

# Case Study of Flood Hazard and Risk Assessment for the Bago River Basin (Myanmar)

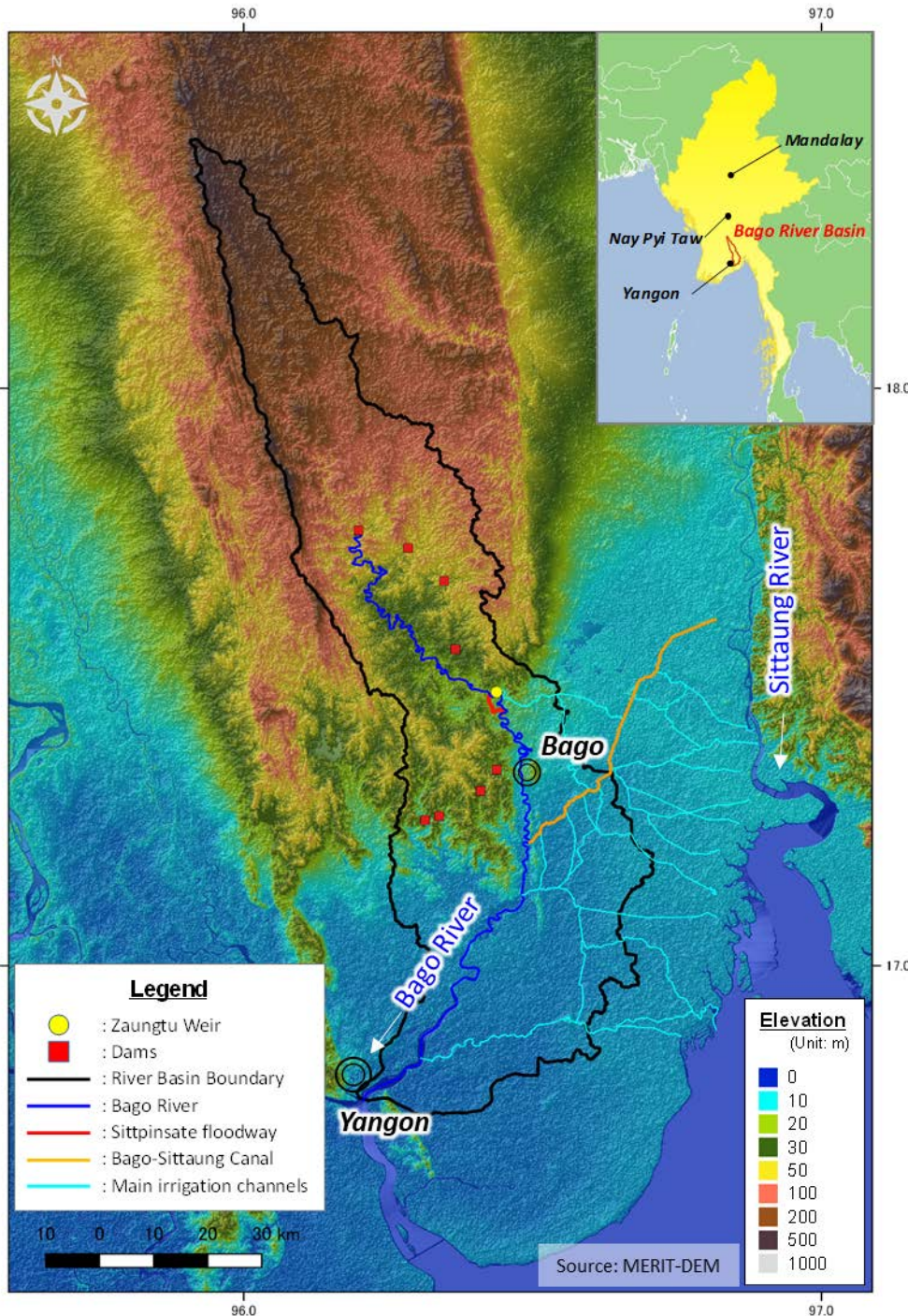


# Target River: the Bago River

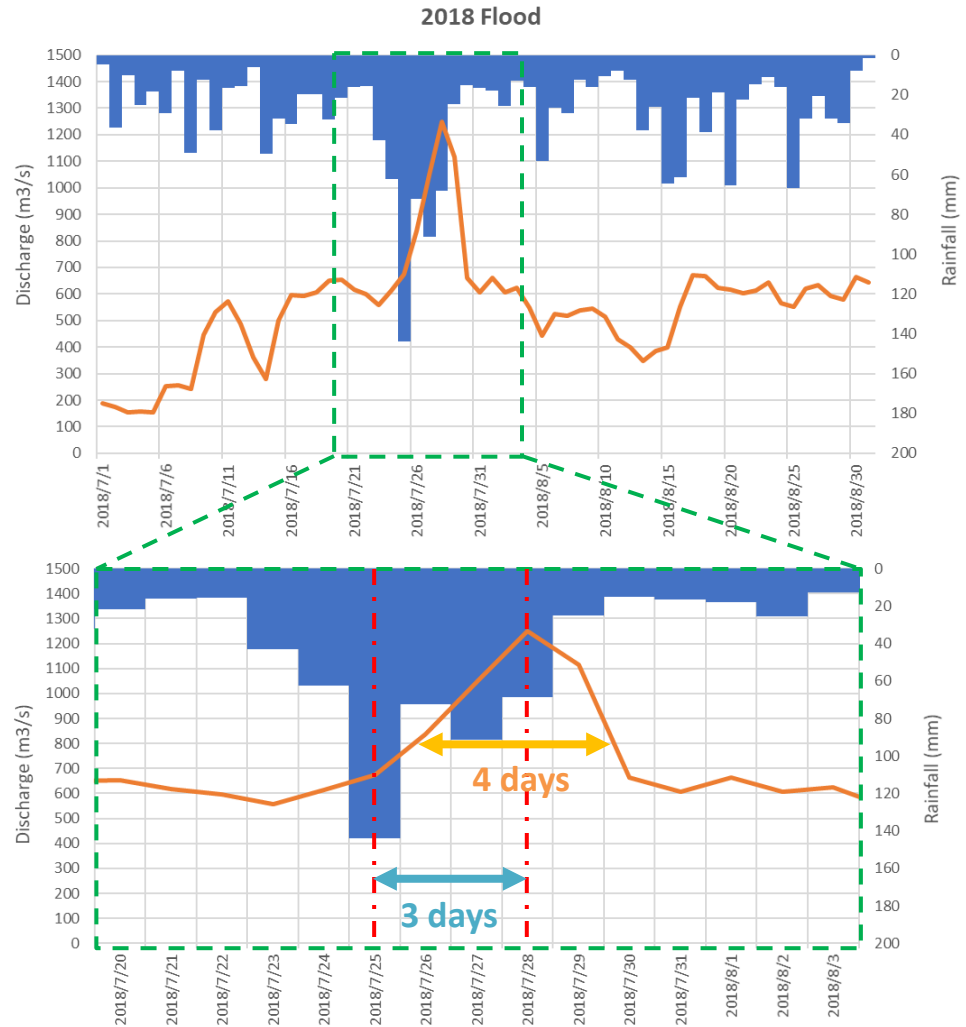
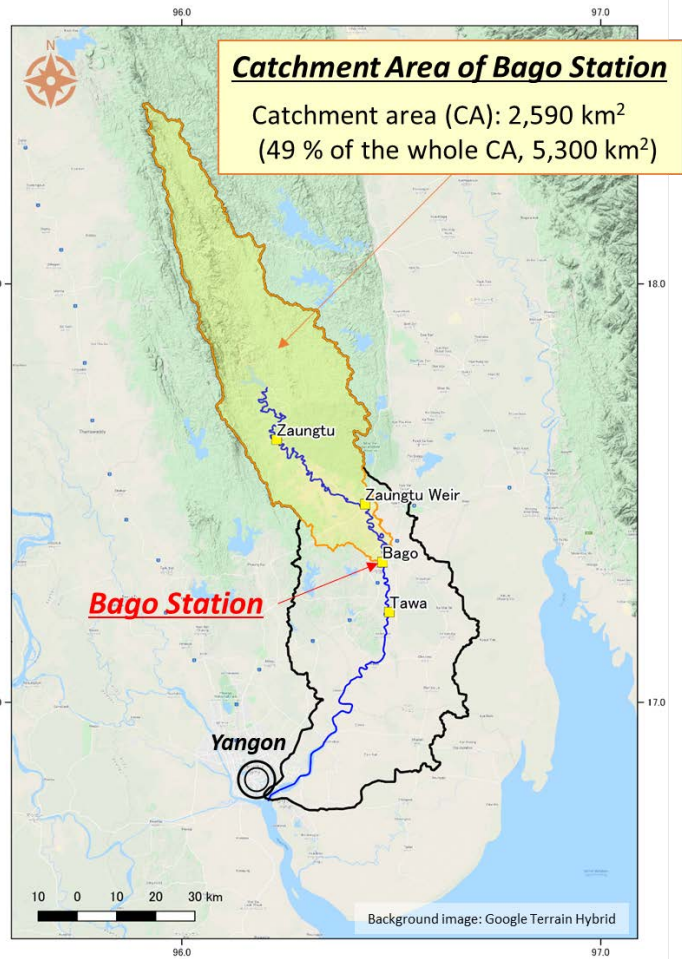
**Table. The Bago River basic information**

Main river length	About 210 km
Catchment area	About 5,300 km <sup>2</sup>
Main river structures	Dams, Dikes, Bago-Sittaung Canal, Irrigation channels

- ❑ The Bago River originates at about 800 meters in the Bago Yoma Mountain Range and flows into the Yangon River where almost equal to the sea level.
- ❑ The Bago River Basin has annual monsoon cycles which produce a dry and wet monsoon climate. Rainfall concentrates from May to October (rainy season), and the annual rainfall is about 2,500-3,500 mm.
- ❑ There are many river structures such as dams, a weir, dikes, Bago-Sittaung Canal, irrigation channels, and gates in the Bago River Basin.



# Flood Characteristics



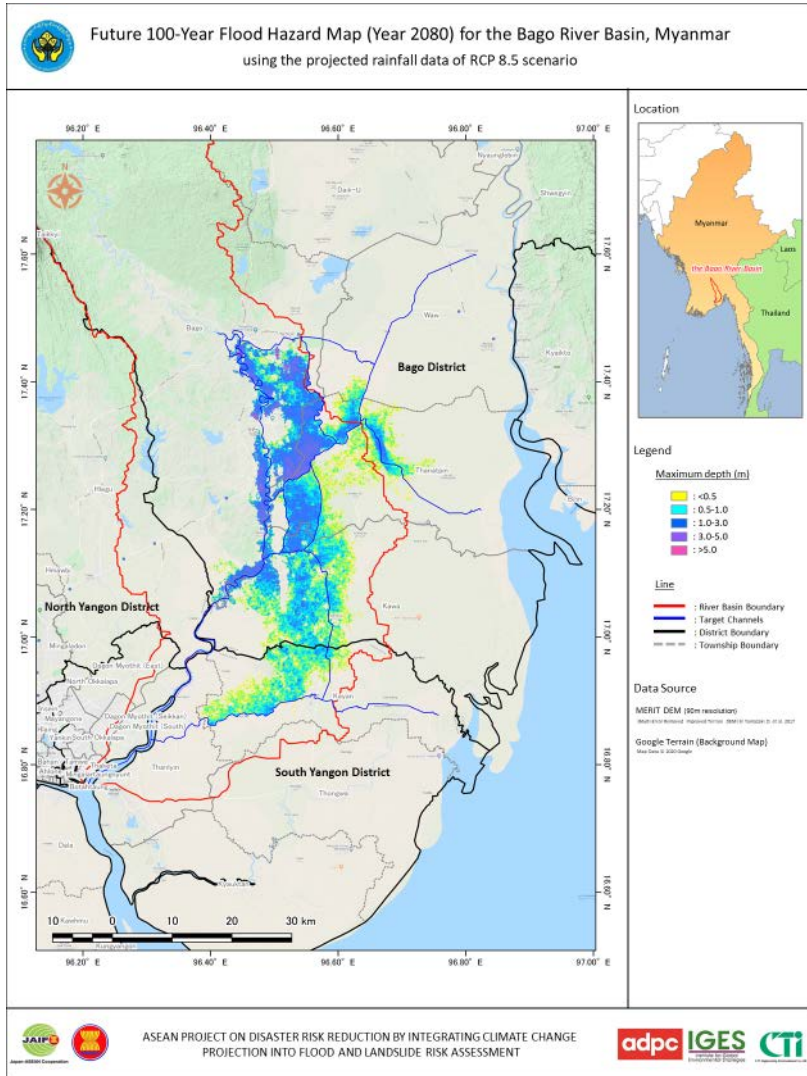
- ❑ The 2018 flood was the biggest flood in the last 30 years (1989-2018).
- ❑ It took about 3 days between the peaks of the hyetograph and the hydrograph.
- ❑ The flood duration is about 4 days.

\*Rainfall: Mean areal rainfall of the Bago Station upstream, Discharge: Observed data of Bago Station

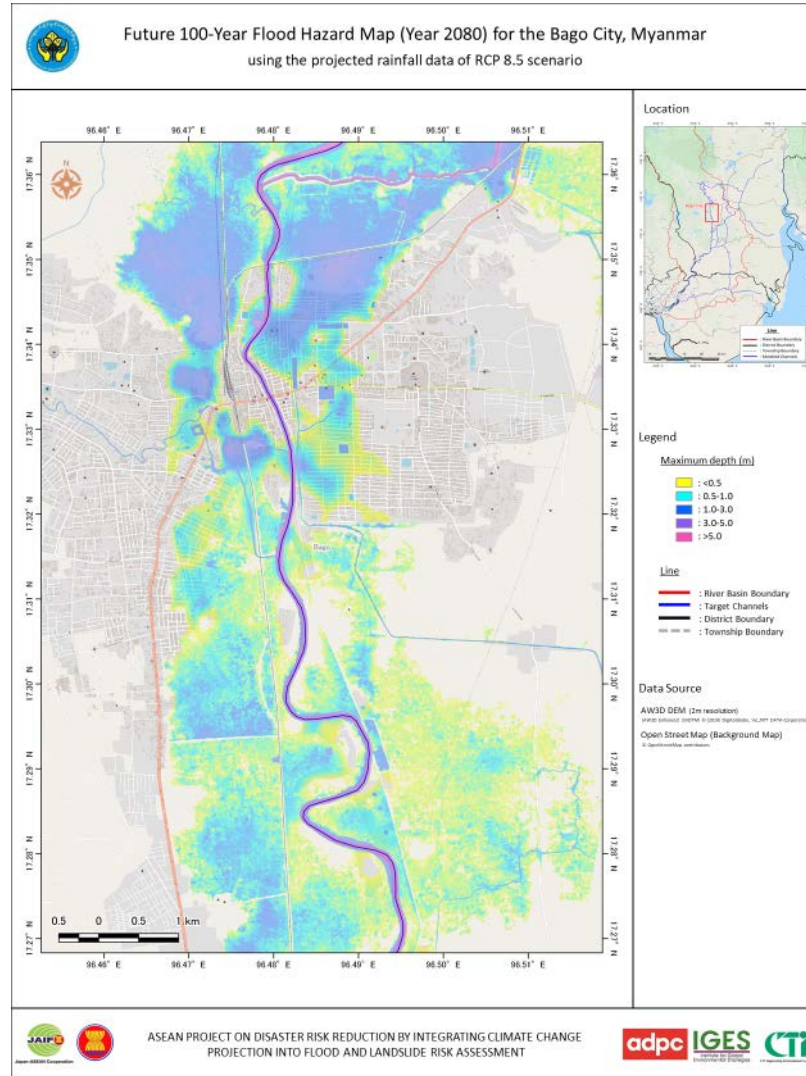
**Fig. The hyetograph & hydrograph in the 2018 flood**



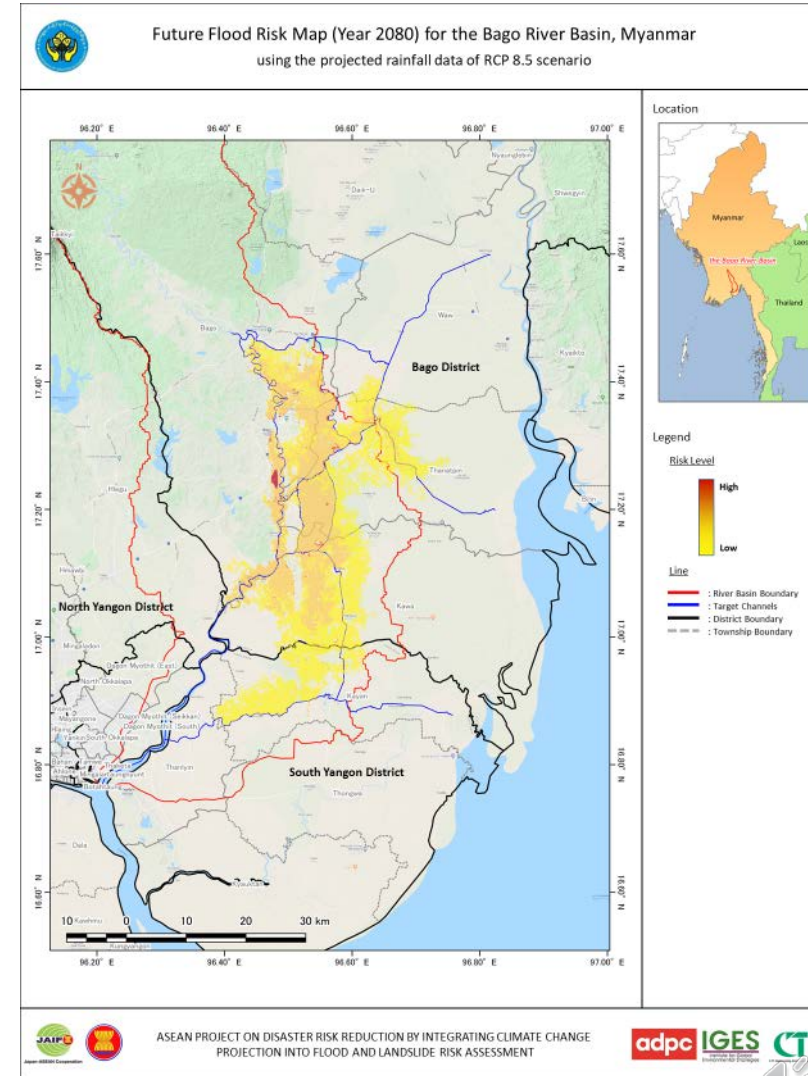
# Flood Hazard & Risk Map Examples



**HM in river basin scale**



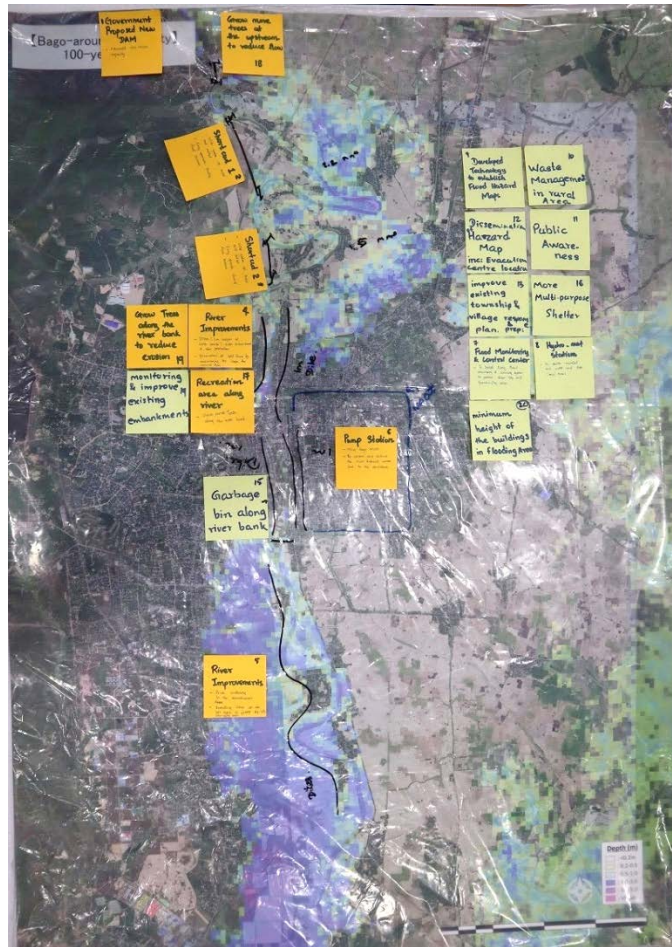
**HM in local scale (Bago City)**



**RM in river basin scale**

# Utilization of the Maps

## Discussion on conceivable counter measures and evacuation plans



# Way Forward (1/4)

## Way forward to utilize the guideline

1. To whom (related organizations) the guideline should be distributed

- DDM (Department of Disaster Management)
- GAD (General Administration Department)
- DMH (Department of Meteorology and Hydrology)
- DWIR (Directorate of Water Resources and Improvement of River Systems)
- IWUMD (Irrigation and Water Utilization Management Department)
- Village Tract GAD
- YTU, MMU, MTU, ---,
- Technicians
- NWRC (National Water Resources Committee) Advisory Group
- IGES send this to Headquarters=> Recommendations / comments
- Integration
- Consultation Workshop (National Level)



# Way Forward (2/4)

## Way forward to collaborate with related organizations

2. How you will collaborate among related organizations in terms of data collection/arrangement, vulnerability analysis, basic hydrological analysis, hydrological modeling and hazard mapping, flood risk mapping, DRRM planning based on the maps?
- a. Organize a Working group (Team)
  - b. Grass root level issues -> for short term
  - c. Long term => Model, urban planning, inundation map, Planning and implementing
  - d. Mitigation => Awareness, good drainage, Administrators, policy, Foundation, Technical team with young people
  - e. Additional comments from upper level
  - f. IGES => DDM HQ & other HQ -> request comments will be perfect guidelines
  - g. Guidelines should be sent to Bago Regional Government Disaster Committee, Committee will guide to relevant departments in the Bago region.
  - h. Method, modify as required, for long term,



# Way Forward (3/4)

To develop a workflow for creating and utilizing flood risk maps

## Data Collection and Arrangement

- Hydrological Data (DMH, IWUMD, DWIR)
- Land use data (Forest, DALMS)
- River channel data (DWIR)
- Houses and asset data (GAD, DUHD, BCDC, DRD, DRRD)
- Soil Data (DALMS)
- Damage Data (DDM)
- Population (GAD, DDM,
- Crops Data (DOA)
- Bridge data (Dept of Bridge)
- Dam data (IWUMD, HPGE)
- Satellite data (Open source)

## **Modeling and Analysis (IWUMD-DMH- DWIR-YTU-MMU)**

## Vulnerability Analysis

- House and assets ( GAD with Academic research institutions)
- Agriculture and livestock (DOA, Dept of livestock)
- others

## Utilization of Flood Risk Maps

- For hard components plan (DRRD, DOB, IWUMD, DWIR, GAD)
- For land use plan (Forest dept; BCDC)
- For evacuation mapping (GAD,)
- For early Flood Warning System (DMH, DDM, GAD, Village tract, )
- Disaster Management committee of Bago
- Fire fighting Department





## Way Forward (4/4)

### To enhance DRR-relevant organization's function for improving flood risk assessment

#### Role of DRR-relevant organizations

- DMH : Downscale modeling for Climate Change Impact for river basins
- YTU, Forest dept, IWUMD, YU : Improve/introduce remote sensing technique to update land use map
- DMH, IWUMD : Enhance hydrological monitoring station network for hourly rainfall and water level data
- BCDC, DUHD, GAD, DDM, DRRD : Establishment of GIS database for houses and buildings property and distributions
- GAD, IWUMD, DDM, DWIR, DMH, DRRD, DOB, DOA, Forest : Policy reviewing for flood DRRM in consideration of the integration
- GAD, IWUMD, DDM, DWIR, DMH, DRRD, DOB, DOA, Forest : Improvement of Planning skills for Flood DRRM in consideration of the integration



# Draft Action Plan

Activity		Short-term	Long-term
1	GIS & RS Training	✓	
2	Hydrological & Hydraulic modeling	✓	✓
3	Channel surveying, cross-sections measurement including Bench Mark construction (once in 3 years)	✓	
4	Assessment of existing crest level (ECL) of Dikes	✓	
5	Assessment of Bago river longitudinal slopes		✓
6	Sandbar removal	✓	
7	Bend cutting		✓
8	Channel stabilization		✓
9	Retention basin area demarcation		✓
10	Urban drainage system upgrading	✓	
11	Urban planning		✓
12	Construction of Sluices gates in Bago city	✓	✓
13	Awareness	✓	
14	Simulation exercises (Drilling)	✓	
15	Trainings on Disaster Management	✓	✓

**Thank you**

