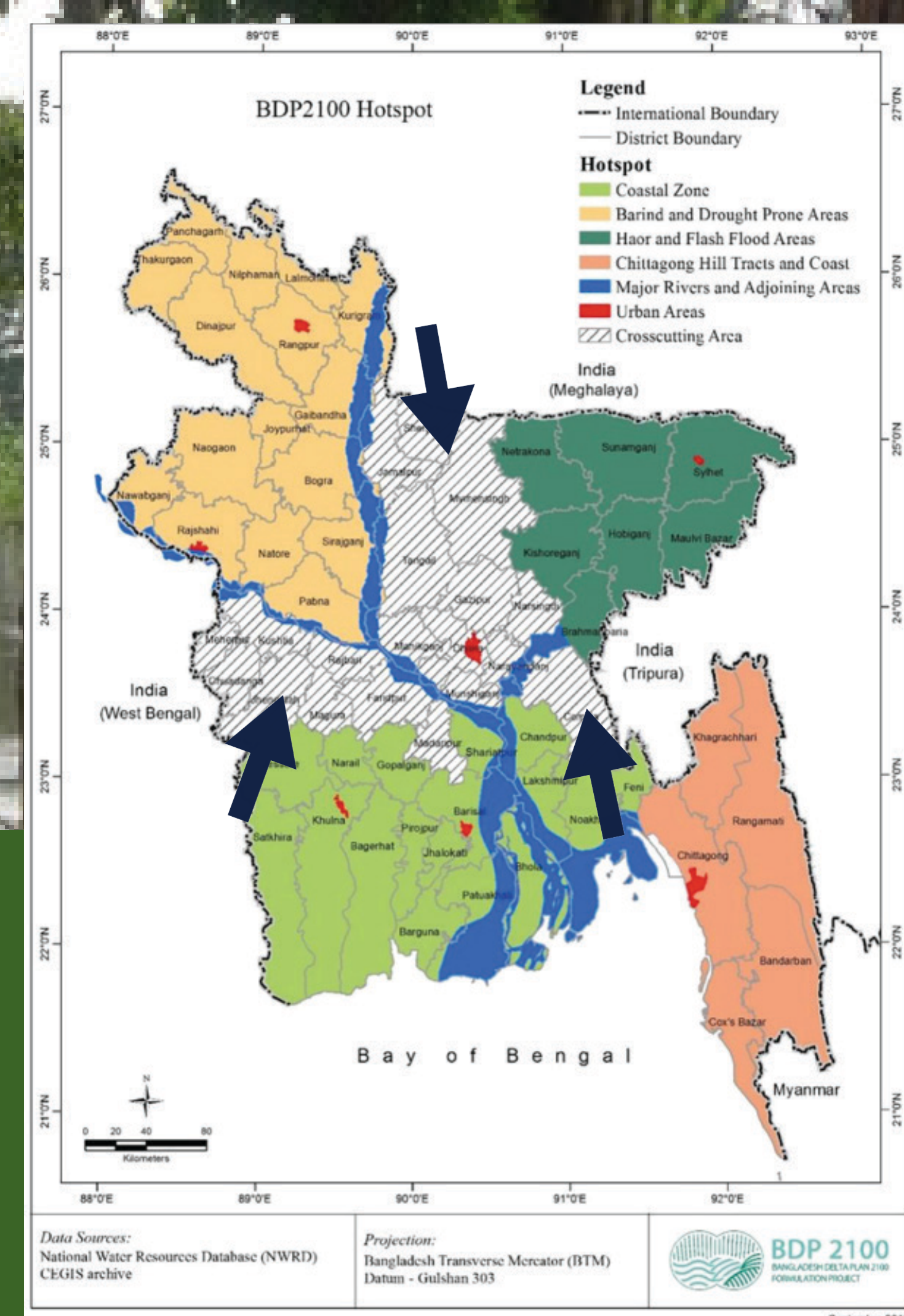


# Green Roads for Water Hotspot: Flood Plains and Estuaries



## Opportunities and Challenges

- 1 Unblock drainage congestion and reduce water logging.**
  - ➔ Systematically equip roads with adequate cross drainage structures and install additional bridges and culverts in critical areas, avoid high bridge sills
- 2 Improve flood protection.**
  - ➔ Built in flood protection requirements in river facing roads – adequate height, armouring, vegetative cover
- 3 Improve flood preparedness.**
  - ➔ Construct elevated roads in lower lying areas (for livestock evacuation); include wide sections for temporary shelter
- 4 Mitigate floods in critical areas.**
  - ➔ Roads may constructed in critical areas to cordon off the area from floods and compartmentalize
- 5 Facilitate fish migration.**
  - ➔ Sufficient culverts and bridges; well-designed and well-placed culverts, i.e. culverts that are not too steep, and have low/moderate velocity; that may have roughened surfaces; that have adequate water levels in dry season; and are connected to the downstream water body
- 6 Optimize functions with well-planned roadside vegetation.**
  - ➔ Vegetation planting and species selection for direct productive use, embankment stability, dust/ pollution control, noise reduction, biodiversity and are suitable to local soil and climate

## Examples of techniques



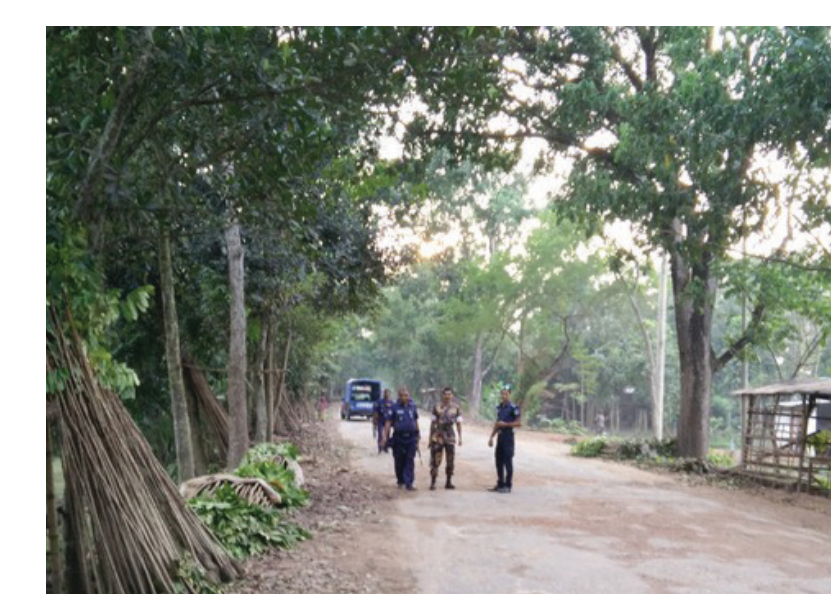
Armouring of river facing roads



Elevated roads providing flood shelter for livestock



Sufficient cross drainage to avoid water logging



Mahogany road side tree planting for productive use and as shelter belt