Decision-making under Deep Uncertainty Conference 2017

BANDUDELTAS

BDP2100

BANGLADESH DELTA PLAN 2100

A challenge in meeting the uncertainties of long-term planning

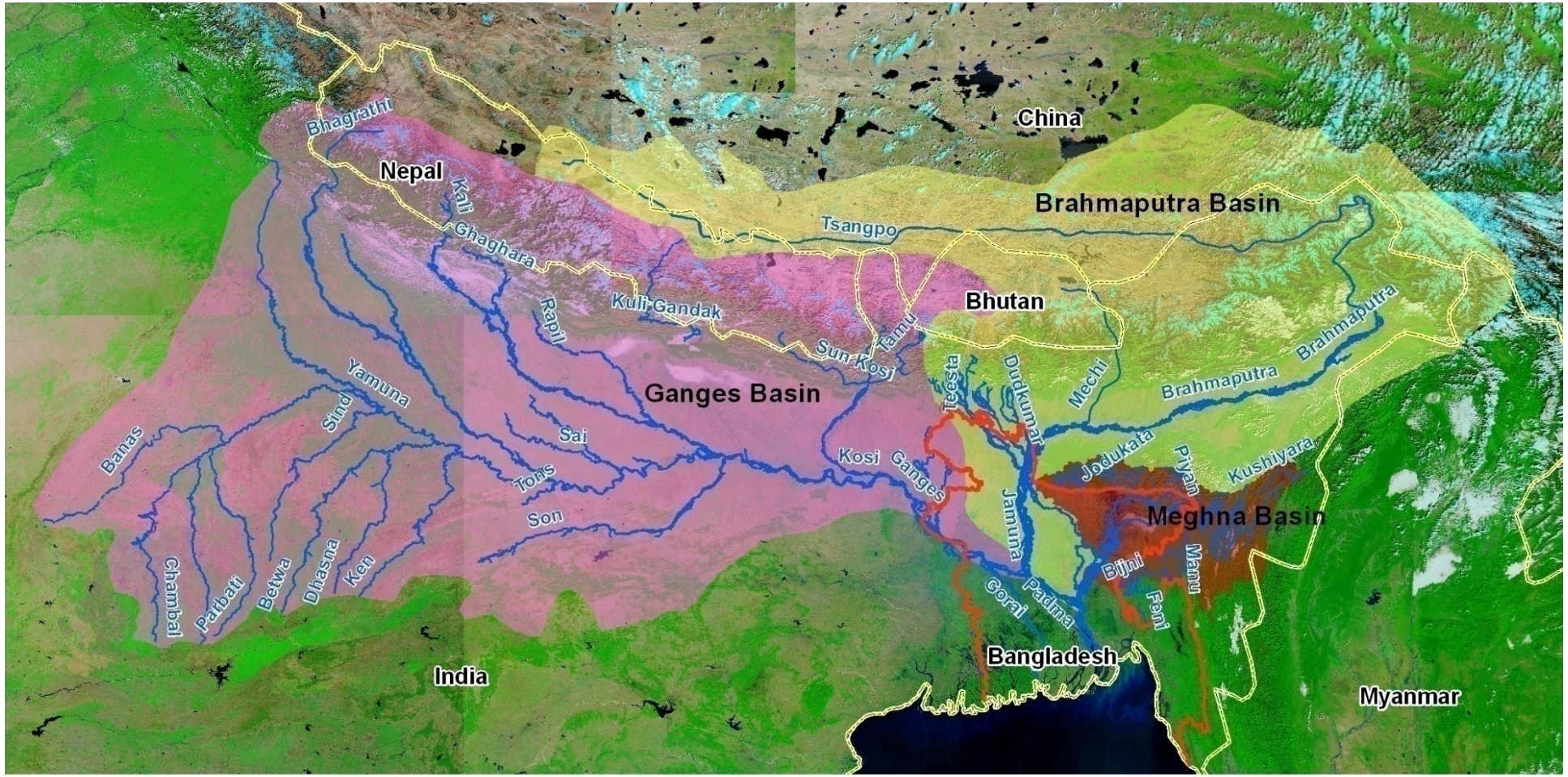
Giasuddin Choudhury

Oxford, 15 November, 2017

Background

- The Honorable Prime Minister Sheikh Hasina initiated the formulation of BDP2100
- Hosted by General Economic Division of Planning Commission, GOB
- Funded by the Government of the Kingdom of The Netherlands
- World Bank providing technical assistance for preparation of BDP 2100 Investment Plan
- Started on 12 March 2014 to be completed in December 2017

Bangladesh Delta: Downstream of Ganges-Brahmaputra-Meghna Rivers

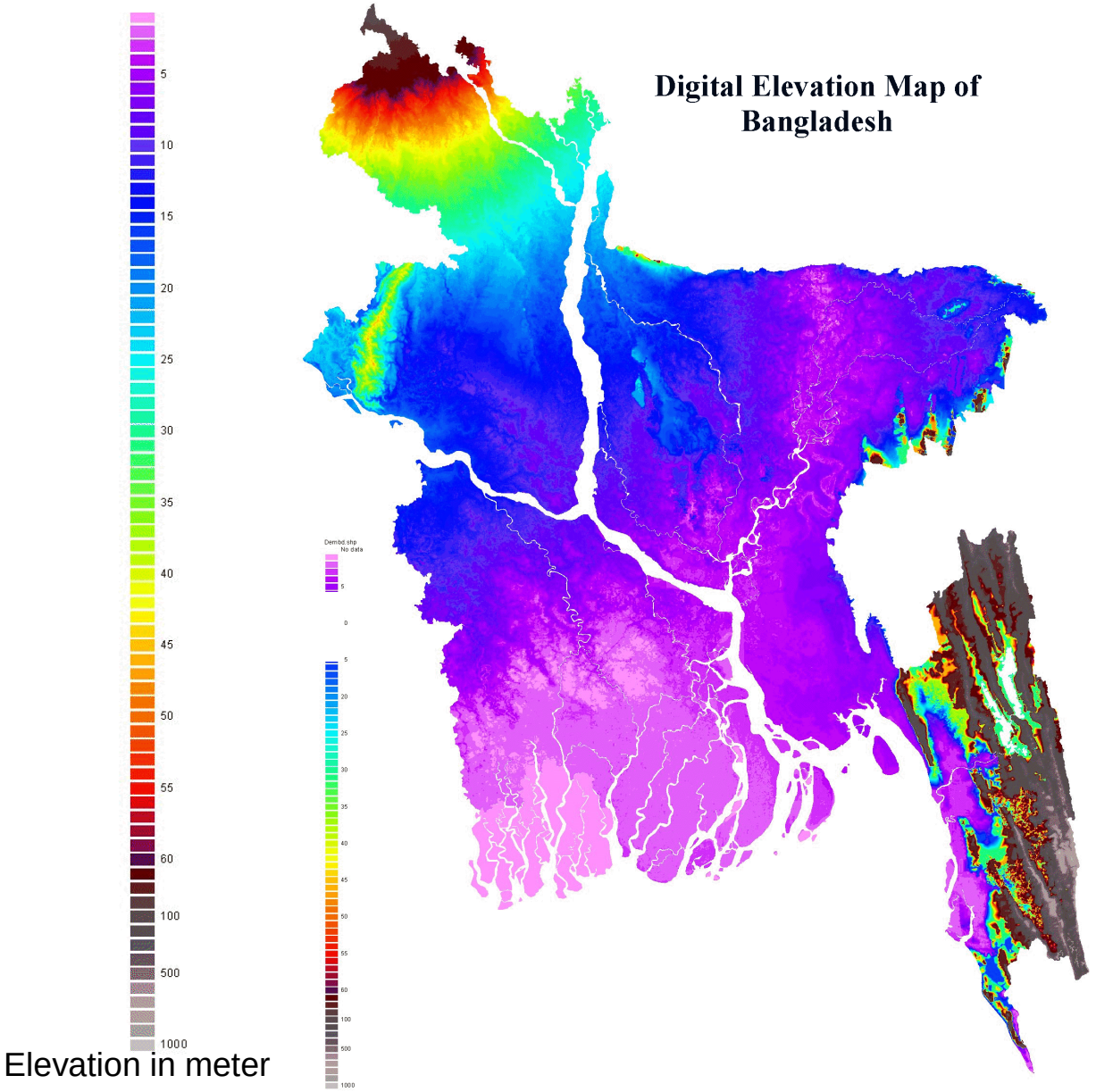


Ganges Basin	
Catchment area (sq km)	10,00,000
Av. Annual rainfall (mm)	1,200
Av. Annual discharges (cumec)	11,000
Max. Discharge (cumec)	78,000
Sediment transport (m ton/yr)	550

Brahmaputra/Jamuna Basin	
Catchment area (sq km)	5,73,000
Av. Annual rainfall (mm)	1,900
Av. Annual discharges (cumec)	20,000
Max. Discharge (cumec)	1,00,000
Sediment transport (m ton/yr)	590

Meghna Basin	
Catchment area (sq km)	77,000
Av. Annual rainfall (mm)	4,900
Av. Annual discharges (cumec)	4,600
Max. Discharge (cumec)	20,000
Sediment transport (m ton/yr)	13

Digital Elevation Model of Bangladesh



Bangladesh Delta includes the entire country

Land Classification

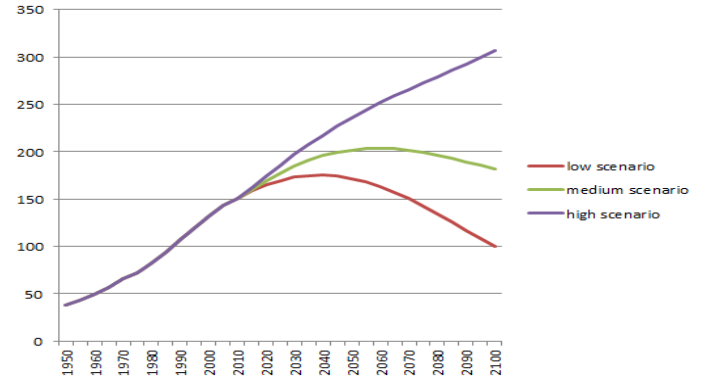
- Area of Bangladesh: 147,570 km²
- Hills : 12%
- Terraces : 8%
- Floodplains : 80%

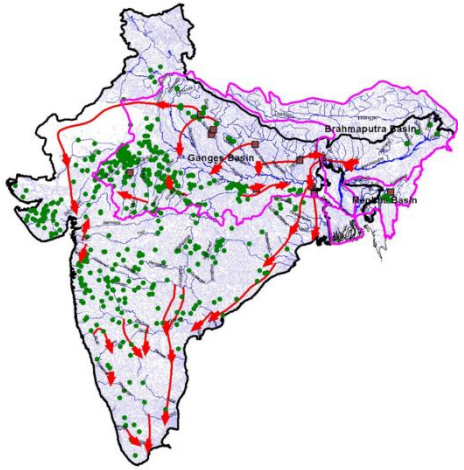
Background: Need for a Delta Plan

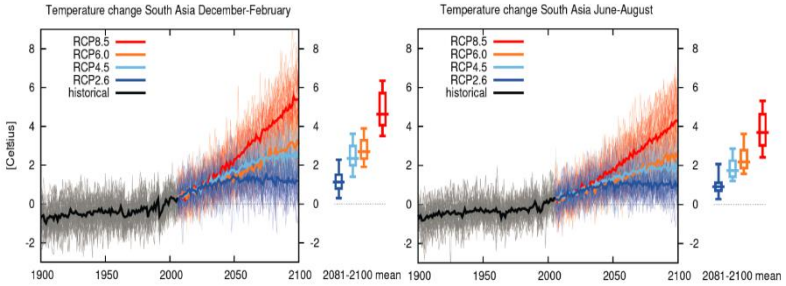
Bangladesh faces the challenge of balancing its available resources and plan against growing uncertainties:

- Integration of existing sectoral plans
- Urbanization & population growth
- Industrialization
- Upstream developments
- Land subsidence & environmental degradation
- Climate change (sea-level rise, flooding, droughts….)
- Adequate and/or innovative financing

A 'new' type of planning is needed for the Delta Plan that can deal with these uncertainties

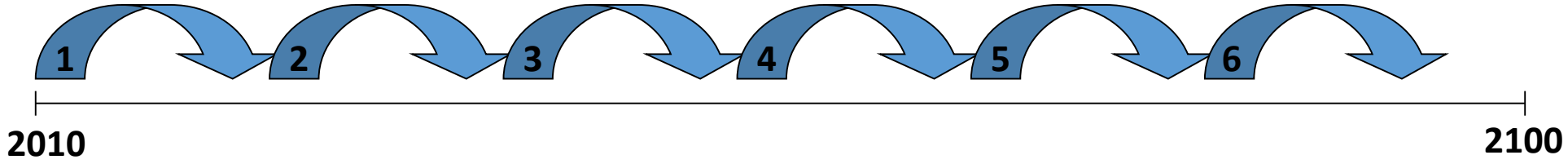




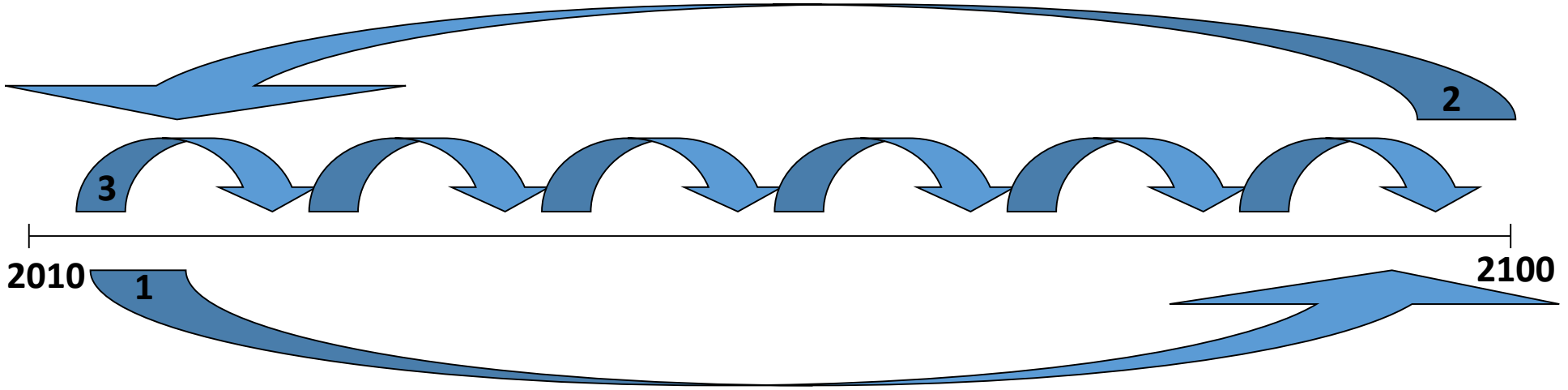


Background: Way of working with Long Term Vision

Instead of:



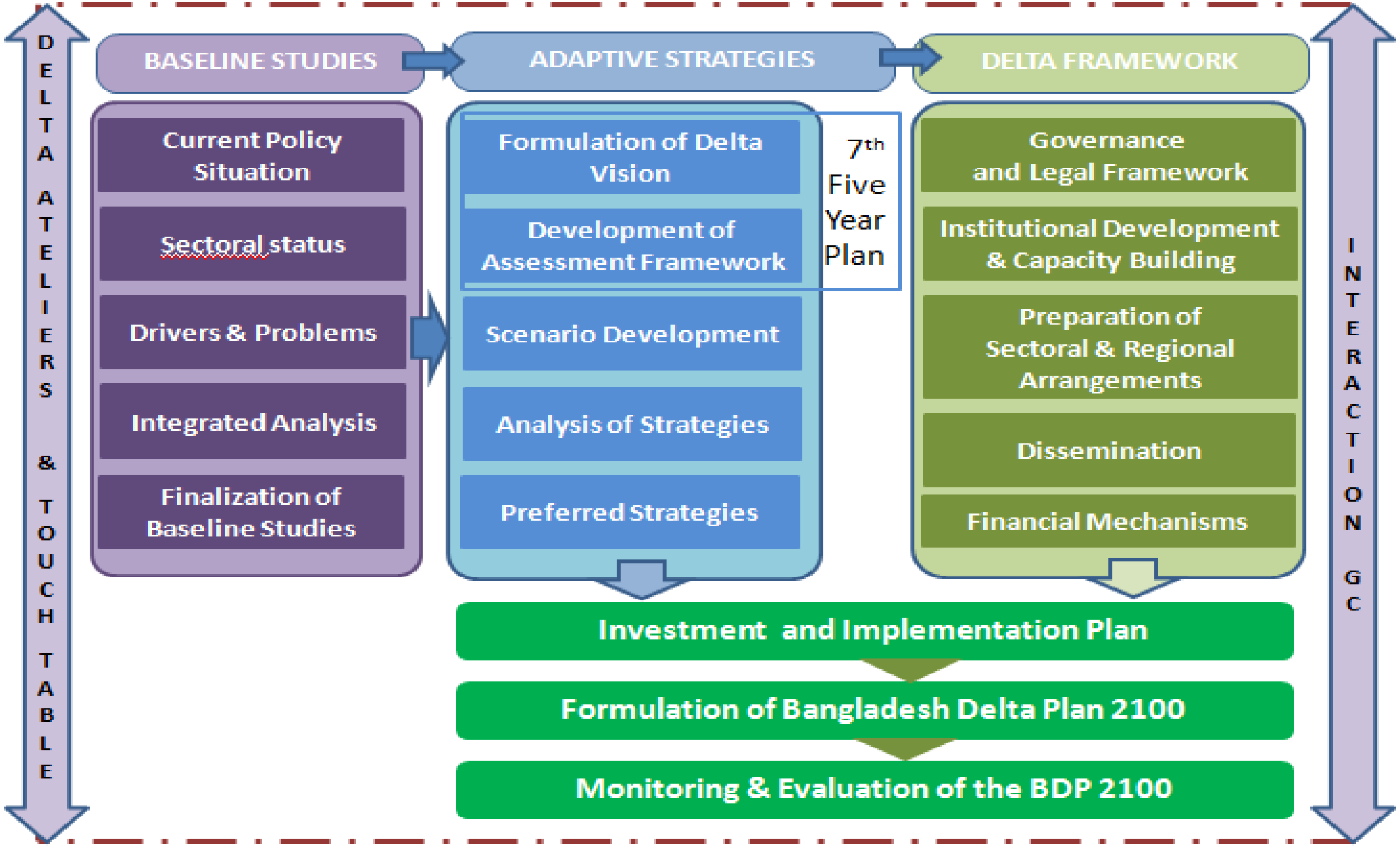
Work with long term vision (e.g. 100 years), next back casting to present and subsequently work with regular plans



Bangladesh Delta Plan 2100

- A long-term (50 to 100 years), holistic, techno-economic, water centric, strategic plan for land and water management in support of a sustainable living environment for Bangladesh delta
- Adaptive delta management (ADM) approach followed to make robust and flexible decisions under uncertain changing conditions
- BDP ADM focusses: “How to enable socio-economic development under uncertain changing conditions especially regarding climate change and (trans-boundary) water availability?”

Framework for the Preparation of the Bangladesh Delta Plan

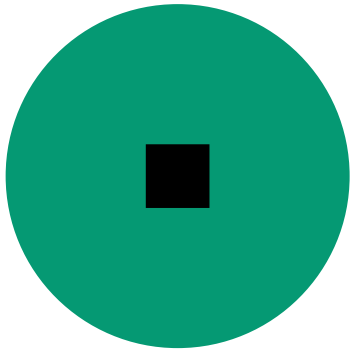


Paradigm Shift: BDP Adaptive Delta Management

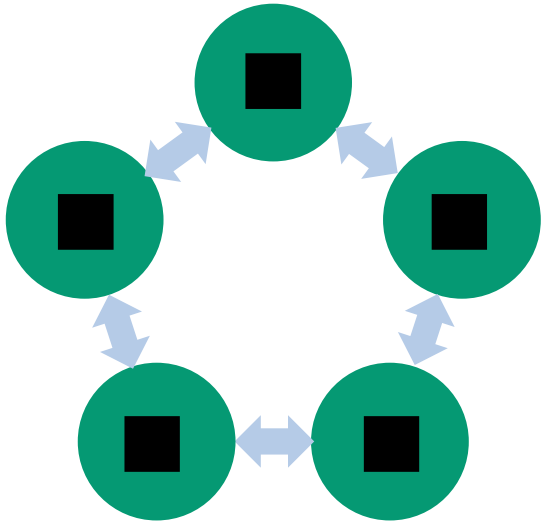
Water Management → **IWRM** → **Integrated Delta Management** → **Adaptive Delta Management**

Standalone

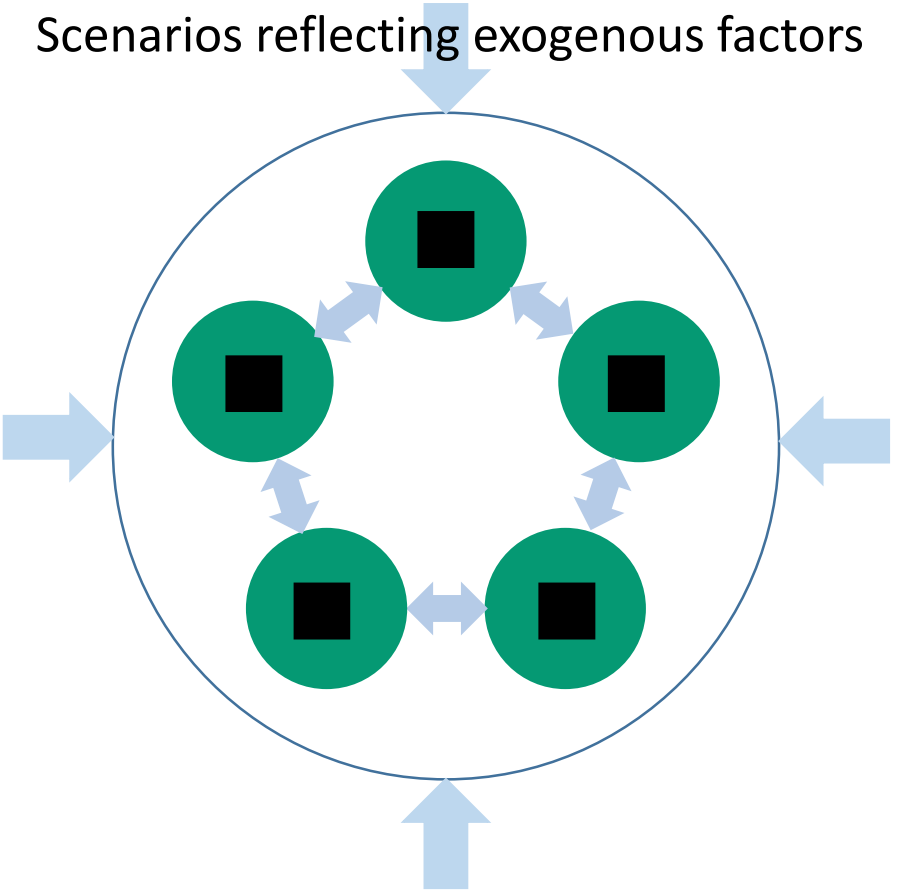
Inter Sectoral



Inter-relations between Projects

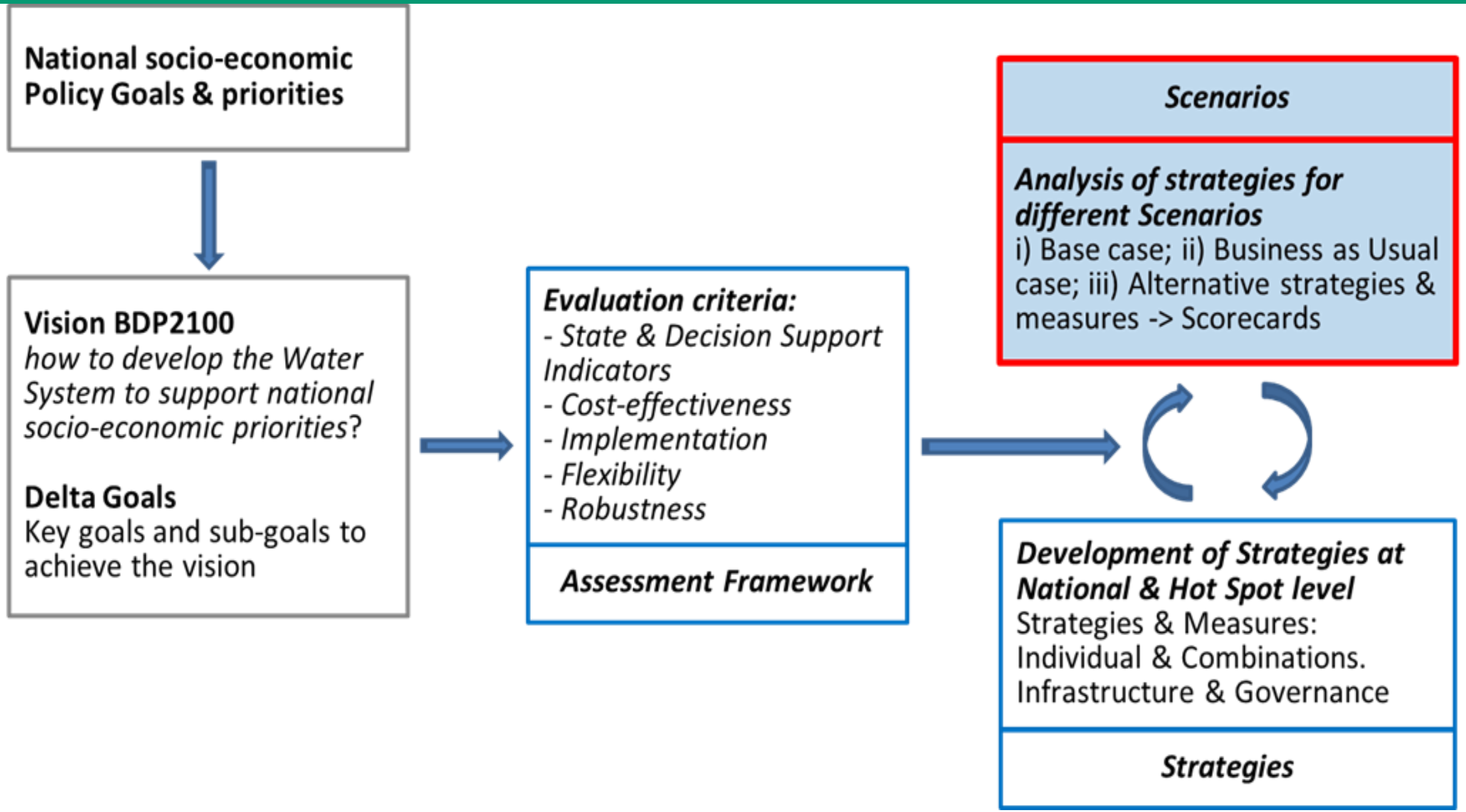


Scenarios reflecting exogenous factors



Decision making process (including cost benefit analysis) becomes increasingly complex

Stages of BDP Strategy Formulation Process



Adaptive Delta Management: Vison and Goals

➢National socio-economic policy goals

Goal 1: Eliminate Extreme Poverty by 2030

Goal 2: Achieve Upper Middle Income Country (UMIC) status by 2030

Goal 3: Being a Prosperous Country beyond 2041

➢ BDP Vision

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

Adaptive Delta Management: Vison and Goals

➢Goals

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

Goal 2: Ensure water security and efficiency of water usages

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

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

Goal 5: Develop effective institutions and equitable governance for in country and trans-boundary water resources management

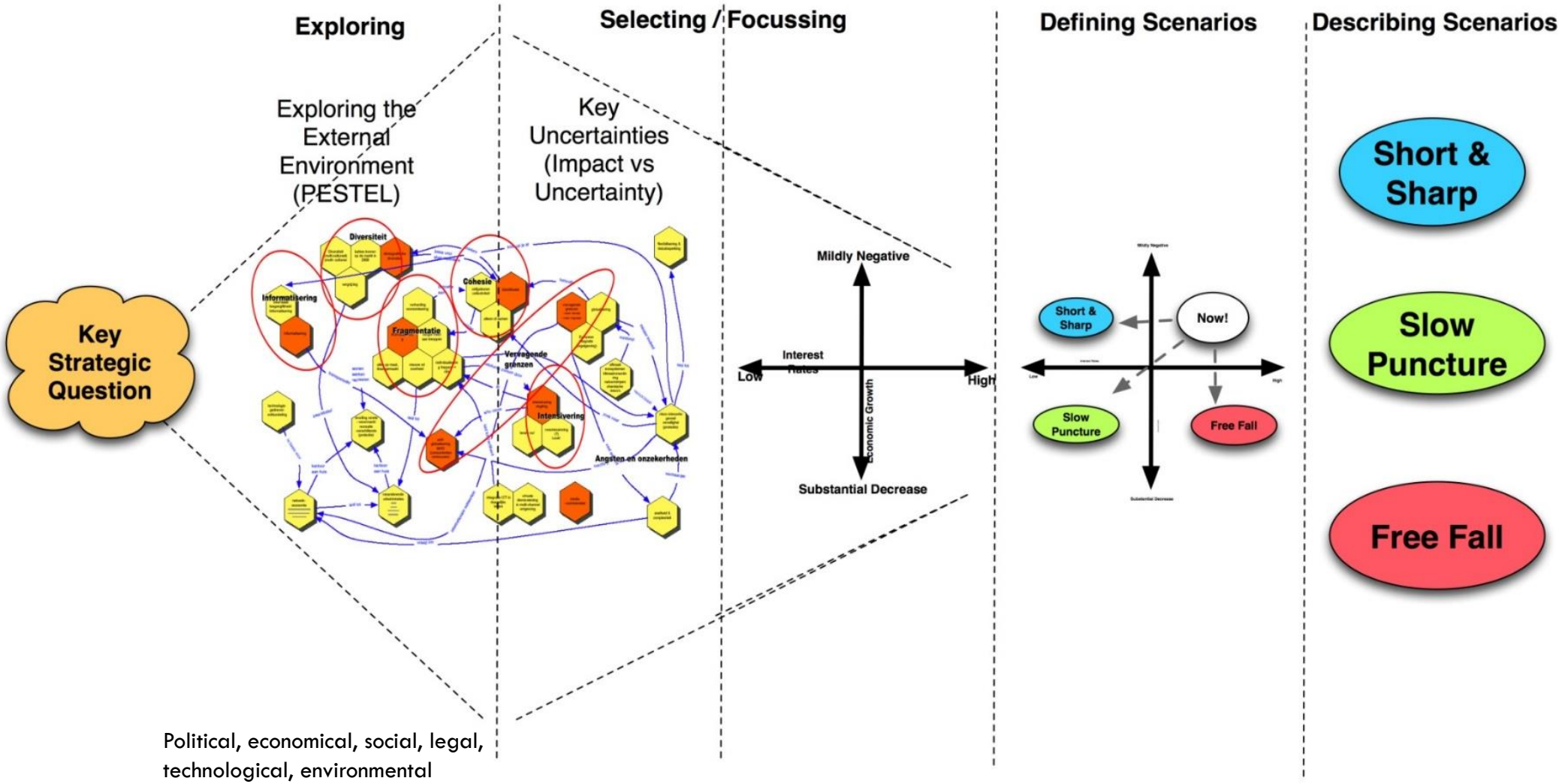
Goal 6: Achieve optimal use of land and water resources

Approach towards BDP scenarios

1. Identify major driving forces
2. Plot drivers based on impact and uncertainty (impact-uncertainty matrix)
3. Place two most important drivers along XY-axis
4. Develop plots/storylines with additional drivers - pressures–states (qualitative and quantitative)
5. Define impacts per scenario–opportunities/ vulnerabilities
6. Test performance of proposed strategies in the different scenarios

Approach towards BDP scenarios

Scenario Planning Process



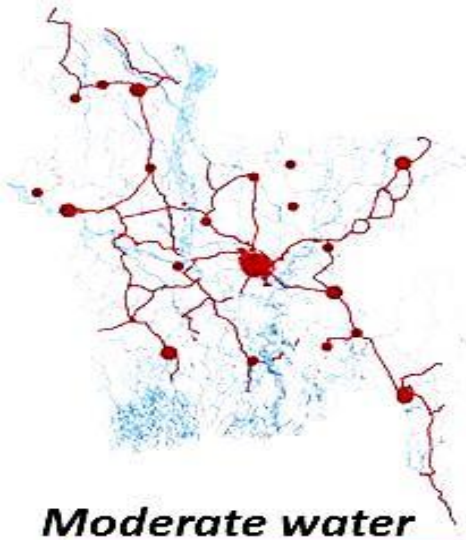
Scenarios

Productive

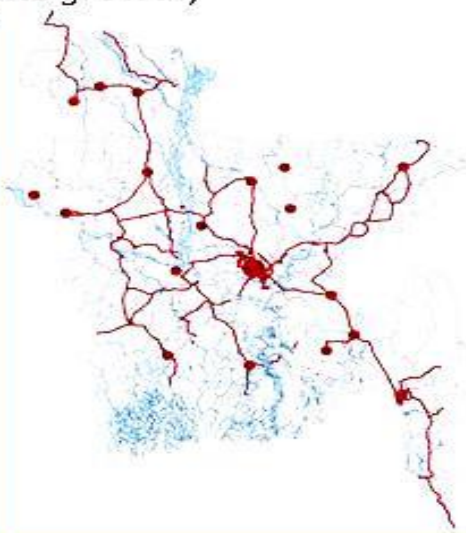
Diversified economy

(high per capita growth)

Resilient



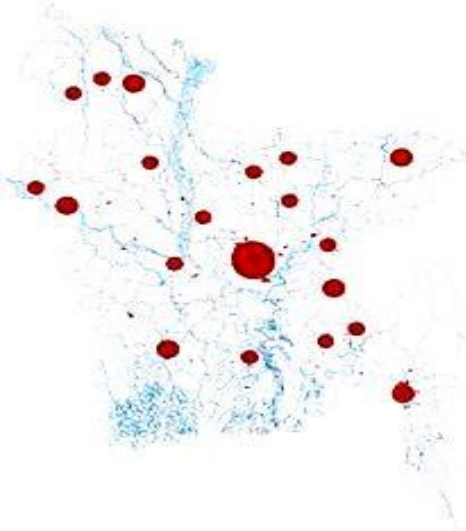
High global growth, moderate climate change, strong regional collaboration, growing population (185, 200 and 165 mln in 2030, 2050 and 2100). High GDP growth, diversified economy, modernized agriculture, decentralization, increased connectivity, high urbanization (49, 70 and 85% in 2030, 2050 and 2100)



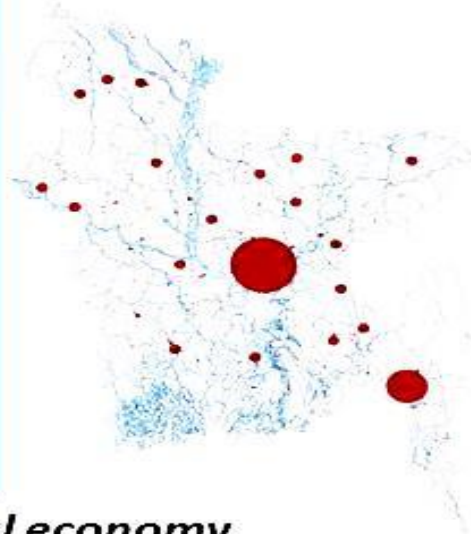
High global growth, high climate change, large upstream developments, stabilizing population (175, 170 and 125 mln in 2030, 2050 and 2100) - high out-migration, High GDP growth, agro-technology development, decentralization, high connectivity, moderate urbanization (45, 60 and 75% in 2030, 2050 and 2100)

Moderate water conditions

Extreme water conditions



Low global growth, moderate climate change, limited upstream developments, fast growing population (188, 210 and 190 mln in 2030, 2050 an d 2100), low GDP growth, traditional economy dependent on low value industry, increased inequality, centralized urbanization (40, 52 and 70% in 2030, 2050 and 2100), poor connectivity



Low global growth, high climate change, large upstream developments, fast growing population (197, 230 and 260 mln in 2030, 2050 and 2100), decreasing GDP growth, highly centralized urban growth, poor housing (39, 48 and 60% urbanization in 2030, 2050 and 2100) high rural poverty, urban-rural isolation

Traditional economy

(low per capita growth)

Moderate

Active

PRODUCTIVE 2030 - 2050 - 2100

- 200m population in 2050
  185m in 2030. 165m in 2100
- very high GDP per capita growth
- moderate climate change
- moderate sea level rise
- regional collaboration, driven by economic interests
- high value industrial products
- environmental degradation by industrial production
- high private sector involvement
- 70% urban population in 2050
  49% in 2030. 85% in 2100
- connected second tier cities

RESILIENT 2030 - 2050 - 2100

- 170m population in 2050
  175m in 2030. 125m in 2100
- high GDP per capita growth
- high climate change
- high sea level rise
- regional collaboration
- high value agro-industrial products
- environmental degradation by industrial production
- decentralization
- 60% urban population in 2050
  45% in 2030. 75% in 2100
- connected urban & rural hubs

Moderate 2030 - 2050 - 2100

- 210m population in 2050
  188m in 2030. 190m in 2100
- low GDP per capita growth
- moderate climate change
- moderate sea level rise
- regional competition and upstream extraction
- low value, low-skilled products
- environmental degradation by population pressure
- top-down centralization
- 52% urban population in 2050
  40% in 2030. 70% in 2100
- few large urban centres, underdeveloped infrastructure

Reactive 2030 - 2050 - 2100

- 230m population in 2050
  197m in 2030. 260m in 2100
- very low GDP per capita growth
- high climate change
- high sea level rise
- regional competition and upstream extraction
- low value, low-skilled products
- environmental degradation by population pressure
- top-down centralization
- 48% urban population in 2050
  39% in 2030. 60% in 2100
- fast growing Dhaka and Chittagong, urban-rural isolation

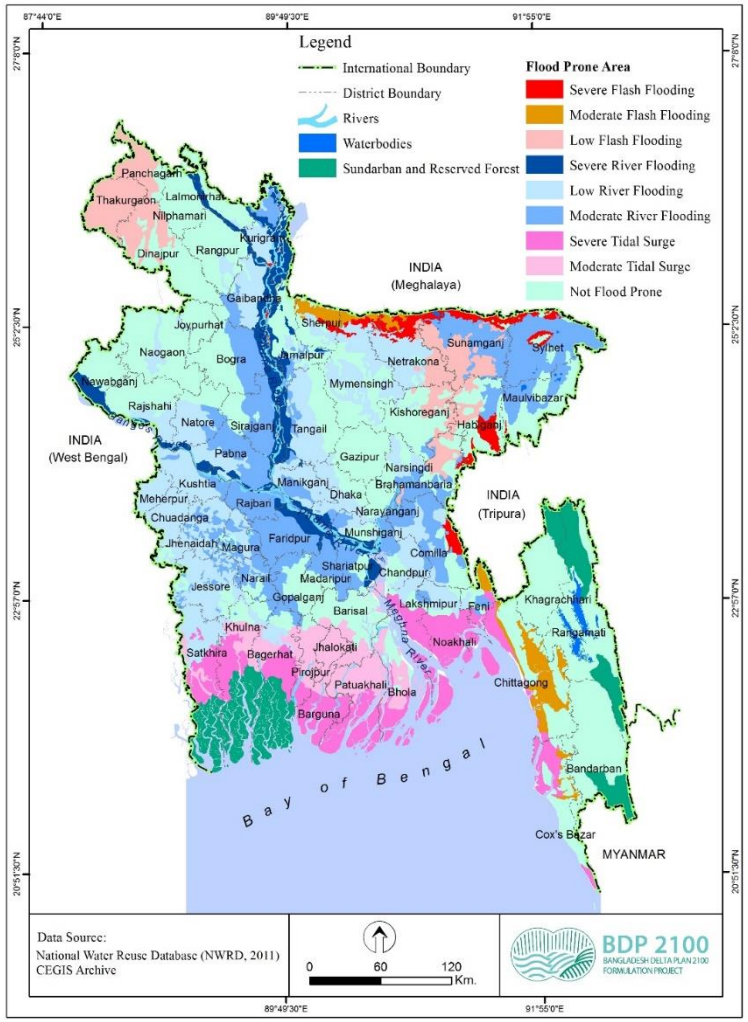
Flood Risk Management Strategy

Sub-strategies ← **Strategies** → **Sub-strategies** → **Measures**

- **Priority Economic Zones** — *Protecting economic strongholds and critical infrastructure*
  - River management; excavation and smart dredging
- **FCD Rationalization** — *Equipping FCD schemes for the future*
  - Restore, redesign and modify embankments and structures
  - Improve Operation & Maintenance
  - Restore water bodies and connectivity
- **Vulnerable Communities** — *Safeguarding livelihoods and communities*

Sub-strategies	Measures
Embankments, barriers and other structures	Ring dikes for economic priority zones and major urban centres
	Chittagong sea wall defense
Adaptive and flood-proof building	Raise and strengthen critical embankments
	Storm surge barriers on tidal inlets (long term)
	Plinths and elevated building
Spatial planning and flood hazard zoning	Financial and legal instruments for flood-adaptive spatial planning and implementation
Extension of the flood warning lead time	Flood early warning system services
	Set up National Flood and Drought Control Center and Regional Hubs (NW, NC, NE, EH, Coast)
Drainage improvement for FCD, priority zones and urban areas	
Pilots for nature based flood defenses (Coast)	Disaster information centers at Upizala level
	Mobile services for community Early Warning, incl community flood agents
Extension of Early Warning services into communities	Construction of cyclone shelters and critical facilities
	Flood resilient water supply and sanitation facilities
Extension and improvement of cyclone shelters	From Katcha to Pucca (coast)
	Homestead raising and flood proofing of critical roads and health services
Flood proofing of houses and critical services	NGO programs; emergency loans and grants
	Rapid response recovery packages
Social safety net and recovery	

Floods in Bangladesh



Freshwater Strategy

WATER AVAILABILITY

Balancing supply and demand for sustainable growth

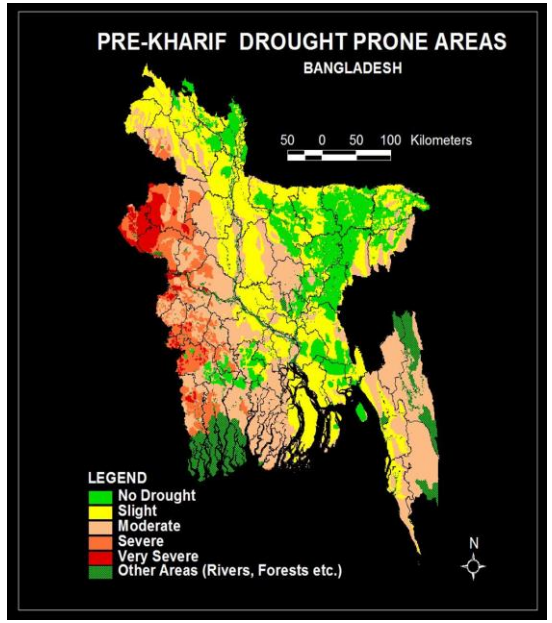
- Supply management and additional irrigation
  - Ganges Barrage (NW, SW, RE)
  - New Irrigation Projects from Major Rivers (NW, RE)
  - New Irrigation from Regional Rivers (NW, EH, NE)
  - Deep Well Development (NW, Coast)
- Demand management and efficient water use
  - Local Storage and Retention (NW, Coast, EH)
  - Modernising/ Improving Irrigation (all regions)
  - Crop Diversification and Land Management (NW, Coast, EH, NE)
- Enhancement of freshwater flows in urban and rural rivers
  - Flow Augmentation Regional Rivers (NC, SC)
  - River and Wetland Restoration (NC, NW, EH, NE)
- Resource planning and environment: restoring water- and ecosystems
  - Groundwater protection zones and use limitation
  - Develop River Basin Management Plans for Priority Basins (NW, NC, EH, EH, SW)
  - Set up Water Management Control Centers in Priority Basins (NW, NC, EH, Coast)
- Ensuring safe access to sustainable drinking water and sanitation
  - See -> WSS Strategy

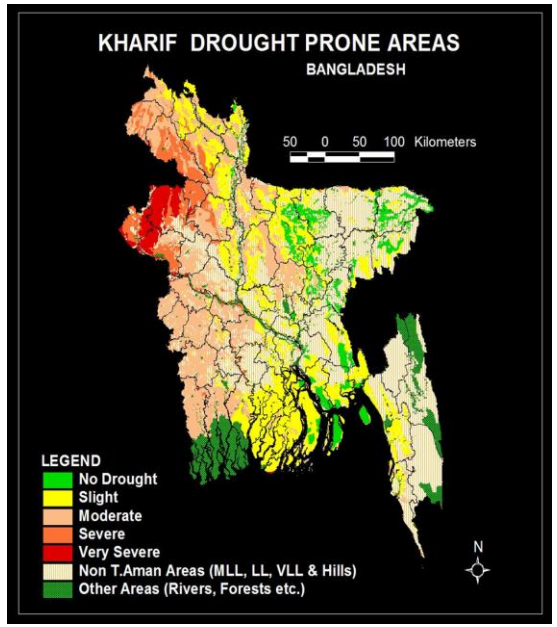
WATER QUALITY

Maintaining water quality for health, livelihoods and ecosystems

- Pollution control and treatment
  - Pollution Monitoring, Permitting and Control
  - Investment in Effluent Treatment from Municipalities and Industries (NC, EH, Div. Capitals)
  - Reduction of Diffuse Emissions in Urban and Rural Areas (all regions)

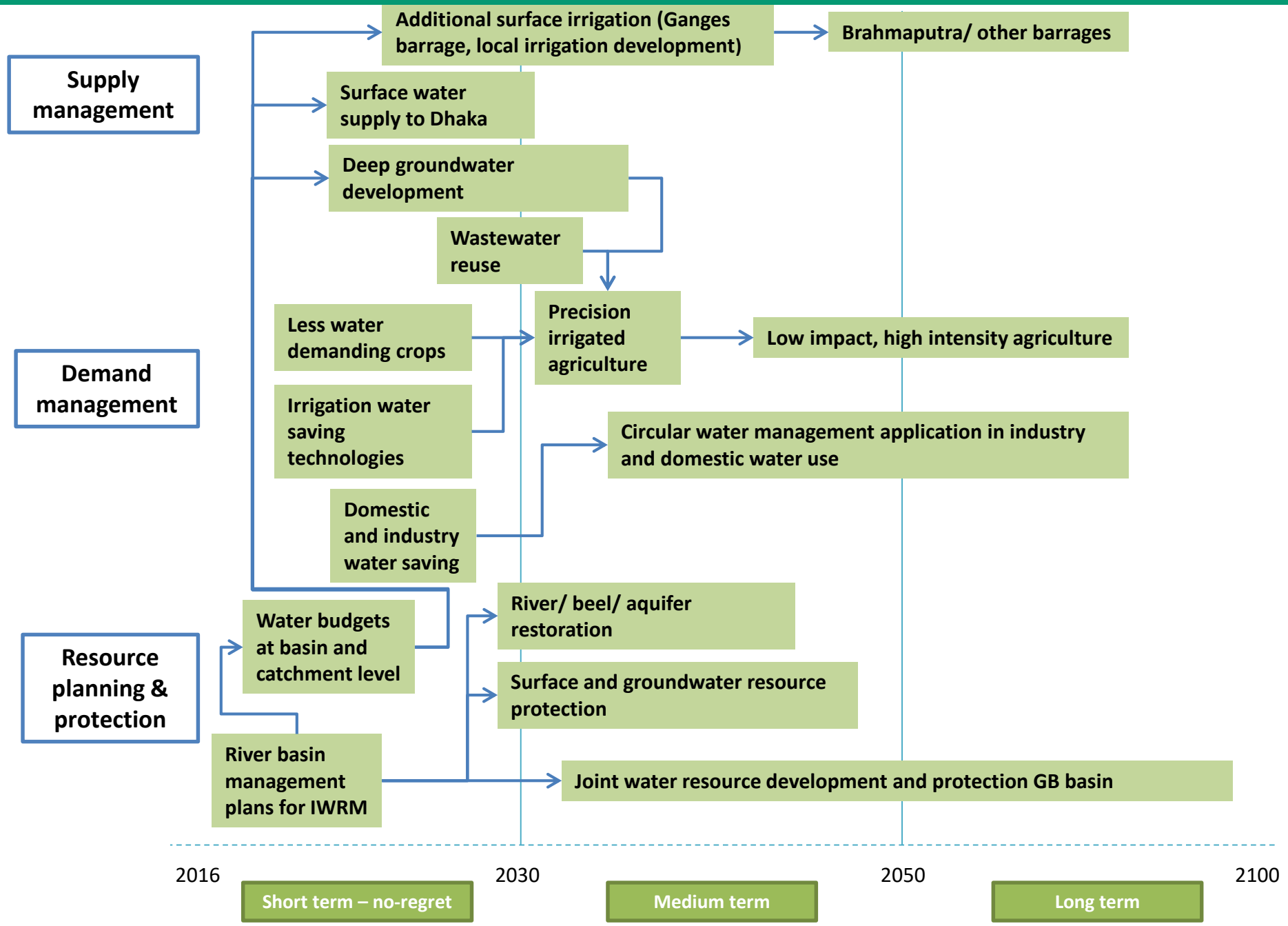
Strategies → ***Sub-strategies*** → ***Measures***





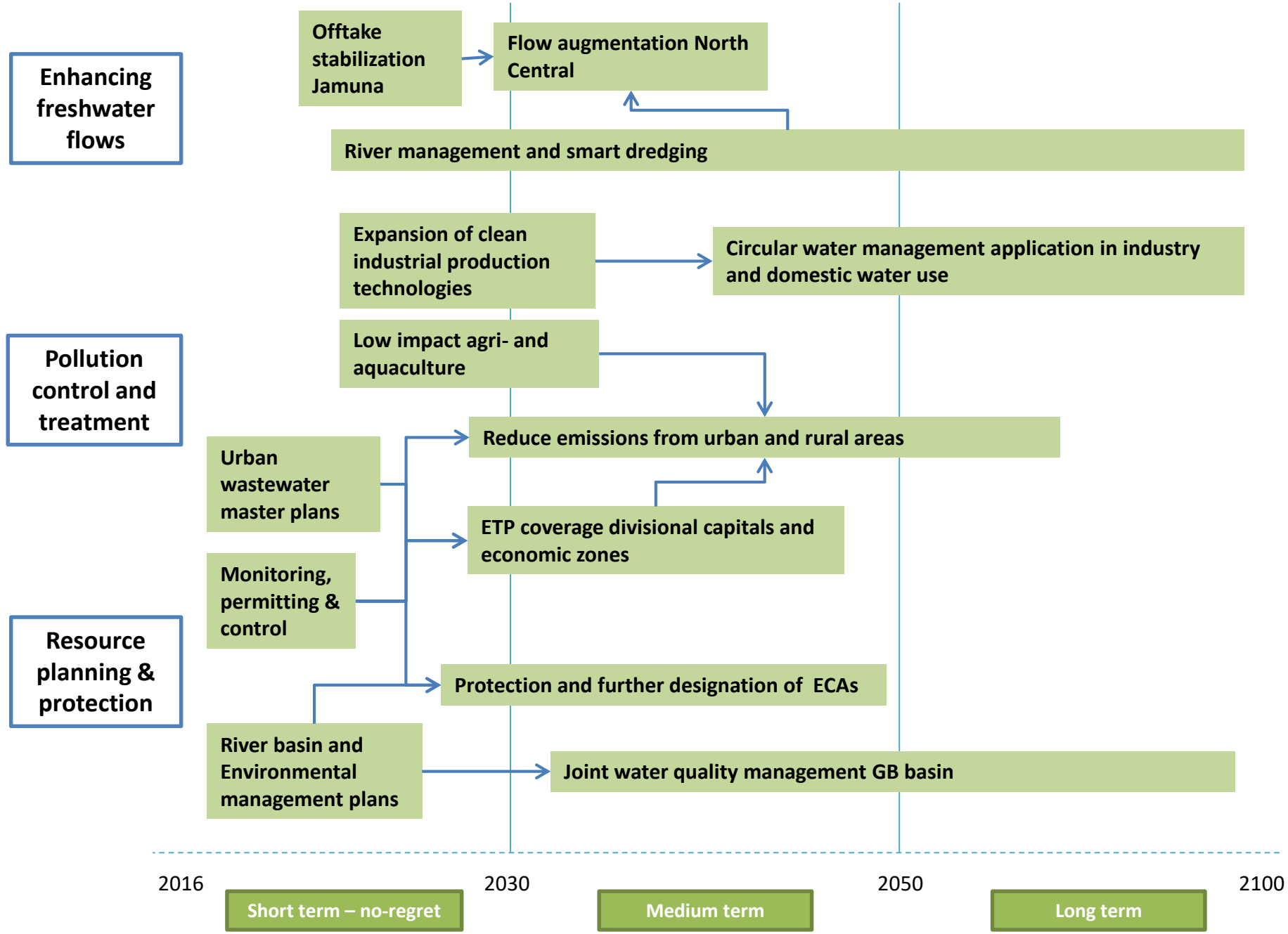
Adaptation Pathway for Fresh Water Strategy

Balancing supply and demand for sustainable inclusive growth



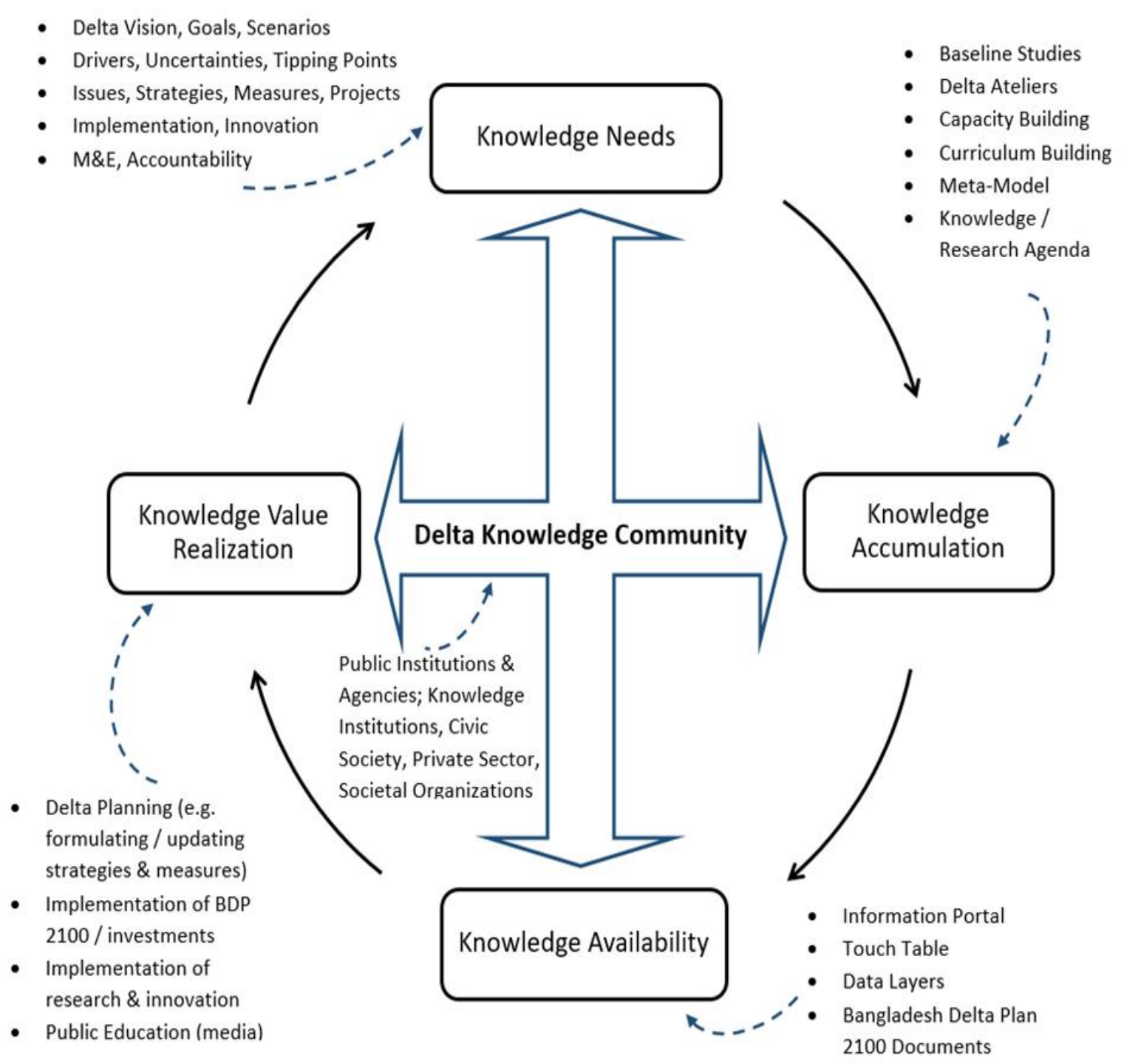
Adaptation Pathway for Fresh Water Strategy

Maintaining water quality for health, livelihoods and ecosystems



Delta Governance

- Adopt Delta Act
- Establish Delta Fund
- Establish Delta Commission
- Strengthen core Delta institutions
- Strengthen cross boundary water dialogue
- Institute beneficiary pays principle
- Strengthen private sector
- Establish M&E system for the Delta Plan
- Establish the knowledge portal and data bank



Funding Arrangements and Financial Mechanism

- Investment portfolio : 80 nos (Physical: 65, Institutional: 15)
- Investment cost up to 2030 : $ 38 billion (World Bank IP)
- Fund allocation (7^{th} FYP) : 2.5% of GDP per annum
- Establishment of Delta Fund
  - Public sector contribution : 2.0 % of GDP (80%)
  - Private sector contribution : 0.5 % of GDP (20%)
- Funding strategy:
  - Tax with non-tax revenue
  - Cost recovery for public services
    - Beneficiary Pay Principle
    - O&M funding
  - Green Climate Fund (GCF)
  - Donor funding
- Public Private Partnership

Conclusion

- Bangladesh Delta Plan is first of its kind in the world prepared for an entire delta using Adaptive Delta Management principle (WB)
- Long-term plan formulated for managing water resources focusing on socio-economic development under uncertain changing conditions considering climate change and decreasing trans-boundary flows
- BDP2100 has taken care of the paradigm shift from sectoral to integrated planning considering exogenous factors
- Four distinctive Scenarios have been developed with the aim to offer four different, plausible stories of possible future directions important for future water management
- In the current phase of the BDP2100, the proposed measures and strategies assessed against different future outcomes

End