

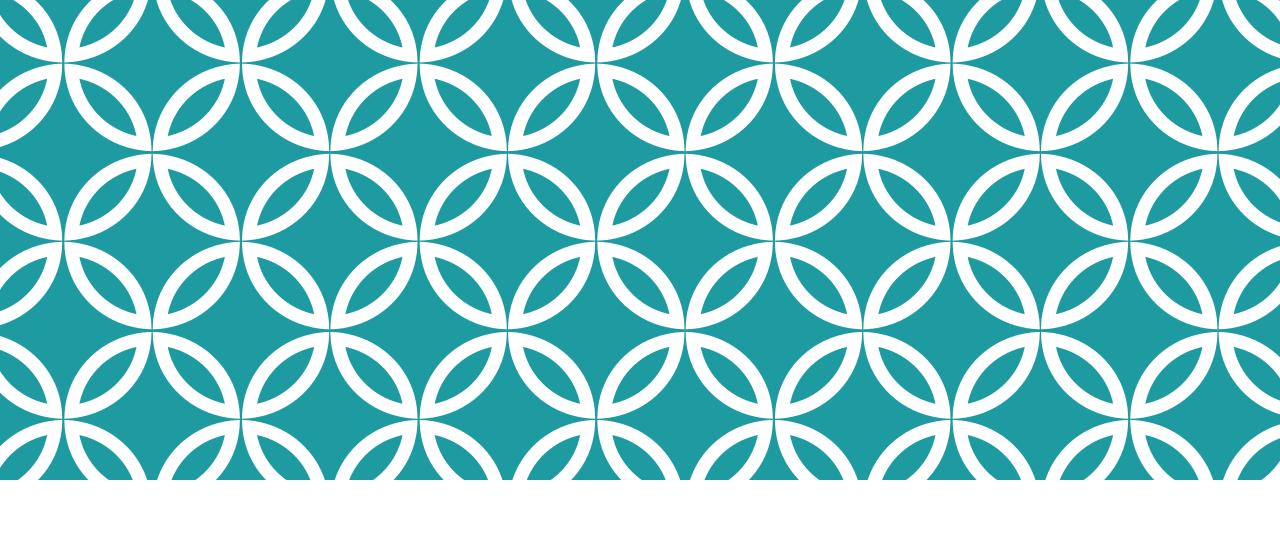
COST AND RESPONSIBILITY SHARING FOR FLOOD PROTECTION

Mikio Ishiwatari

JICA

The University of Tokyo

- 1. Flood disasters in Japan
- 2. Investment in flood protection in Japan
- 3. Investment in flood protection in the Philippines
- 4. How to secure funding



1.FLOOD DISASTERS AND INVESTMENT IN JAPAN

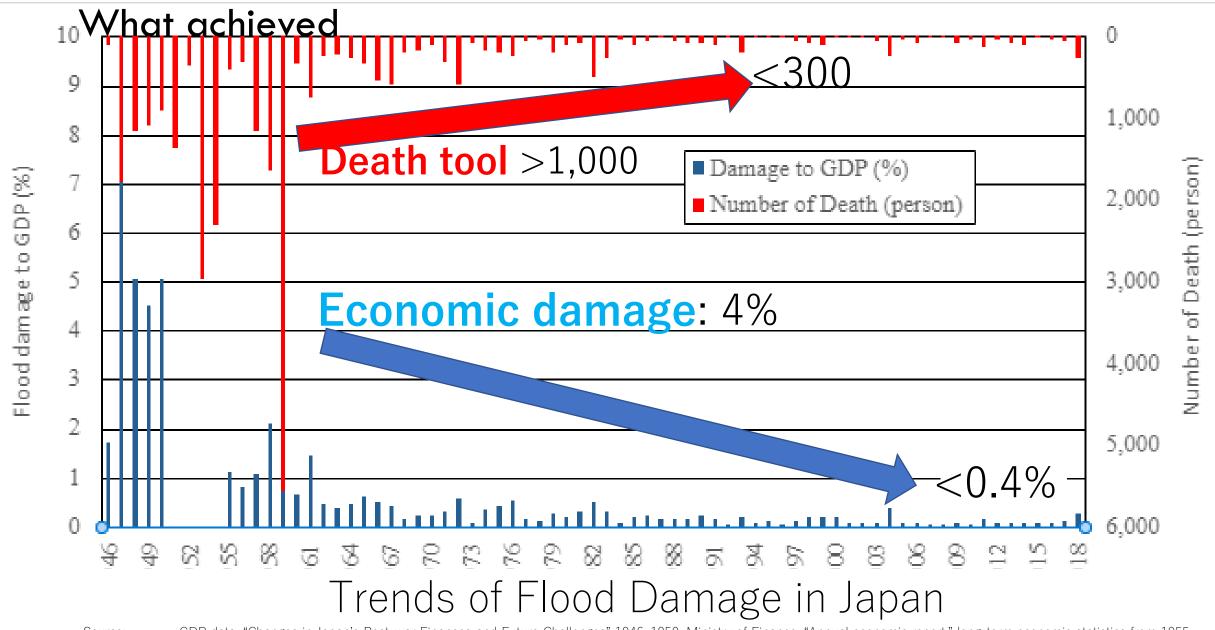




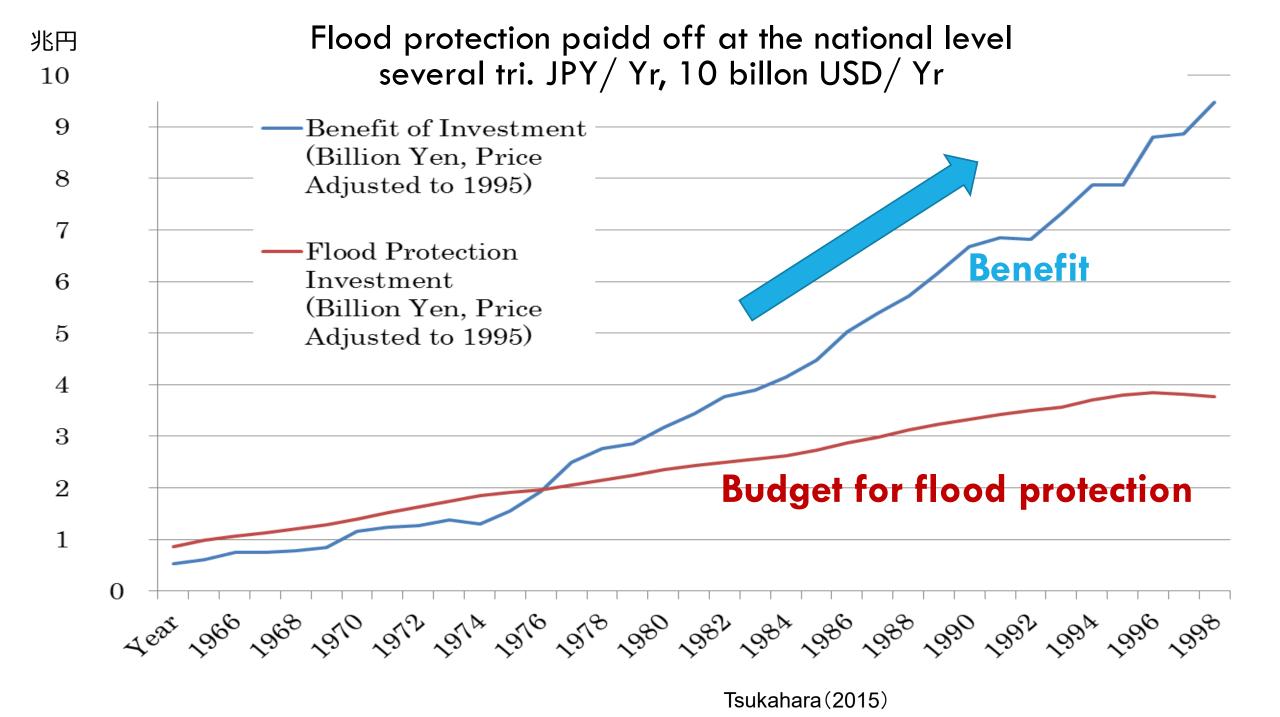
Ishiwatari

## SEVERE FLOOD DISASTERS IN RECENT YEARS

Year	Event				Economic loss
		dead & missing	destroyed	houses flooded	trillion JPY (billion USD)
2015	Three typhoons	11	8,721	13,392	0.32 (3.0)
2016	Typhoon Lionrock	27	2,912	1,930	0.28 (2.5)
2017	Northern Kyushu	42	1,476	1,667	0.19 (1.6)
	Torrential Rainfall				
2018	Western JPN Torrential Rainfall	<u>232</u>	21,460	30,439	1.215 (11)
2019	Typhoon Hagibis	91	67,016	29,556	<u>1.86 (17)</u>
2020	Kumamoto Torrential Rain	86	4,558	13,934	0.58 (5.3)



Source: GDP data, "Changes in Japan's Post-war Finances and Future Challenges" 1946–1950, Ministry of Finance, "Annual economic report," long-term economic statistics from 1955 to 2019. Amount of flood damage and number of casualties: "Statistical survey on flood damage" 2018 MLIT





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Investing in flood protection in Asia: An empirical study focusing on the relationship between investment and damage



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ЛСА Ogata Research Institute Working Paper

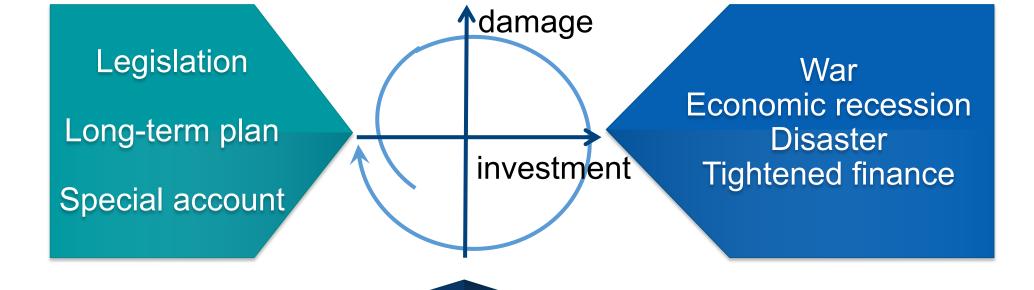
Research on Demand Estimate on Infrastructure in Asia

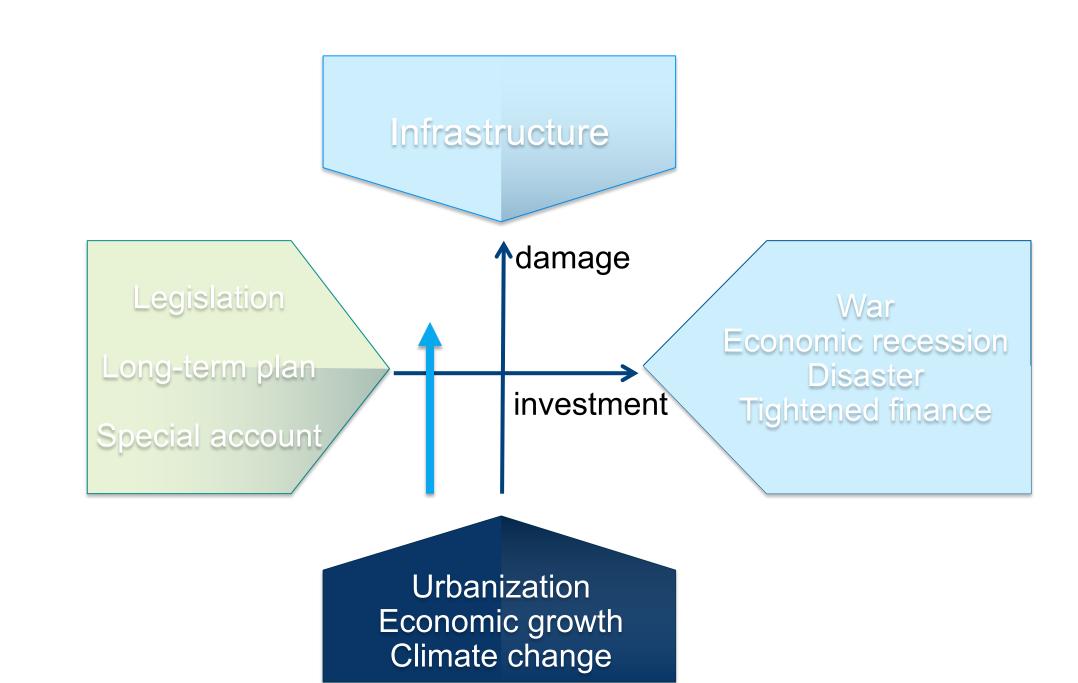
Investments in flood protection: Trends in flood damage and protection in growing Asian economies

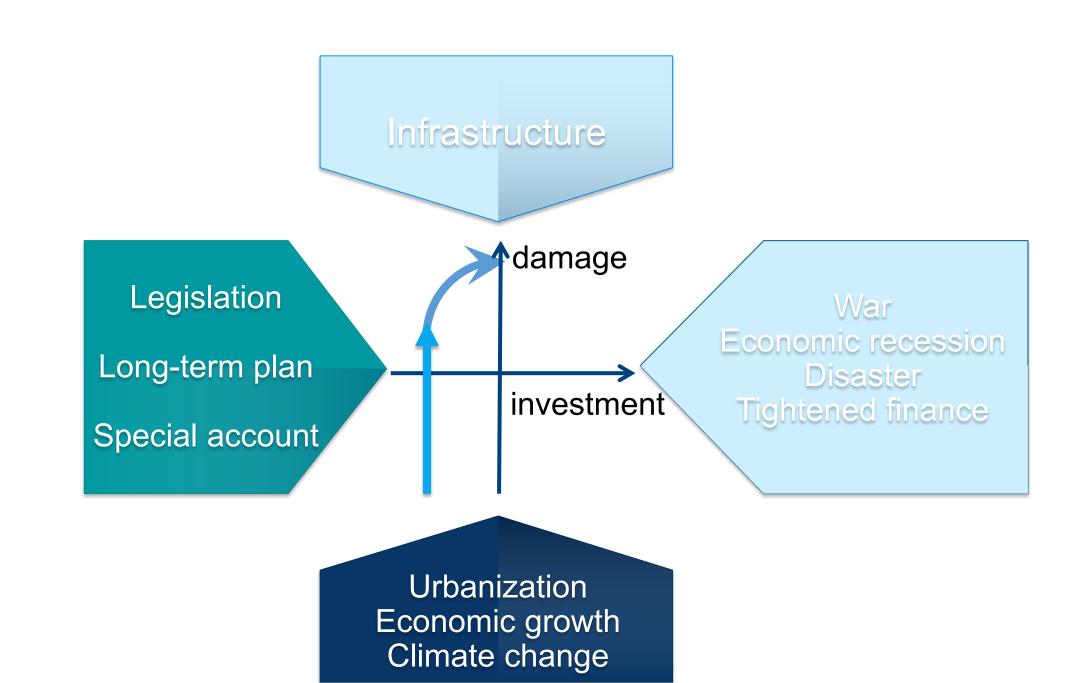
Mikio Ishiwatari and Daisuke Sasaki

# 1-2 INVESTMENT CYCLE IN DRR HYPOTHESIS

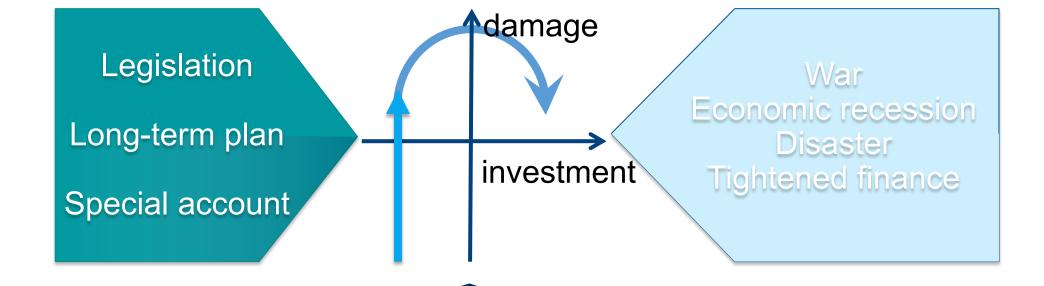
Infrastructure



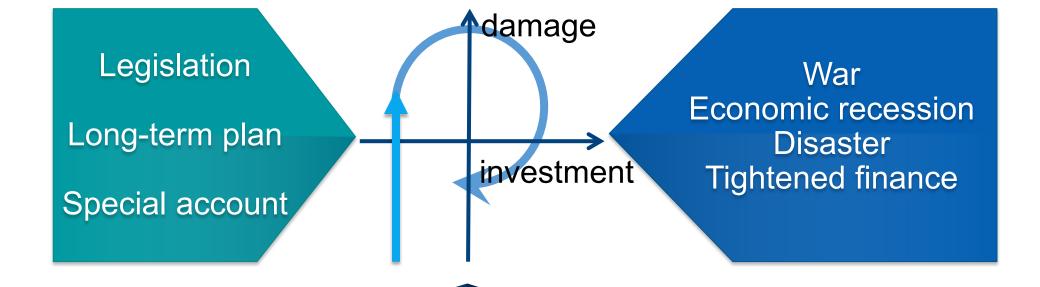




#### Infrastructure



#### Infrastructure



### HYPOTHESIS

Infrastructure

Legislation
Long-term plan
Special account

Adamage

War

Economic recession

Disaster

Tightened finance

## **METHODS**

Creating dataset of flood protection budgets, flood damage, and national income since 1878

Examining documents and reports with disaster management, river management, and finance

- 1) Large disasters that triggered budget increase identified, and periods of expanding damage determined.
- 2) Periods of increasing budgets following the large disasters determined.
- 3) Periods of decreasing budgets and damage before the next large disasters determined.

#### 1 ESTABLISHING MODERNIZED MECHANISM OF FLOOD PROTECTION

(1878-1906)

Flood damage increased as country modernized

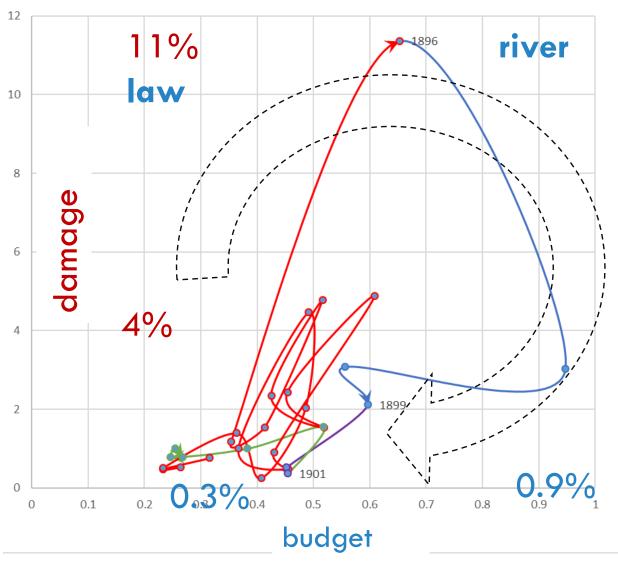
- > 4% of national income
- > 11% in 1896

enacted <u>river law</u> in 1896: implementing national flood protection project

> 0.9% of national income

Russo-Japanese War in 1904

< 0.3%

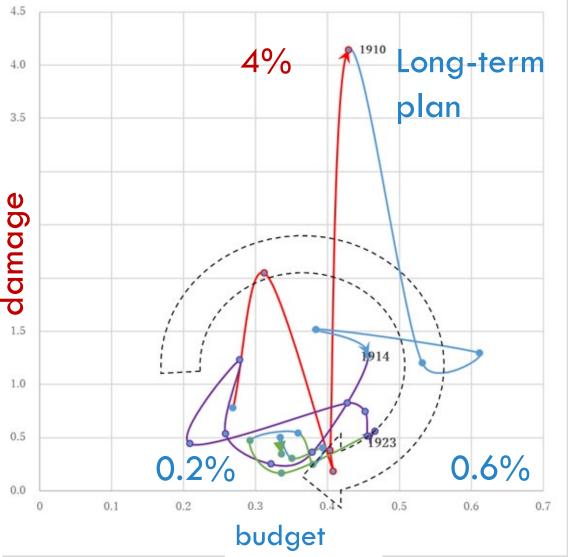


# 2 CONSTRUCTING STRUCTURAL FRAMEWORK IN MAJOR RIVERS (1906-1931)

disasters 4% of NI in 1910

established long-term planning and special account to secure multi-year commitment: 0.6%

1923 Great Kanto Earthquake & 1929 Great Depression 0.2%



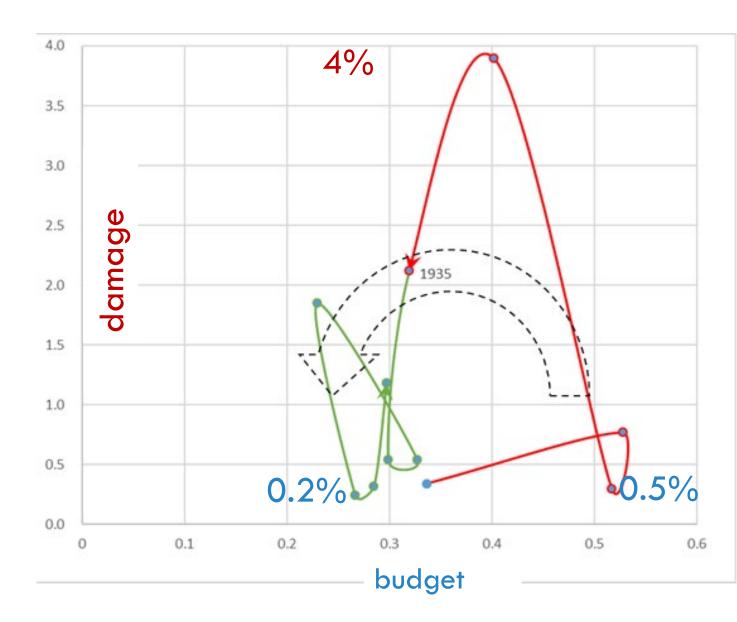
# 3 WARTIME REGIME (1931-1945)

reverse cycle because of military expenditures

1934 Muroto Typhoon 4% of National Income

Sino-JPN War, WWII

0.20.3%: lowest level

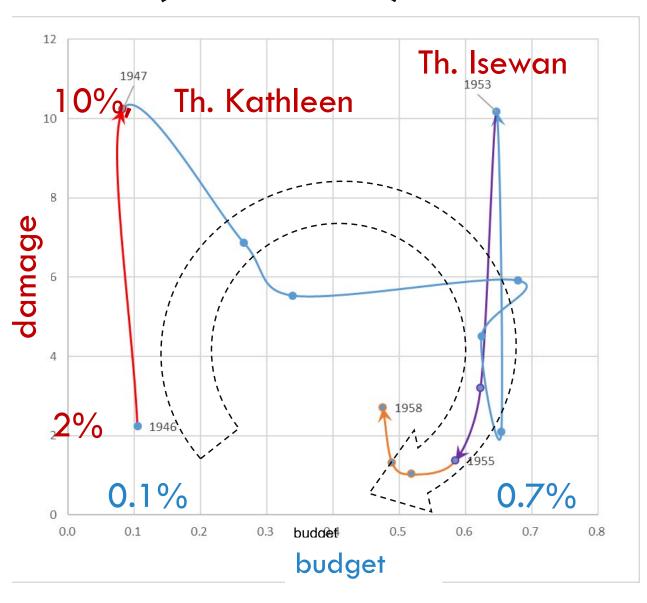


## 4 A SERIES OF FLOOD DISASTERS (1945-1958)

recover from World War II

respond to a series of severe floods in 1940s and 1950s 10% of national income in 1947 & 53

Budget increased to 0.7% but damage remained at 2%.



## 5. IMPLEMENTING FLOOD PROTECTION DURING HIGH GROWTH AND RECESSION (1958-2014)

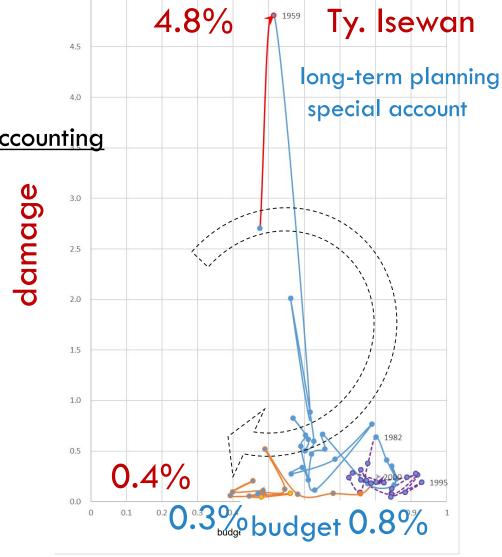
1959 Isewan Typhoon 4.8% of Nat Income

developed mechanisms for <u>long-term planning & special accounting</u> in 1960

Some 0.8% from 1977 until 2001

<0.4% from 1983 till 2014 except 2004

Lost decades from 2000: 0.3-0.4%



NO

Infrastructure

Legislation

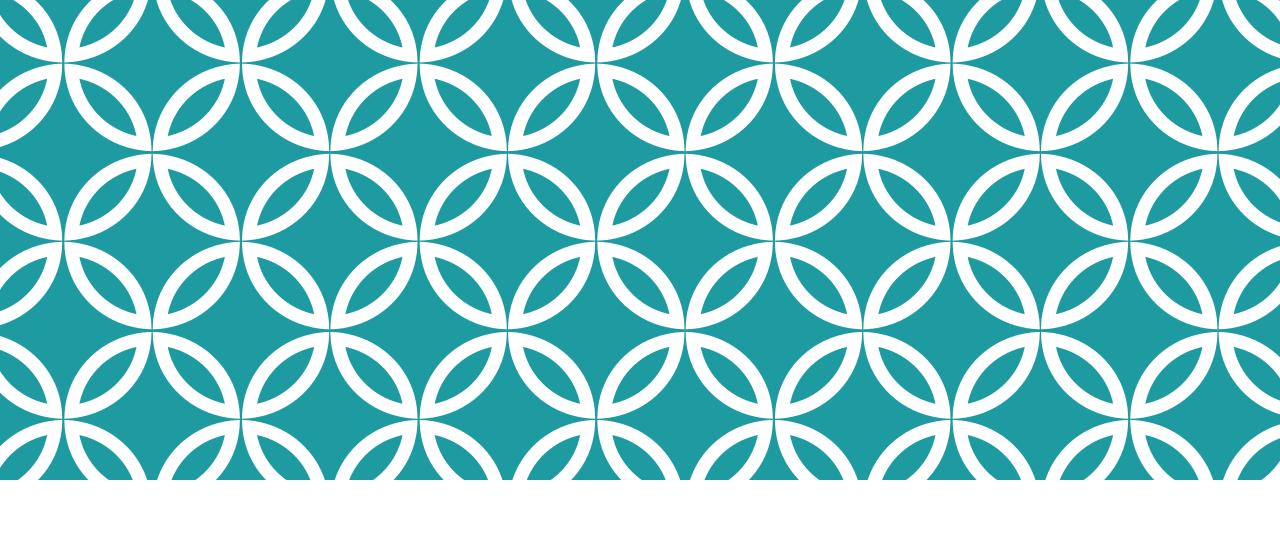
Long-term plan

Special account

investment

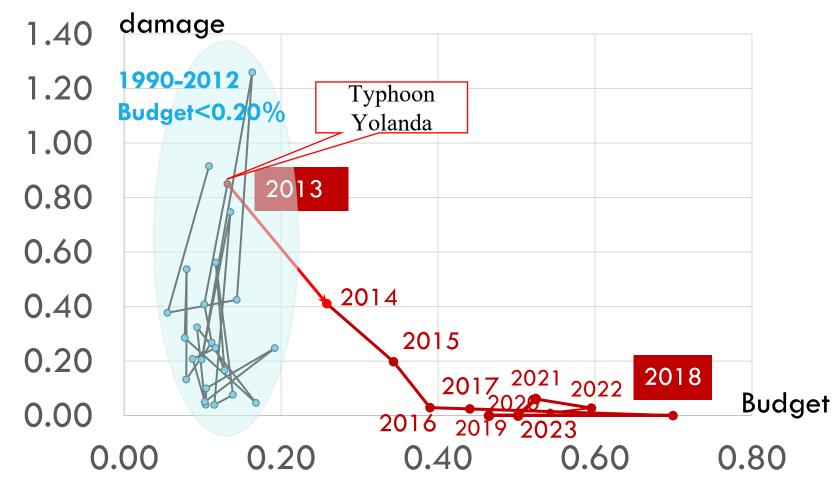
War
Economic recession
Disaster
Tightened finance

Japan experienced
5 investment cycles
for the last 150 years



2. INVESTMENT IN FLOOD PROTECTION IN THE PHILIPPINES

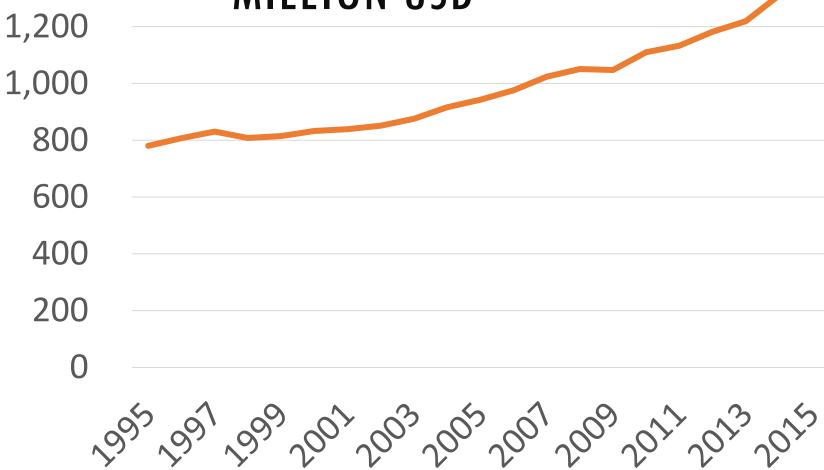
## FLOOD DAMAGE AND INVESTMENT IN FLOOD PROTECTION 1990- RATIO TO GDP

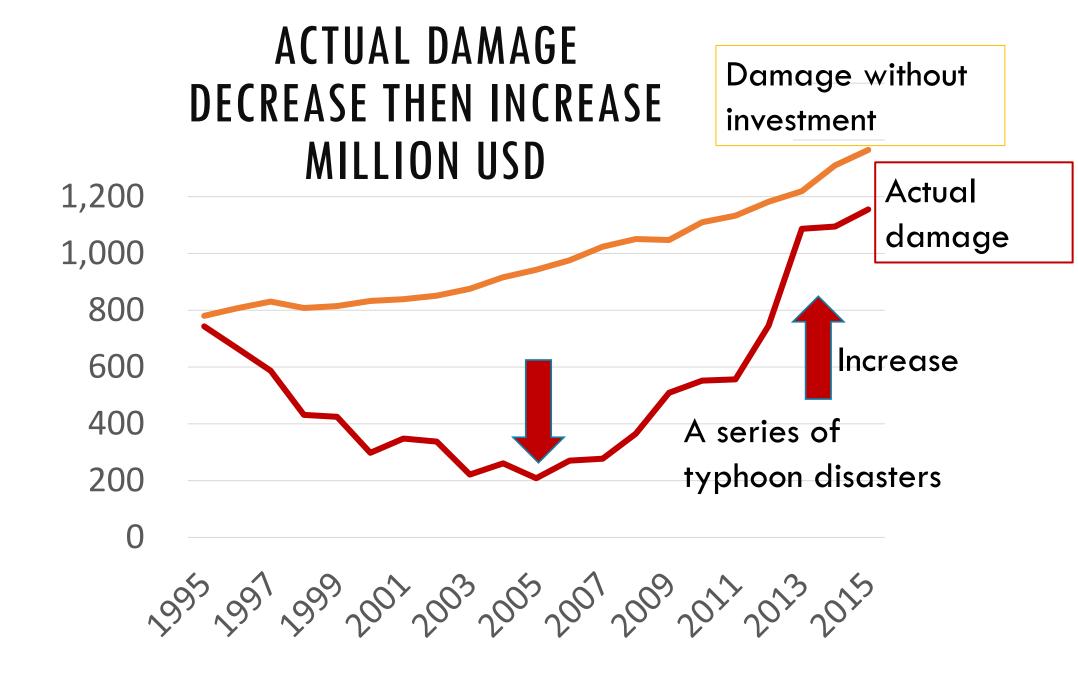


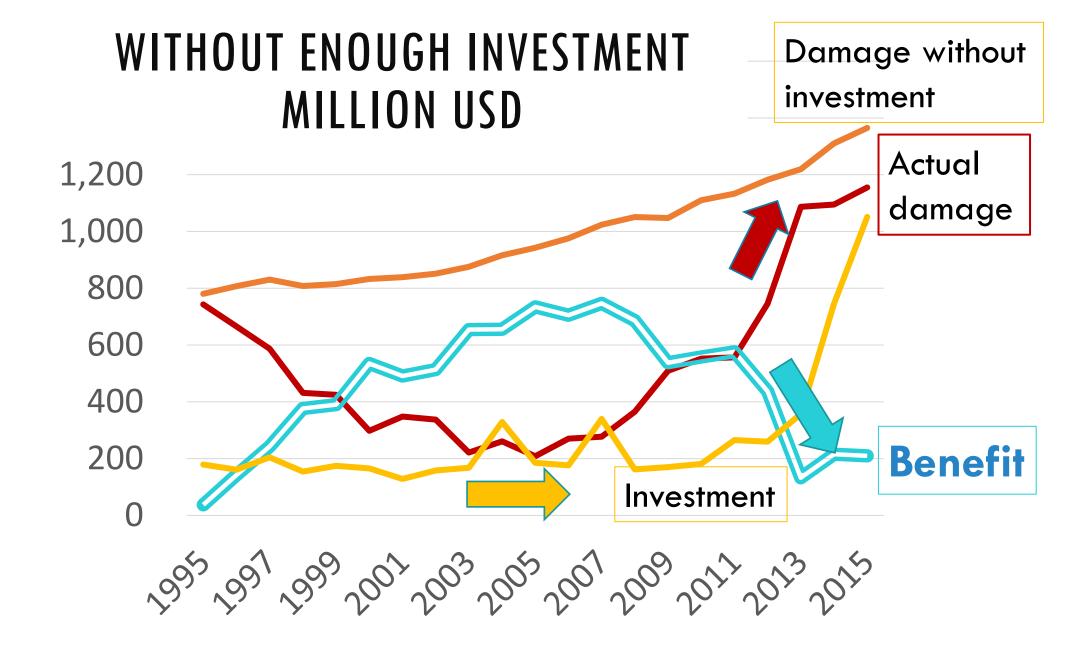
Source: data from DBM, OCD, EM-DAT

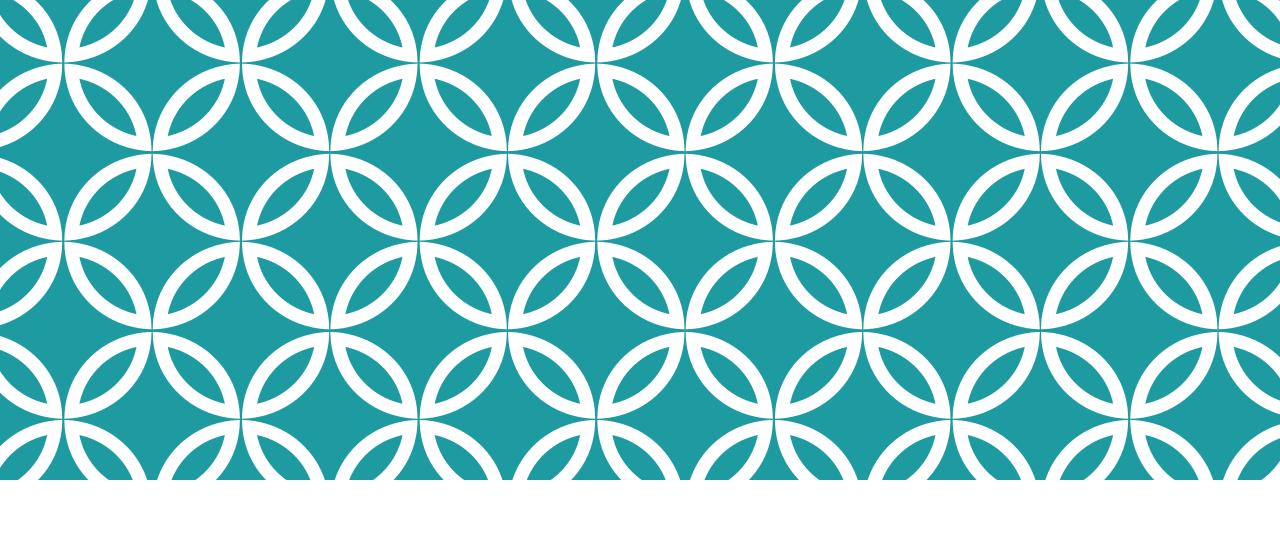
# BENEFIT ESTIMATE DAMAGE WITHOUT INVESTMENT MILLION USD

Damage without investment









3. HOW TO SECURE FUNDING

# JAPAN: LONG-TERM PLAN FOR FLOOD PROTECTION TO SECURE MULTI-YEAR COMMITMENT

	year	Plan (a) (billion JPY)	Disbursed (b) (billion JPY)	Ratio (b/a) (%)
1	1960-1964	365	430	117.9
2	1965-1967	850	474	55.8
3	1968-1971	1,500	1,060	70.7
4	1972-1976	3,000	2,836	94.5
5	1977-1981	5,810	5,818	100.1
6	1982-1986	8,250	6,550	79.4
7	1987-1991	8,000	8,802	110.0
8	1991-1996	10,900	11,533	105.8
9	1997-2003	11,600	13,720	118.3

1960. The Cabinet decided on 10-year plan with committed budget

- river works in major 100 rivers within 15 yrs
- budget planned for 0.7%/ yr of NI
- budget increased by over 40% in 1960
- invested 18 % more than planned between 1960-65

2<sup>nd</sup> plan by revising first plan at midyear

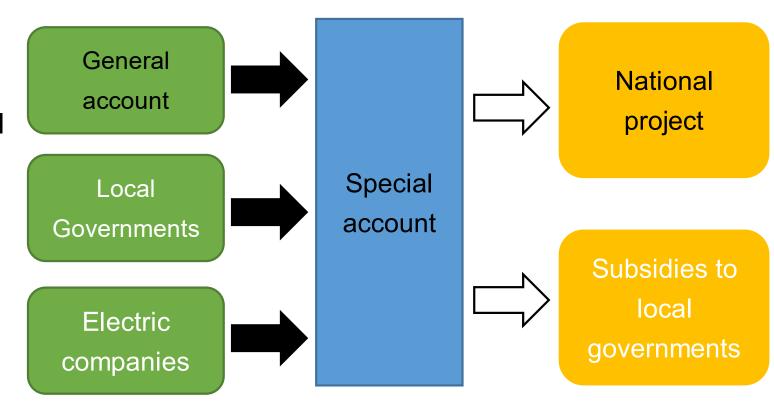
3rd plan, increased by 85 % in midyear of 2nd plan

4th plan, doubled budget, in 1972

#### SECURE COMMITMENT

#### Special account

- ✓ Separated, independent from general account
- May lose flexibility from national budgetary management



# HOW TO MOBILIZE FINANCE FOR FLOOD PROTECTION RESPONSIBILITY AND COST SHARING

	Central	Provincial/ District	Local community
Philippines			
Flood national	0		
Flood Prov/ City		•	
Japan			
Flood National	O Construction, OM	O CP for construction	0
Flood Prov/ District	O Subsidy	0	0
Indonesia			
Flood Central	0	• JKT: OM	- JKT: Troop
Flood Prov/ Dist	· Loan JKT	•	
	<ul> <li>Subsidy DKA</li> </ul>		

## **RESULTS**

- 1. external shocks, war, economic recession, disaster, and tightened national finance impacted investments.
- 2 To secure sustainable financing
- Establish financing mechanisms, mobilizing financial sources from national government, local government, local communities is needed.
- Formulate legislation and long-term plans, following major flood disasters is crucial.



## FLOOD DAMAGE AND INVESTMENT IN FLOOD PROTECTION 1990-

