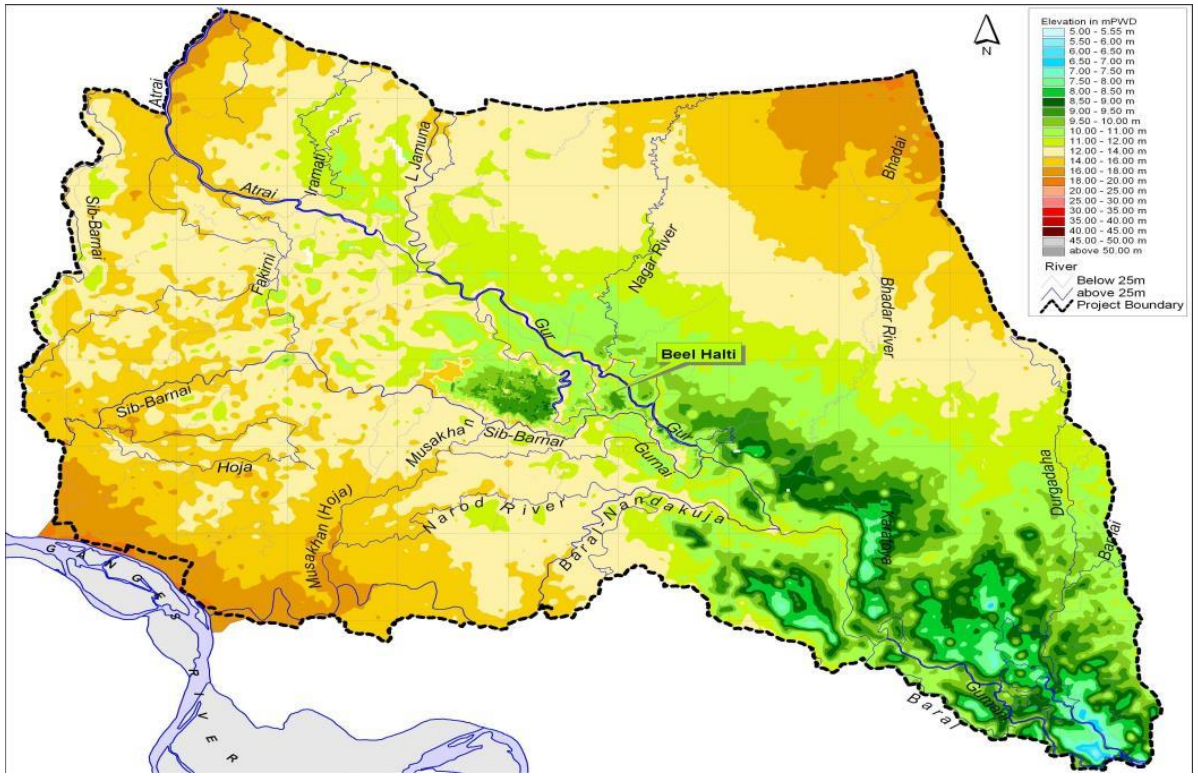
The NW Environment and Ecosystems programme has three objectives:

- **OBJECTIVE 1: ENVIRONMENTAL FLOWS; bringing the rivers back to life**
- **OBJECTIVE 2: RESTORING CHALAN BEEL; a multi-purpose productive ecosystem**
- **OBJECTIVE 3: POLLUTION CONTROL AND TREATMENT; technology for water quality**

Programme Objectives; example Objective 2: *Chalan Beel*

OBJECTIVE 2: RESTORING CHALAN BEEL; a multi-purpose productive ecosystem

The second objective is to restore the wetland system of Chalan beel to meet the multiple needs of fisheries, agriculture, tourism and ecology, by: i) restoring dry season flows and year-round connectivity; ii) modifying infrastructure to accommodate multiple interests; iii) provide protection against disastrous floods, and iv) invigorating the local economy through green economic growth.

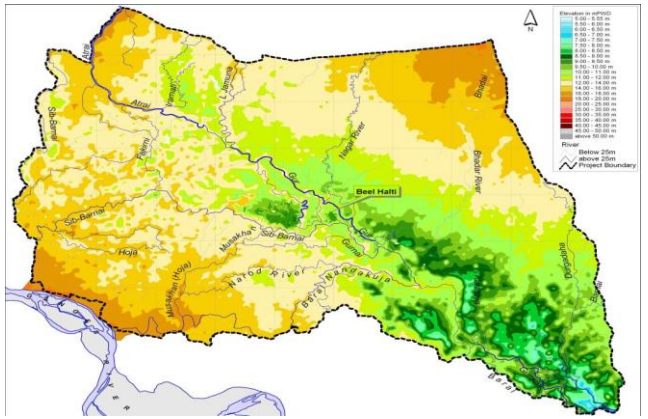


Source: Mathematical modelling for IWRM Chalan Beel incl. Beel Halti (IWM, 2005)

Programme Performance Targets; example Objective 2: *Chalan Beel*

OBJECTIVE 2: RESTORING CHALAN BEEL; a multi-purpose productive ecosystem

1) Restored biological connectivity of the river-floodplain-beel system, with signature species, by 2035
2) Enhanced fish productivity of capture and culture fisheries, by ..% and ..% respectively, by 2030
3) Reduced flood damage, by ..% for flood events with a flood return period of 1:5 and ..% for flood events with a return period of > 1:10 or higher
4) Enhanced agricultural productivity, by ..% in economic terms, by 2030
5) Reduced conflicts by ..%, by 2030
6) Positive Economic Rate of Return (ERR) of ..%



Reference:

- Bangladesh Biodiversity Act, 2017, and Bangladesh Environment Conservation Act, 1995
- Water Act, 2013
- BDP2100 Volume 1: Strategy. National Freshwater Strategy, page

Programme Objectives; example Objective 1: *Environmental Flows*

OBJECTIVE 1: : ENVIRONMENTAL FLOWS; bringing the rivers back to life

The first objective is to revive the ecological functions of the regional rivers, by: i) limiting dry season surface water abstraction to allow for ecological flows in line with ecological needs; and ii) restoring biological connectivity and habitat diversity of the river system

Programme Performance Targets; example Objective 1: *Environmental Flow*

OBJECTIVE 1: ENVIRONMENTAL FLOWS: brining rivers back to life

1) Established minimum environmental flow requirements, for selected regional rivers of the NW, by 2030
2) Monitoring system in place for the main regional rivers in place by 2025, including all necessary hydro-biological parameters
3) Permits for surface water abstraction in place that enable timely adjustment of abstraction limits

Reference:

- Water Act, 2013
- BDP2100 Volume 1: Strategy. National Freshwater Strategy, page ….
- Bangladesh Environment Conservation Act, 1995
- Environment conservation rules, 1997

4) Priority interventions for river restoration identified and included in all river related investment projects, by 2025

Programme Objectives; example Objective 3: *Pollution Control and Treatment*

OBJECTIVE 3: POLLUTION CONTROL AND TREATMENT; technology for water quality

The third objective is to minimise chemical and biological pressures on the surface and groundwater system, through: i) the application of clean production techniques in industry; ii) treatment of domestic wastewater; iii) good agri-environmental practices; and iv) strict enforcement of environmental regulations

Programme Performance Targets; example Objective 3: *Pollution Control and Treatment*

OBJECTIVE 3: POLLUTION CONTROL AND TREATMENT; technology for water quality

1) Monitoring system, for all rivers and water bodies, and all relevant parameters, by 2025
2) Register of pressures and emissions in place, by 2030 of all industries, urban areas and land use types
3) Permitting and fining system, for all rivers and water bodies, by 2030
4) Financing mechanism for local governments to invest in water treatment, by 2023
5) Private sector innovation programme, for clean production techniques, by 2023
6) Agri-environment innovation and investment scheme, by 2030

Reference:

- Water Act, 2013
- BDP2100 Volume 1: Strategy. National Freshwater Strategy, page ….
- Bangladesh Environment Conservation Act, 1995
- Environment conservation rules, 1997

Reflection on Performance Targets: SMART?

- **Specific**
- **Measurable**
- **Achievable**
- **Realistic and Representative**
- **Time-bound**

BDP2100 - Project Screening

	Number of projects		
	BDP2100	Agency	New
STEP 1: Collect projects Collection of all BDP2100 projects and *ongoing and proposed* projects by the agencies with any relevance for the North-West	12	29	0
STEP 2: Assign projects to programmes Projects are assigned to one of the four programmes in the North-West	12	29	0
STEP 3: Gap Analysis Comparison of projects in each program with the performance targets. Definition of new projects that fill the identified gaps	12	29	46
STEP 4: Select most promising new projects Selection of new projects that contribute most to the program goals and the BDP2100 and agency projects. Development of new concept notes	12	29	18
STEP 5: Combine and prioritize projects into integrated, holistic and adaptive programmes Selection, adaptation and phasing of *proposed* projects, using MCA and Metamodel	**12**	**5**	**18**

Example scores Projects Chalan Beel

Goal & Indicators	DP 1.2	DP_DoF1	DP_LGED1	DP_New7
Goal 1				
I-1: Reduction in damage due to river and rainfall floods	1,00	0,00	-1,00	3,00
I-2: Reduction in population affected by river and rainfall floods	1,00	0,00	-1,00	3,00
Goal 2				
I-3: Food security	1,00	1,00	1,00	2,00
I-4: Rice production		0,00	0,00	1,00
I-5: Fish production	2,00	2,00	0,00	2,00
I-6: Sustainable groundwater use	0,00	0,00	0,00	0,00
I-7: Rural population with safe drinking water access	0,00	0,00	0,00	0,00
Goal 4				
I-8: Water quality in water bodies and rivers	1,00	0,00	-1,00	3,00
I-9: Restoration of goods and services of wetland ecosystems	3,00	1,00	-1,00	3,00
Goal 5				
I-10: Capacity and knowledge development	0,00	1,00	1,00	2,00
Goal overarching				
I-11: Reduction of extreme poverty		1,00	1,00	1,00
Totaal	**9,00**	**6,00**	**-1,00**	**20,00**
Implementation				
I-12: Implementation readiness	1	2	2	1
I-13: Potential financing available		1	1	2

Scoring Categories	
-3	Major negative impact
-2	Moderate negative impact
-1	Minor negative impact
0	No impact
1	Minor positive impact
2	Moderate positive impact
3	Major positive impact

NW Environment and Ecosystems Programme Objective 2: Restoring Chalan Beel

Project Code	Project Name	Criteria												
		Relation to Bangladesh Delta Plan 2100 Goals										Poverty Reduction	Implementation feasibility	
		Goal 1		Goal 2					Goal 4		Goal 5			
		Flood damage	Flood affected population	Food security	Rice production	Fish production	Sustainable groundwater	Access to safe drinking water	Water quality	Ecosystems services	Capacity development	Poverty Reduction	Implementation readiness	Potential financing
NEW	**Application of environmental flow method for the Atrai, Dharla, Dhudkumar rivers**	0	0	0	0	0	0	0	1	1	2	0	2	2
CC 1.43	**Revitalization of Khals all over the country**	1	1	1	0	1	0	0	1	1	0	1	0	1
DP 1.3	**Revitalization & restoration of Hurasagar & Atrai rivers**	2	1	0	1	1	0	0	1	1	0	0	1	1
DP 1.2	**Revitalization and restoration of Beel Halti**	1	1	1	1	1	0	0	0	1	0	1	1	1
EXIST	**Fisheries Resource Management and Socio-economic development in Chalan Beel**	0	0	1	0	2	0	0	0	1	1	1	2	1
EXIST	**Chalan Beel Infrastructure and Livelihood Improvement Project**	-1	-1	1	0	0	0	0	-1	-1	1	1	2	1
NEW	**Integrated Development and Restoration of Chalan Beel**	3	3	2	1	2	0	0	3	3	2	1	1	2

Legend	
-3	Major Negative Impact
-2	Moderate Negative Impact
-1	Minor Negative Impact
0	No Impact
1	Minor Positive Impact
2	Moderate Positive Impact
3	Major Positive Impact

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Kingdom of the Netherlands

** NEW = Newly Developed*

** EXIST = Existing Concenpt Note, not included in the BDP2100 Investment Plan*

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

NW Environment and Ecosystems Programme (all projects)

Project Code	Project Name	Criteria: Relation to Bangladesh Delta Plan 2100 Goals — Goal 1: Flood damage	Goal 1: Flood affected population	Goal 2: Food security	Goal 2: Rice production	Goal 2: Fish production	Goal 2: Sustainable groundwater	Goal 2: Access to safe drinking water	Goal 4: Water quality	Goal 4: Ecosystems services	Goal 5: Capacity development	Poverty Reduction: Poverty Reduction	Implementation feasibility: Implementation readiness	Implementation feasibility: Potential financing
NEW	**Pilot application of simplified environmental flow method for the Atrai, Dharla and Dhudkumar rivers**	0	0	0	0	0	0	0	1	1	2	0	2	2
DP 1.3	**Revitalization & restoration of Hurasagar & Atrai rivers**	2	1	0	1	1	0	0	1	1	0	0	1	1
NEW	**Connectivity restoration between Brahmaputra Right Embankment (BRE) and floodplain**	2	2	2	0	3	0	0	1	2	2	2	-2	1
DP 15.3	**Barind Area Fisheries Resources Development**	0	0	1	0	3	0	0	-1	0	2	1	1	1
EXIST	**Hurasagar Fiseries Management and Development Project**	-1	0	1	0	2	0	0	-1	0	0	1	1	1
CC 1.43	**Revitalization of Khals all over the country**	1	1	1	0	1	0	0	1	1	0	1	0	1
DP 1.2	**Revitalization and restoration of Beel Halti**	1	1	1	1	1	0	0	0	1	0	1	1	1
EXIST	**Fisheries Resource Management and Socio-economic development of the Fisher's in Chalan Beel Project**	0	0	1	0	2	0	0	0	1	1	1	2	1
EXIST	**Chalan Beel Infrastructure and Livelihood Improvement Project**	-1	-1	1	0	0	0	0	-1	-1	1	1	2	1
NEW	**Integrated Development and Restoration of Chalan Beel**	3	3	2	1	2	0	0	3	3	2	1	1	2
NEW	**Strengthening monitoring capacity of the DoE in the NW Basin**	0	0	0	0	0	0	0	2	2	3	0	1	2
NEW	**Program for developing register of pressures and emissions on water bodies in NW basin**	0	0	0	0	0	0	0	1	1	3	0	2	2
NEW	**Financing mechanism for local governments to invest in (domestic) wastewater treatment**	0	0	0	0	1	0	1	2	1	1	0	0	0
NEW	**Private sector innovation programme for cleaner production techniques**	0	0	0	0	0	1	0	2	1	2	0	1	1

Legend

- -3 Major Negative Impact
- -2 Moderate Negative Impact
- -1 Minor Negative Impact
- 0 No Impact
- 1 Minor Positive Impact
- 2 Moderate Positive Impact
- 3 Major Positive Impact

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Kingdom of the Netherlands

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Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Intermezzo: applying the Metamodel for Chalan Beel - problem description

Siltation of main rivers Atrai and Hurasagar

↓

Impeding navigation & erosion of river banks, increased flooding

FCD-projects (1980s)

↓

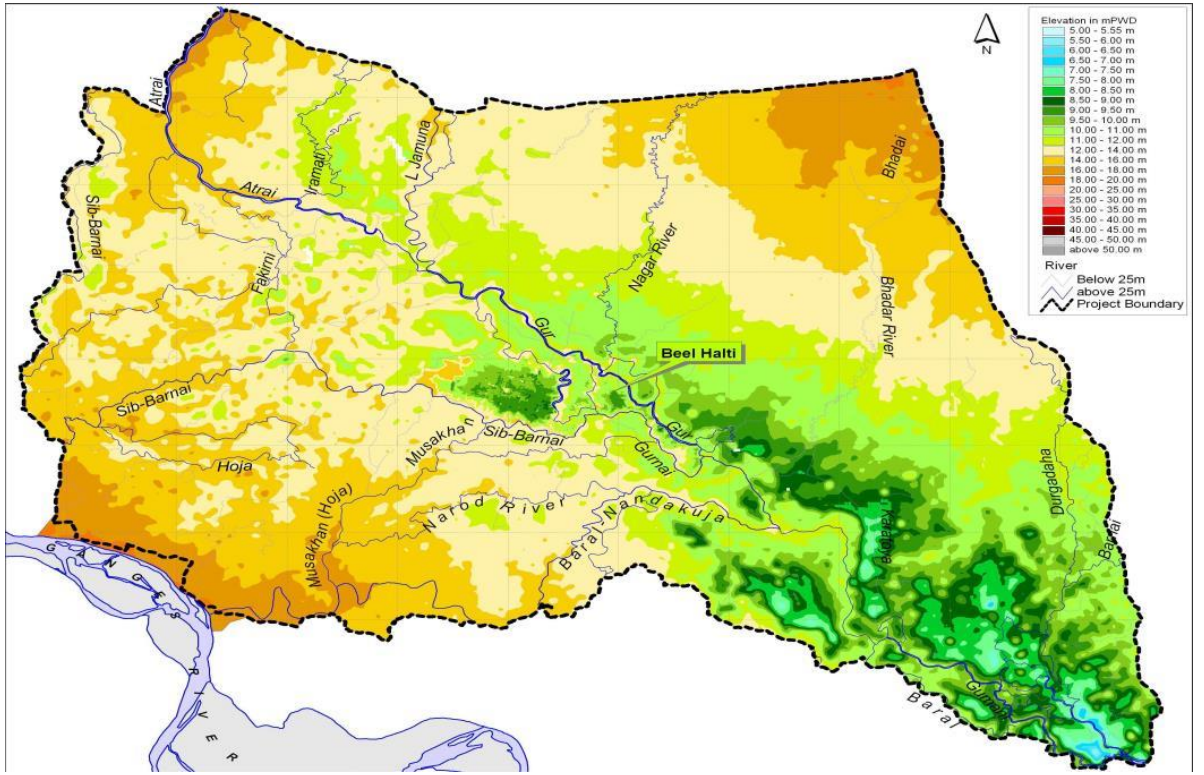
Decreasing agriculture yield

Decreasing fisheries

Loss of floodplains & wetland

Cuts/breaches embankments

Closure of navigation routes



Source: Mathematical modelling for IWRM Chalan Beel incl. Beel Halti (IWM, 2005)

BDP2100 note: increased flooding may also be caused by impediments to drainage due to unplanned infrastructure

Potential future impacts

More rainfall and transboundary river discharge
More people and economic value

More flooding and waterlogging (river and rainfall)
More groundwater recharge, and *less* declining groundwater level

More damage to infrastructure and buildings
Lower rice production and food security

Chalan Beel example projects

1. **Revitalization and Restoration of Chalan Beel (DP 1.2)**

To enhance livelihood and food security by protecting the lands from flood events and to extend the irrigation coverage in the dry season.

2. **Green corridor: revitalization and restoration of Chalan Beel (new)**

To restore the wetland system and natural connectivity, provide protection against monsoon flooding, support integrated rural livelihood development, enhance agricultural and fisheries production, environmental-friendly tourism and preserve critical ecological habitats.

3. **Climate resilient roads in Chalan Beel (new)**

To improve living standards and reduce vulnerability of the poor through enhanced access to markets, livelihood opportunities and social services, enhanced village mobility.

Main interventions

1. **Revitalization and Restoration of Chalan Beel (DP 1.2)**
   - *Excavate regional rivers to remove siltation*
   - *Improved drainage capacity of regulators*
   - *Full FCD control by improving embankments*
2. **Green corridor: revitalization and restoration of Chalan Beel (new)**
   - *Re-alignment of embankments to permanently connect beels with regional rivers*
   - *Excavate regional rivers to remove siltation*
   - *Increased local drainage efficiency by revitalization and decreased flow blockage*
   - *Elevate infrastructure and buildings (flood-proofing)*
3. **Climate resilient roads in Chalan Beel (new)**
   - *Option A: increase density of upazila roads -> increased flow blockages and damages*
   - *Option B: increase density of upazila roads with climate-resilient design -> minor additional flow blockage and minimal additional road damage*

Outcomes on main indicators

		Base 2020	Base mod 2050	Base res 2050	Baseroads	Baseroads mod	Baseroads re	Climateroa	Climate mod 2	Climate res 205	Original_BWDB	Original n	Original re	Greencorrid	Greenc mo	Greenc res
Agricultural damage due to river and rainfall floods	Cr. BDT	1218	31.7%	70.6%	9.3%	42.0%	81.8%	0.0%	31.7%	70.6%	-2.3%	27.0%	64.3%	-9.0%	20.0%	55.0%
Damage due to river and rainfall floods	Cr. BDT	506	648.6%	102.2%	8.1%	685.6%	2003.2%	0.0%	648.6%	1932.4%	-7.3%	592.1%	1730.4%	-11.7%	568.2%	1689.9%
Damage due to river floods	Cr. BDT	105	1520.0%	5504.8%	-4.8%	1518.1%	5386.7%	0.0%	1520.0%	5504.8%	-37.1%	1192.4%	4397.1%	-37.1%	1216.2%	4504.8%
Damaging rainfall and river flood extent	ha	185689	47.4%	110.8%	14.6%	63.9%	127.8%	0.0%	47.4%	110.8%	-9.1%	32.9%	91.2%	-19.1%	20.4%	77.0%
Food security for the poor	-	2.2	-22.7%	-22.7%	-13.6%	-31.8%	-36.4%	-13.6%	-31.8%	-31.8%	-13.6%	-31.8%	-31.8%	-13.6%	-31.8%	-31.8%
Population affected due to river and rainfall floods	People	621029	147.3%	281.6%	8.0%	173.1%	302.5%	0.0%	159.1%	281.6%	-6.1%	145.5%	259.5%	-11.0%	134.8%	247.8%
Rainfall and river flood extent	ha	759618	11.8%	25.0%	3.0%	15.0%	30.2%	0.0%	11.8%	25.0%	-0.5%	11.5%	23.6%	-2.6%	9.4%	21.4%
Rice production	Tonnes	5076194	-5.7%	-12.8%	-1.7%	-7.6%	-14.8%	0.0%	-5.7%	-12.8%	0.4%	-4.9%	-11.7%	1.7%	-3.6%	-10.0%
River flood extent	ha	86358	91.3%	220.5%	-0.7%	90.2%	216.0%	0.0%	91.3%	220.5%	-47.1%	34.3%	126.8%	-46.4%	36.5%	134.0%
Sustainable groundwater use	cm	-9	33.3%	66.7%	22.2%	55.6%	77.8%	0.0%	33.3%	66.7%	11.1%	55.6%	77.8%	-11.1%	33.3%	66.7%
Waterlogged area	ha	150215	39.9%	98.0%	19.1%	60.5%	120.1%	0.0%	39.9%	98.0%	-6.6%	32.0%	81.6%	-14.6%	16.3%	65.1%

Base = without interventions
Base roads = with add. upazila roads – not adapted
Climate roads = with add. Upazila roads – adapted
Original BWDB = DP 1.2
Green corridor = DP 1.2 environmental

Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

NW Environment and Ecosystems Programme Objective 2: Restoring Chalan Beel

Project Code	Project Name	Criteria: Relation to Bangladesh Delta Plan 2100 Goals: Goal 1: Flood damage	Goal 1: Flood affected population	Goal 2: Food security	Goal 2: Rice production	Goal 2: Fish production	Goal 2: Sustainable groundwater	Goal 2: Access to safe drinking water	Goal 4: Water quality	Goal 4: Ecosystems services	Goal 5: Capacity development	Poverty Reduction: Poverty Reduction	Implementation feasibility: Implementation readiness	Implementation feasibility: Potential financing
NEW	Application of environmental flow method for the Atrai, Dharla, Dhudkumar rivers	0	0	0	0	0	0	0	1	1	2	0	2	2
CC 1.43	Revitalization of Khals all over the country	1	1	1	0	1	0	0	1	1	0	1	0	1
DP 1.3	Revitalization & restoration of Hurasagar & Atrai rivers	2	1	0	1	1	0	0	1	1	0	0	1	1
DP 1.2	Revitalization and restoration of Beel Halti	1	1	1	1	1	0	0	0	1	0	1	1	1
EXIST	Fisheries Resource Management and Socio-economic development in Chalan Beel	0	0	1	0	2	0	0	0	1	1	1	2	1
EXIST	Chalan Beel Infrastructure and Livelihood Improvement Project	-1	-1	1	0	0	0	0	-1	-1	1	1	2	1
NEW	Integrated Development and Restoration of Chalan Beel	3	3	2	1	2	0	0	3	3	2	1	1	2

Legend

-3	Major Negative Impact
-2	Moderate Negative Impact
-1	Minor Negative Impact
0	No Impact
1	Minor Positive Impact
2	Moderate Positive Impact
3	Major Positive Impact

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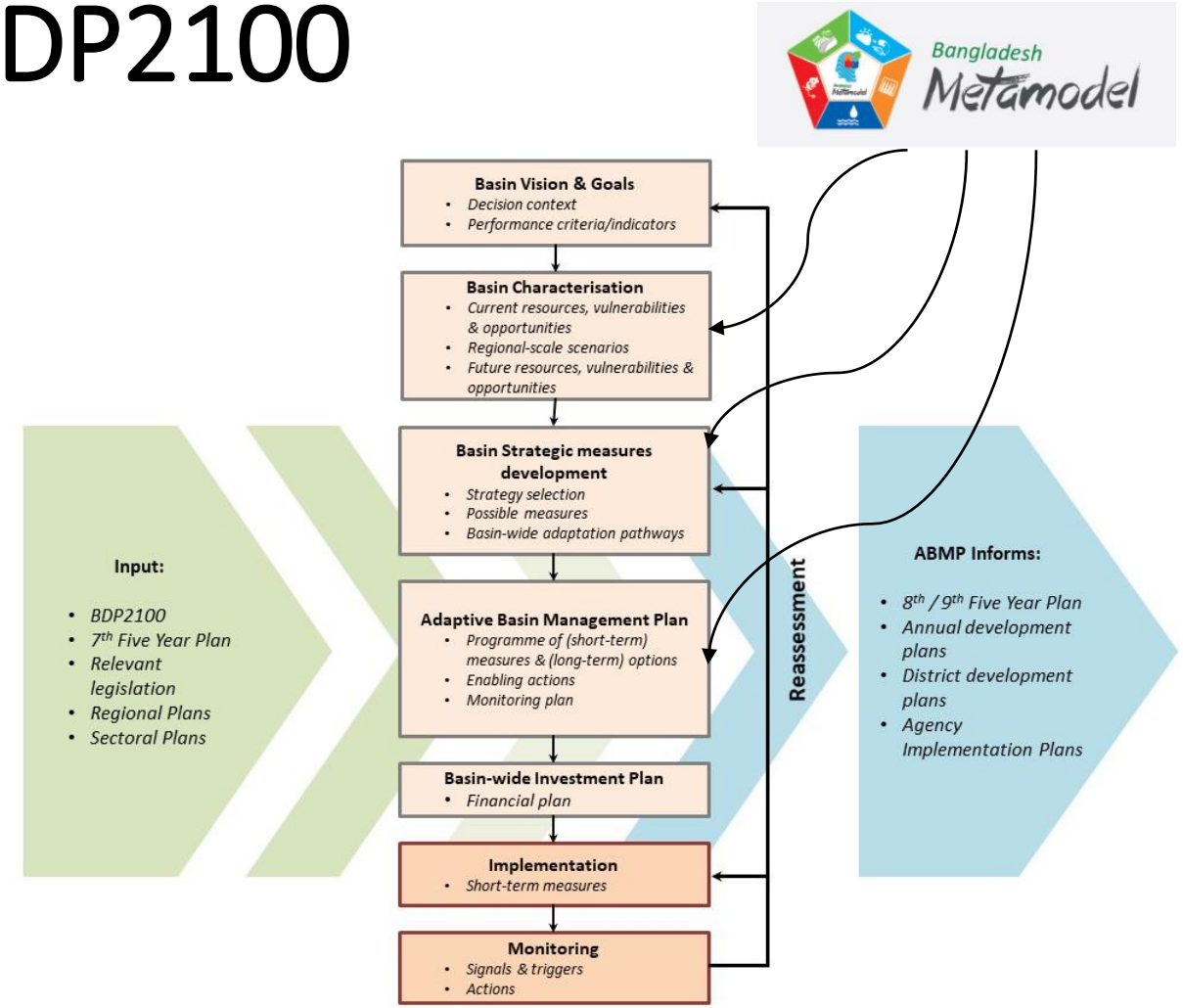
Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Metamodel: tool to assess and enhance programme quality for BDP2100

- GED and Ministries can work with Bangladesh Metamodel to develop programmes that meet BDP goals and criteria
- BD Metamodel ready for use NW
- BD Metamodel ready for use Coast July 2021
- Dashboards can be configured as per GED and Agency needs by CEGIS and IWM
- MM team provide training and adapt dashboards to coincide with SIBDP/GED planning



Bangladesh Metamodel

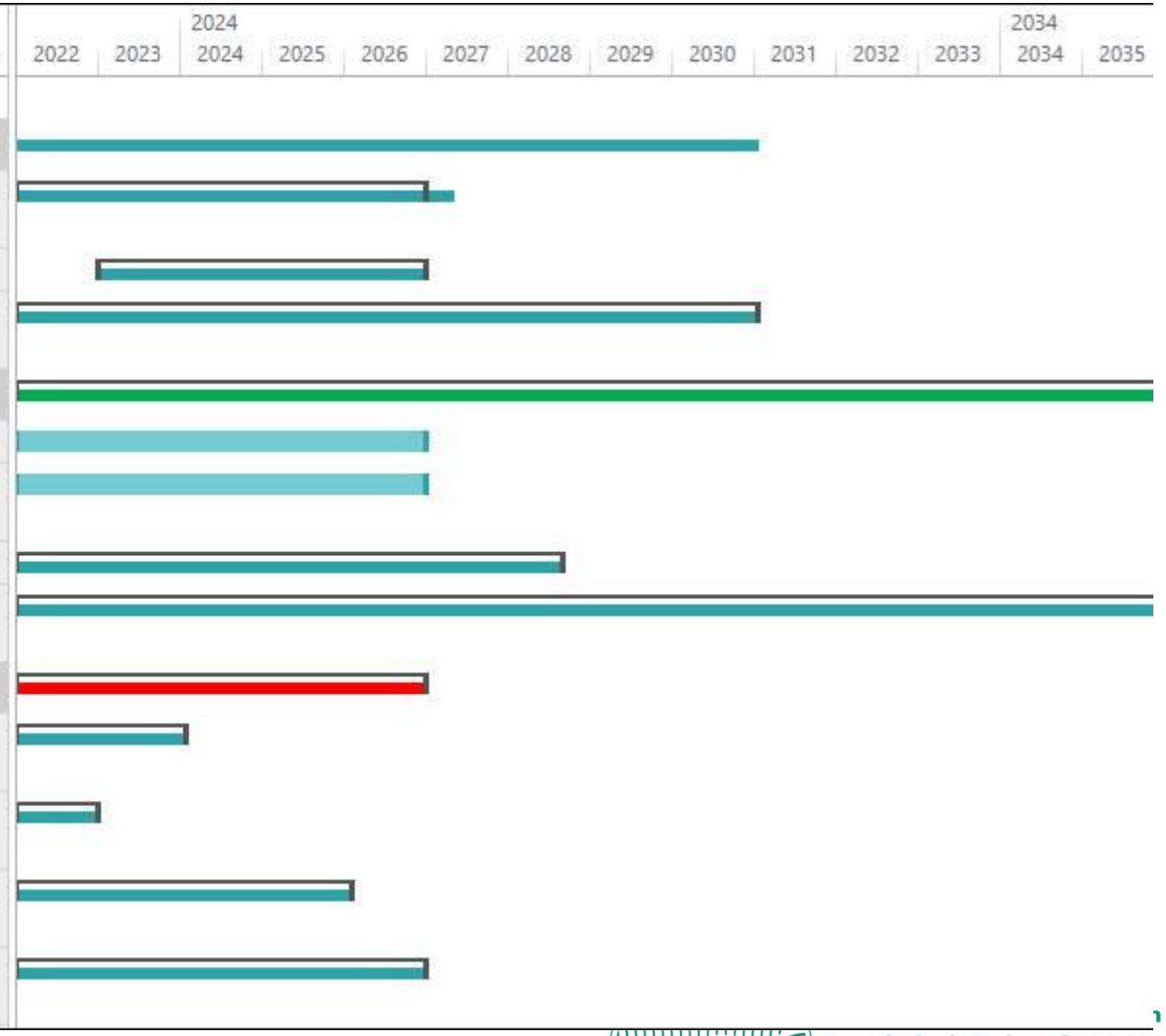
Support to Implementation of Bangladesh Delta Plan 2100 (SIBDP)

Overview MCA scores and costs

Worldview	**DP_New1** Rainwater harvesting	**DP1.1** Rasjahi irrigation	**DP1.4** Kurigram irrigation south	**DP1.5** Kurigram irrigation north
Environmental	0.59	0	0.06	0.05
People	0.69	0.61	0.78	0.68
Economic	0.53	0.67	0.68	0.37
Balanced	0.5	0.3	0.5	0.35
Costs (mBDT)	100	19910	19954	6968

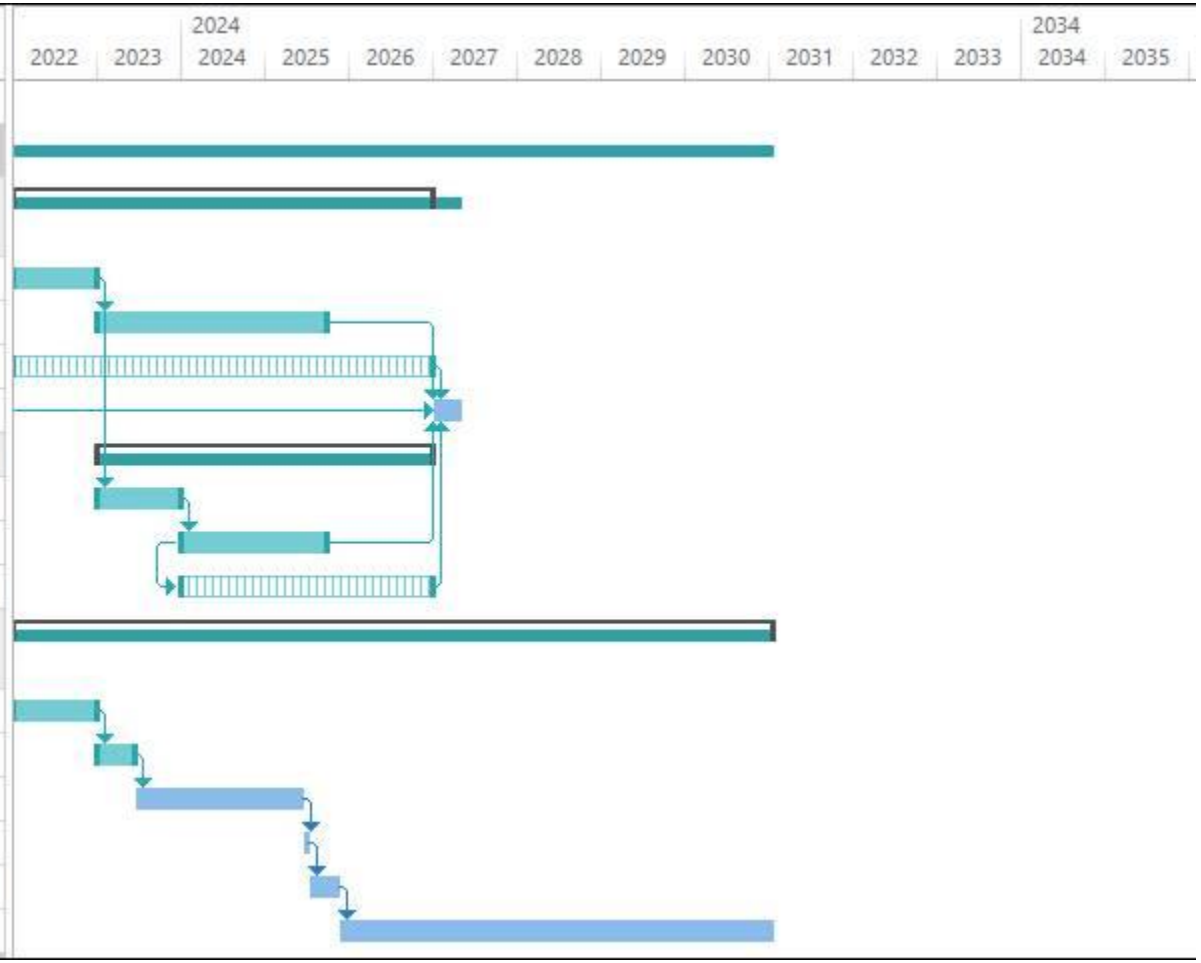
Implementation Programming: bringing it all together

Task Name	Duration	Start	Finish
NW IP: ENVIRONMENTAL FLOWS			
Pilot application environmental flow Atrai, Dharla and Dhudkumar rivers	1305 days?	Fri 31-12-21	Thu 31-12-26
Revitalization & restoration of Hurasagar & Atrai rivers	1044 days	Mon 2-1-23	Thu 31-12-26
Connectivity restoration between Brahmaputra Right Embankment (BRE) and its	2358 days	Fri 31-12-21	Tue 14-1-31
NW IP: RESTORING CHALAN BEEL	5070 days?	Fri 31-12-21	Thu 6-6-41
Barind Area Fisheries Resources Development	1305 days	Fri 31-12-21	Thu 31-12-26
Hurasagar Fiseries Management and Development Project	1305 days	Fri 31-12-21	Thu 31-12-26
Revitalization of Khals	1740 days	Fri 31-12-21	Thu 31-8-28
Integrated Development and Restoration Programme (IDRP) of Chalan Beel	5070 days?	Fri 31-12-21	Thu 6-6-41
NW IP: POLLUTION CONTROL AND TREATMENT	1305 days	Fri 31-12-21	Thu 31-12-26
Strengthening monitoring capacity of the DoE in the NW Basin	544 days	Fri 31-12-21	Wed 31-1-24
Development register of pressures and emissions on water bodies in NW basin	262 days	Fri 31-12-21	Sat 31-12-22
Financing mechanism for local governments to invest in (domestic) wastewater treatment	1070 days	Fri 31-12-21	Thu 5-2-26
Private sector innovation programme for cleaner production techniques	1305 days	Fri 31-12-21	Thu 31-12-26



Implementation Programming: bringing it all together

Task Name	Duration	Start	Finish
NW IP: ENVIRONMENTAL FLOWS			
Pilot application environmental flow Atrai, Dharla and Dhudkumar rivers	**1305 days?**	**Fri 31-12-21**	**Thu 31-12-26**
develop BD applicable method	262 days	Fri 31-12-21	Sat 31-12-22
carry out 3 pilots	717 days	Mon 2-1-23	Tue 30-9-25
monitoring	1305 days	Fri 31-12-21	Thu 31-12-26
draft guideline for environmental flows	90 days	Fri 1-1-27	Thu 6-5-27
Revitalization & restoration of Hurasagar & Atrai rivers	**1044 days**	**Mon 2-1-23**	**Thu 31-12-26**
detailed feasibility study	261 days	Mon 2-1-23	Sun 31-12-23
implementation	457 days	Mon 1-1-24	Tue 30-9-25
monitoring and adaptation	784 days	Mon 1-1-24	Thu 31-12-26
Connectivity restoration between Brahmaputra Right Embankment (BRE) and its	**2358 days**	**Fri 31-12-21**	**Tue 14-1-31**
pre-feasibility study	262 days	Fri 31-12-21	Sat 31-12-22
preliminary approval	120 days	Mon 2-1-23	Fri 16-6-23
detailed feasibility study	521 days	Mon 19-6-23	Mon 16-6-25
GO / NO GO decision	20 days	Tue 17-6-25	Mon 14-7-25
financing proposal	90 days	Tue 15-7-25	Mon 17-11-25
implementation and monitoring	1346 days	Tue 18-11-25	Tue 14-1-31



Capacity development needs?

- Adaptive Delta Planning and Management
- Tools and instruments
- Joint programming
- …??

THANK YOU FOR YOUR ATTENTION

QUESTIONS?

GOPALGANJ, TRAINING ON THE BDP2100, GED