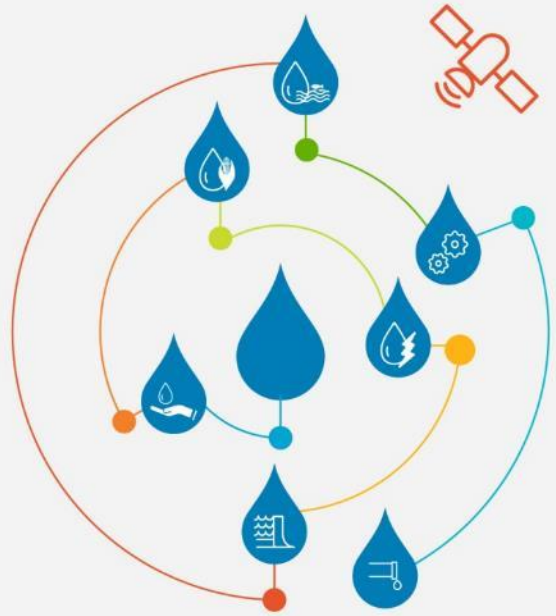
Structural Solutions to Mitigate Flood and Riverbank Erosion Disasters along the Brahmaputra in Assam, India and Bangladesh



Knut Oberhagemann

Northwest Hydraulic Consultants, Canada

4th October 2018

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The Ganges, Brahmaputra, Meghna (GBM) Basin

Ganges:

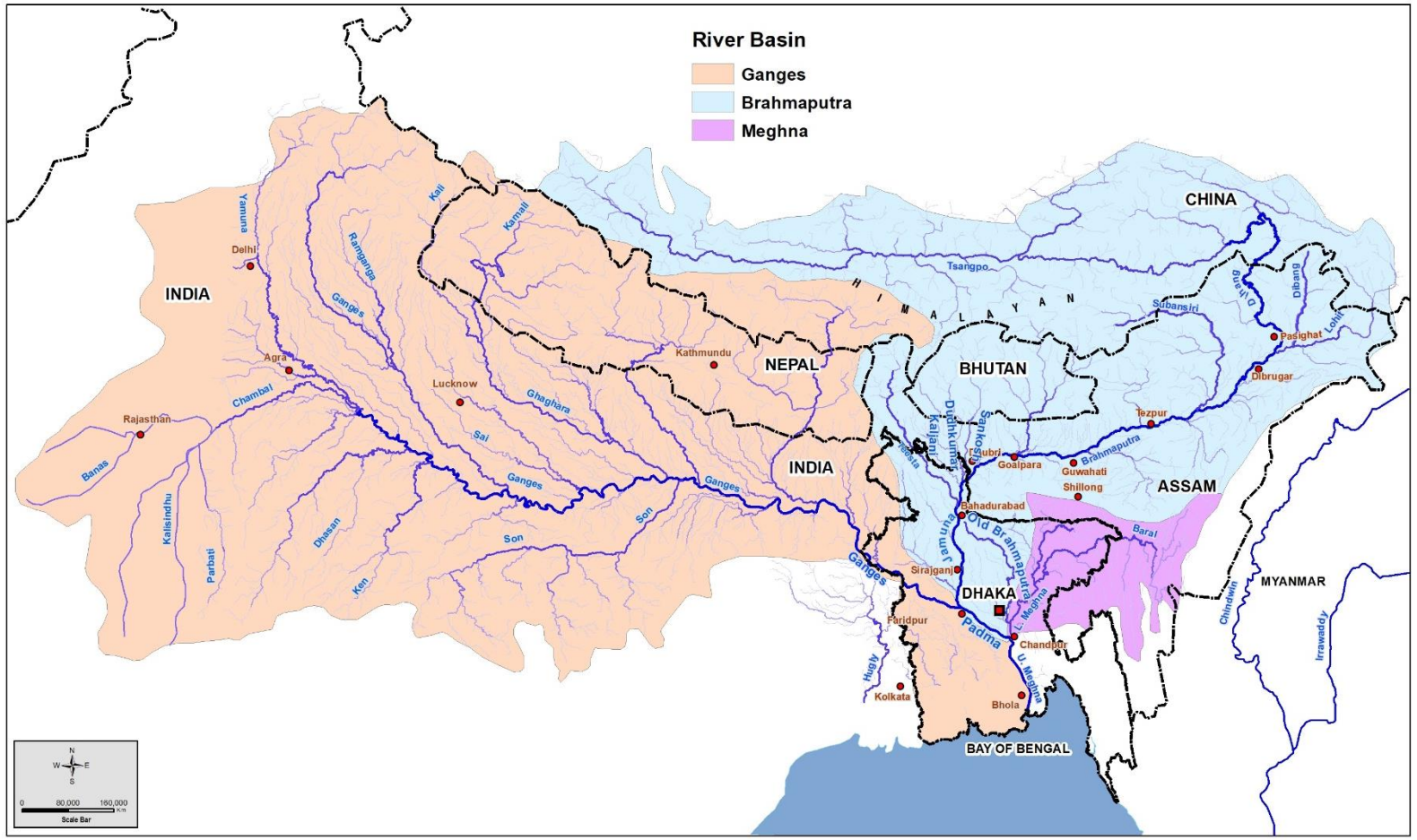
1 m km², 11,000m³/s

Brahmaputra

0.58 m km², 20,000m³/s

Meghna

0.08 m km², 4,600m³/s



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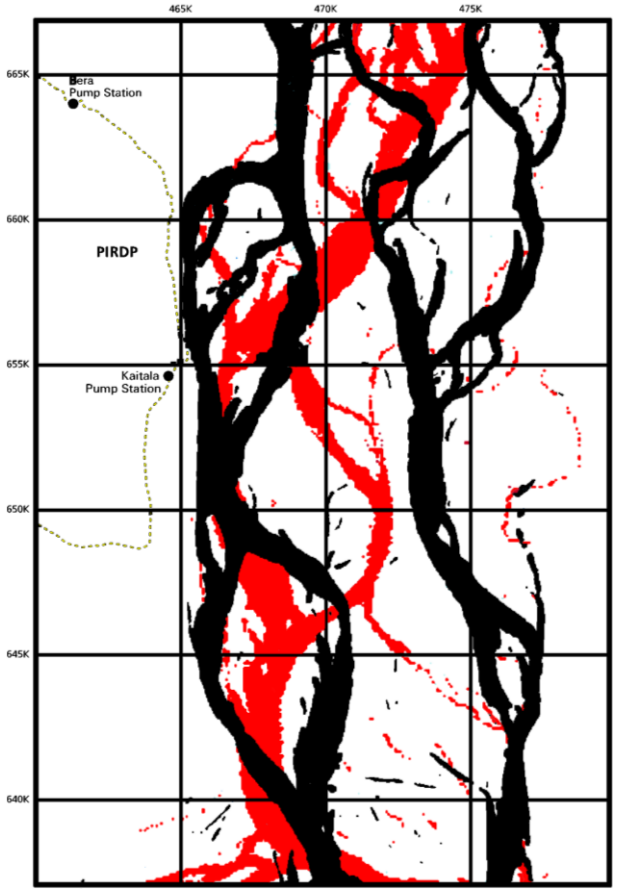
The Widening of the braided Brahmaputra

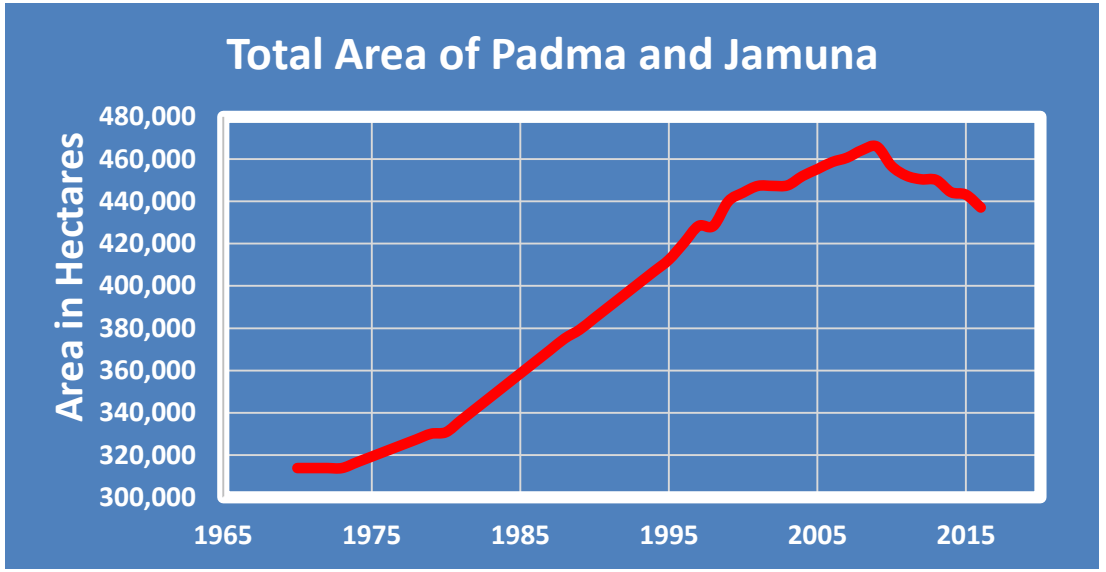


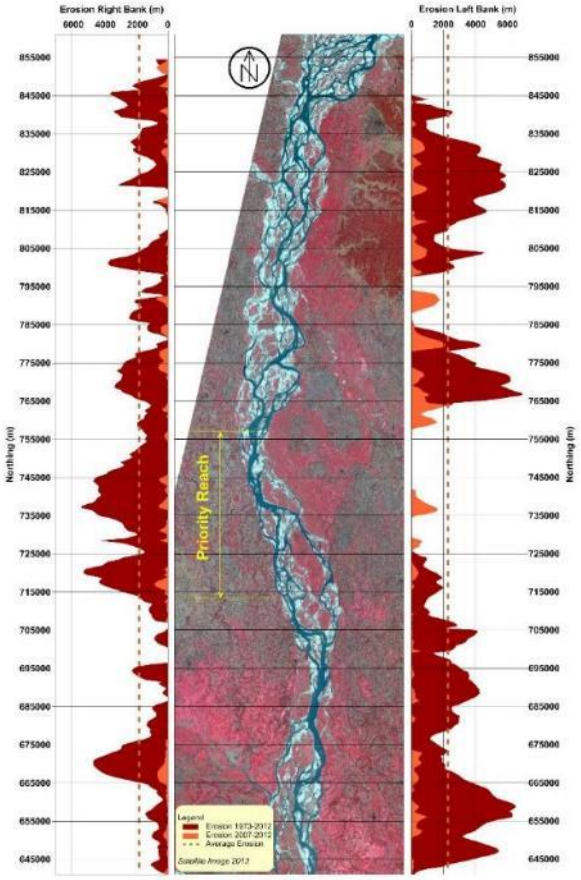
Reason: Great Assam Earthquake

Consequence: widening by 50%:

- Assam from 6 to 9km

  Bangladesh from 8 to 12km





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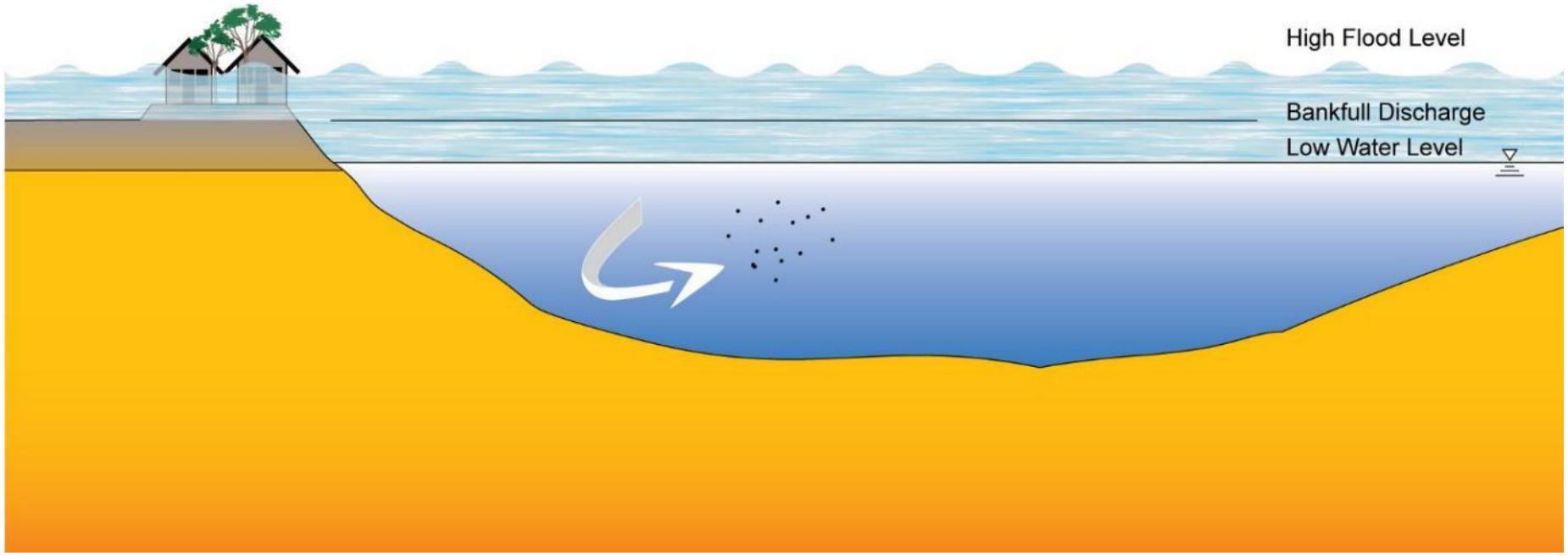
The Consequence of River Widening

River widening destroys infrastructure and livelihoods, especially when flood embank-ments erode



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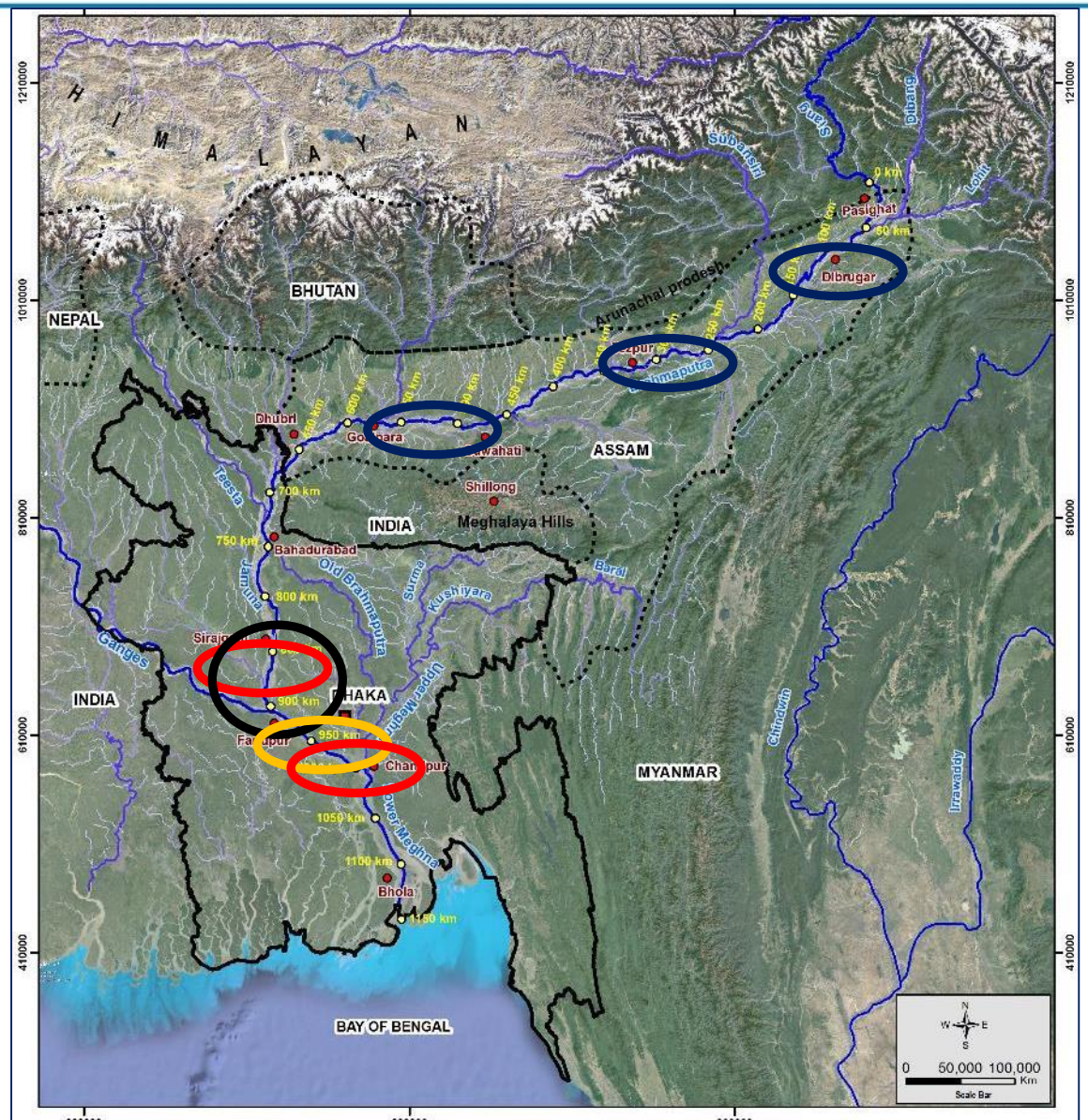
ADB Interventions along the braided Brahmaputra

- Bangladesh: 2003-2011, 2 sites
- Assam: MFF, 2010-2020, 3 sites
- Bangladesh: Padma Bridge 2015-2021
- Bangladesh: MFF 2014-2023, 2 reaches (Jamuna and Padma)



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Key Technological Development

Key technology: long-guiding revetments maximizing local resources and resulting in cost-effective works (USD 3m/km)

Video: FRERMIP, 2016

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Key Technological Development

Modern flood embankments incorporating future anticipated changes

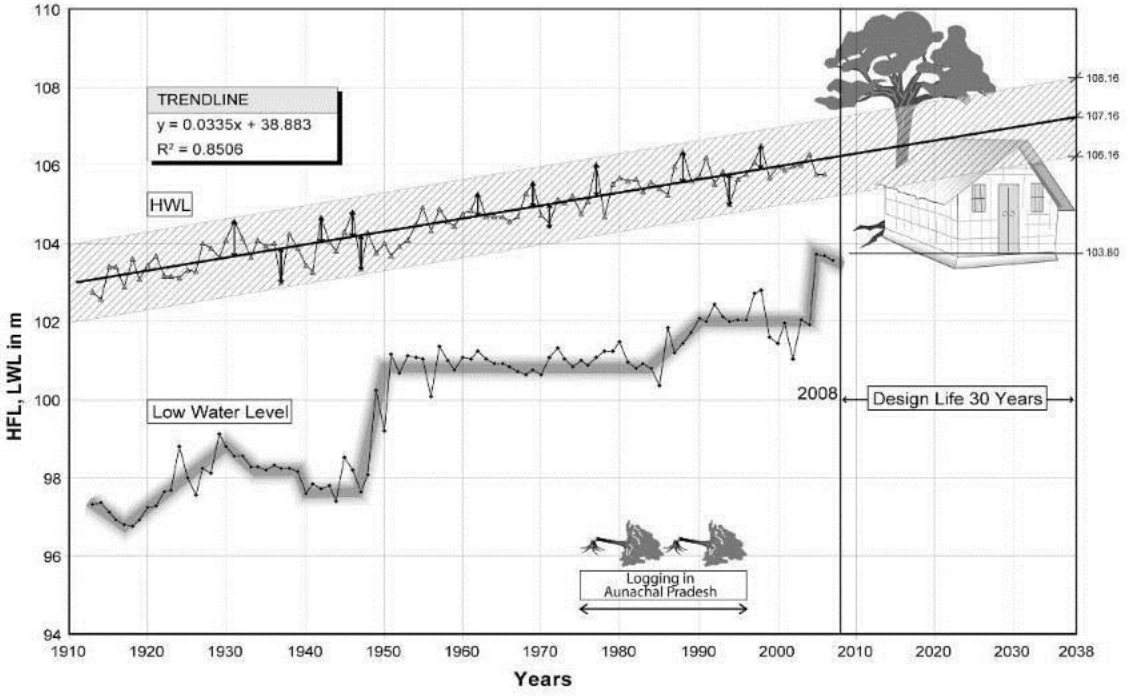

Photo: Knut Oberhagemann, 2017

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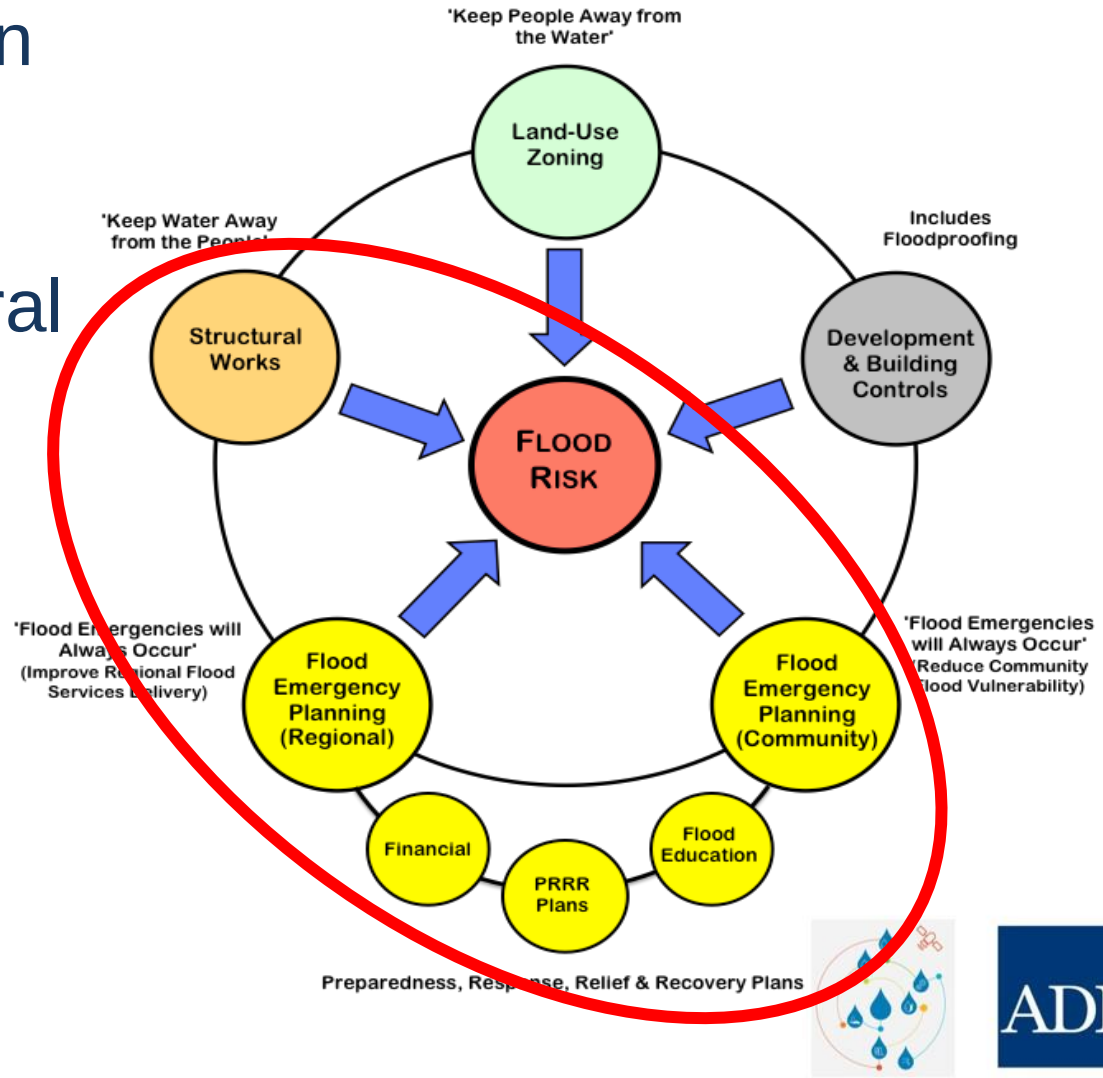
Development Achievements - General

- Integrated flood and riverbank erosion risk management (FRERM)
- Integrated structural and non-structural approach including safeguards
- Community-based flood risk management approach



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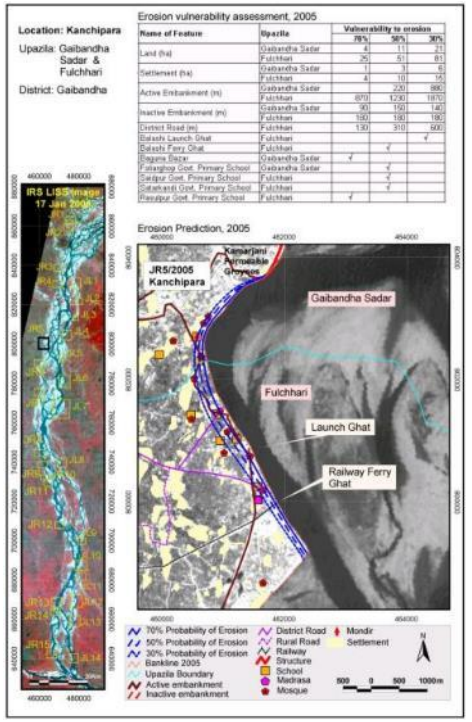
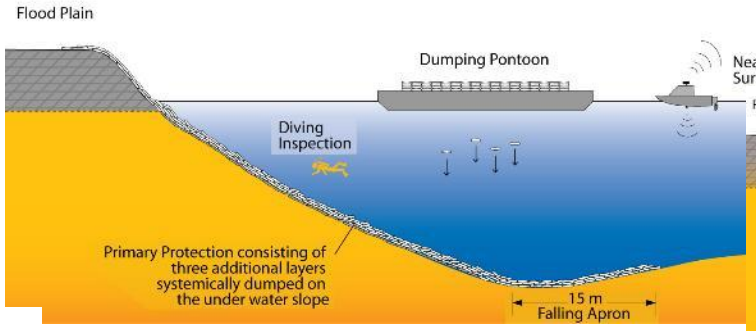
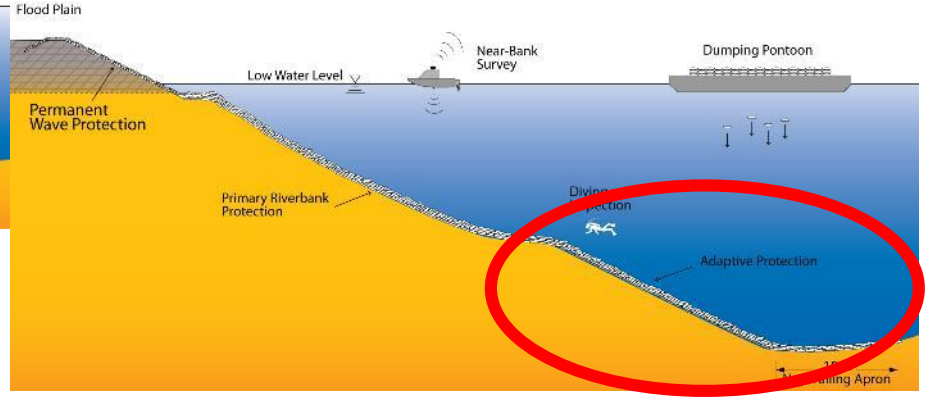
Development Achievements - Technical

- New type of riverbank protection
- Systematic erosion prediction
- Modern flood embankments
- Quality construction
- Phased implementation (Adaptive Approach)







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Technology Transfer to Neighboring Country

Bangladesh in April 2004

Assam in February 2013

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Summary

- Proven Benefits
  - Robust, proven, and cost-effective riverbank solution with minimal maintenance
  - Substantial infrastructure saved from erosion in Bangladesh and Assam
  - Secured livelihoods and increased economic activities in protected areas
- Enabling Conditions
  - Institutional change towards flexible implementation (phased and adaptive)
  - Approved Guideline for Riverbank Protection in Bangladesh institutionalizes the approach
  - Developed local capacity (geotextile producers and local contractors)
- Upscaling
  - Suitable for deltaic areas worldwide
  - Cost effective riverbank erosion prediction system (adapted to Kosi in India)
  - Initial stabilization of river reaches – towards river stabilization (“building with nature”)

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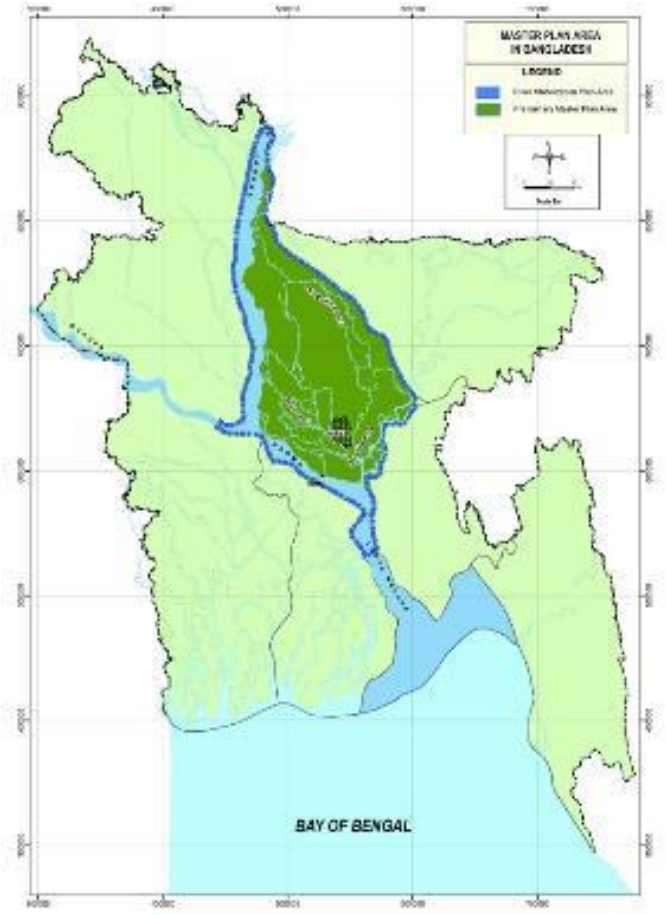
Outlook – towards Systematic River Stabilization



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RIVER STABILIZATION

- Land Recovery
- Navigation Restoration
- Flood Protection
- Distributary Restoration
- Peri-urban Development
- Environmental Restoration