

CECAR10, Jeju, Korea, 2025

Trans-disciplinary Approach for Disaster Risk Reduction by Scientific Knowledge-Based Decision-Making

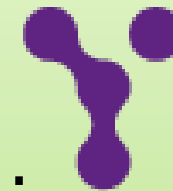
-Nine years of activity of TC21-

October 23, 2025

Need of Transdisciplinary Approach (TDA) to Implement Reverse Zoning and Basin Flood Control Policies in Japan



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地域の中核 世界の人材

Background

- In Japan, like any other countries, flood-related disasters are intensifying and occurring nearly every year
 - e.g., 2018 West Japan Heavy Rain (D&M: 245), 2019 Super Typhoon19 (D&M: 98)
- Basic Counter measures are twofold:
 - **Infrastructure development** against hazards & for preparedness
 - **Relocation of people** to safer place
- Nevertheless, relocation is very difficult! Needs TDA.

Striking examples in Japan: Ex.1 & Ex.2

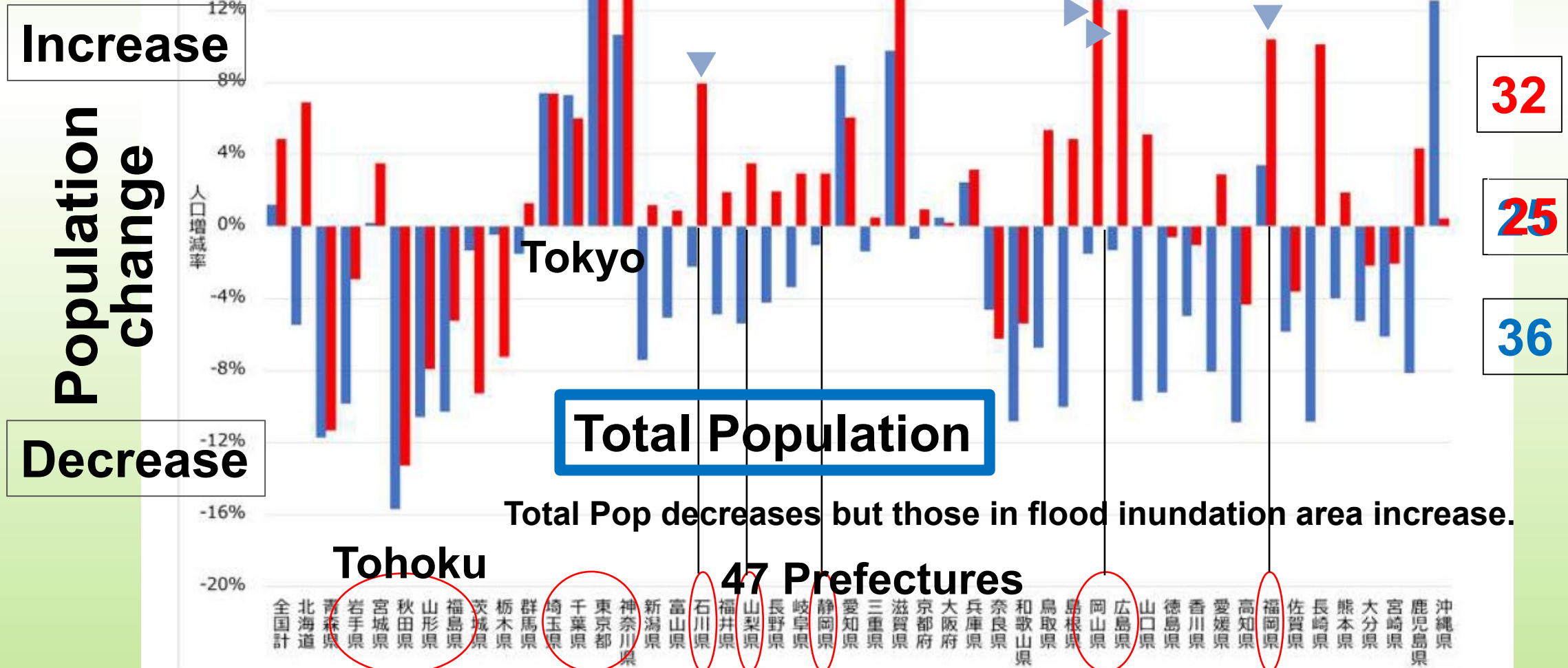
(Ex.1)

■ Total Pop
■ Pop in Flood Inundation Area
1995-2015

Ministry of Finance (2023.10.19)
Report on Social Capital Development

Flood Inundation Area
estimated in 2012

Population in Flood Inundation Area



(出所) 令和4年4月20日財政制度等審議会歳出改革部会資料より抜粋

(注) 洪水浸水想定区域内人口増減率は、平成24年時点の洪水浸水想定区域における平成7年と平成27年の人口を比較して算出。

Why?

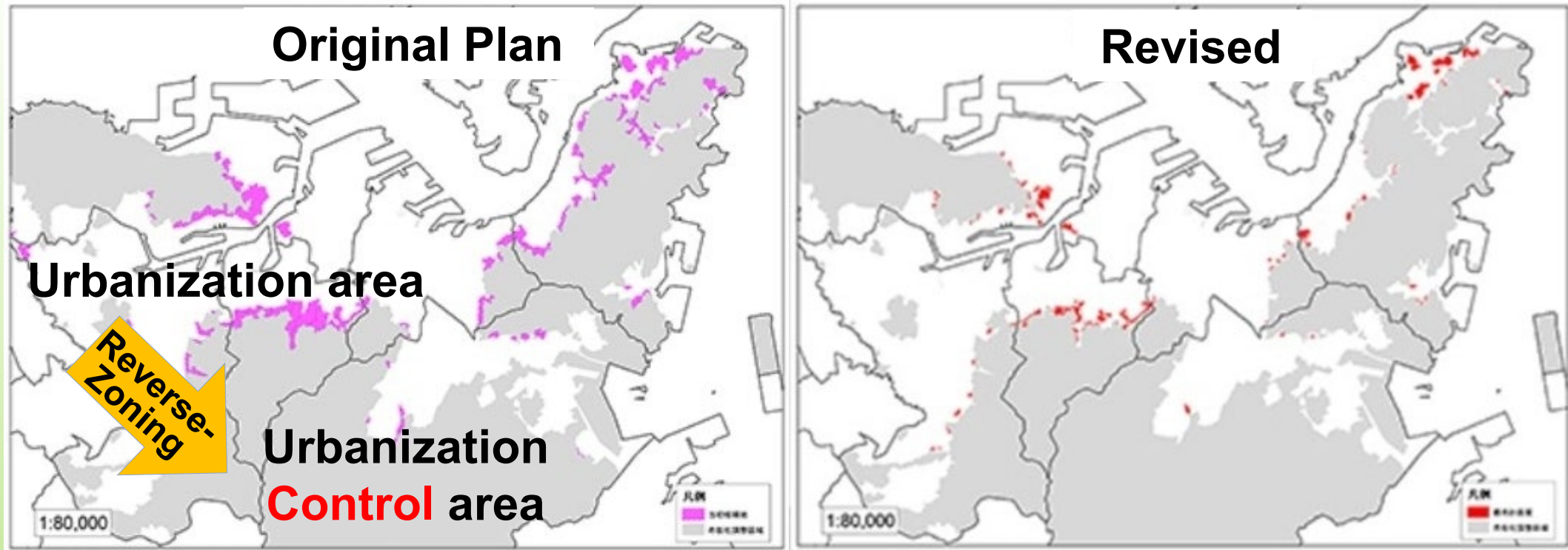
- Because land price is low in disaster risk area.
- For migrants, land price is more important than potential disasters, especially where there are recently no serious disasters.
- So, new residents tend to settle in disaster prone areas.
- ➡ Creation of new risk that the SF urges to stop.

(Ex.2)

Kitakyushu City Reverse-Zoning Plan

Badly damaged by
sedimentary disasters
in 2018

2019 Original Plan → (280 Public hearings) → 2024 Revised Plan



Proposed: **1157ha, 35,200 pop**

Agreed: **263ha, 165 pop**
1/4 1/200

Reasons of Objections

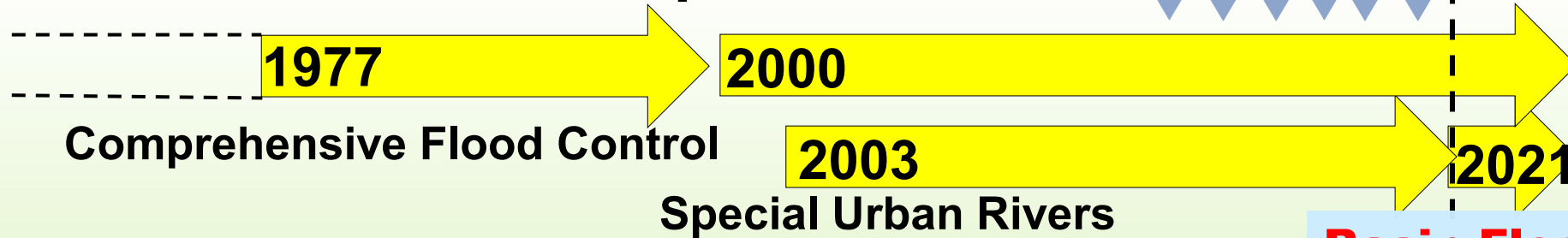
Accept the spirit of the policy, but

- **Land price decline** (ex. ¥28M ➡ ¥8M only in the proposal stage)
- **Lack of pub supports**: Financial compensation? Alternative sites?
- Don't want to leave the residents over generations Esp. in flood inundation areas
 - *But responses differ by disaster experiences, depopulation in the village, availability of city support, image for future generations etc.*
- **Hiroshima Prefecture's strategy**: Plan r-z in long time span in 3 steps:
 - First, designate r-z only where **no residents**.
 - In 20 years, designate r-z **with residents** but residents are **allowed to stay**.
 - Finally, in 50 years, **no residents allowed**.

Implementation already started. Good results awaited.

Basic laws of flood-related DRR

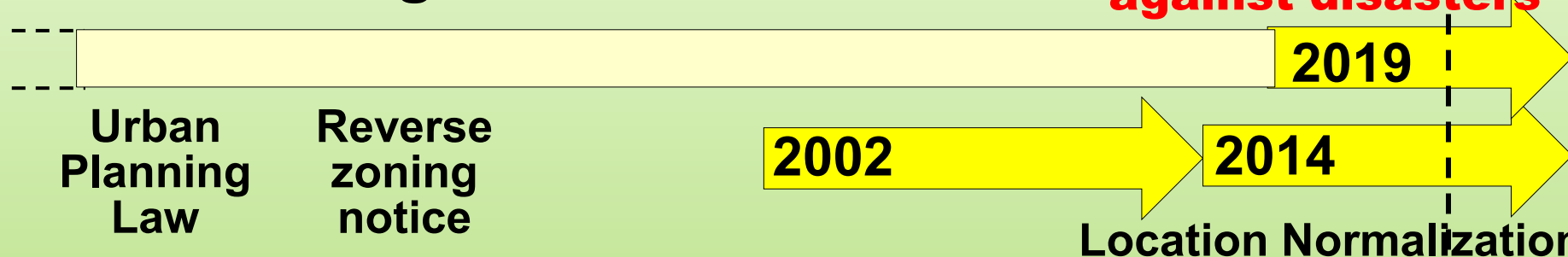
- Infrastructure development



- Early warning & evacuation

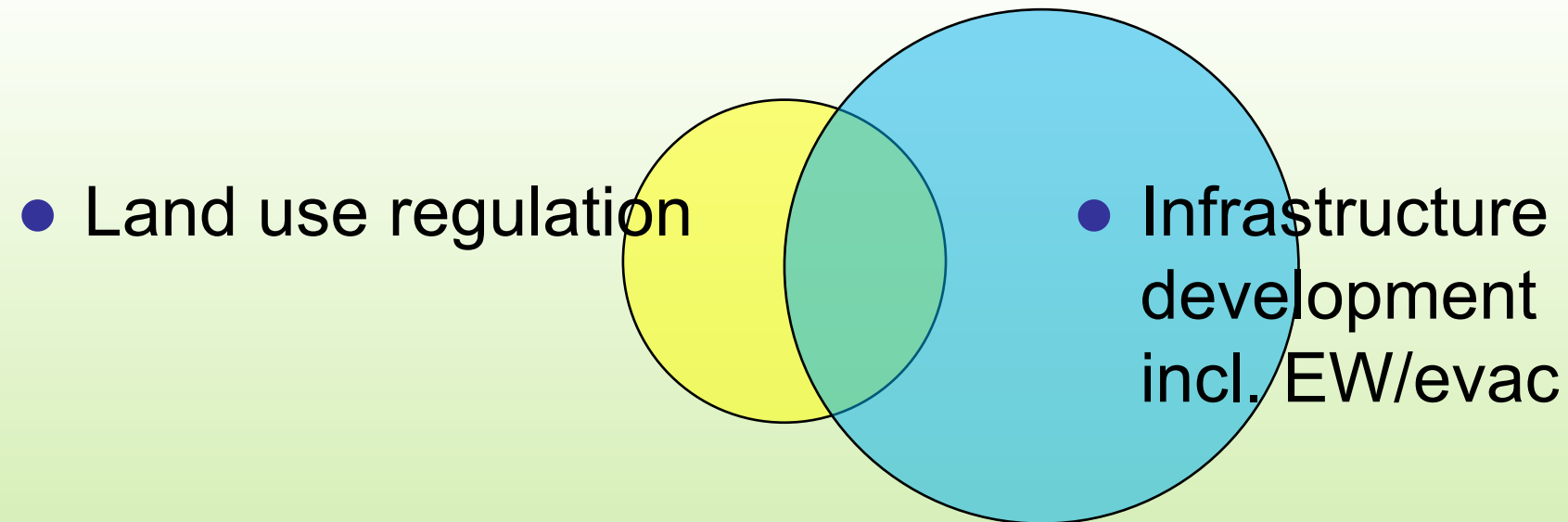


- Land use regulation

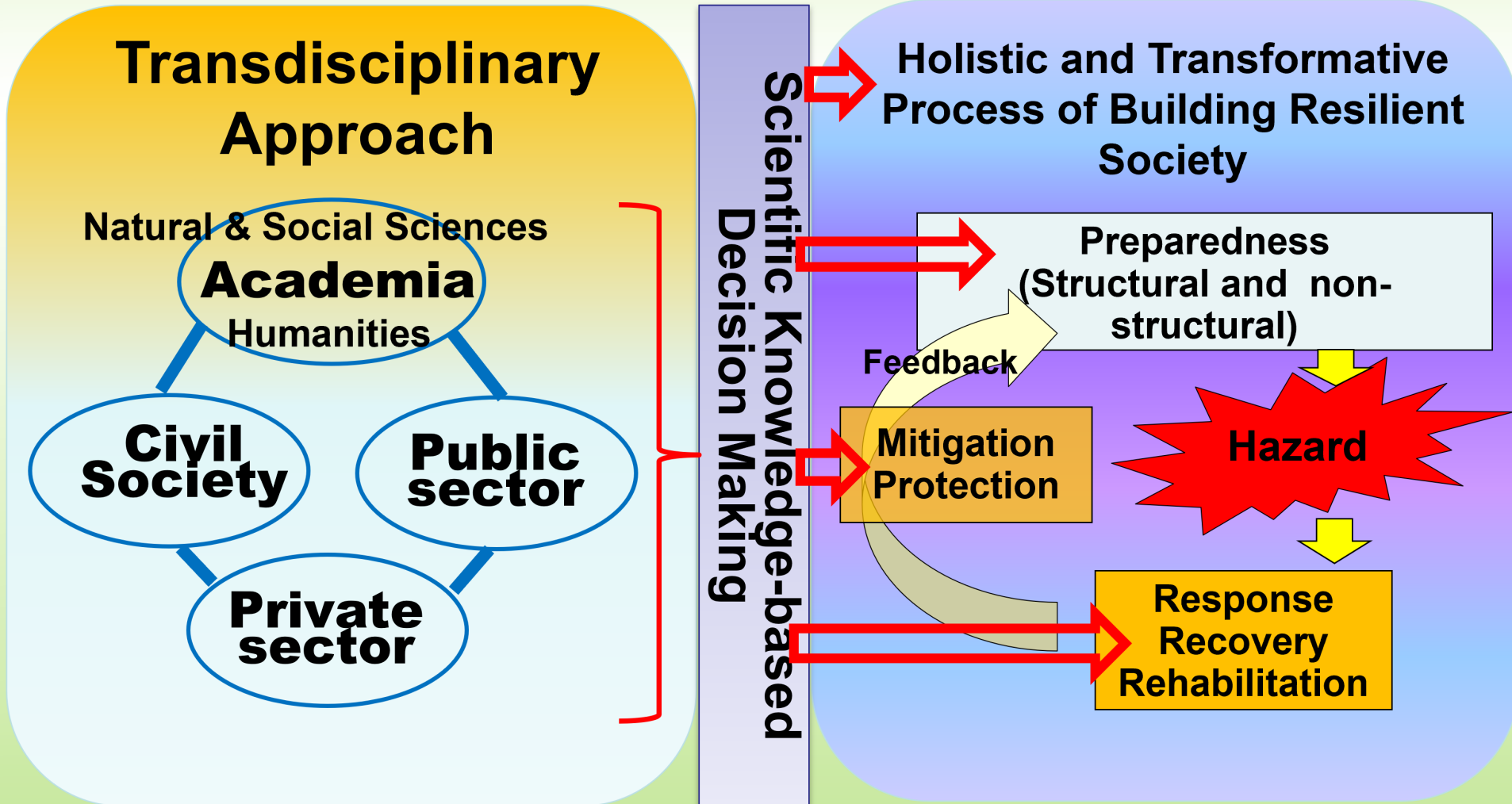


Amendments:
river, urban,
agriculture,
parks, sabo,
sewerage,
architecture,
victims support

Best-mix of the two ways for DRR



TC21 Transdisciplinary Approach for Building Societal Resilience to Disasters



Co-Design, Co-Produce, Co-Deliver, and Co-Implement

Transdisciplinary Approach (TDA)

- All stakeholders working together to go beyond disciplinary and sectoral limit and make holistic solutions possible by societal transformation.
 - Disciplinary & sectoral **cooperation** **river & urban national & cities**
 - **Transparency** in info exchanges and DM processes
 - **Scientific knowledge-based decision making**
 - **Participatory app**, accountability, democratic proc,
...

Conclusions (Take home message)

- ***Now DRR needs land use control. but unpopular***
- ***Land use control needs Transdisciplinary Approach (TDA).***
- ***TDA is All stakeholders working together***
 - ***With cooperation*** among disciplines and sectors especially with academia, between central and local governments, within governments, with residents, NGOs and private sect.
 - ***With transparency*** in information exchanges and on decision making processes,
 - ***With scientific knowledge-based DM***

An aerial photograph of a town completely surrounded by floodwater. A bridge crosses the river, and some buildings are visible on the islands of land. The sky is overcast.

安きにありて危うきを思う
居安思危 Be aware of risk while we are safe

思えば則ち備えあり
思則有備 Awareness leads us preparedness

備えあれば患いなし
有備無患 Preparedness leaves us no regret

「春秋」左氏伝

Source: Zuo Qiuming “Zuoshi Commentary”
in Confucius ed. “Spring and Autumn”, 480BC

*All stakeholders working together is the only
way to make societal transformation
possible with scientific decision making.*

preparedness for floods

Especially

- Inter-sectoral & disciplinary cooperation
 - **River, urban**, coast, forest, park, agriculture, road, media, natural, social, cultural sciences,
- Central and local governments cooperation
 - **National** gov'ts (agencies, regional offices), **local** gov'ts (provinces, cities, towns, villages)
 - With communities, residents, NGOs, private sector