

Controlled flooding in Asia

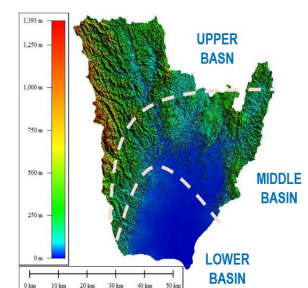
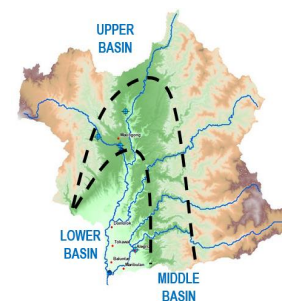
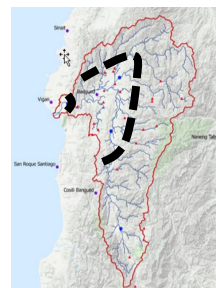
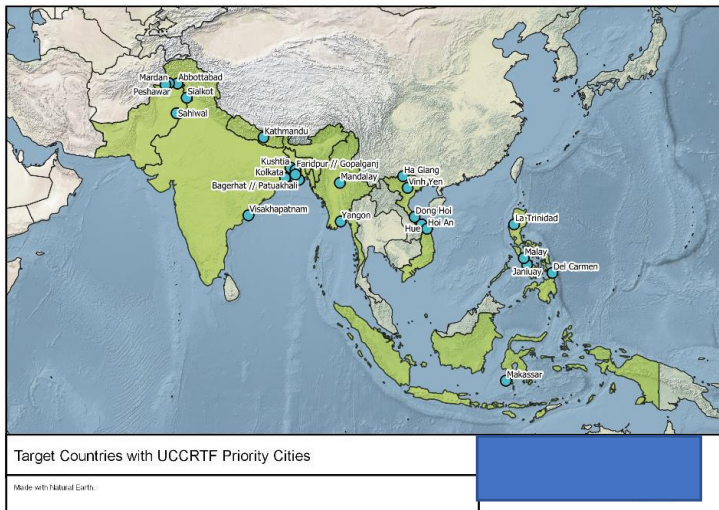
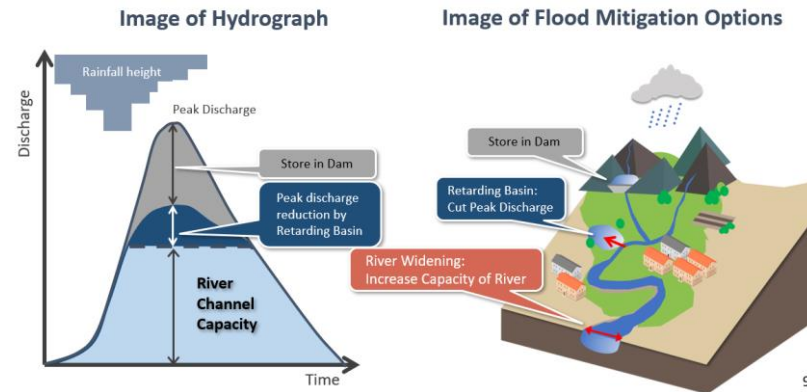
Three tiered approach:

The design incorporates a "tiered" or "terraced" approach which attempts to conform to and protect the existing topography.

This concept generally includes three terraces; the **low terrace** adjoining the river channel, the **middle terrace**, bounded by a higher terrace or river training walls and a **higher terrace** bounded by the road on the outside.



Contribution of Options to Reduce Water Level





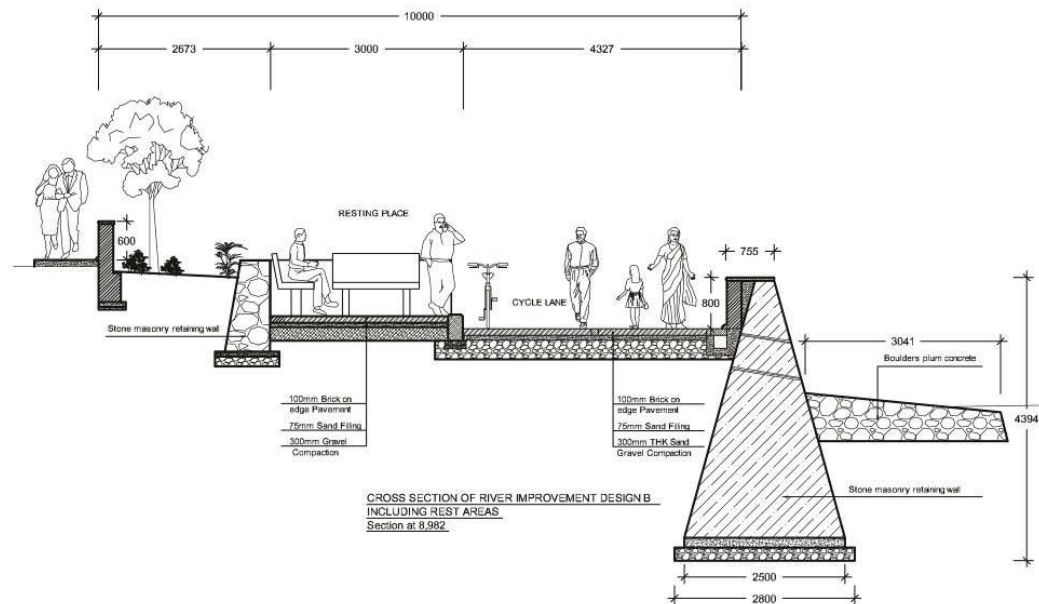
Contents

- 1) The Bagmati River in Kathmandu
Spilling River Concept
- 2) Nepal Priority Basins
A country wide approach
- 3) Urban Climate Change Resilience
Study of various options, coastal areas
- 4) Nadi River Flood Alleviation Project
Finding an optimal solution
- 5) Nature based solutions for flooding in the
Philippines



Bagmati River Basin Improvement Project, Nepal





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Implementation and progress: improved river environment



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Project Overview

Name of Division:

SAER

Project Title:

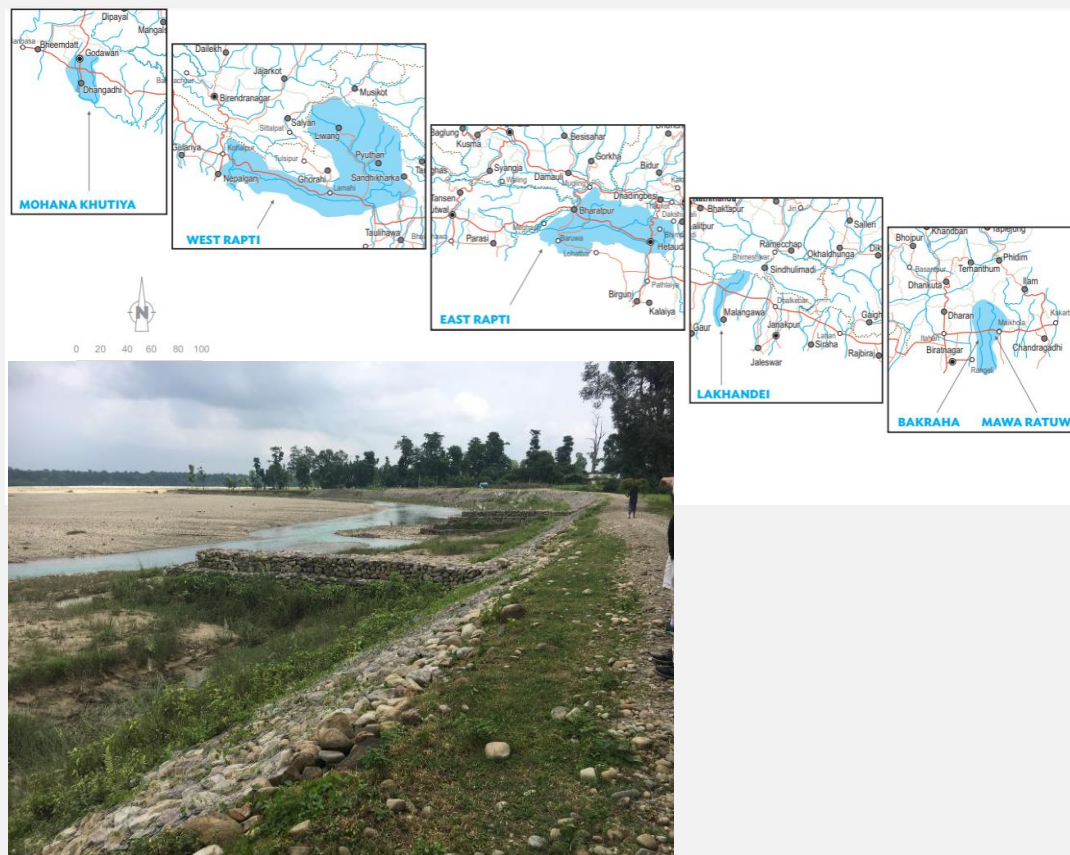
Nepal: Priority River Basins
Flood Risk Management
Project

Date of Project Commitment:

28 September 2020

Project Cost and Funding:

\$63.0 million - (OCR \$40
million, Grant \$10.0 million,
Govt \$13.0 million)





Innovative features and other highlights



The project contributes to the Operational Priority to tackle **climate change, build climate and disaster resilience, and enhance environmental sustainability** by adopting the following innovative features;

- (i) **Construction of flood embankments, with vetiver grass** erosion protection, to protect households and agricultural land for 1 in 50 year flood.
- (ii) Developing capacity of local communities on disaster preparedness through development of **community-based disaster risk management plans**.
- (iii) Development of **flood forecasting and early warning systems** in 5 river basins – providing early warning for communities to act.
- (iv) Improving planning and implementation of **river embankments** for enhanced flood risk management.
- (v) GIS flood protection infrastructure **Asset Management System** developed to improve embankment maintenance and improve resilience to flood events.



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NBS – Estuaries and Coast

Managing tidal storage and sediment processes – example Bangladesh Beels

Mud flat and mangroves to reduce storm surge

Sand and shingle management on coast - beach recharge and dune preservation rather than walls



TA 9634-REG: Strengthening Integrated Flood Risk Management



PAK: Proposed Sindh Coastal Resilience Project

Project cost
(Expected)
\$100 million

Impacts/ Outcomes

- Improved freshwater availability and environmental conditions
- Improved protection against natural hazards
- Resilience to future climate changes and variability

Solutions / Outputs

Focus on the physical 'building blocks' of resilience in Sujawal, Thatta, and Badin districts:

- Integrated flood risk management schemes strengthened including revival of natural waterways and storage ponds
- Natural coastal defenses enhanced including plantation of mangroves and saline-tolerant species
- Strategic action planning established for coastal zone strengthened





1. History

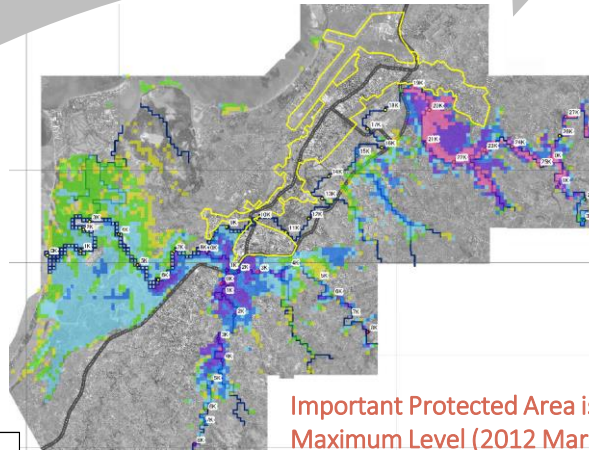
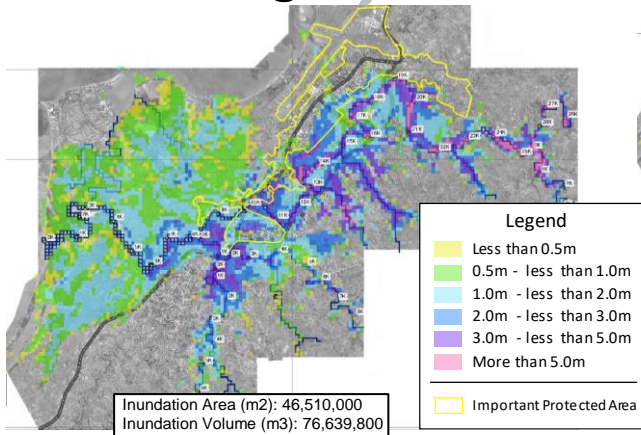
Feasibility Study 2016 Protection options against 2012 flood 1-in-50 year event

Inundation Maps

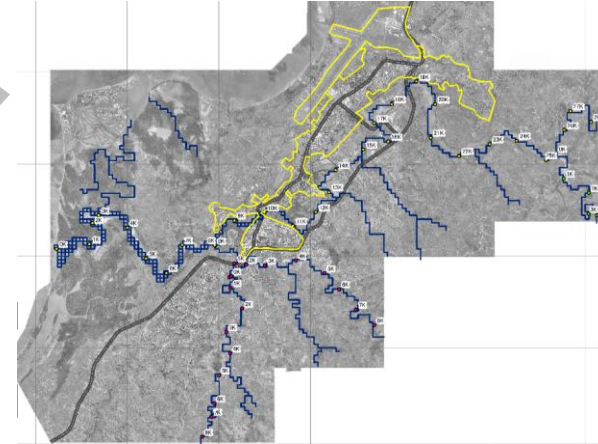
Priority Project

Master Plan

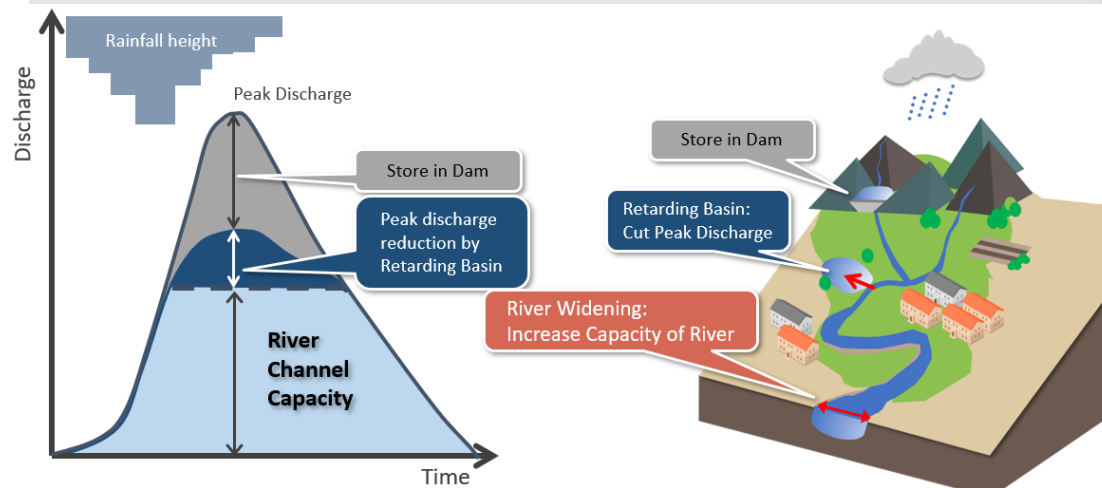
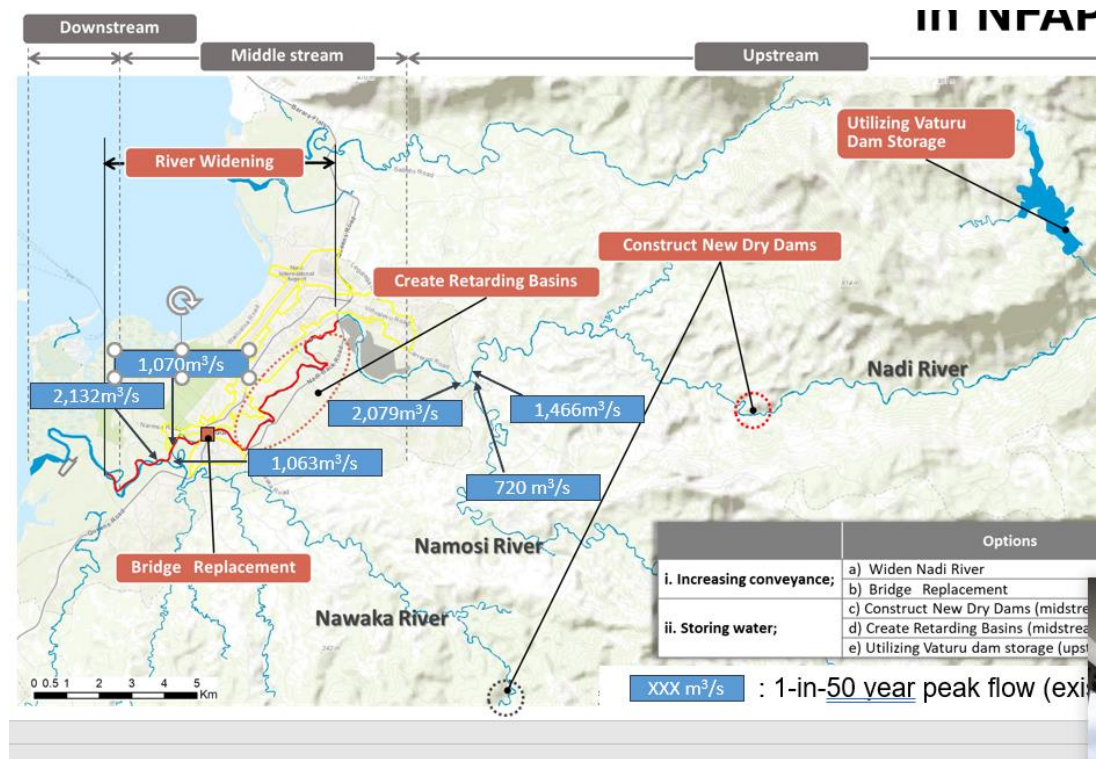
Do nothing



Important Protected Area is protected at Historical Maximum Level (2012 March.Flood, Approx.1 in 50 year return period)

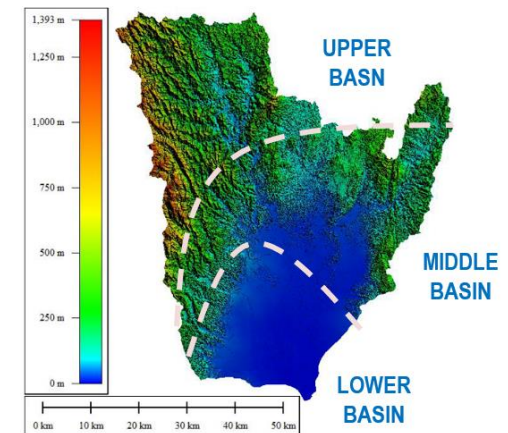
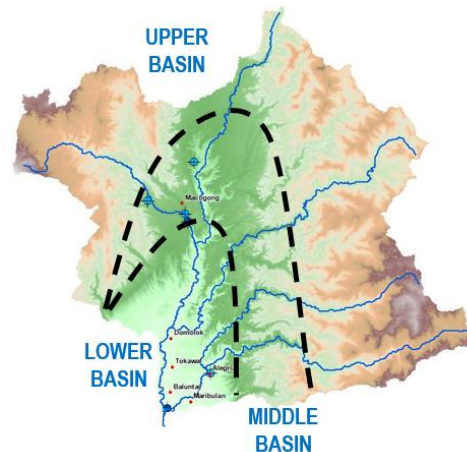
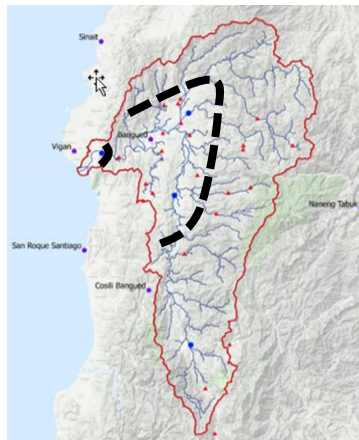


Whole river basin is protected at Historical Maximum Level (2012 March.Flood, Approx.1 in 50 year return period)



Study areas

Features	Abra	Buayan - Malungon	Tagum - Libuganon
Location	Cordillera, Luzon	South Cotabato, Mindanao	Davao el Norte, Mindanao
Population	487,651	433,353	713,169
Natural state river	Average - High	Low- Average	Low-Average
Forest area	52%	5.6%	43%



- **High-risk locations in relatively large cities** (with around 300,000 inhabitants)
- **Multiple hazards** - flooding from river and coast and by stormwater run-off

Proposed NBS interventions (specific measures)

- **Buayan-Malungon: *Room for the river***

- Creating room for the river by ***removing obstacles*** such as the Old Buayan bridge and embankments to reduce flood damages and *reduce waterborne diseases*
- ***Designing natural by-pass*** from Maribulan River to Buayan River mouth to reduce flooding and increase natural values of downstream river (e.g., *recreational wetland area, wildlife sanctuary*)
- ***Restoring mangrove forests*** to reduce impact of coastal flooding and provide *spawning ground for fish*

- **Tagum-Libuganon: *Wetlands for enhanced water retention***

- Reviving the Ising river with ***wetland areas as buffer zones*** to increase water retention and reduce flood risk
- Providing co-benefits of *water purification, sediment trapping, and recreational opportunities*

- **Abra: *Smart quarrying* strategy**

- Providing alternative to hard infrastructure by facilitating desired morphological river development through indicating smart quarrying locations
- Creating *job opportunities for local community*



Thank you very much for your attention

Any questions/issues for discussion