INTERNATIONAL RECOVERY PLATFORM FORUM 2022
Session 1: Assessing 6 Years of Progress and Challenges in Implementing Sendai Framework Priority 4
19 January 2022

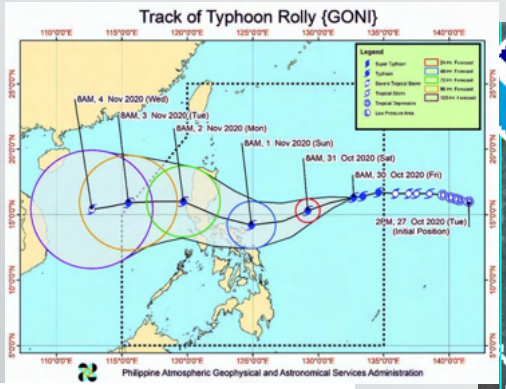
Build Back Better for Flood Disaster Mitigation

Case of Typhoon Ketsana (2009) vs Typhoon Vamco (2020) in the Philippines

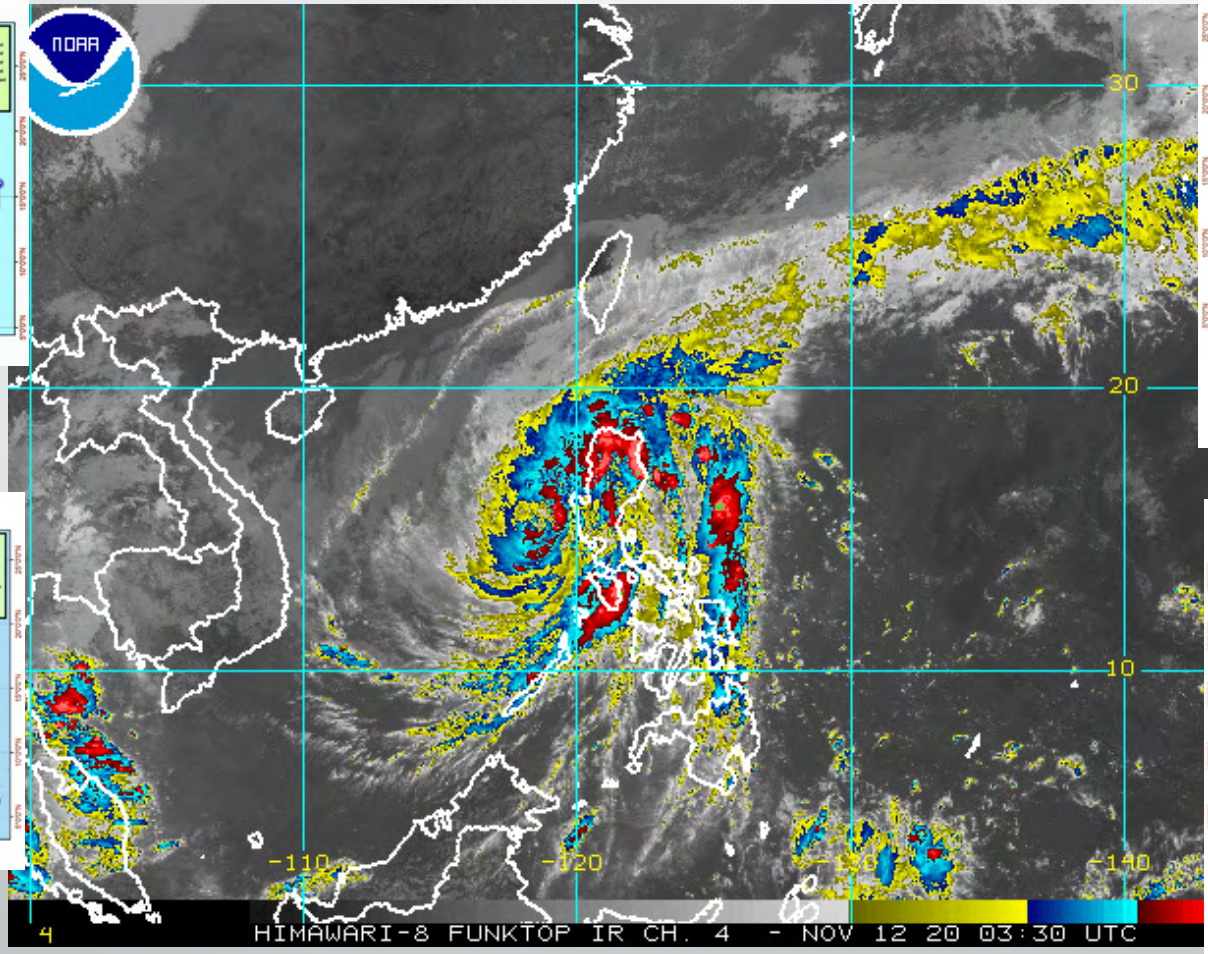
Rescuers evacuate residents from their flooded homes after Typhoon Vamco hit, in Marikina City, suburban Manila on November 12, 2020. (AFP)

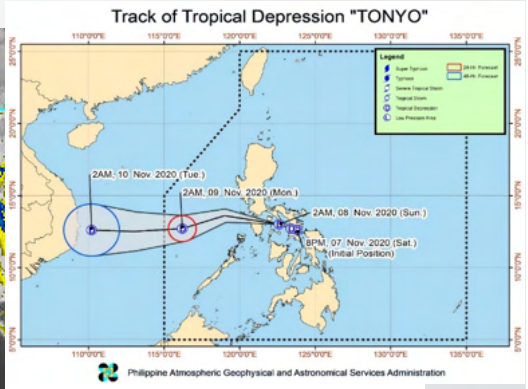
JERRY A. FANO
Project Manager, Flood Control Management Cluster
Department of Public Works and Highways - Philippines

Philippines was affected by four (4) typhoons in November 2020 that caused too much rainfall.



Typhoon Rolly
(November 1-2, 2020)

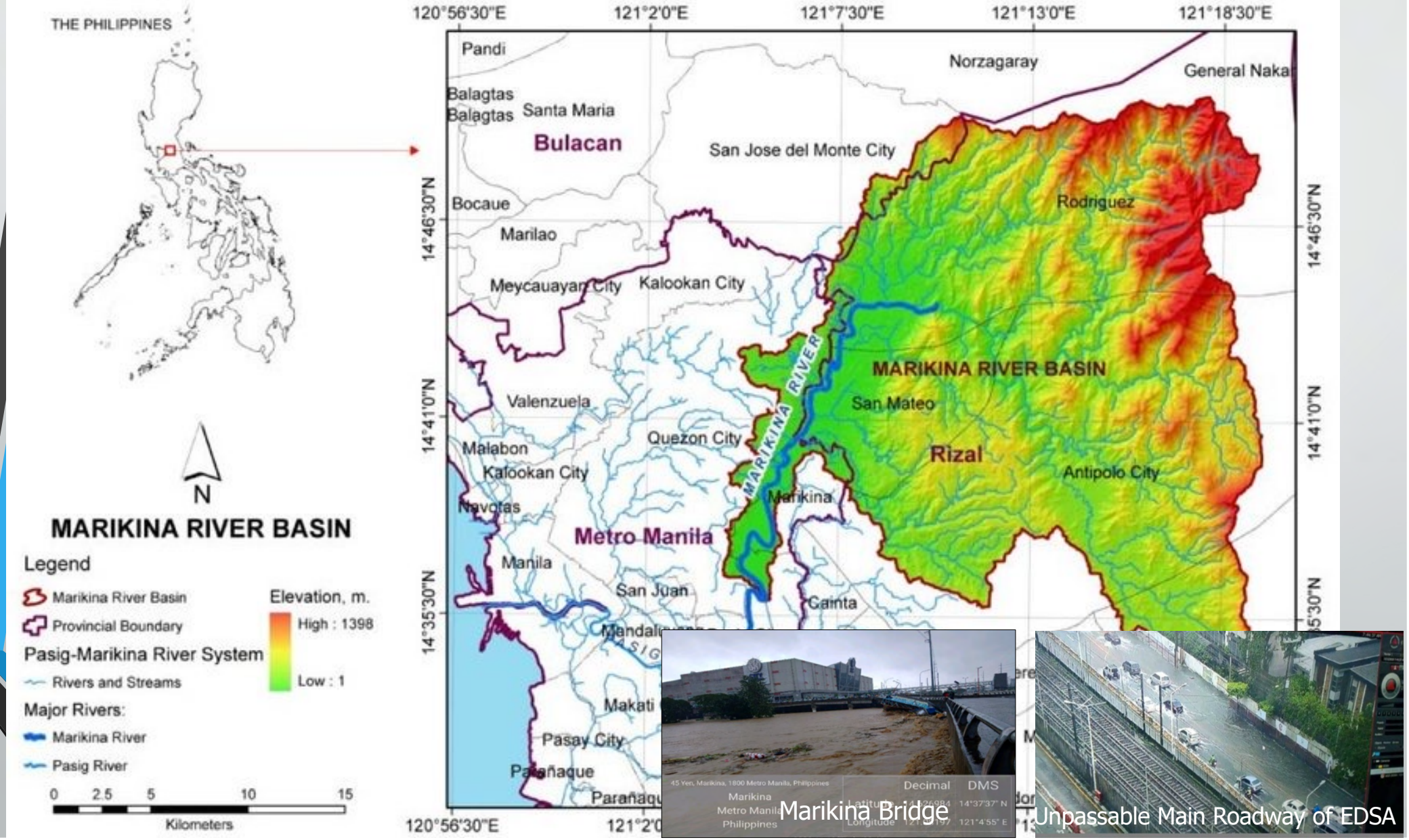




Typhoon Tonyo
(November 8-9, 2020)

Typhoon Siony
(November 4-6, 2020)

Typhoon Ulysses
(November 11-12, 2020)


THE PHILIPPINES
120°56'30"E
121°2'0"E
121°7'30"E
121°13'0"E
121°18'30"E
14°46'30"N
14°41'0"N
14°35'30"N
Pandi
Norzagaray
General Nakar
Balagtas
Balagtas
Santa Maria
Bulacan
San Jose del Monte City
Bocaue
Rodriguez
Marilao
Meycauayan City
Kalookan City
MARIKINA RIVER BASIN
MARIKINA RIVER
Valenzuela
San Mateo
Quezon City
Malabon
Rizal
Kalookan City
Antipolo City
Marikina
Navotas
Metro Manila
Manila
San Juan
Cainta
Makati
Pasay City
Parañaque
N
MARIKINA RIVER BASIN
Legend
Marikina River Basin
Provincial Boundary
Pasig-Marikina River System
Rivers and Streams
Major Rivers:
Marikina River
Pasig River
Elevation, m.
High : 1398
Low : 1
0 2.5 5 10 15
Kilometers
Marikina Bridge
Unpassable Main Roadway of EDSA

REPUBLIC OF THE PHILIPPINES

NATIONAL DISASTER RISK REDUCTION AND MANAGEMENT COUNCIL

National Disaster Risk Reduction and Management Center, Camp Aguinaldo, Quezon City, Philippines

NDRRMC UPDATE

Sitrep No. 13 re Preparedness Measures and Effects for Typhoon "ULYSSES" (I.N. VAMCO)

INCIDENTS MONITORED (TAB A)

A total of **315 incidents** were monitored in Regions I, II, III, CALABARZON, MIMAROPA, V, CAR, and NCR:

TYPE OF INCIDENT	NO. OF INCIDENTS
Flooding	196
Landslide / Soil Collapse	51
Maritime	2
Uprooted Tree / Fallen Posts	63
Storm Surge Incident	1
Collapsed Structure Incidents	2
TOTAL	315

AFFECTED POPULATION (TAB B)

A total of **995,476 families or 4,079,739 persons** in **6,644 barangays** in Regions I, II, III, CALABARZON, MIMAROPA, V, NCR, and CAR were affected. Of which, **34,232 families / 139,443 persons** are being served inside **670 evacuation centers** while **19,296 families / 83,739 persons** are being served outside evacuation centers.

Sources: DSWD DROMIC Report No. 25

CASUALTIES

A total of **73 dead, 69 injured, and 19 missing** persons were reported in Regions II, III, CALABARZON, V, CAR, and NCR.

Source: DILG MDM, OCDROs

Note: Subject for further validation and verification.

DAMAGE

1. **Damage to Agriculture (TAB E)**

An estimated **₱4,213,681,074.00** worth of damage to agriculture was incurred in Regions I, II, III, CALABARZON, V, CAR and NCR.

Source: DA

REGION	AMOUNT (₱)
GRAND TOTAL	4,213,681,074.00
CAR	336,095,881.00
I	183,664,322.00
II	1,129,653,867.00
III	1,377,811,376.00
CALABARZON	668,653,185.00
V	168,502,913.00
NCR	349,299,530.00

Note: Figures are still subject to change due to ongoing assessment and validation

2. **Damage to Infrastructure (TAB F)**

An estimated **₱8,691,252,576.28** worth of damage to infrastructure was incurred in Region I, II, III, CALABARZON, MIMAROPA, V, CAR and NCR:

REGION	AMOUNT (₱)
GRAND TOTAL	8,691,252,576.28
I	443,095,000.00
II	4,952,417,825.00
III	964,589,751.30
CALABARZON	294,000,000.00
MIMAROPA	62,800,000.00
V	1,850,205,000.00
CAR	107,050,000.00
NCR	17,000,000.00

Source: OCDROs

Note: Figures are still subject to change due to ongoing assessment and validation

3. **Damaged Houses (TAB G)**

A total of **98,285 houses were damaged (10,524-totally / 87,761-partially)** in Regions I, II, III, CALABARZON, V, and CAR.

Source: DSWD DROMIC Report No. 24

https://ndrrmc.gov.ph/attachments/article/4138/SitRep_no_13_re_TY_ULYSSES_as_of_23NOV2020.pdf.pdf

FACTS AND FINDINGS

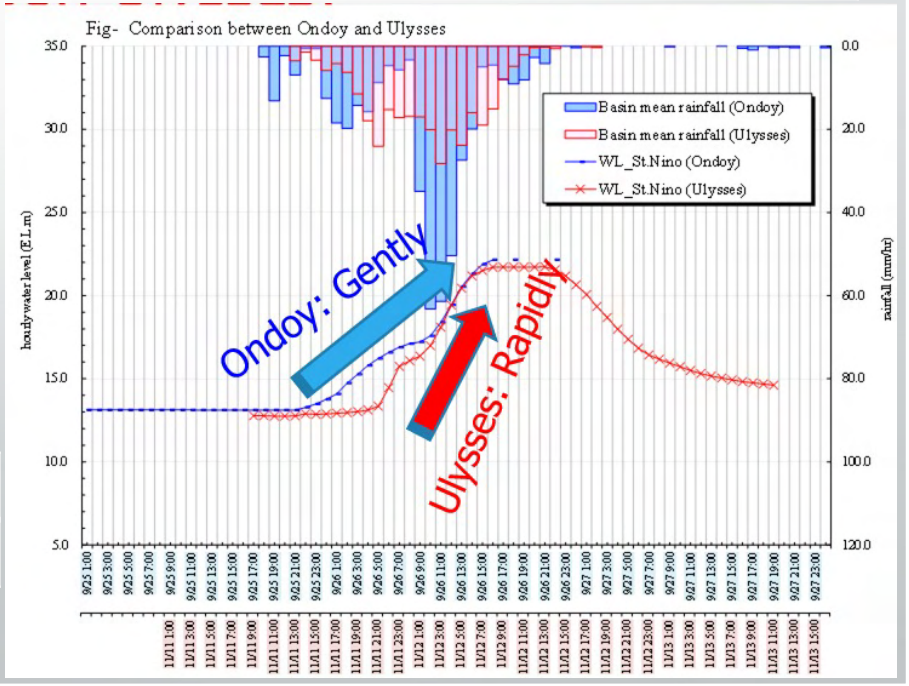
- Facts
  - ✓ Water Level and Rainfall in the Pasig-Marikina Basin
  - ✓ Peak Discharges and Design Discharge at Sto. Nino Gauging Station
- Findings and Way Forward
  - ✓ Why did the water level increase rapidly even though Typhoon Ulysses dumped smaller amount of rainfall compared to Typhoon Ketsana in 200
  - ✓ Why heavy flood didn't occur in the downstream areas of Pasig Marikina River basin and around the Laguna Lake?

Why the water level rapidly increased in Typhoon Ulysses?

✓Rainfall in the Pasig-Marikina River Basin

Item	Ondoy	Ulysses
Period of Record	September 26 – 27, 2009 (8AM-8AM)	November 11 – 12, 2020 (8AM-8AM)
Basin Mean Rainfall	299.3mm/day	287.1mm/day
Period of Record	September 25 – 26, 2009 (8PM-8PM)	November11–12, 2020 (12PM-12PM)
Basin Mean Rainfall	406.3mm/24hours	302.2mm/24hours

- In the upstream area at Mt. Oro Station (Rodriguez, Rizal), PAGASA recorded heavy rainfall of 374 mm in just 15 hours. The basin average rainfall is 287 mm, meaning a large volume of rainfall was received by the river basin especially from the upstream .



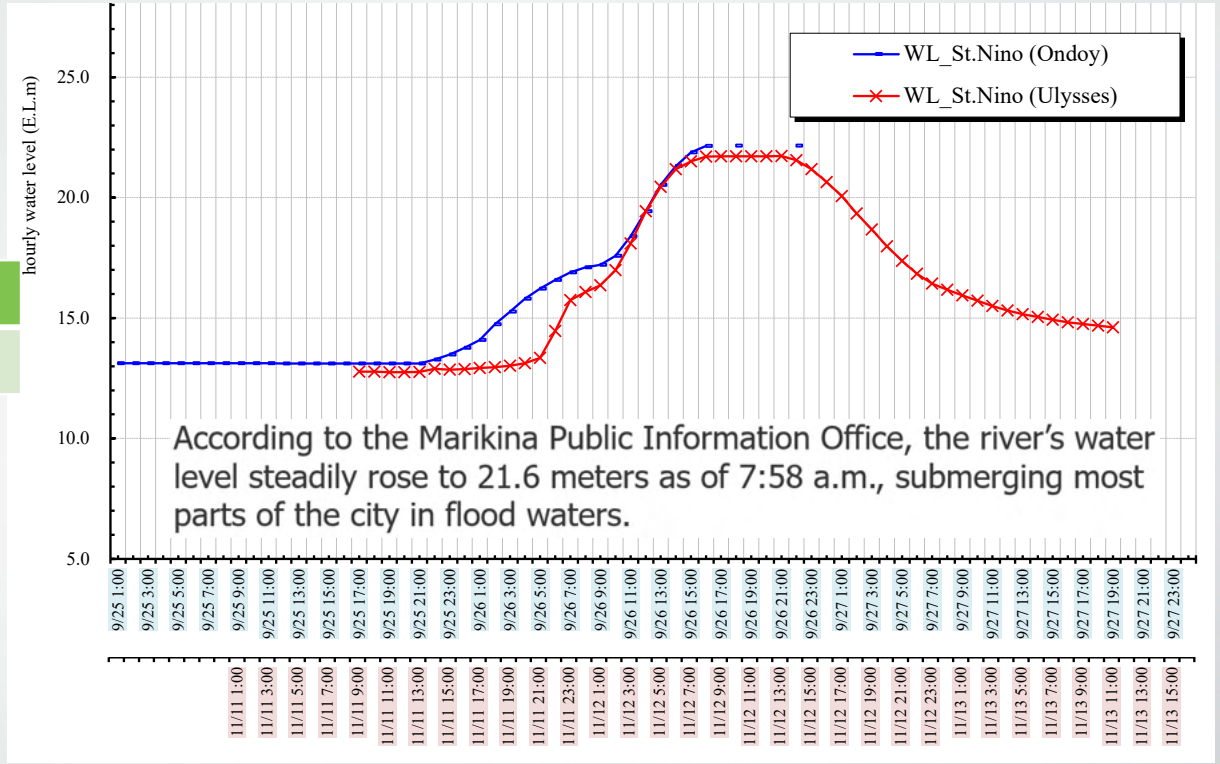
✓Peak Discharges and Design Discharge

Item	Ondoy	Ulysses	PMRCIP 4
Peak Discharge	3,480m3/s	3,255m3/s	2,900m3/s

- Fact

✓Water Level at Sto. Nino

Item	Ondoy	Ulysses
Max. Water Level	EL+22.16m	EL+21.73m

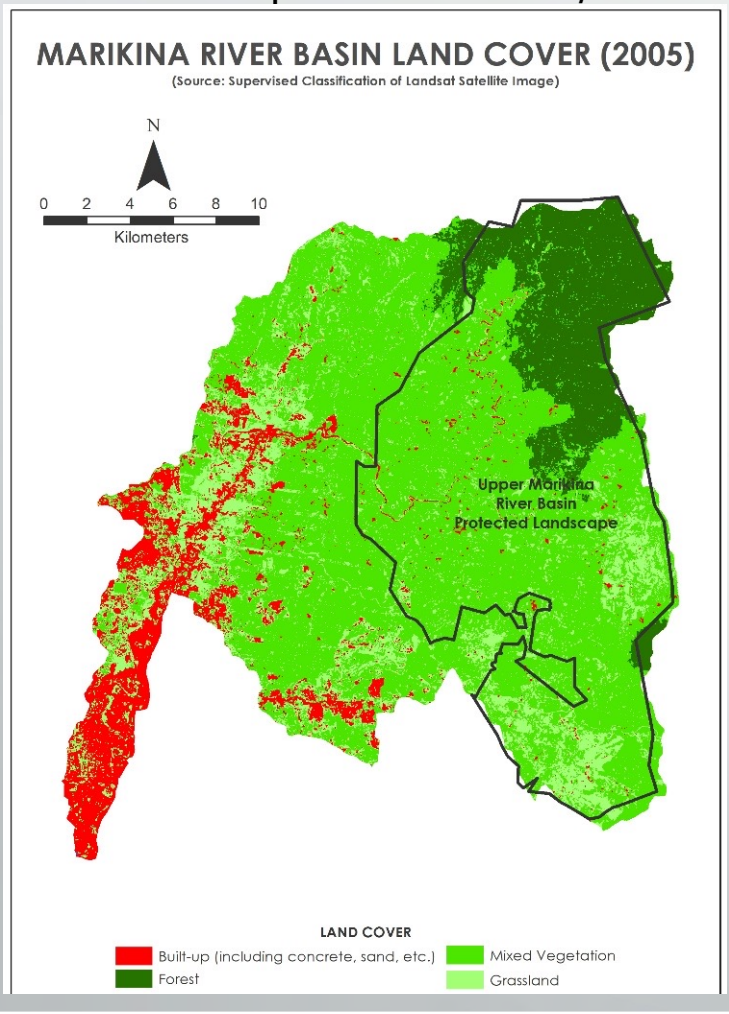


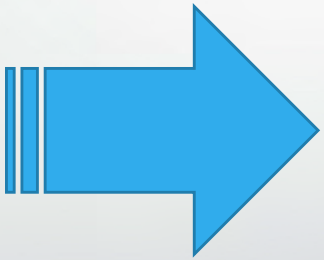
✓Why heavy flood didn't occur around the Laguna Lake?

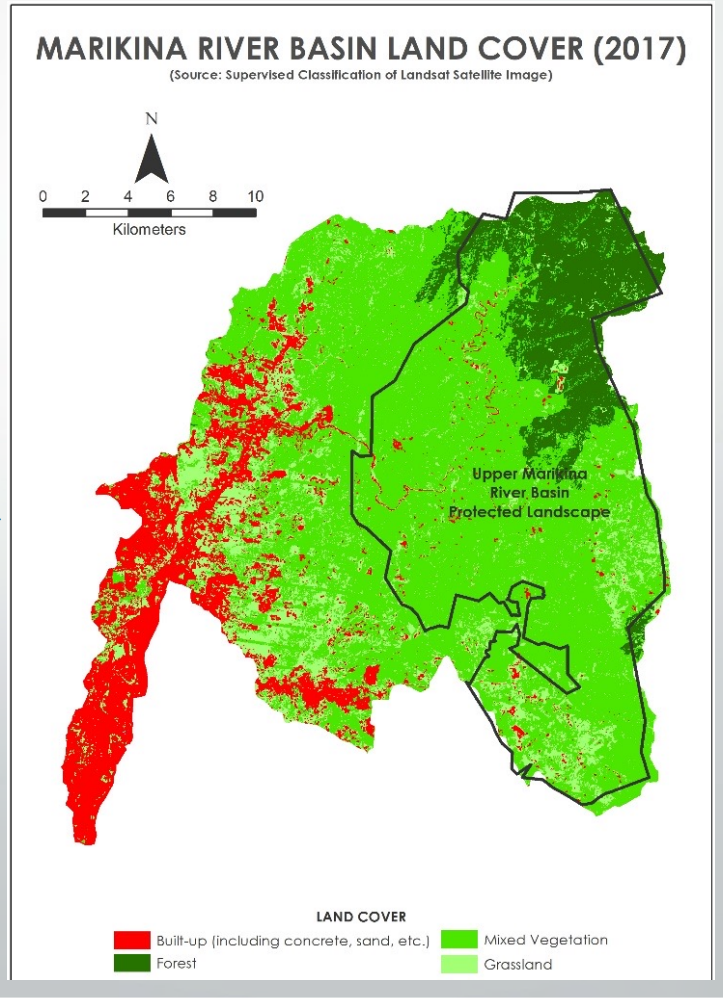
- Reason-1: The water level in Laguna Lake was **low** during that time

Item	Ondoy	Ulysses
Initial W/L of Laguna	September 25 (5PM): EL+12.77m	November 11 (10AM): EL+12.25m
After Typhoon Event	September 27 (6PM): EL+13.84m	November 12 (11AM): EL+13.13m

- Findings and Ways Forward
  - ✓Rapid Urbanization in the Watershed of Pasig Marikina River Basin
    - ➢ Reason: Rapid Urbanization / Built Up Areas

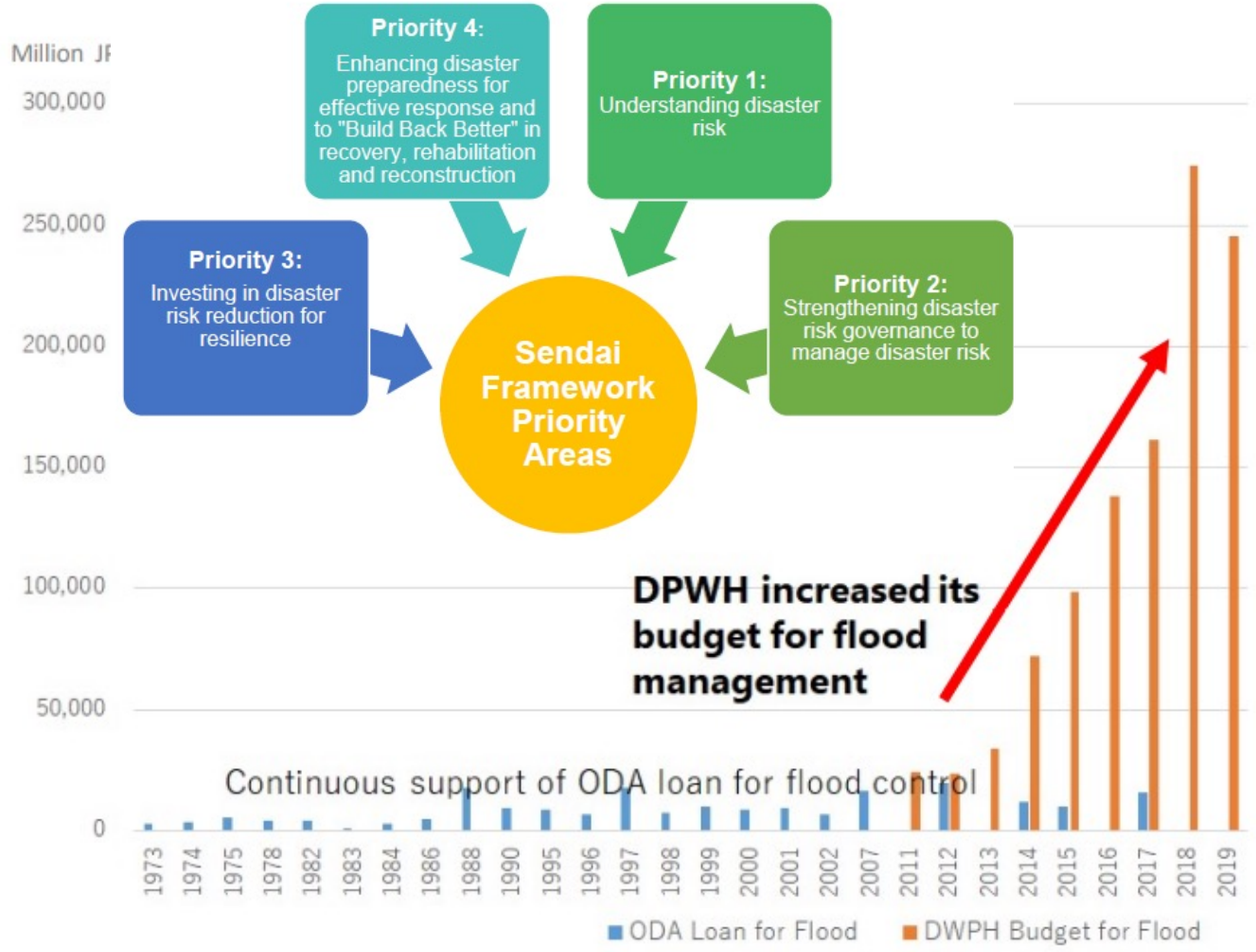




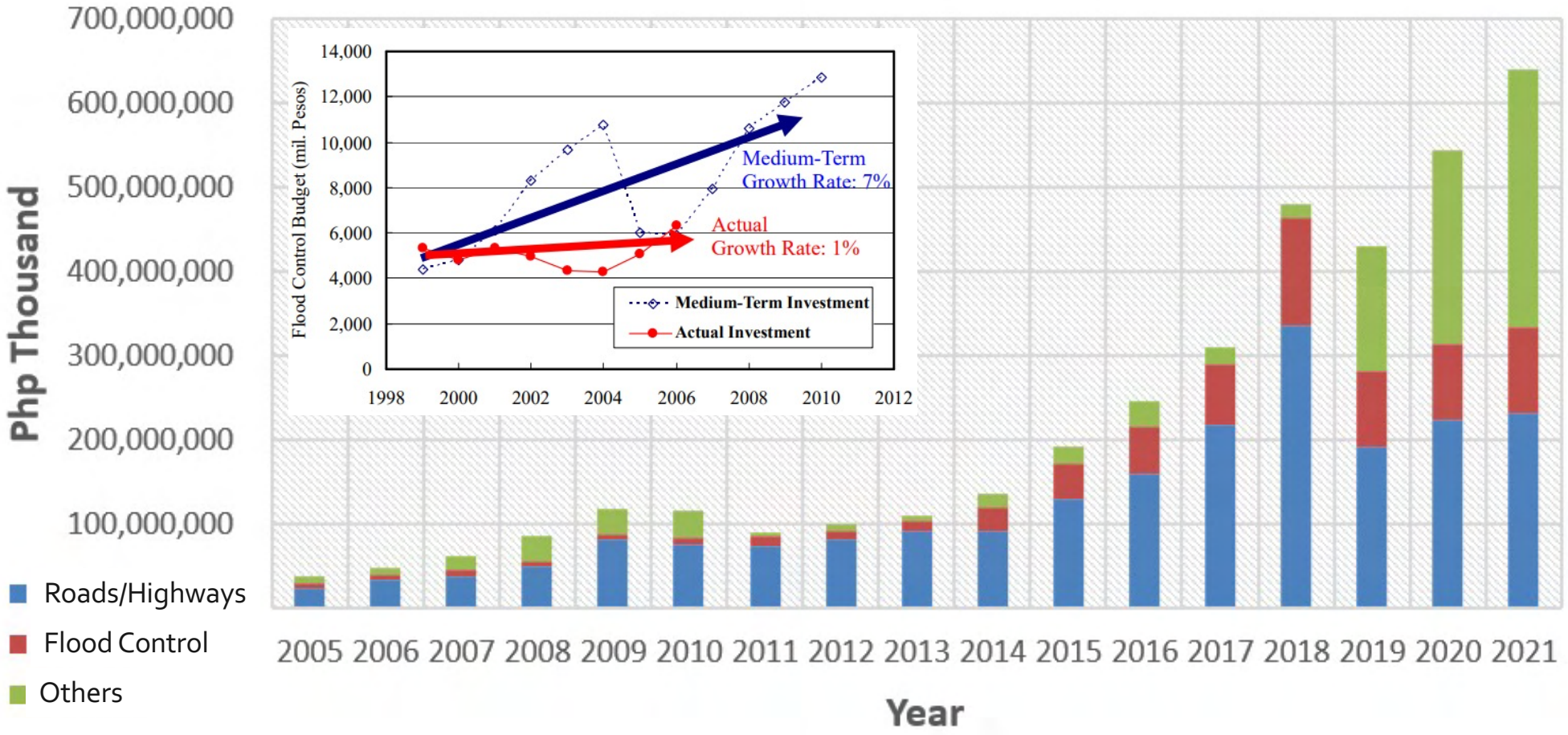


The Philippines – Budget increase for DPWH

Significant increase in Department of Public Works and Highways (DPWH)'s budget for flood management while Japan continued supporting the Government of the Philippines' DRR efforts through ODA.



DPWH Annual Budget



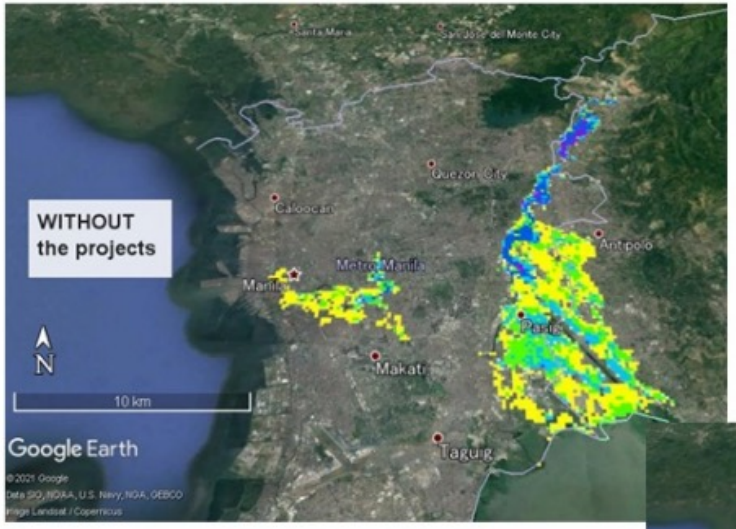
PRE-DISASTER INVESTMENT FOR RISK REDUCTION

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

7 GLOBAL TARGETS

Reduce	Increase
Mortality/ global population 2020-2030 Average << 2005-2015 Average	Countries with national & local DRR strategies 2020 Value >> 2015 Value
Affected people/ global population 2020-2030 Average << 2005-2015 Average	**International cooperation** to developing countries 2030 Value >> 2015 Value
Economic loss/ global GDP 2030 Ratio << 2015 Ratio	**Availability and access** to multi-hazard early warning systems & disaster risk information and assessments 2030 Values >> 2015 Values
Damage to critical infrastructure & disruption of basic services 2030 Values << 2015 Values	

Estimated damage: **62,785 million PHP (1,300 million USD)**
Affected people: **1 million**



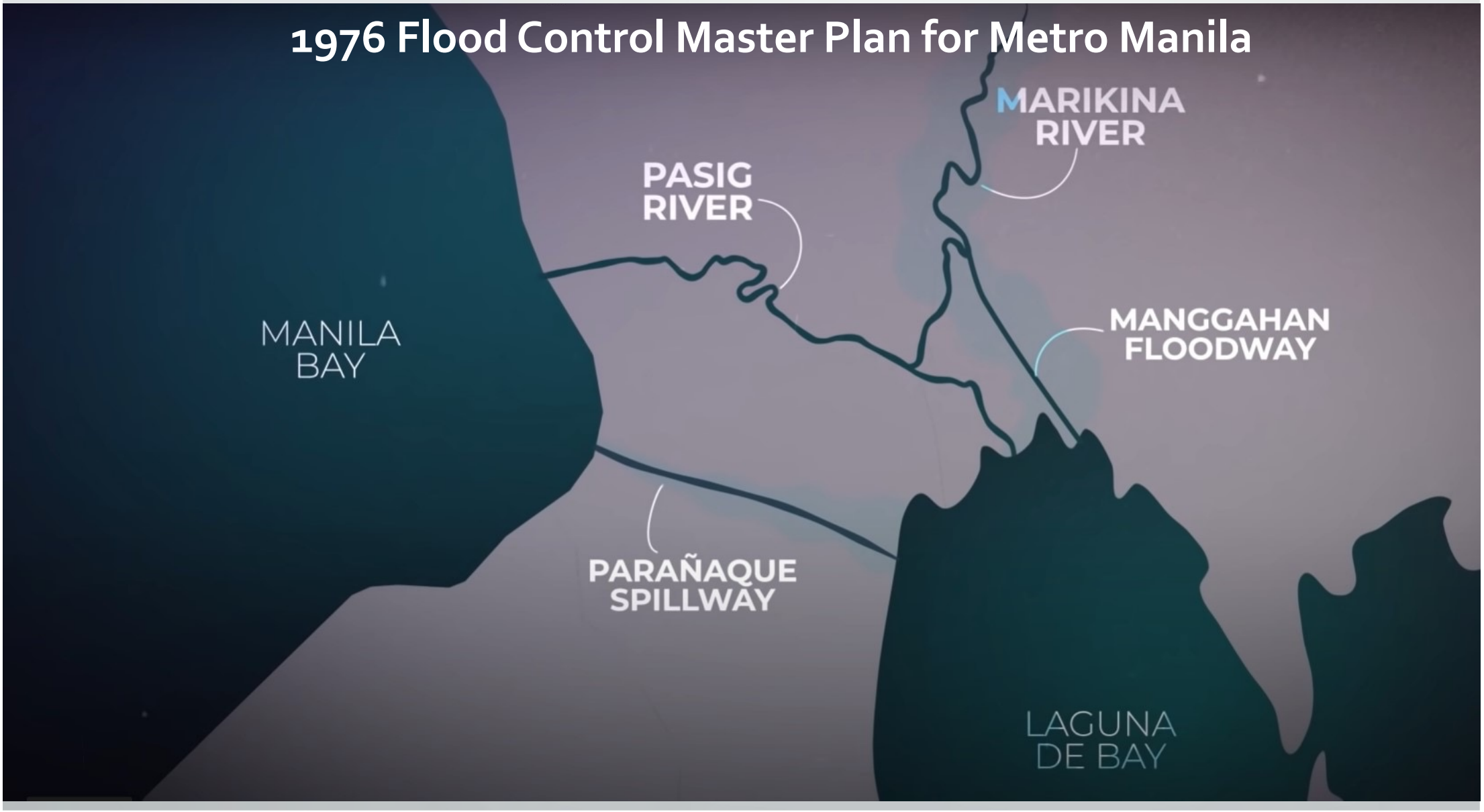
Tyhoon Ulysses (2020)
Estimated areas of inundation, damage, and affected people

Economic damage and the number of affected people drastically reduced.

Estimated damage: **9,811 million PHP (200 million USD)**
Affected people: **0.03 million**

With the floodway and river channel capacity strengthened over time, the Typhoon Ulysses had a minimum impact in the Metro Manila area, significantly reducing inundation and economic damage by 85%.

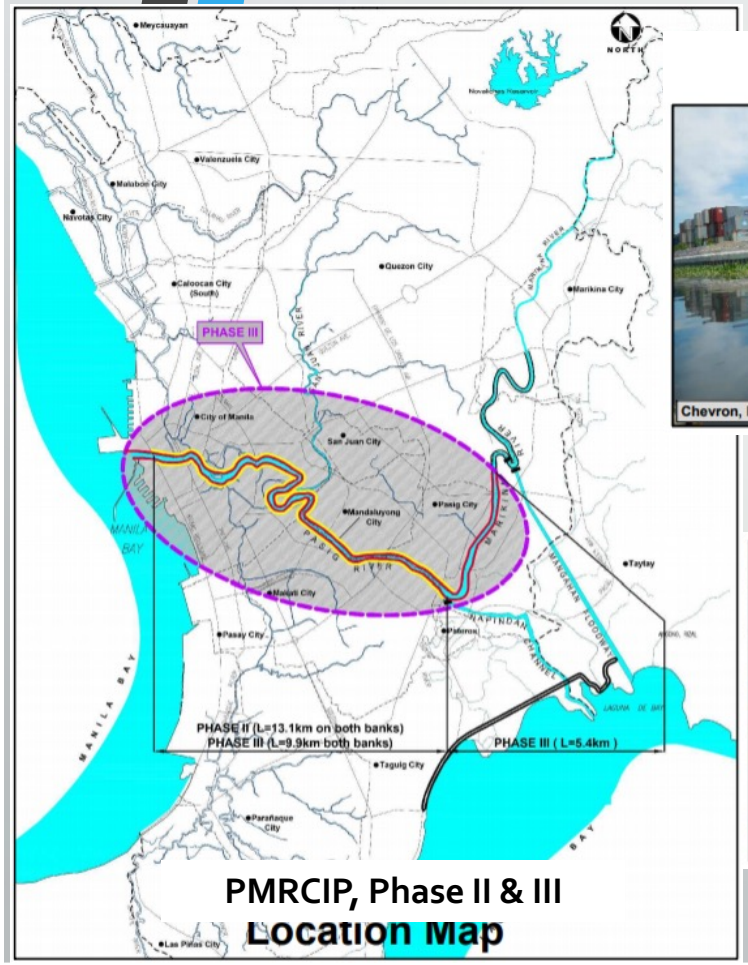
1976 Flood Control Master Plan for Metro Manila



- Findings and Ways Forward

✓Why heavy flood didn't occur in the Pasig River (Downstream Areas) ?

Reason: Completed Phase 2 and Phase 3 of the Pasig Marikina River Channel Improvement Project as well as Rehabilitation of Pumping Stations along Pasig River



PMRCIP, Phase II & III

Location Map

Completed Flood Control Structures along Pasig River


Chevron, Pandacan, Manila


Arroceros Park, Ermita, Manila


Barangka Itaas, Mandaluyong City


Makati Park, Makati City (Left Bank)

Completed Flood Control Structures along Lower Marikina River


REVETMENT SECTION 1, Brgy. Capasigan, Pasig City


REVETMENT SECTION 2, Brgy. Ugong, Pasig City

Pasig-Marikina River Channel Improvement Project, Phase IV

PROPOSED FLOOD CONTROL STRUCTURES ALONG MIDDLE MARIKINA RIVER

MANGGAHAN CONTROL GATE STRUCTURE (MCGS)

REVETMENTS AND FLOOD WALLS

REVETMENTS AND FLOOD WALLS

PROPOSED FLOOD CONTROL STRUCTURES ALONG MANGGAHAN FLOODWAY

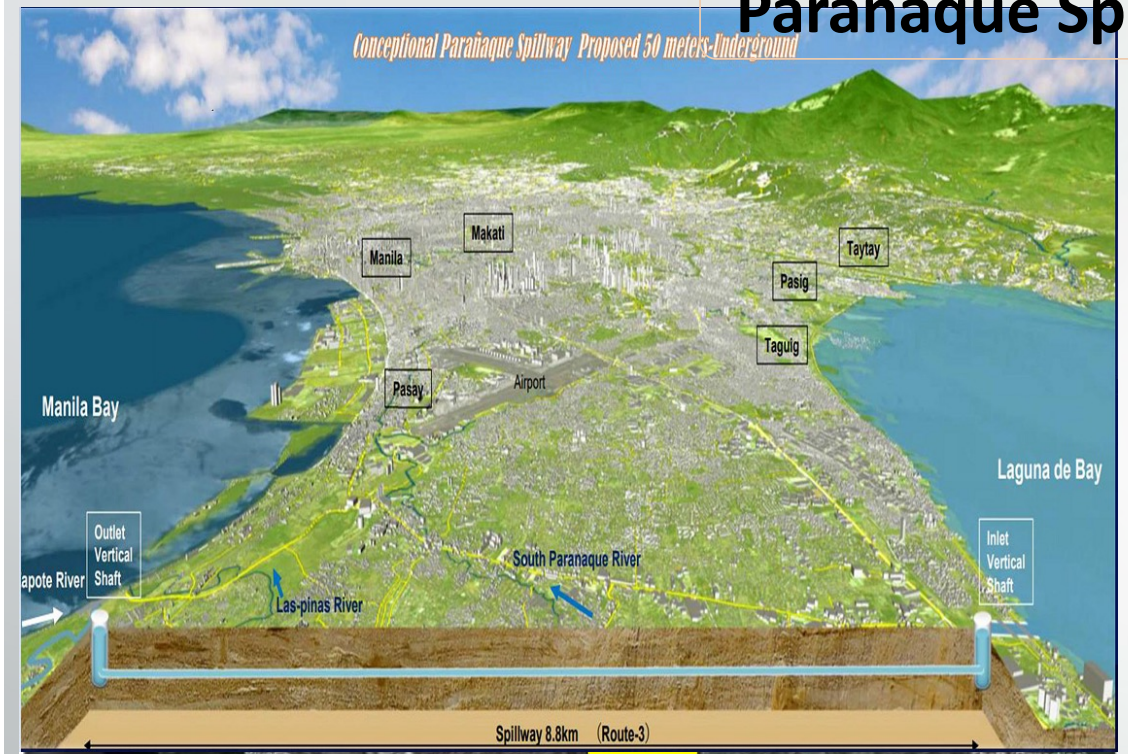
CAINTA FLOOD GATE

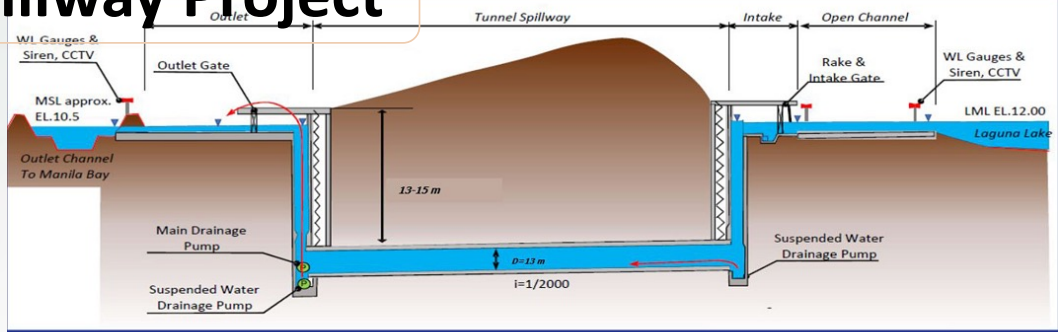
TAYTAY SLUICE GATE

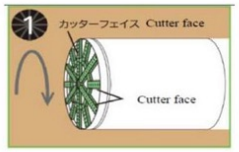
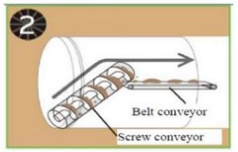
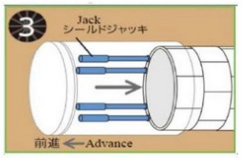
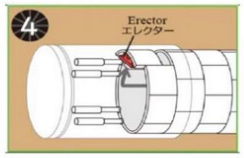
Mangahan Control Gate Structure (MCGS)

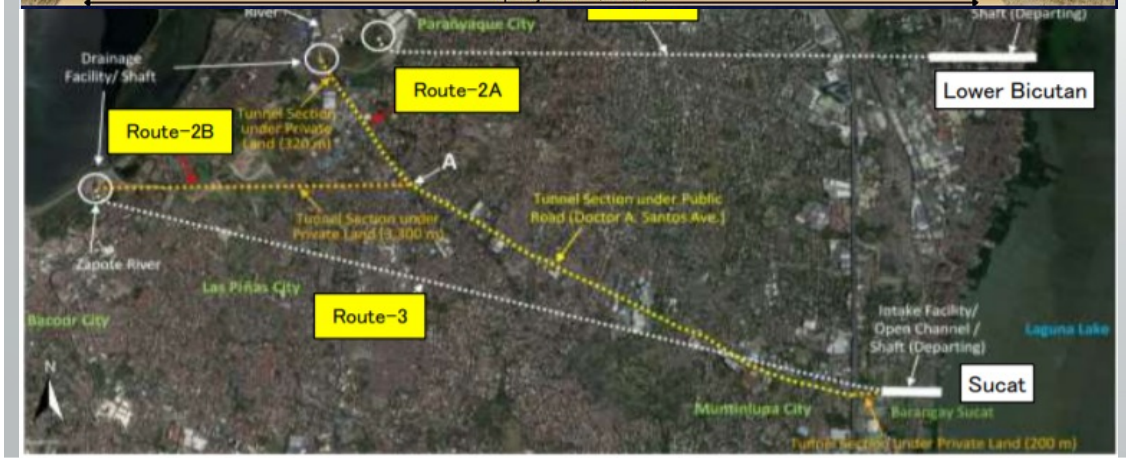
Along Pasig-Marikina River

Parañaque Spillway Project



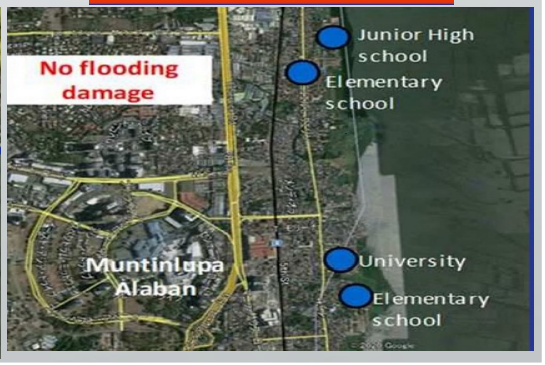


Step-1: Excavation			Step-2: Segment Assembly
1.Cutting	2.Transporting excavated soil	3.Advancing Shield Machine	4. assemble/insert segment
			
Revolve the cutter face to cut the ground	Load excavated soil into the machine by a screw conveyor and transport it to the outside	Apply reaction force with jacks installed in the machine against segments and advance the machine accommodating the speed of excavation	Secure the space to assemble segments by shortening jacks situated at the element to assemble and insert the segment using an erector



Without PSW
Max Lvl 14.5m (100-yr flood)

With PSW
Max Lvl 12.5m (100-yr flood)



LAGUNA LAKESHORE ROAD NETWORK PROJECT

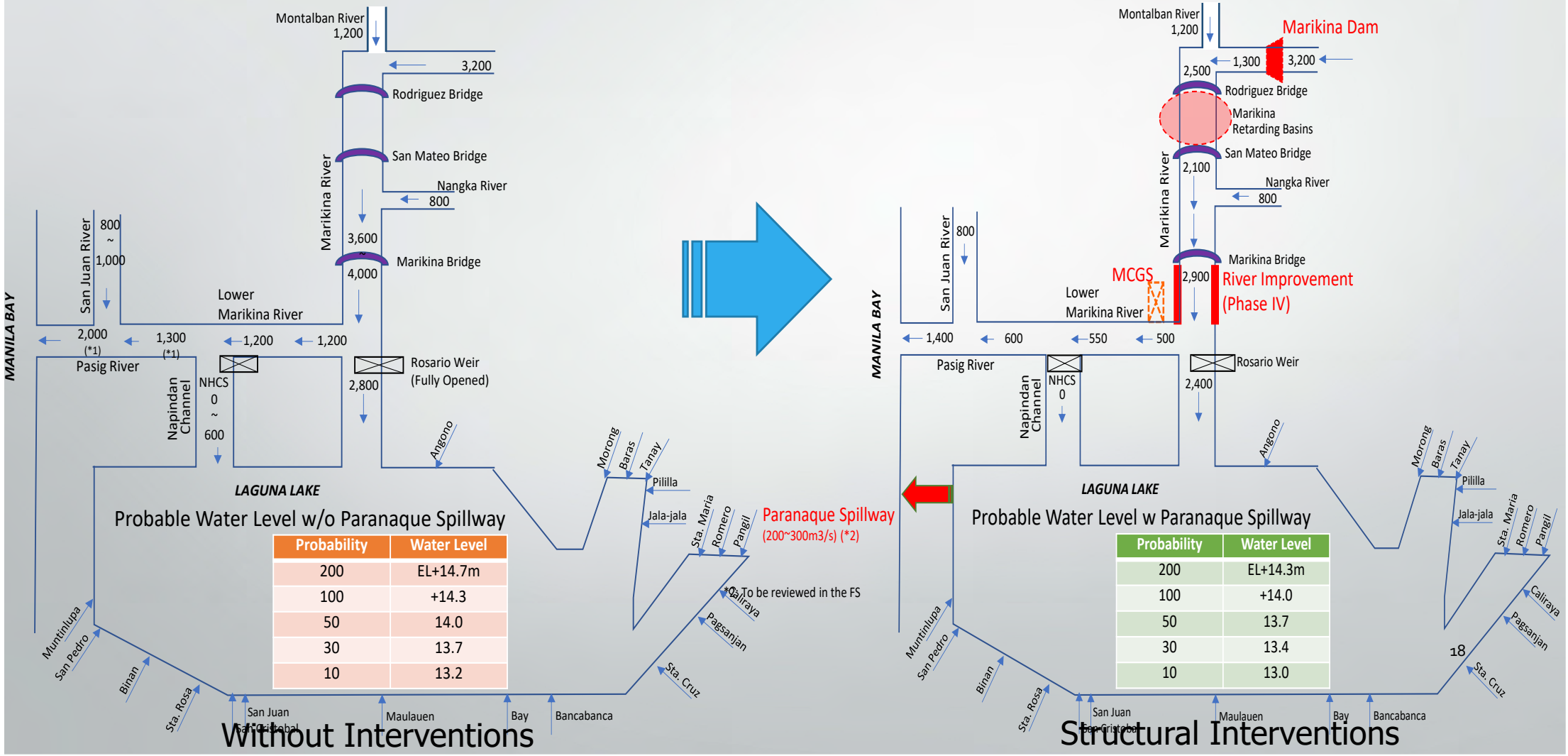
Contract Package	Segment	Approximate Length (km)	Viaduct (km)	Embankment (km)	Estimated Total Project Cost (PhP in Billion)
Package 1	Lower Bicutan to Alabang	8.05	6.7	1.4	46.85
Package 2	Alabang to San Pedro	8.45	5.6	2.9	49.93
Package 3	San Pedro to Cabuyao	11.80	5.2	6.7	43.92
Package 4	Cabuyao to Calamba	9.36	3.6	5.8	34.99
		37.66	21	17	175.69

PROJECT TIMELINES/SCHEDULE

- Procurement of Consultancy Services for the Detailed Engineering Design - October 2020 – November 2021
- Detailed Engineering Design Stage - December 2021 – February 2023 (15 Months)
- Land Acquisition - Preliminary Data is available and will be checked during the DED Stage
- Tentative Schedule of Loan Negotiation - 1st Quarter of 2023 (For Civil Works)
- Procurement of Civil Works - 2nd to 3rd Quarter of 2023

- Findings and Ways Forward

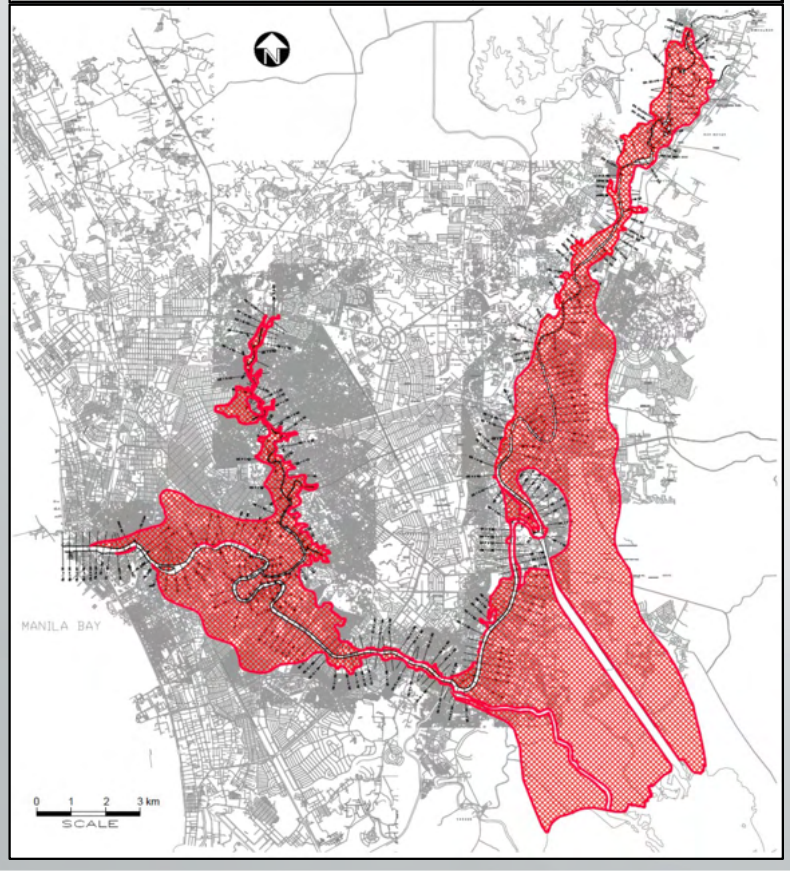
✓The need for Marikina Dam and Paranaque Spillway



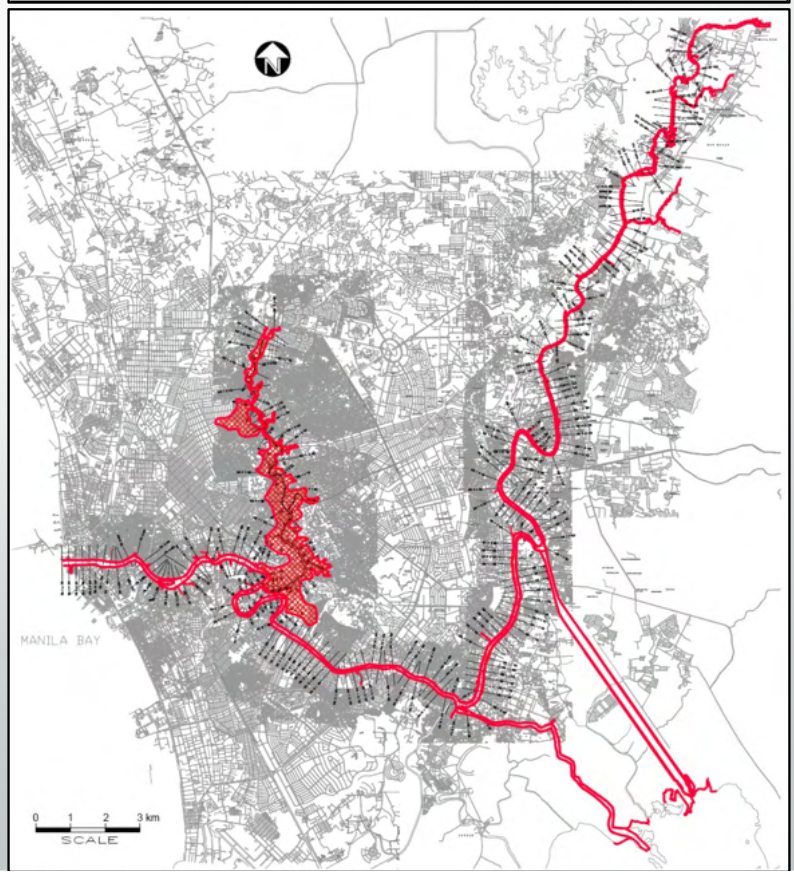
Inundation Conditions for 100-year Return Period Flood With and Without the Project

- Pasig Marikina River Channel Impr. Project (Phase IV), Marikina Dam and Retarding Basin -

Without Project (100-year Return Period Flood)	
Flooded Area (km^2)	79.00
Affected Population (1,000)	2,291
Estimated Damage (Million Pesos)	151,522



With Project (100-year Return Period Flood)	
Flooded Area (km^2)	5.60
Affected Population (1,000)	162
Estimated Damage (Million Pesos)	10,741




End of Presentation
Thank
You!