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**Nature-based Solutions for Riverbank Erosion  
Management, Embankment Stabilization, Flood Risk  
Reduction at the Brahmaputra River & creating buffer  
space for Wetlands**

**Insights from the Regional Conference**

# FLOOD AND RIVER EROSION MANAGEMENT AGENCY OF ASSAM (FREMAA)



FREMAA, a special purpose vehicle of the Govt. of Assam, has been established to execute the Externally Aided Projects as Project Management Unit (PMU) with implementation support from Project Implementing Units (PIUs). The projects executed by FREMAA have established effective and efficient management systems with overwhelming emphasis on building capacities of implementing agencies.

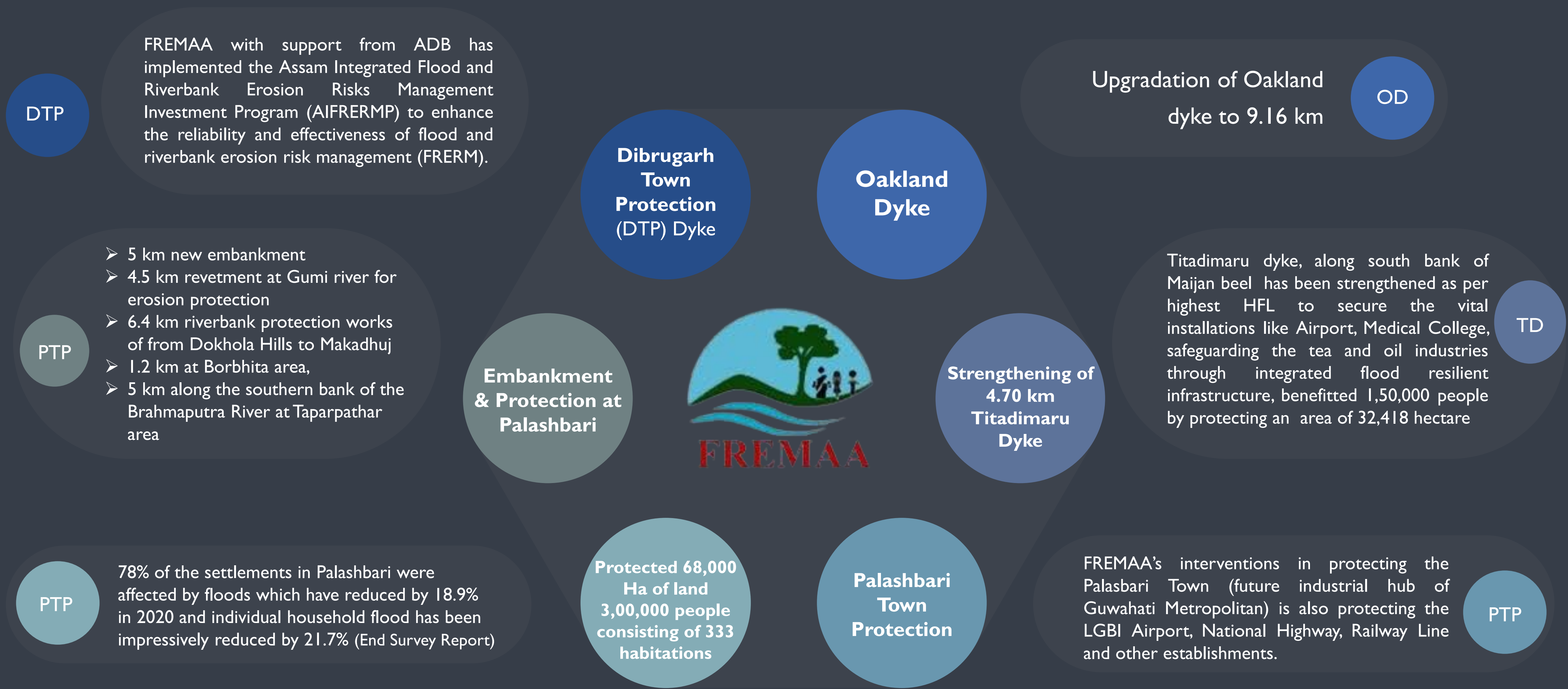


FREMAA is anchored to Water Resource Department (WRD), Assam State Disaster Management Authority (ASDMA) and Assam Agroforestry Development Board (AADB) for implementation of the World Bank and Asian Development Bank supported projects.



FREMAA also engages consultants/ consulting firms and NGOs for assisting in effective project management, strengthening institutionalization and benefit monitoring and evaluation.

# Initiatives taken by FREMAA for climate-resilient Urban Development



**AIFRERMP**

**CRBIFRERMP**

**AIRBMP**



- FREMAA has successfully completed the Assam Integrated Flood and Riverbank Erosion Risks Management Investment Program (AIFRERMP)
- FREMAA is executing the Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project (CRBIFRERMP) supported by the Asian Development Bank (ADB) and Assam Integrated River Basin Management Program (AIRBMP) supported by the World Bank.



In both the ongoing projects, apart from the structural measure, FREMAA is envisioning to implement non-structural measure and a hybrid approach

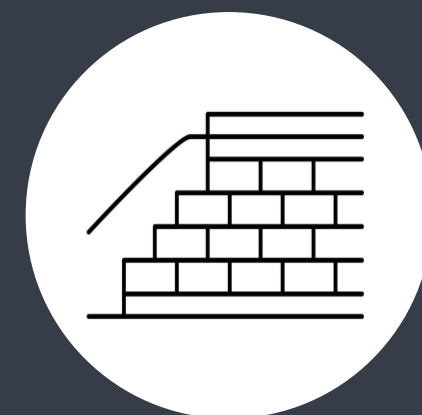
### Stabilize Riverbanks and Embankment Slopes

To stabilize the riverbanks, reduce vulnerability of riverbank erosion and promote sediment at the riverbanks



### Protection of Embankment Slopes

Protection of embankment slopes from the risk of rain cuts to reduce maintenance requirements



### Livelihood Opportunities

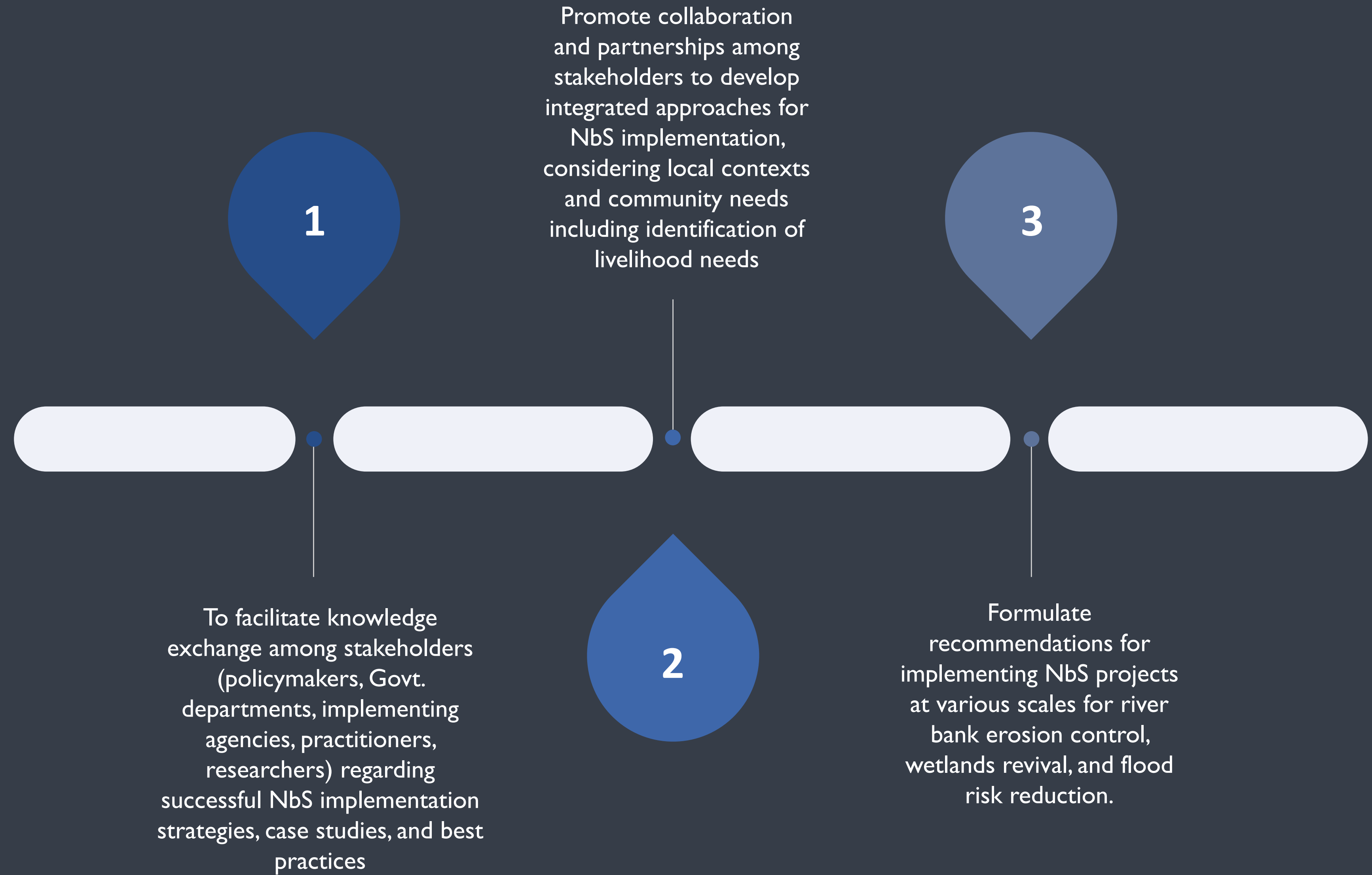
Provide local stakeholders with income generating scope by incorporating NbS in Flood and River Erosion Risk Management



### Buffer Space for River

Wetland revival as the rewetting of wetlands lead to form the nucleus for larger, systematic floodplain management activities, improving water retention capacity at the landscape scale for 'sponge functioning' of catchments to reduce and delay peak flows and stimulate infiltration to the groundwater

Regional Conference for implementation of Nature-based Solutions, buffer space for Wetlands for floodwater diversion, embankment stabilization and riverbank erosion management at the River Brahmaputra



# Riverbank Erosion Management

Riverbank erosion is a significant challenge along the Brahmaputra River, threatening livelihoods and infrastructure.  
Insights gained:

## Riverbank Vegetation

Planting indigenous species of grasses, shrubs and trees to stabilize riverbanks and prevent erosion.

## Soft Engineering Approaches

Using geotextiles, coir mats, and other biodegradable materials to protect riverbanks from erosion while promoting natural vegetation growth.

## Sediment Management

Implementing measures to manage sediment loads and flow patterns to reduce the impact of erosion on riverbanks.

# Embankment Stabilization

The Brahmaputra River's embankments are crucial for protecting populated areas from floods.  
Insights gained:

## Bioengineering Techniques

Using vegetation and natural materials to reinforce embankments, reducing reliance on concrete and synthetic materials.

## Monitoring & Maintenance

Regular monitoring of embankments to detect and repair any damage or weaknesses before they lead to failures.

## Innovative Materials

Incorporating new materials and construction methods to improve the durability and resilience of embankments.



# Incorporation of Nature-based Solutions (NbS)

Nature-based Solutions involve using natural processes and ecosystems to address environmental challenges.  
Insights gained:

## Reforestation & Afforestation

Planting native species of grass, shrubs and trees along riverbanks to stabilize soils, reduce erosion, enhance biodiversity and create scope for income generation

## Riparian Buffer Zones

Establishing vegetated buffers and fresh water mangroves along river edges to protect against erosion, provide habitats for wildlife, and improve water quality.

## Restoration of Wetlands & Floodplains

Creating buffer scape for wetlands and floodplains to enhance their capacity to absorb and store floodwaters, thereby reducing flood risks downstream.

# Experience & Takeaways

from the Regional Conference



To work on Pilot projects for understanding the effectiveness of the soft engineering approaches in reducing erosion while maintaining the natural dynamics of the river.



Active involvement of local communities in planting and maintaining riverbank vegetation increasing the success and sustainability of erosion management efforts.



Understanding sediment transport and deposition patterns was critical for designing effective erosion control measures.



Combining traditional knowledge with modern engineering techniques enhanced embankment stability and resilience.

# Experience & Takeaways

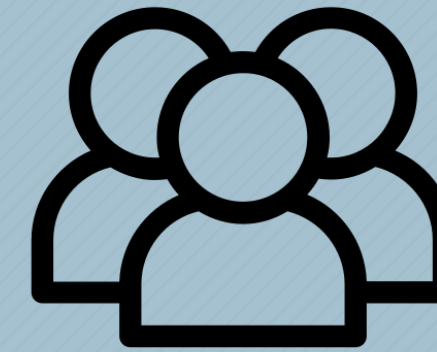
from the Regional Conference



Mapping and prioritizing critical wetlands for protection and restoration in the flood management strategy are key outcomes.



Effective buffer space management around wetlands will lead to a noticeable reduction in flood impacts in the regions where these strategies will be applied.



Engaging local communities in the conservation and sustainable use of wetlands will provide both environmental and socio-economic benefits.



Community-based monitoring programs enabled quicker response to embankment issues and improved overall management.



THANK YOU!