BANGLADESH DELTA PLAN 2100
A challenge in meeting the uncertainties of long-term planning

Giasuddin Choudhury
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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

<table>
<thead>
<tr>
<th>Ganges Basin</th>
<th>Brahmaputra/Jamuna Basin</th>
<th>Meghna Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment area (sq km)</td>
<td>Catchment area (sq km)</td>
<td>Catchment area (sq km)</td>
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<tr>
<td>10,00,000</td>
<td>5,73,000</td>
<td>77,000</td>
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<tr>
<td>Av. Annual rainfall (mm)</td>
<td>Av. Annual rainfall (mm)</td>
<td>Av. Annual rainfall (mm)</td>
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<tr>
<td>1,200</td>
<td>1,900</td>
<td>4,900</td>
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<tr>
<td>Av. Annual discharges (cumec)</td>
<td>Av. Annual discharges (cumec)</td>
<td>Av. Annual discharges (cumec)</td>
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<tr>
<td>11,000</td>
<td>20,000</td>
<td>4,600</td>
</tr>
<tr>
<td>Max. Discharge (cumec)</td>
<td>Max. Discharge (cumec)</td>
<td>Max. Discharge (cumec)</td>
</tr>
<tr>
<td>78,000</td>
<td>1,00,000</td>
<td>20,000</td>
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<tr>
<td>Sediment transport (m ton/yr)</td>
<td>Sediment transport (m ton/yr)</td>
<td>Sediment transport (m ton/yr)</td>
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<tr>
<td>550</td>
<td>590</td>
<td>13</td>
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Bangladesh Delta includes the entire country

Land Classification

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

**Baseline Studies**
- Current Policy Situation
- Sectoral Status
- Drivers & Problems
- Integrated Analysis
- Finalization of Baseline Studies

**Adaptive Strategies**
- Formulation of Delta Vision
- Development of Assessment Framework
- Scenario Development
- Analysis of Strategies
- Preferred Strategies

**Delta Framework**
- Governance and Legal Framework
- Institutional Development & Capacity Building
- Preparation of Sectoral & Regional Arrangements
- Dissemination
- Financial Mechanisms

**Investment and Implementation Plan**
- Formulation of Bangladesh Delta Plan 2100
- Monitoring & Evaluation of the BDP 2100

**7th Five Year Plan**
- Interaction GC
Decision making process (including cost benefit analysis) becomes increasingly complex.
Stages of BDP Strategy Formulation Process

National socio-economic Policy Goals & priorities

Vision BDP2100
how to develop the Water System to support national socio-economic priorities?

Delta Goals
Key goals and sub-goals to achieve the vision

Scenarios

Analysis of strategies for different Scenarios
i) Base case; ii) Business as Usual case; iii) Alternative strategies & measures -> Scorecards

Evaluation criteria:
- State & Decision Support Indicators
- Cost-effectiveness
- Implementation
- Flexibility
- Robustness

Assessment Framework

Development of Strategies at National & Hot Spot level
Strategies & Measures:
Individual & Combinations. Infrastructure & Governance

Strategies
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.
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
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

- Exploring
  - Exploring the External Environment (PESTEL)
- Selecting / Focussing
  - Key Uncertainties (Impact vs Uncertainty)
- Defining Scenarios
- Describing Scenarios

Key Strategic Question

Political, economical, social, legal, technological, environmental

Short & Sharp

Slow Puncture

Free Fall
Scenarios

Productive

Moderate water conditions

Low global growth, moderate climate change, limited upstream developments, fast growing population (188, 210 and 190 mln in 2030, 2050 and 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

Diversified economy (high per capita growth)

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)

Resilient

Extreme water conditions

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)

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)
**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

**REACTIVE 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

**MODERATE 2030 - 2050 - 2100**

- 217m population in 2050
  - 175m in 2030. 125m in 2100
- high GDP per capita growth
- high climate change
- high sea level rise
- regional collaboration
- 60% urban population in 2050
  - 45% in 2030. 75% in 2100
- connected urban & rural hubs

**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
- fast growing Dhaka and Chittagong, urban-rural isolation
Flood Risk Management Strategy

**Priority Economic Zones**
- Protecting economic strongholds and critical infrastructure
  - Embankments, barriers and other structures
  - Adaptive and flood-proof building
  - Spatial planning and flood hazard zoning
  - Extension of the flood warning lead time
  - Drainage improvement for FCD, priority zones and urban areas
  - Pilots for nature based flood defenses (Coast)
  - Extension of Early Warning services into communities
  - Extension and improvement of cyclone shelters
  - Flood proofing of houses and critical services
  - Social safety net and recovery
  - Ring dikes for economic priority zones and major urban centres
  - Chittagong sea wall defense
  - Raise and strengthen critical embankments
  - Storm surge barriers on tidal inlets (long term)
  - Plinths and elevated building
  - Financial and legal instruments for flood-adaptive spatial planning and implementation
  - Flood early warning system services
  - Set up National Flood and Drought Control Center and Regional Hubs (NW, NC, NE, EH, Coast)

**FCD Rationalization**
- Equipping FCD schemes for the future
  - Disaster information centers at Upazila level
  - Mobile services for community Early Warning, incl community flood agents
  - Construction of cyclone shelters and critical facilities
  - Flood resilient water supply and sanitation facilities
  - From Katcha to Pucca (coast)
  - Homestead raising and flood proofing of critical roads and health services
  - NGO programs; emergency loans and grants
  - Rapid response recovery packages

**Vulnerable Communities**
- Safeguarding livelihoods and communities
  - River management; excavation and smart dredging
  - Restore, redesign and modify embankments and structures
  - Improve Operation & Maintenance
  - Restore water bodies and connectivity

**Sub-strategies**
- Strategies
- Sub-strategies
- Measures
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)
  - Local Storage and Retention (NW, Coast, EH)
  - Modernising/Improving Irrigation (all regions)
  - Crop Diversification and Land Management (NW, Coast, EH, NE)

- Demand management and efficient water use
  - Flow Augmentation Regional Rivers (NC, SC)
  - River and Wetland Restoration (NC, NW, EH, NE)
  - Groundwater protection zones and use limitation
  - Develop River Basin Management Plans for Priority Basins (NW, NC, EH, E4, SW)
  - Set up Water Management Control Centers in Priority Basins (NW, NC, EH, Coast)

- Enhancement of freshwater flows in urban and rural rivers

- Resource planning and environment: restoring water- and ecosystems

- 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**
Balancing supply and demand for sustainable inclusive growth

Adaptation Pathway for Fresh Water Strategy

Supply management
- Additional surface irrigation (Ganges barrage, local irrigation development)
- Surface water supply to Dhaka
- Deep groundwater development
- Wastewater reuse
- Precision irrigated agriculture
- Low impact, high intensity agriculture
- Circular water management application in industry and domestic water use

Demand management
- Less water demanding crops
- Irrigation water saving technologies
- Water budgets at basin and catchment level
- Domestic and industry water saving
- River/ beel/ aquifer restoration
- River basin management plans for IWRM

Resource planning & protection
- Surface and groundwater resource protection
- Joint water resource development and protection GB basin

Timeline:
- Short term – no-regret
- Medium term
- Long term
Maintaining water quality for health, livelihoods and ecosystems

Adaptation Pathway for Fresh Water Strategy

Enhancing freshwater flows
- Offtake stabilization Jamuna
- Expansion of clean industrial production technologies
- Urban wastewater master plans
- Monitoring, permitting & control
- Joint water quality management GB basin

Pollution control and treatment
- Flow augmentation North Central
- Circular water management application in industry and domestic water use
- Low impact agri- and aquaculture
- Reduce emissions from urban and rural areas
- ETP coverage divisional capitals and economic zones

Resource planning & protection
- River management and smart dredging
- Protection and further designation of ECAs
- Joint water quality management GB basin
- Reduce emissions from urban and rural areas
- ETP coverage divisional capitals and economic zones

2016
- Short term – no-regret

2030
- Medium term

2050
- Long term

2100
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 (7th 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