



Department of Public Works and
Highways (DPWH)



Davao City Local Government Unit

Japan International Cooperation
Agency (JICA)



Davao River Flood Control Master Plan Structural and Non-Structural Mitigation Measures

JERRY A. FANO

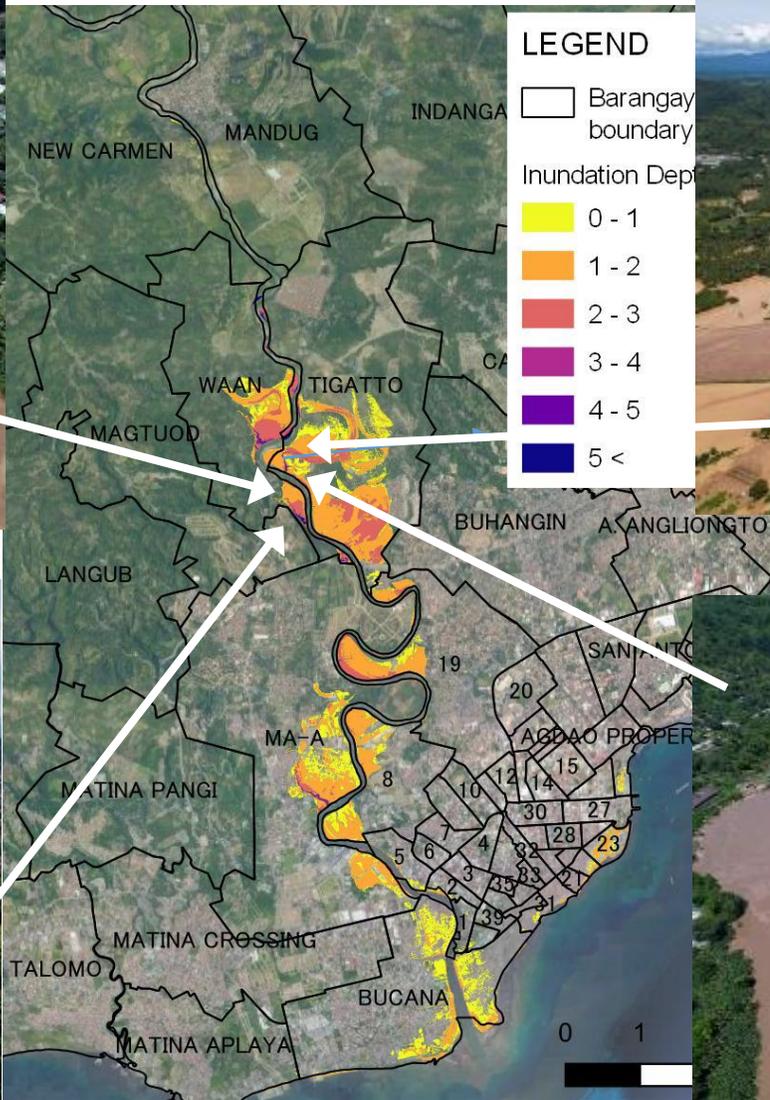
Project Manager

Flood Control Management Cluster

Department of Public Works and Highways

21 September 2022

Flood in Davao River during Nov. 9 to 10, 2021 → ≐ 5 year flood ?



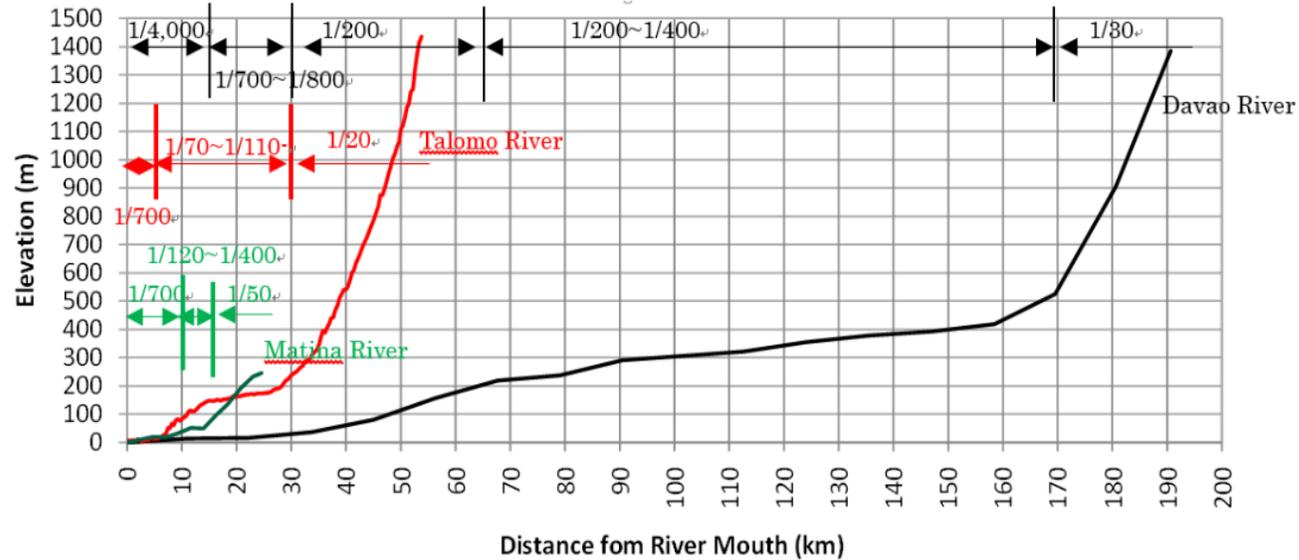
5 year flood w/o Measures

Target Area

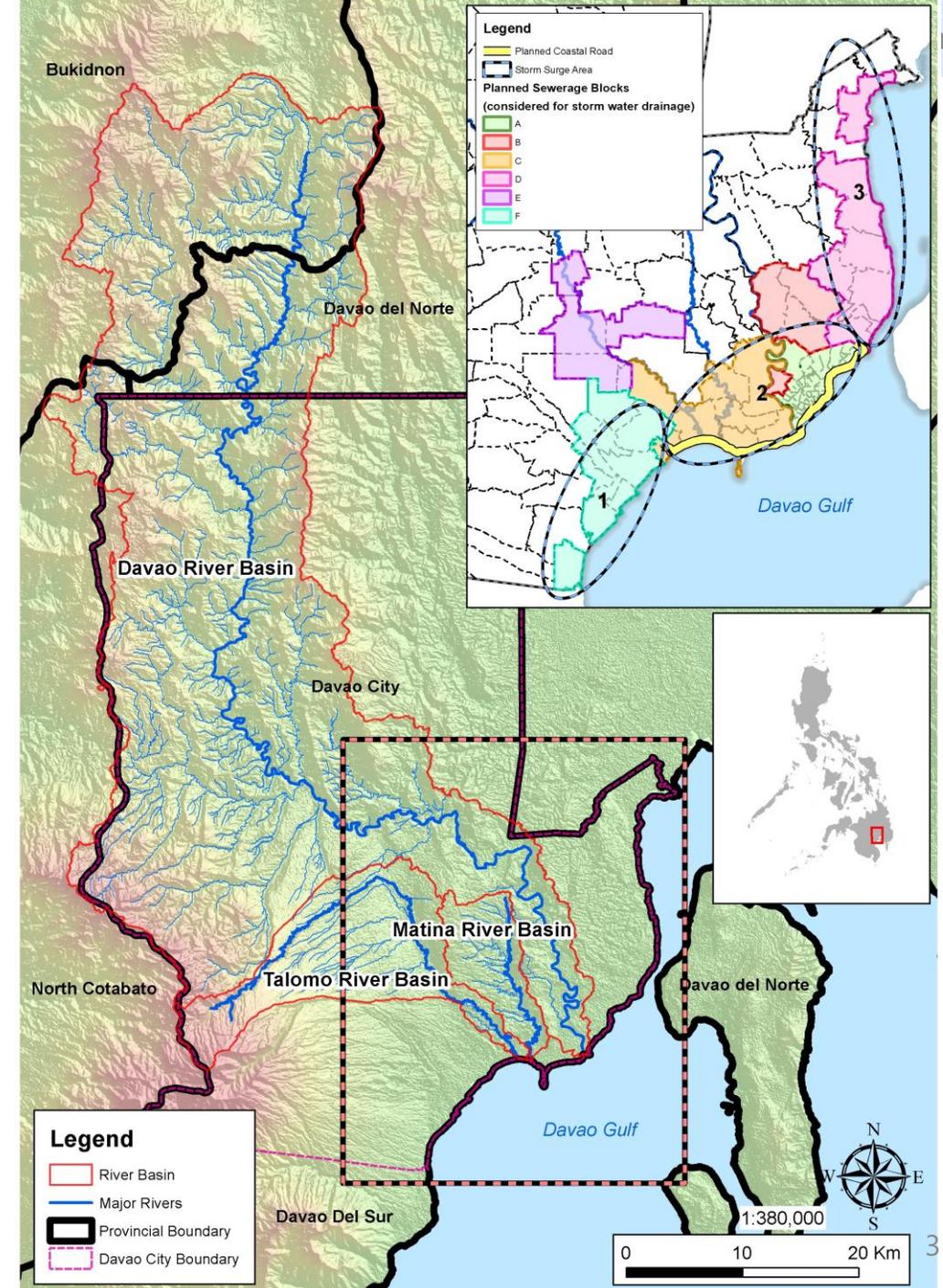
River Basin	Area (km ²)
Davao River	1,750.8
Talomo River	268.2
Matina River	71.2

Source: JICA Project Team Based on SRTM30
Calculated by GIS

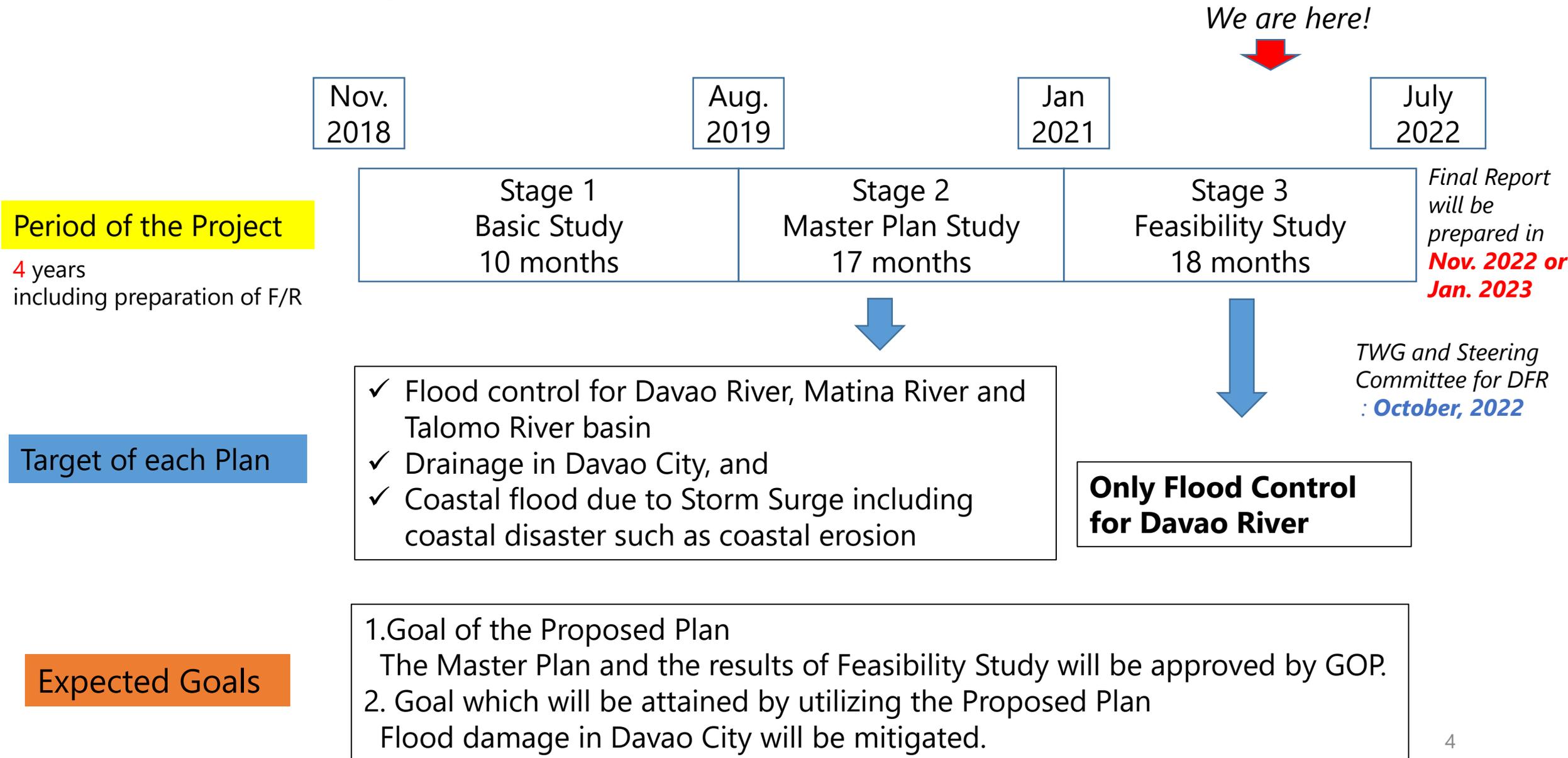
Longitudinal Profile of the Target Rivers



Source: JICA Project Team Based on SRTM30



Overall Project Schedule



Period of the Project

4 years including preparation of F/R

Target of each Plan

Expected Goals

Approach to Master Plan

◆ **Target Year for M/P** ⇒ **2045**

◆ **Climate Change Adaptation** in Planning and Design for Flood Control Structures

⇒ **“Incorporating into Present Design”**: the design of the structure is upgraded to account for climate change estimates now, **is applied**.

- **Rainfall**: the probable rainfall for annual maximum daily rainfall increases by 10% from the climate condition in 2019.
- **Mean sea level**: to be 0.2m higher than the level in 2000, and 0.1m higher than the level in 2019.

◆ **Target Design Level for M/P**

Flood Type		Design Level
Flood in 3 rivers 【Riverine flood】	Davao River	100-year flood
	Matina River	100-year flood
	Talomo River	100-year flood
Inland flood in the city 【Inland flood】		for Main Drainage Channel: 25-year flood
Coastal conservation and storm surge measures 【Coastal flood】		100 year (corresponding to “Urban Areas” of DGCS)

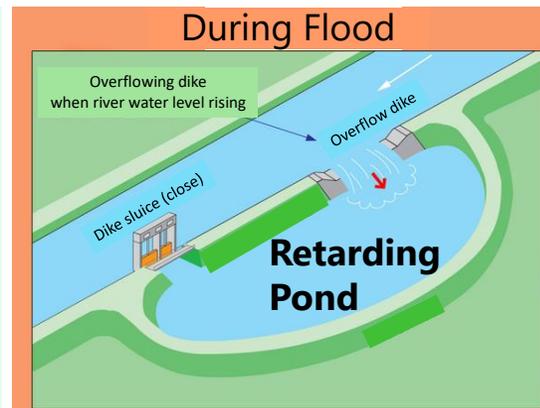
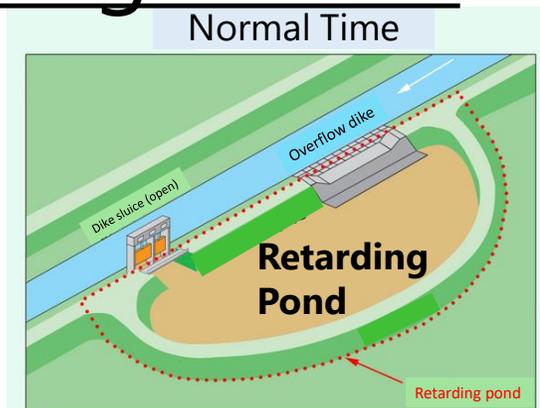
Proposed Structural Measures against Riverine Flood for the Davao River

Combination of River Widening



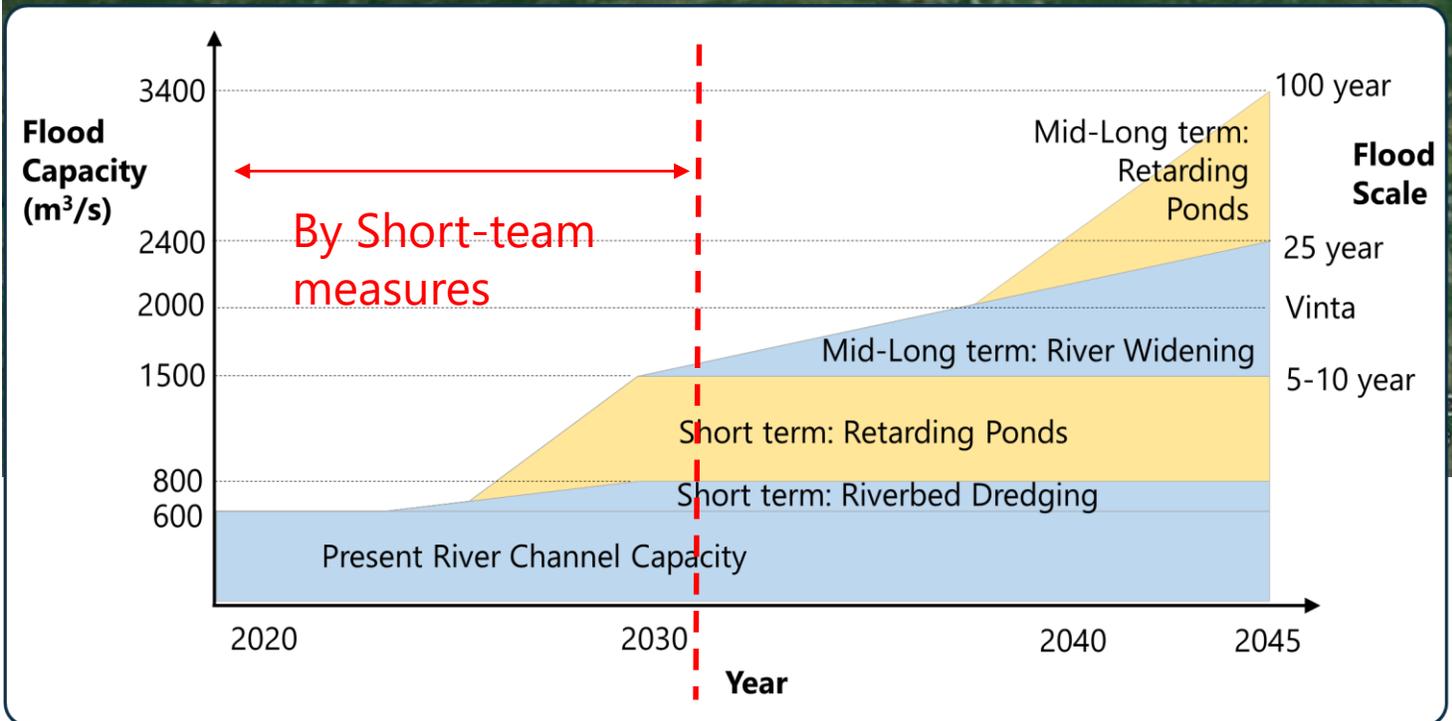
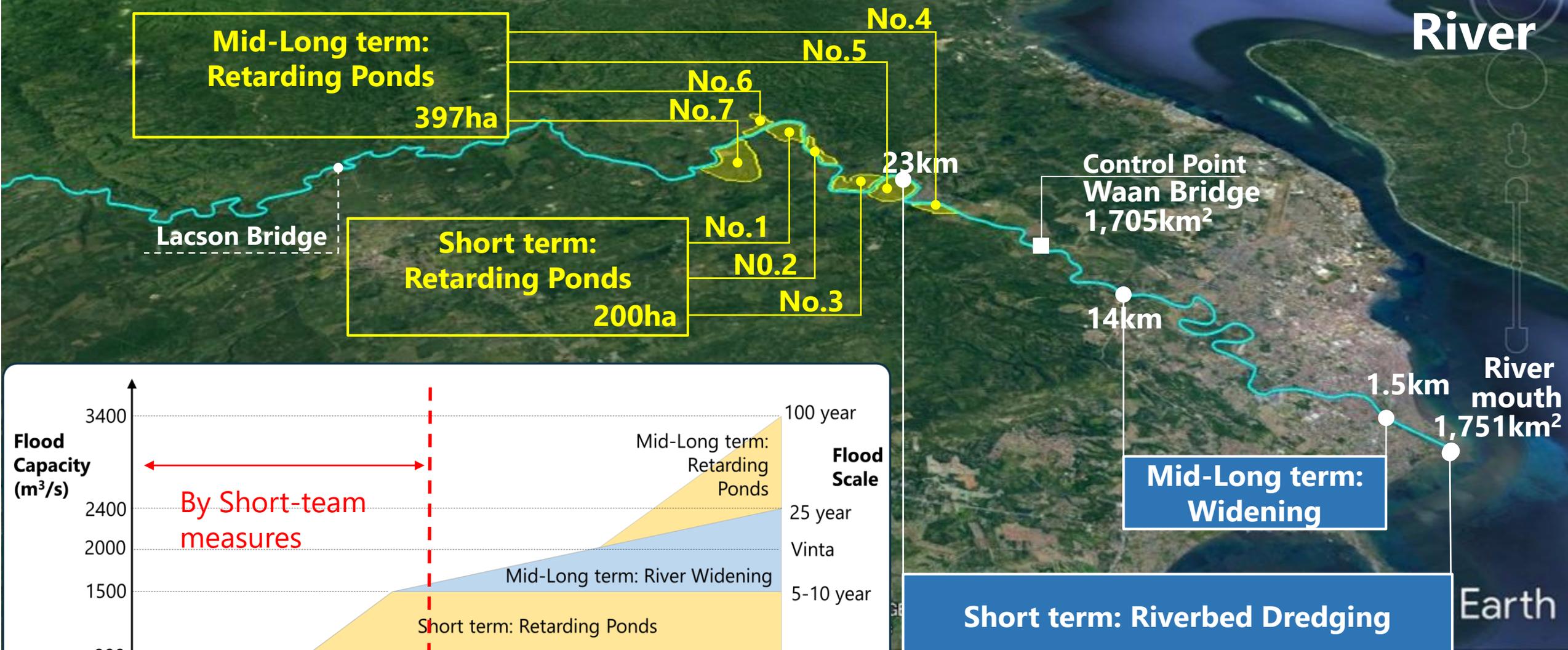
&

Retarding Ponds



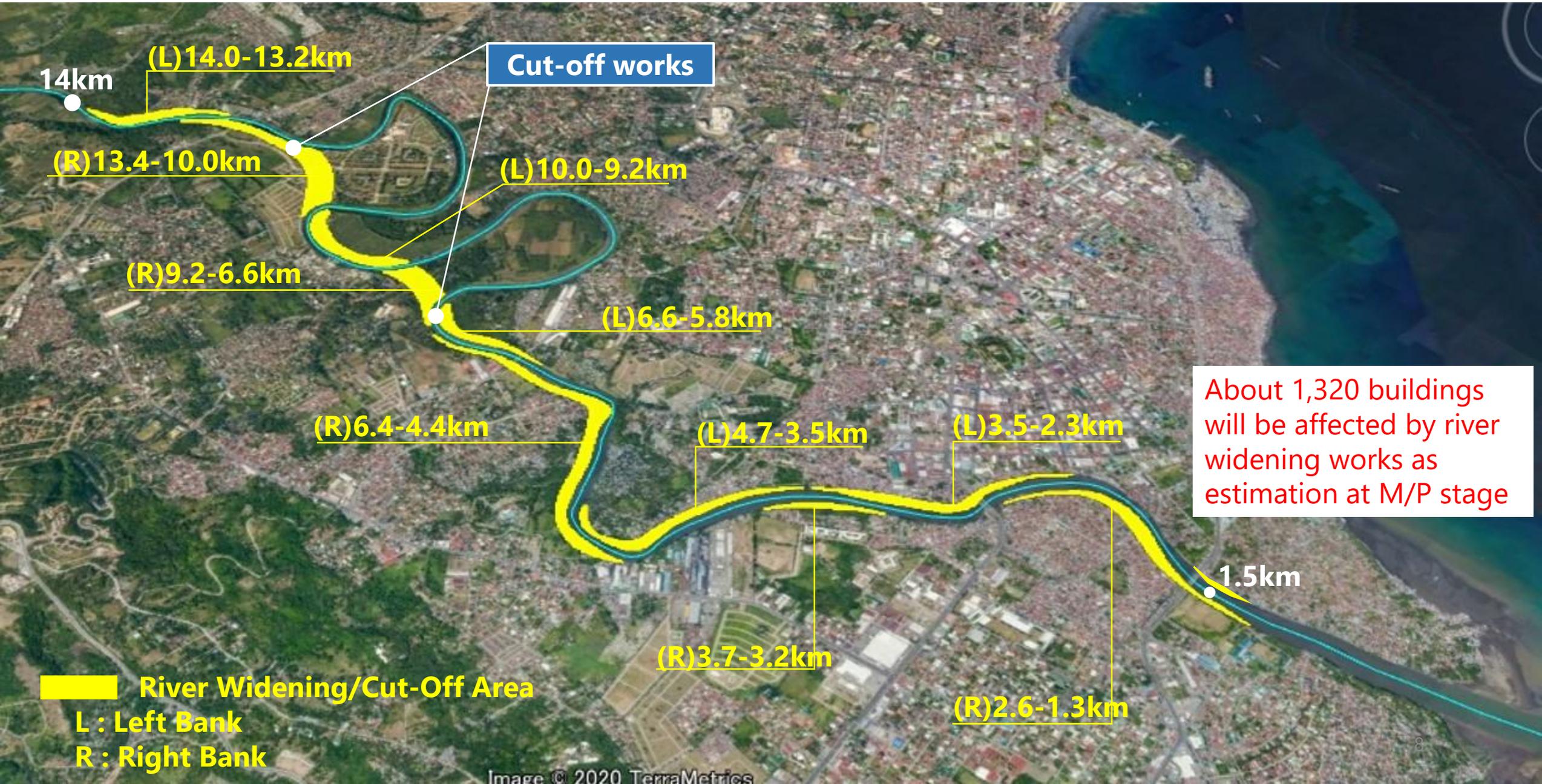
Measures	Merit	Demerit
River Widening	<ul style="list-style-type: none"> ➤ Can minimize flood risk by lowering Flood Water Level ➤ No risk of serious damage by dike collapse 	<ul style="list-style-type: none"> ➤ Resettlement of the affected people along river bank is necessary
Retarding Ponds	<ul style="list-style-type: none"> ➤ Can reduce flood volume of downstream section ➤ May utilize area for another purpose at normal time 	<ul style="list-style-type: none"> ➤ Large land acquisition is necessary in upstream rural area

Location Map of Proposed Structural Measures for the Davao River



River Widening (& cut-off) Works in the downstream of Davao River (1.5km-14km)

M/P for Davao River



Riverine Flood Control Master Plan in Davao River (Structural Measures)

	Short-Term Measures	Mid-Long Term Measures
Implementation Period (Target Year)	2023-2032 (2032)	2033-2045 (2045)
Design Level	5-10 year scale flood	100 year scale flood
Design Discharge	1,500m ³ /s	3,400m ³ /s
Target Area	From river mouth to 23km	ditto
Measures	<ul style="list-style-type: none"> • Dredging from river mouth to 23km • Cut-off works (a part of river widening works) • Installation of three retarding ponds 	<ul style="list-style-type: none"> • River widening (from Bolton bridge to 14km) • Installation of four retarding ponds
Project Cost (Financial / Economic Cost)	\$ 334 M / \$ 310 M	\$ 1.017 B / \$ 945 M (including short-term measures)
Economic Evaluation (EIRR)	16.50%	16.10% (including short-term measures)
Economic Evaluation (ENPV) (Discount rate: 10%)	\$ 197 M	\$ 244 M (including short-term measures)
Economic Evaluation (B/C) (Discount rate: 10%)	2.128	1.833 (including short-term measures)

Target Structural Measures in F/S Stage

ANAB: Assumed Number of Affected Buildings
IFB: InFormal Building

Retarding Pond
-700m³/s (Excavation volume 12.2 MCM)
(ANAB: 1 (IFB: 0%)) 200ha

RP 08 (ANAB: 0 (IFB: 0%))
RP 09 (ANAB: 0 (IFB: 0%))
RP 11 (ANAB: 1 (IFB: 0%))



Cut Off Works
(ANAB: 40-90 (IFB: --%))

23km

Control Point
Waan Bridge
1,705km²

14km



For Pre F/S
Widening
+900m³/s

4km

1.5km

1,751km²

River mouth

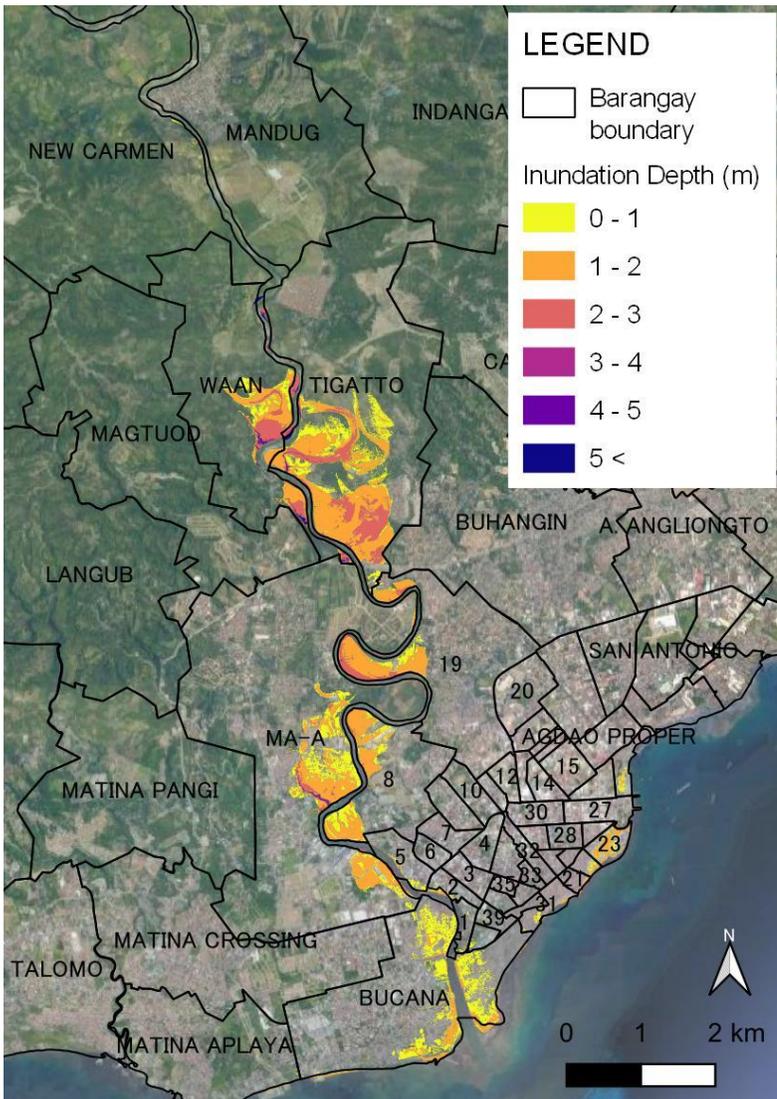
Riverbed Dredging +200m³/s
(Exca.Vol. 1.3MCM)
(→ Minimum Flood Capacity 800m³/s)
(ANAB: 0)

Impacts by Target Priority Projects for F/S

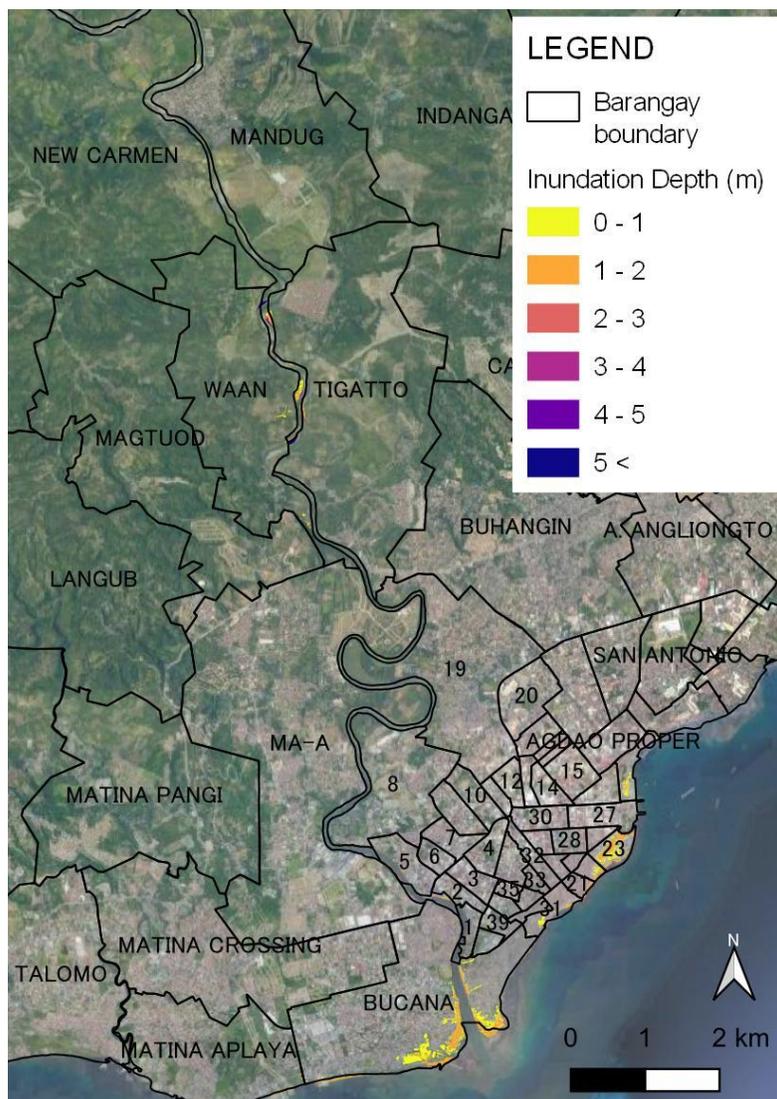
5yr Scale Flood

Impact against floods by F/S Target Structural Measures Inundation Maps with/without Target Measures for F/S

Flood Scale	Design Q (m ³ /s) With Climate Change Condition	"Reference" Q (m ³ /s) * Without Climate Change Condition
3 yr	1,100	852
5 yr	1,400	1,118
10 yr	1,850	1,492
25 yr	2,500	2,020
50 yr	3,000	2,418
100 yr	3,400	2,817



5 year without Measures

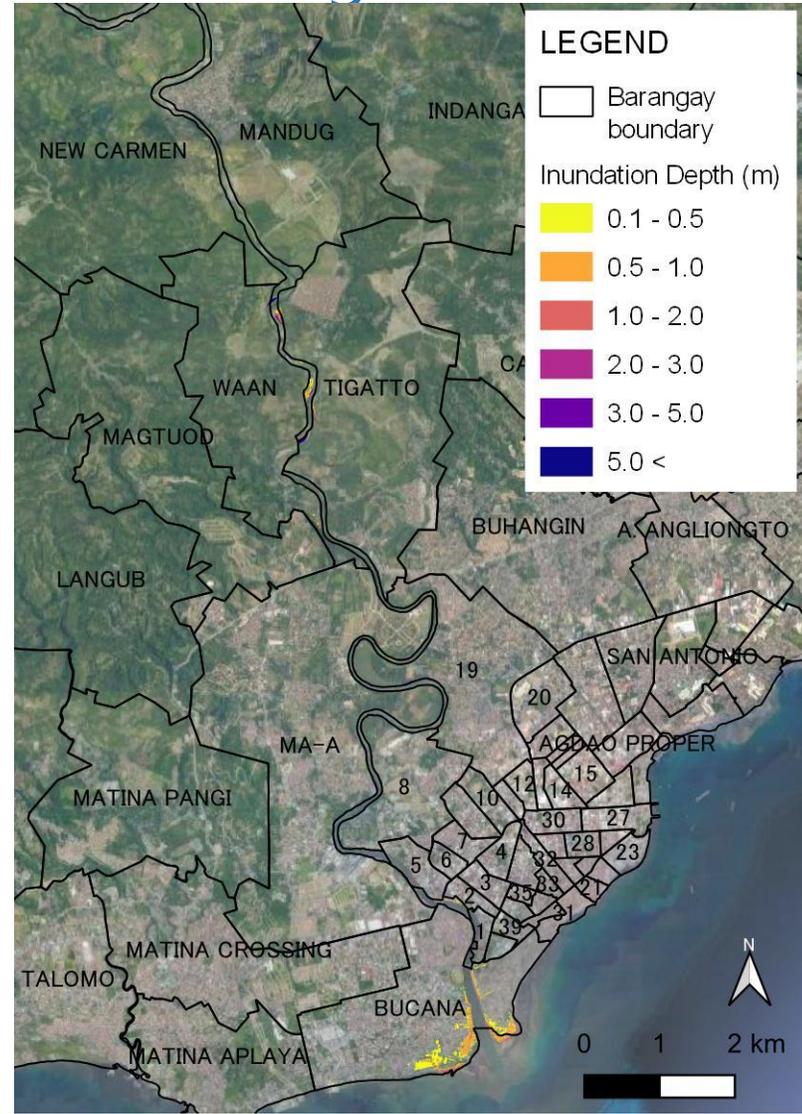
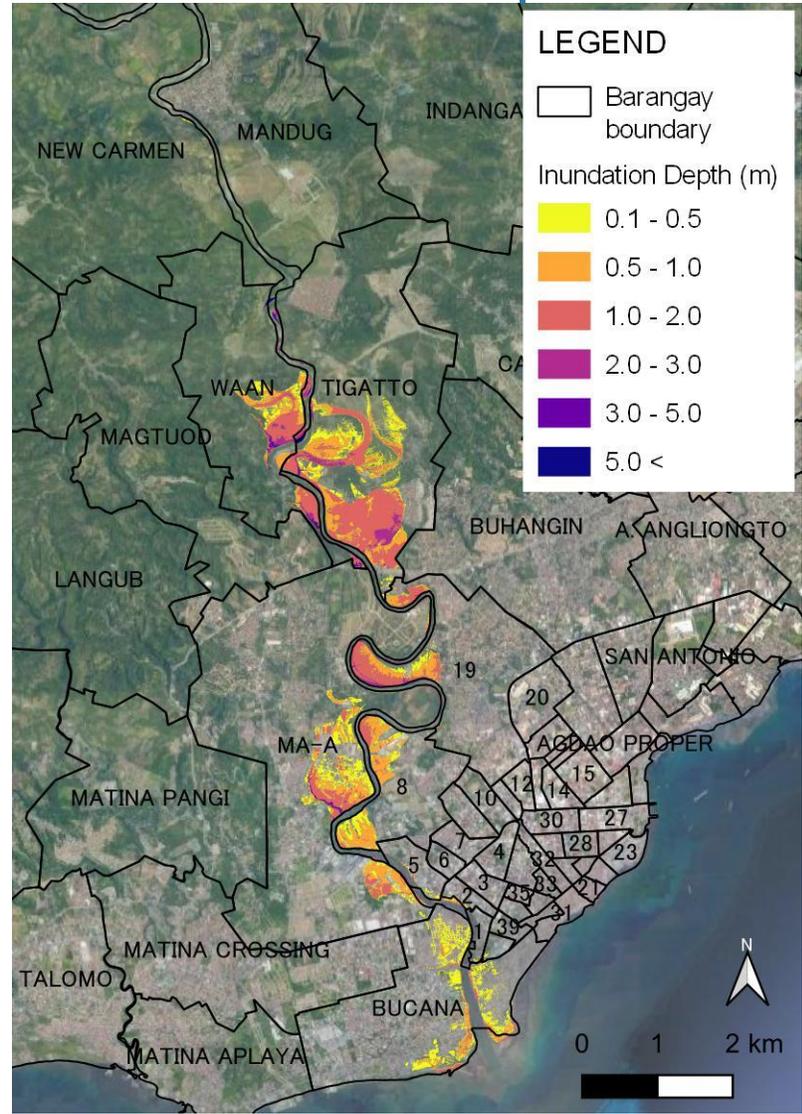


5 year with All Measures

Comparison of Impact against floods by Combination of Target Structural Measures of F/S

5yr Scale Flood

Inundation Maps with/without Target Measures



All Three measure of

- Dredging**
- Cut-off Works**
- Retarding Ponds**

Name of Barangay	Inundation Area in Present Condition (A) (ha)	Inundation Area with Projects (B) (ha)	Reduced Area of Inundation (C=A-B) (ha)
Waan	63.6	1.6	61.9
Tigatto	171.0	1.7	169.4
Maa	91.8	1.2	90.6
19	48.4	0.6	47.8
8	46.6	0.9	45.7
Bucana	53.1	22.5	30.6
Other	6.2	1.7	4.5
Total	480.6	30.2	450.4

In Present Condition

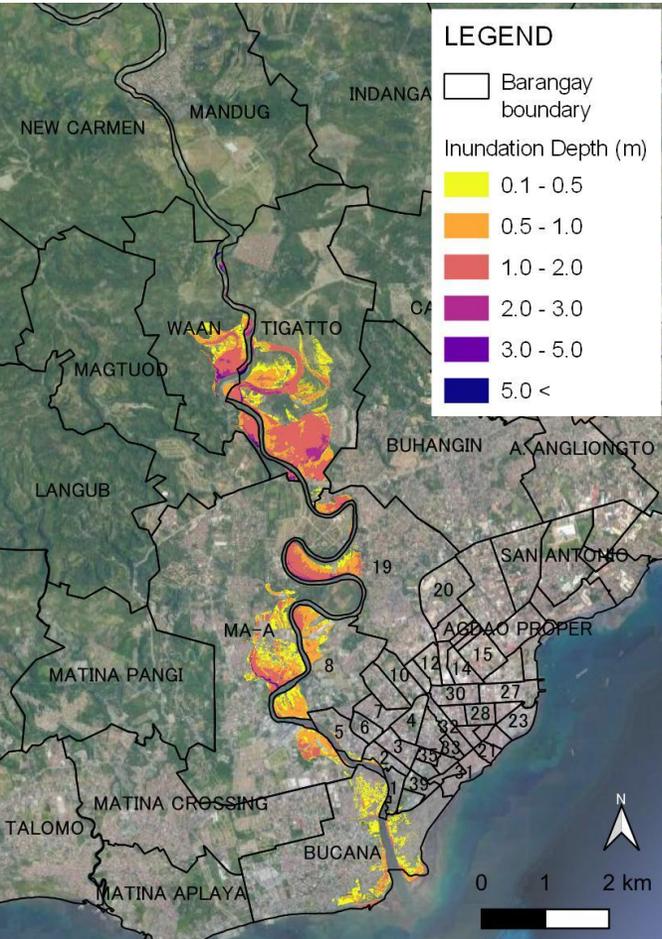
With Projects

- Inundation area is simulated inundation area with more than 0.1m inundation depth.

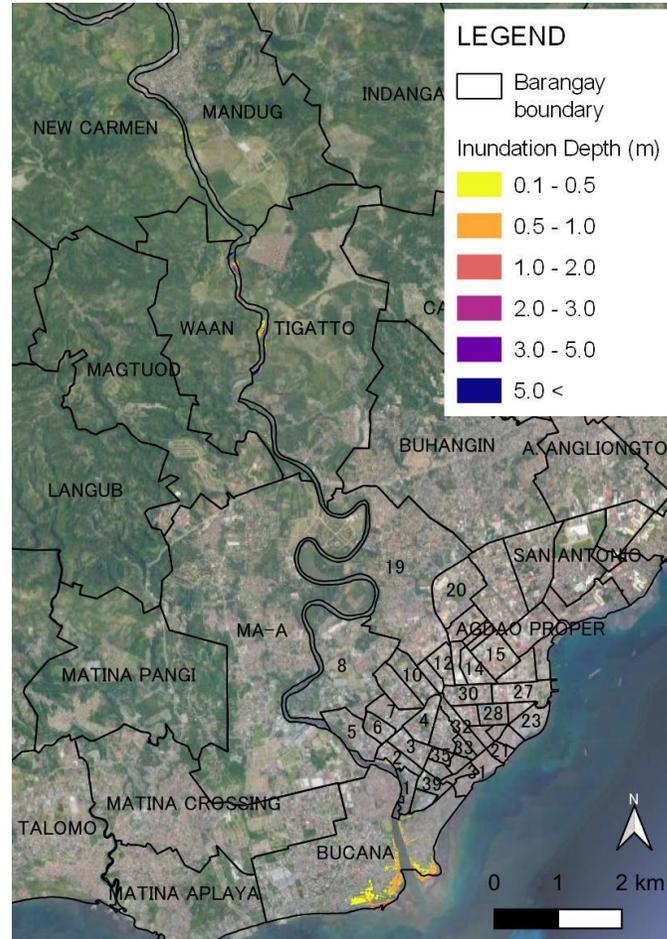
Comparison of Impact against floods by Combination of Target Structural Measures of F/S

5yr Scale Flood

Inundation Maps with/without Target Measures



In Present Condition (without Measures)



With Projects (with Target Measures)

All Three measure of
1) Dredging
2) Cut-off Works
3) Retarding Ponds

Name of Barangay	Estimated Number of Affected Buildings / People in Present Condition	Estimated Number of Affected Buildings / People with Projects	Reduced Number of Affected Buildings / People
Waan	146 / 584	2 / 8	144 / 576
Tigatto	1,771 / 7,084	1 / 4	1,770 / 7,080
Maa	2,804 / 11,216	24 / 96	2,780 / 11,120
19	445 / 1,780	2 / 8	443 / 1,772
8	1,874 / 7,496	26 / 104	1,848 / 7,392
Bucana	3,131 / 12,524	1,198 / 4,792	1,933 / 7,732
Other	672 / 2,688	140 / 560	532 / 2,128
Total	10,843 / 43,372	1,393 / 5,572	9,450 / 37,800

- Affected buildings were identified based on building data (GIS data) and simulated inundation area with more than 0.1m inundation depth.
- Number of affected people is estimated using the assumption of 4 persons in 1 building.



THANK YOU
FOR YOUR
ATTENTION