

# 2<sup>nd</sup> Workshop on Risk-sensitive Land Use and Urban Development Planning

**December 09, 2016**  
**JICA Project Team**

## **Contents of Presentation**

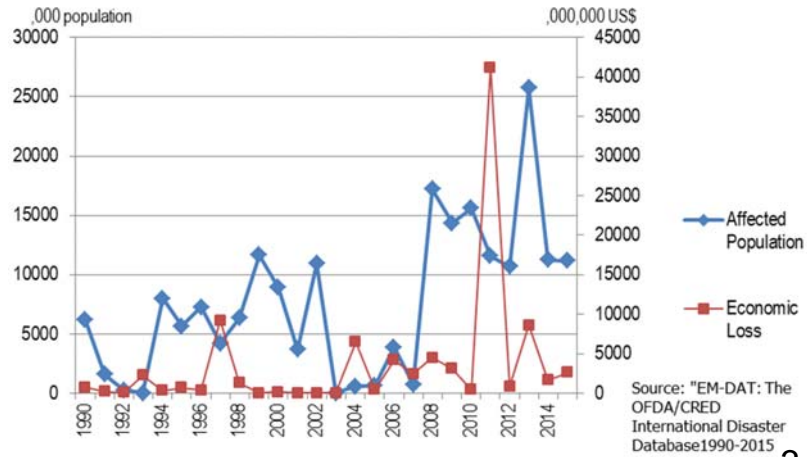
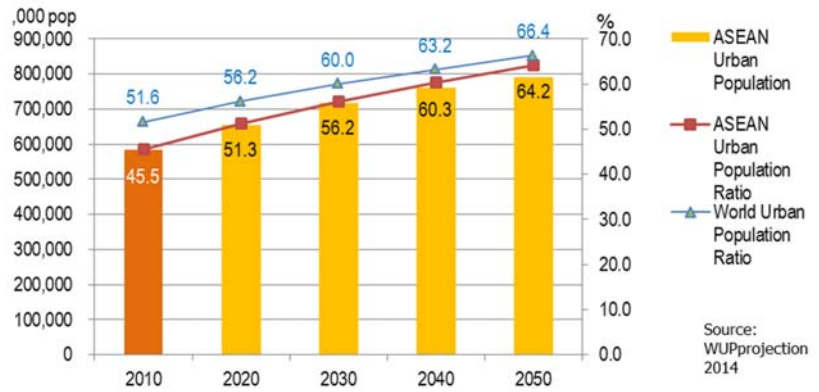
### **PART-1**

1. Introduction
2. Roles and Functions of Land Use & Urban Planning in Disaster Risk Reduction (DRR)
3. Challenge and Approaches to Risk-sensitive Urban Planning

# 1. Introduction

## Urbanization & Disaster Risk Increase in ASEAN

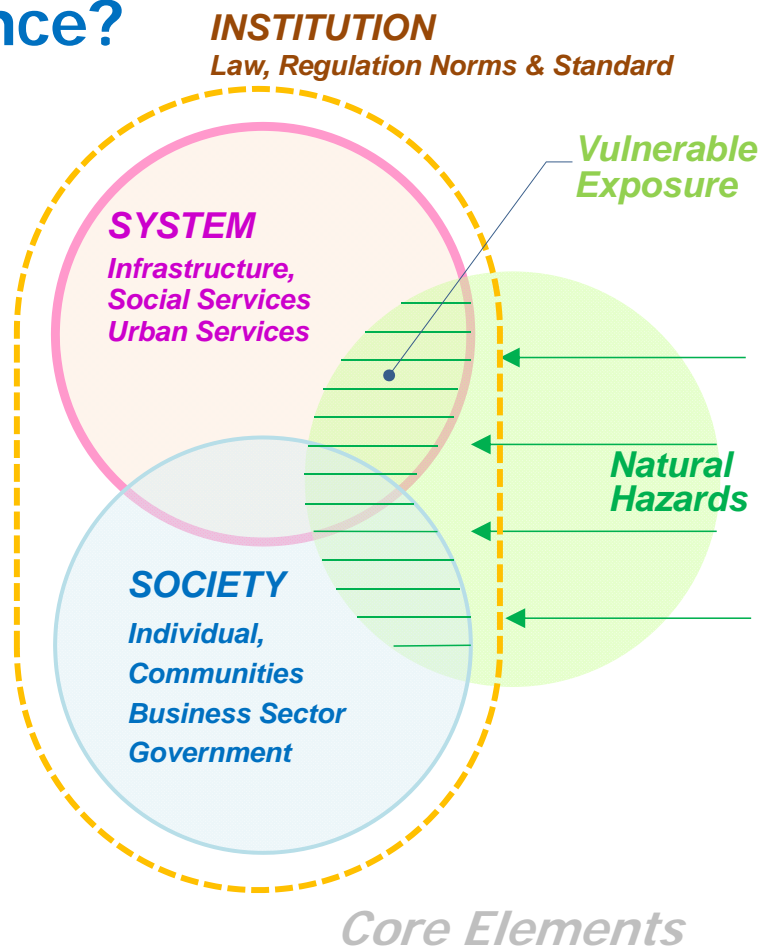
- The Asian region including China and India would be predominant growth zone, while urban population ratio in ASEAN would become 64% at 2050
- Natural disasters have been increased in ASEAN countries in terms of affected population and economic loss
- Urban centers in ASEAN countries were/would be counted as large potential areas with assets suffered from natural hazards.



3

## What is Urban Resilience?

**Resilience** is the ability of a system, society supported by institutions exposed to (natural) hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structure



World Bank: Building Urban Resilience 2012

4

# Framework for Risk Sensitive Planning: SENDAI Framework on Disaster Risk Reduction

## Priority Actions (SENDAI Framework)

1. **Understanding** Disaster Risk
2. **Strengthening** Disaster Risk Governance
3. **Investing** in Disaster Risk Reduction for Resilience
4. **Enhancing** Disaster Preparedness & **Building back better** in recovery

## By 2020

**Establishing DRR Strategies at National & Local Level + DONORS Assistances**

(Example: Japanese Government has funded for oversea's DRR 2015~18)

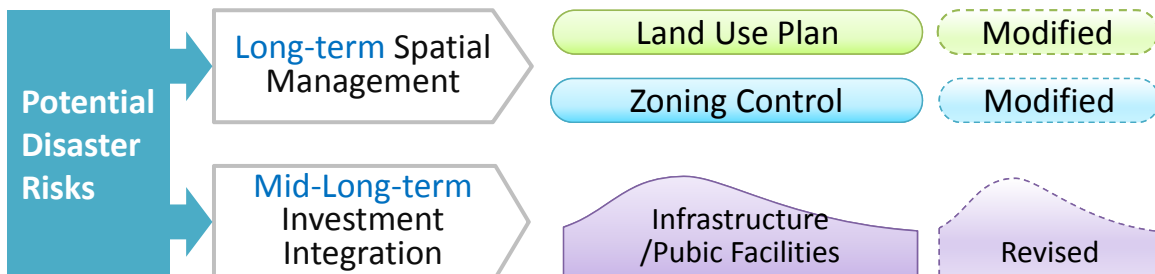
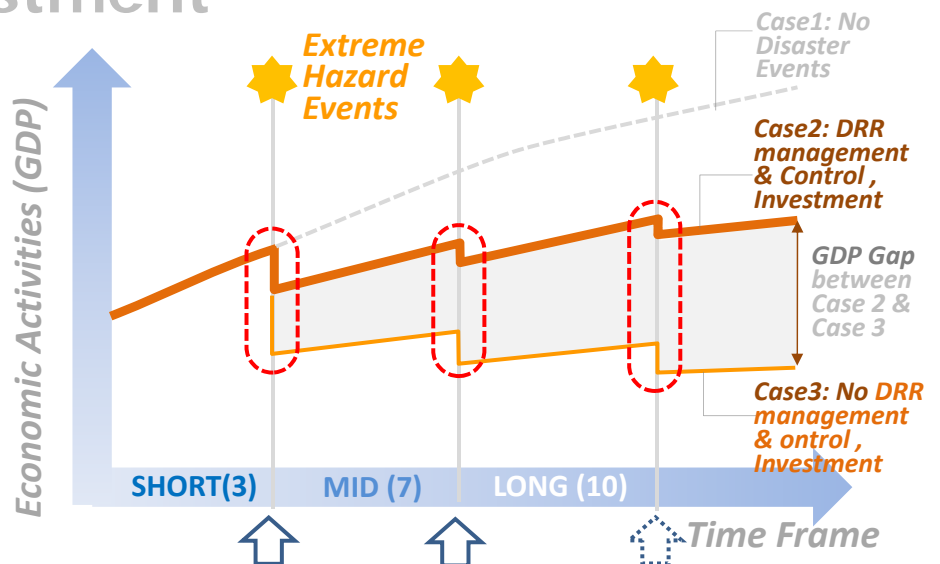
## By 2030

- Reduce global disaster mortality
- Reduce number of affected people globally
- Reduce direct **disaster economic loss**
- Reduce disaster damage to **critical infrastructure** and disruption of **basic services**, through **developing their resilience**
- Enhance international cooperation
- Increase the availability of and access to multi-hazard early warning systems and **risk information & assess**

5

# Long-term Effective Impacts by Integrated Planning & Investment

- **Minimize** social and economic(GDP) **loss** by long-term development plans and projects
- **Example:** 1us\$ DRR investment in advance makes 5~7 us\$ saving for post-disaster recovery cost



6

# 3. Role & Function of land use & Urban Planning in DRR

## Potential Natural Hazard Risks

### Long-term Approach

- Long-term **spatial organization** to prevent and mitigate potential natural disaster risks
- **Manage and control physical features** for social and economic activities on the ground **effectual** to prevent and mitigate natural disaster risks for long-term period
- **Integrate and organize** urban development **measures & resources** for disaster risk reduction

7

## Resilient Spatial Organization by land use planning

### BASES / CENTERS

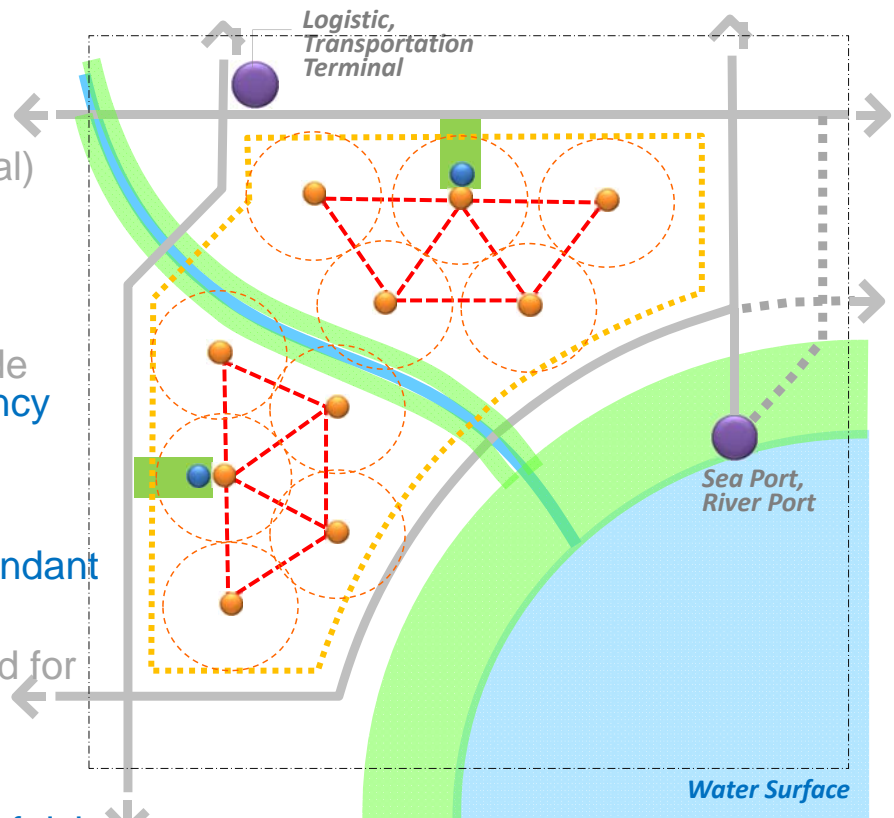
- Public facilities (school, hospital) covering daily activities areas
- Refuge and Open Space for evacuation in emergency
- Logistic and transportation node for daily activities and **emergency delivery base/centers**

### NETWORKS

- Road & transportation by **redundant network** linking with bases
- - - Evacuation route to be secured for evacuation in emergency

### USE AREA DISTRIBUTION

- Settlement allocation **outside of risk area** with appropriate **density**
- **Green buffer** for natural hazard prone areas



8

# Spatial Control and Management

## ZONING CONTROL

 Settlement growth control for carrying capacity of lands with natural hazard risk areas

 Overlay development control regulations for natural hazard risk and environmental protection

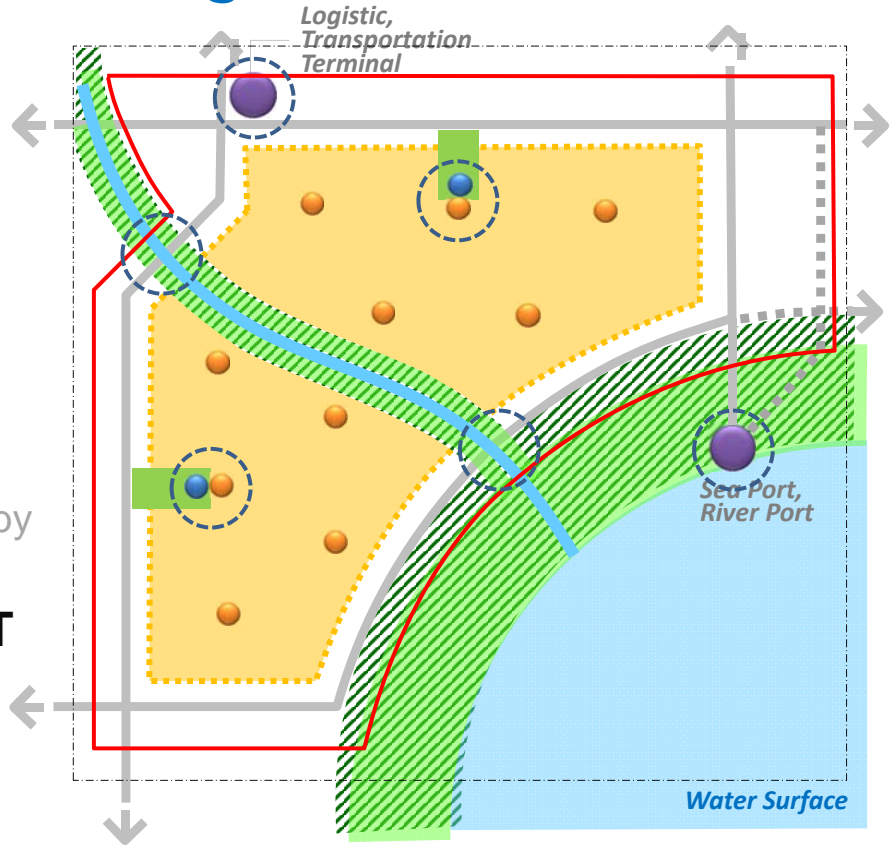
## BUILDING REGULATIONS

 Building regulations to be strengthened and familiarized by hazard-resistance standards

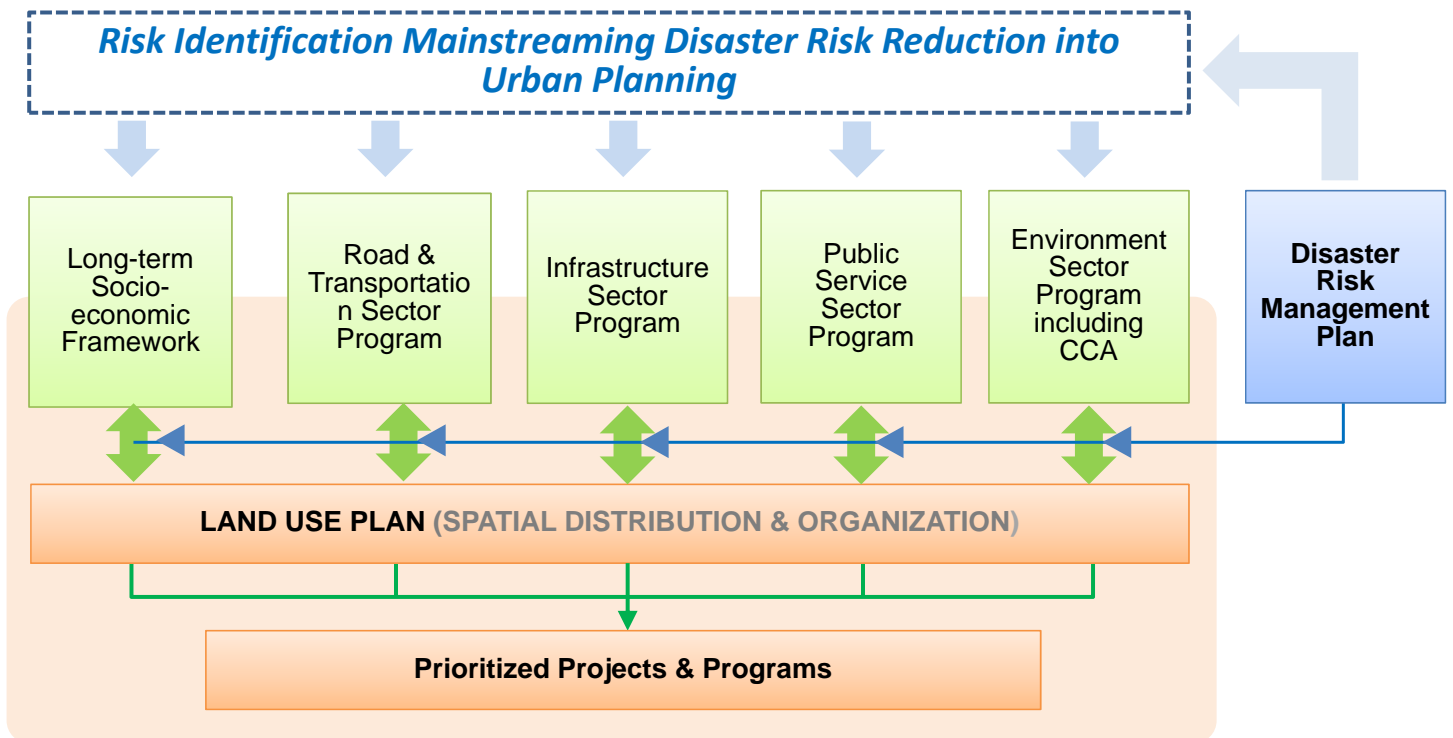
## EFFECTIVE MANAGEMENT

 Key infrastructure and public facilities to be strengthened as priority mitigation measures

Coping Capacity improvement to address adverse conditions by natural disasters



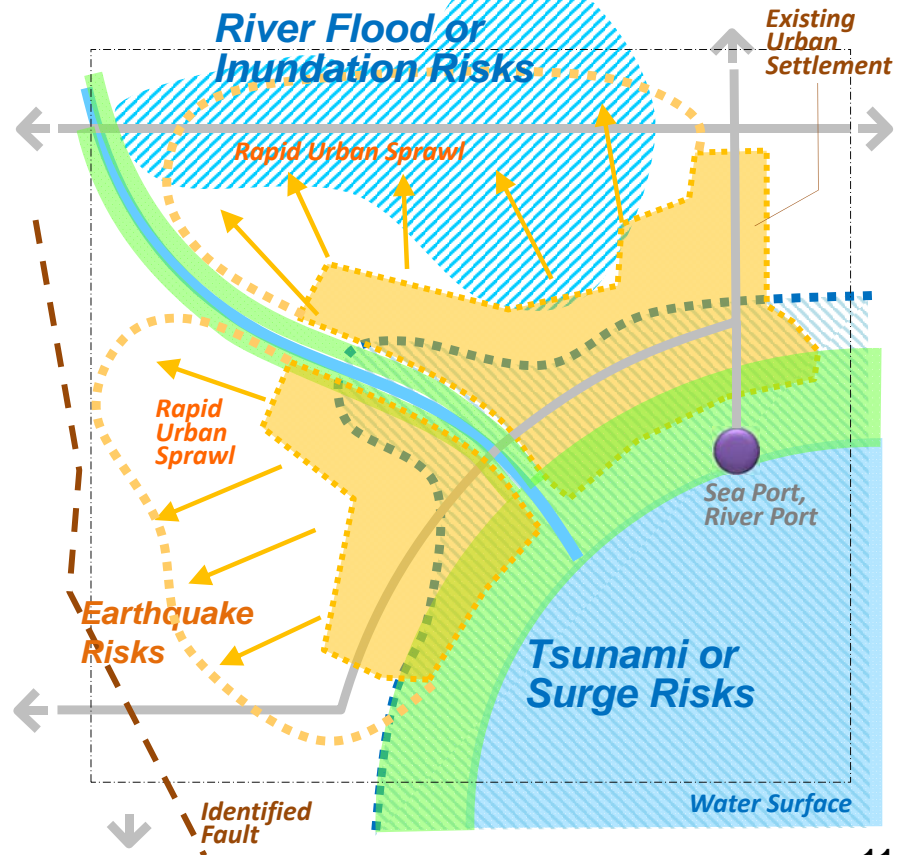
# Integrate and organize urban development measures & resources



### 3. Challenges and Approaches to Risk-sensitive Urban Planning

## Growing Cities in ASEAN facing Hazard Risks

- Rapid urban sprawl under pressures of population increase and economic growth
- Spatial expansion and its demand into hazard risk areas and existing settlement with hazards
- Economic developments suffered and stagnant by natural hazards due to infrastructure damages
- Insufficient urban service and administrative capacities to manage urban growth and natural hazard increase



11

## Typical Issues of Cities exposed by Natural Hazard Intensity

Typological Urban Areas in ASEAN Cities		Urban Planning & Development Issues on Natural Disasters	
		Severe Hazard Risk Prone Area	Frequent & Light Hazard Prone Area
Existing Urban Area	Successive (traditional) urban settlement	▲ ◆ ●	
	Planned/organized settlement	■ ▲ ◆	▲ ◆
	Organized industrial area	■ ▲ ◆	▲ ◆
	Unplanned or illegal settlement		▲ ●
Urbanization Potential Area	New / Planned Settlement	■ ▲	▲ ◆
	New / Planned Industrial Area	■ ▲	▲ ◆

ISSUES  
Likely  
Happened

- Inappropriate Land Use Planning and Urban Service Allocation
- Insufficient Development Control or Incentives for Construction
- ▲ Inefficient Disaster Response/Facilities Provision
- ◆ Insufficient Hazard-resistant Infrastructure Design and Provision (transportation, utilities, public facilities=administration, hospital, education, industrial estates, etc.)

12

# Urban Planning & Development Measures contributing to DRR

Key Categories for Disaster Risk Reduction (DRR)		At Risk	Urban Planning & Development Tools				
			LUP	DCI	PFD	URD	BGR
1. Risk Avoidance and Elimination		No	●	●	--	--	--
2. Risk (or loss) Reduction	2.1 Prevention ( <b>completely</b> ) from risks	Yes	●	●	◎	--	◎
	2.2 Mitigation of risks ( <b>if difficult prevention</b> )	Yes	◎	●	●	●	●
	2.3 Preparedness (for <b>response &amp; recovery</b> )	Yes	◎	◎	●	◎	--
	2.4 Segregation or alteration of exposures	Yes	◎	●	●	●	●
3. Risk Sharing and/or Transfer (risk finance)		Yes	--	--	--	◎	--
4. Risk Retention and Acceptance ( <b>do nothing</b> )		Yes	--	--	--	--	--

Urban Planning & Development Measures/ Tools

**LUP:** Land Use Planning (use distribution and allocation)

**DCI:** Development/Use Control or Incentives for building (Zoning)

**PFD:** Public Facilities/Infrastructure Designation / Development

**URD:** Urban Redevelopment / Urban Renewal

**BRG:** Building Regulation (structure, disaster resistance measures)

Legend: ● = Effective, ◎ = Applicable partially, -- = not applicable

13

## Contents of Presentation

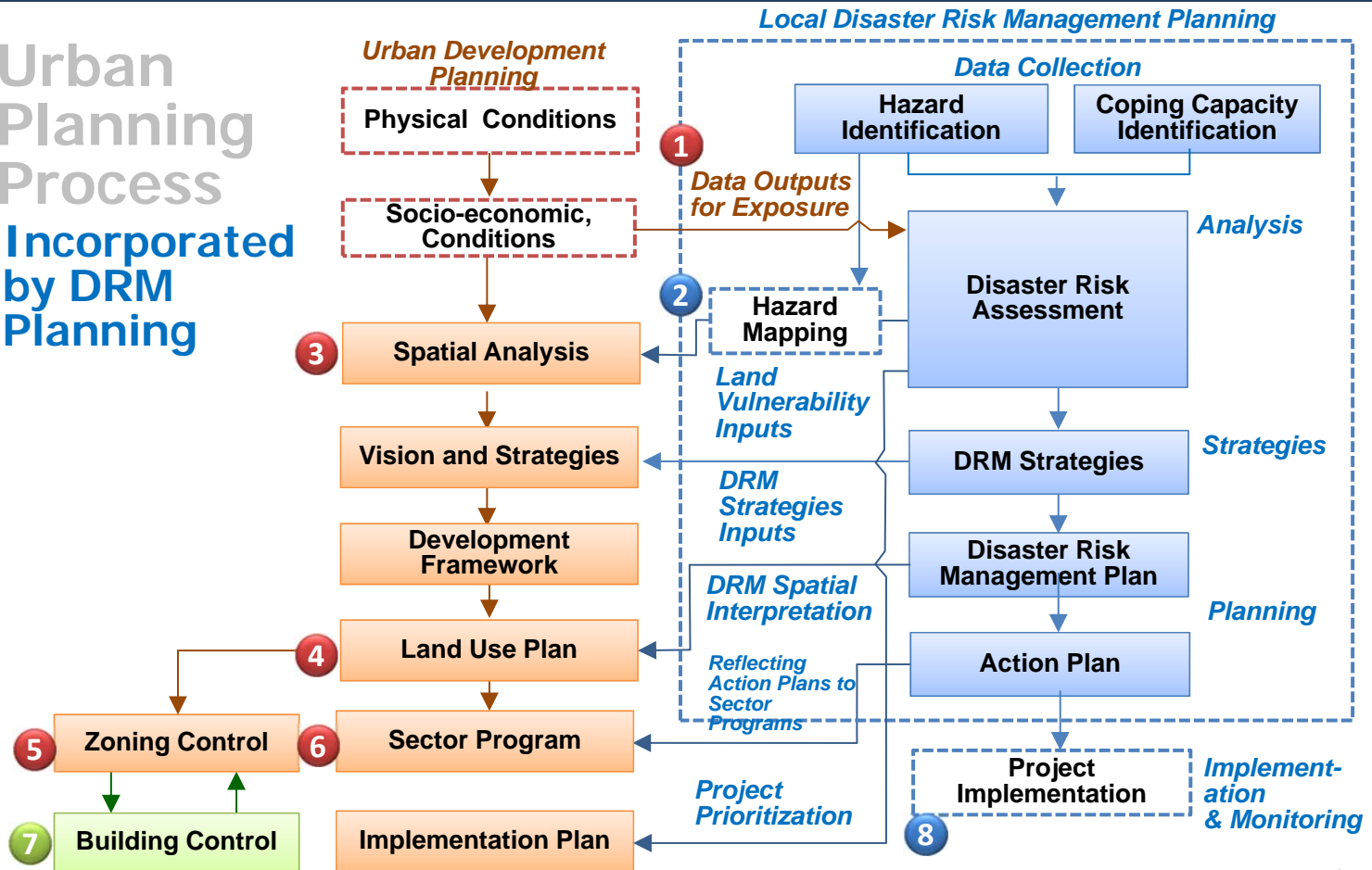
### PART-2

#### 4. Step-wise Risk-sensitive Urban Planning and Examples

14

# 4. Step-wise Risk-sensitive Urban Planning & Examples

## Urban Planning Process Incorporated by DRM Planning



15

## 1 Urban Information Inputs for assumption of exposed assets in Risk Assessment

Urban Information/Data Inputs for Potential Exposed Assets Analyses		Key Analyses Components in Risk Assessment		
		Hazards/ Risk Mapping	Fragility/ Function Curve	Damage /its Distribution
Natural Conditions	Natural (topo, resources, etc)	●	--	--
	Vulnerable environment (protected area)	●	--	--
	Natural hazards records and tracks	●	●	◎
Socio-economic	Population (density, distribution)	◎	●	●
	Economic (products, enterprises, etc)	◎	●	●
Physical Assets	Buildings (location, height, structure)	●	●	●
	Heritages (cultural and historical assets)	●	◎	◎
Infrastructure for Response	Utilities (elec. water, telecom, etc)	●	◎	●
	Key public facilities (adm, hosp, school)	●	◎	●
	Road and transportation (node, network)	●	◎	●

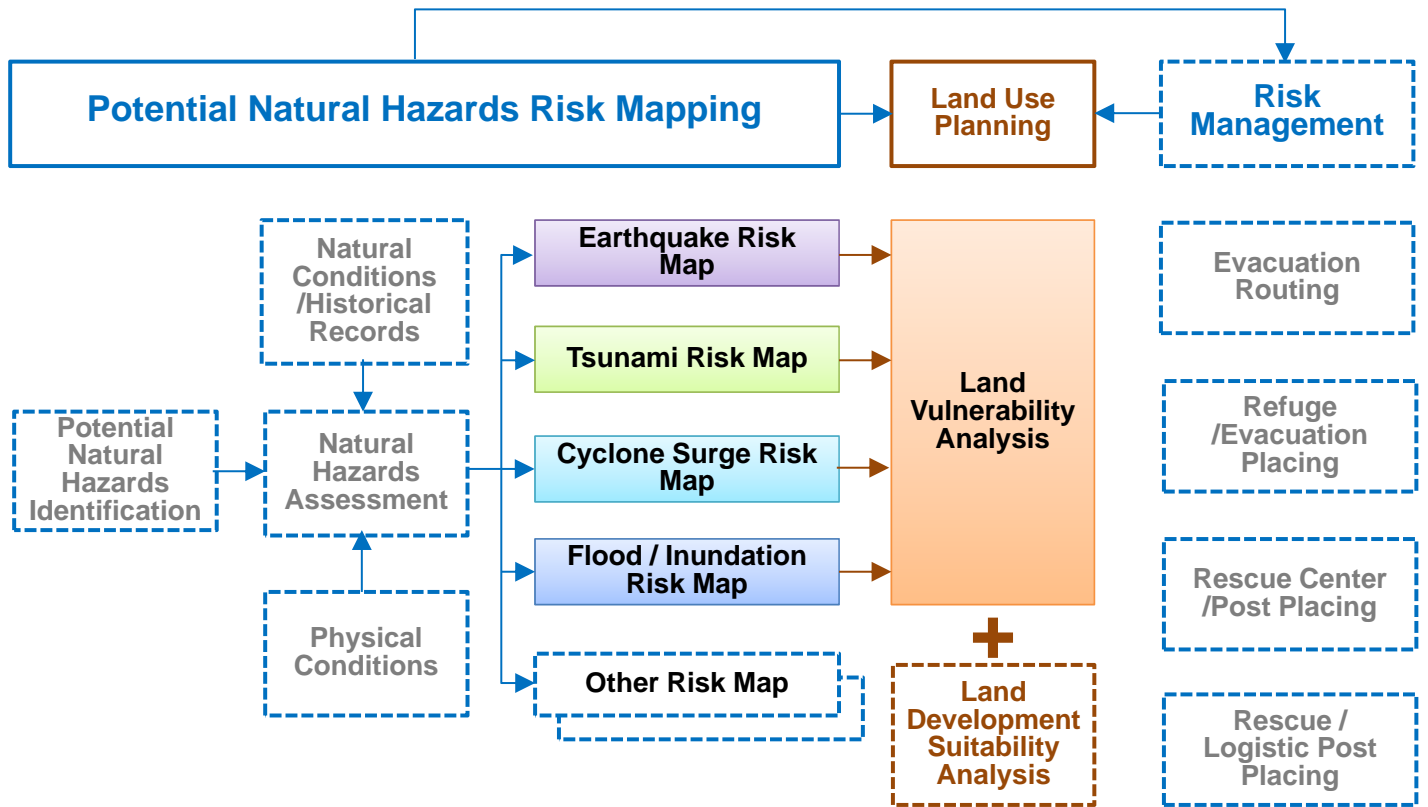
Legend: ● = Compulsory, ◎ = Necessary partially, -- = not applicable

\* ●/◎ = Information and data are archived by Disaster Risk Management

16

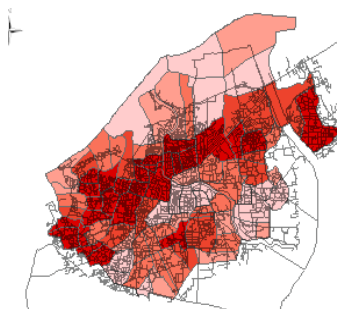
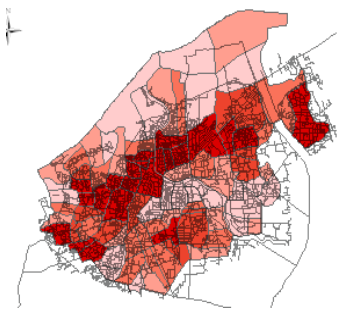
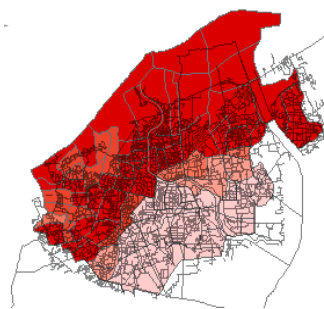


## 2 Hazard Mapping for Appropriate Spatial Analysis and Resilient Land Use Planning



17

## 2 E Example 1: Hazard Mapping for Aceh



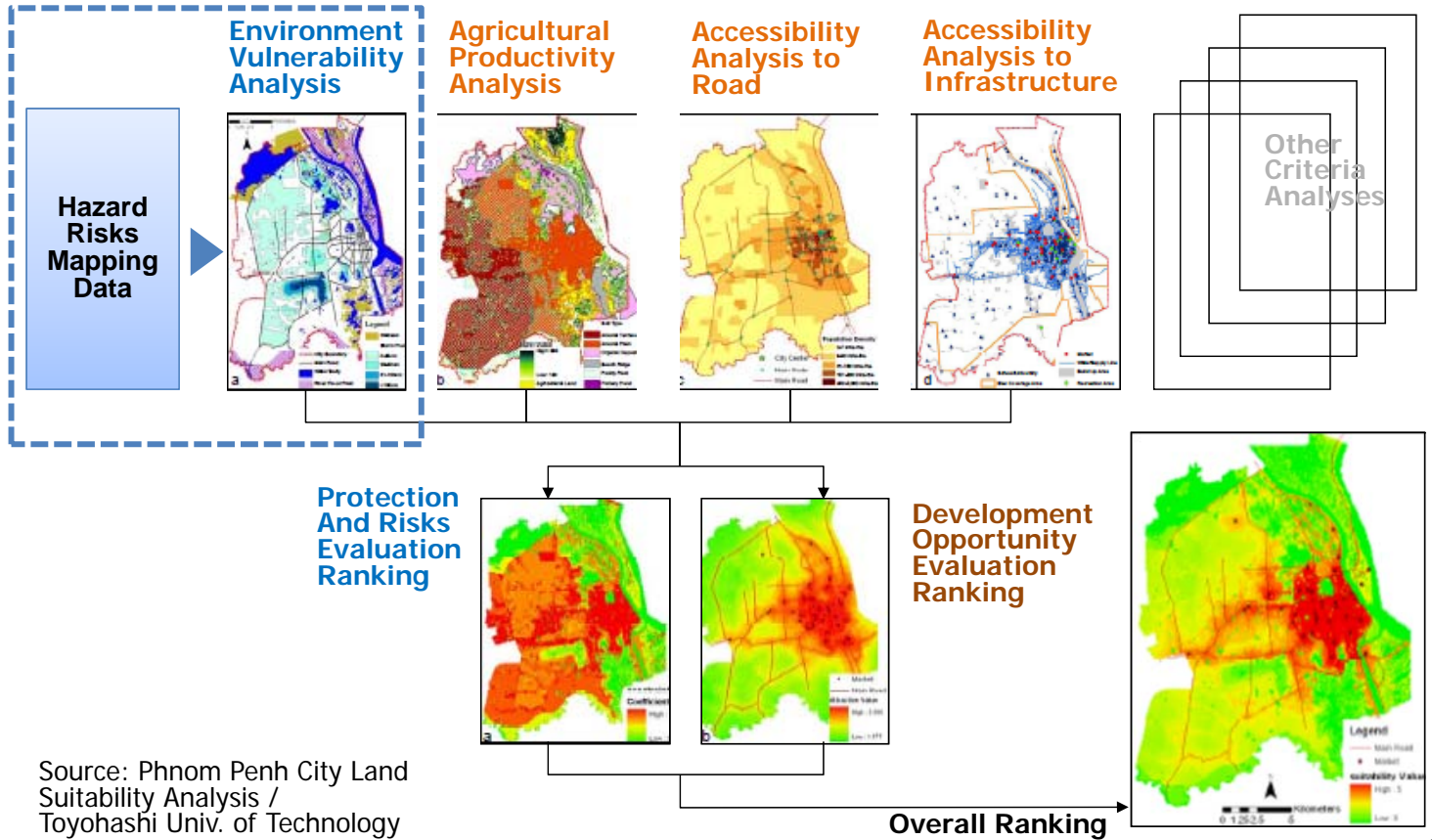
### Legend

- Very high hazard risk
- High
- Medium
- Low
- Very low

Source: The Study on The Urgent Rehabilitation & Reconstruction Plan for Banda Aceh City / JICA

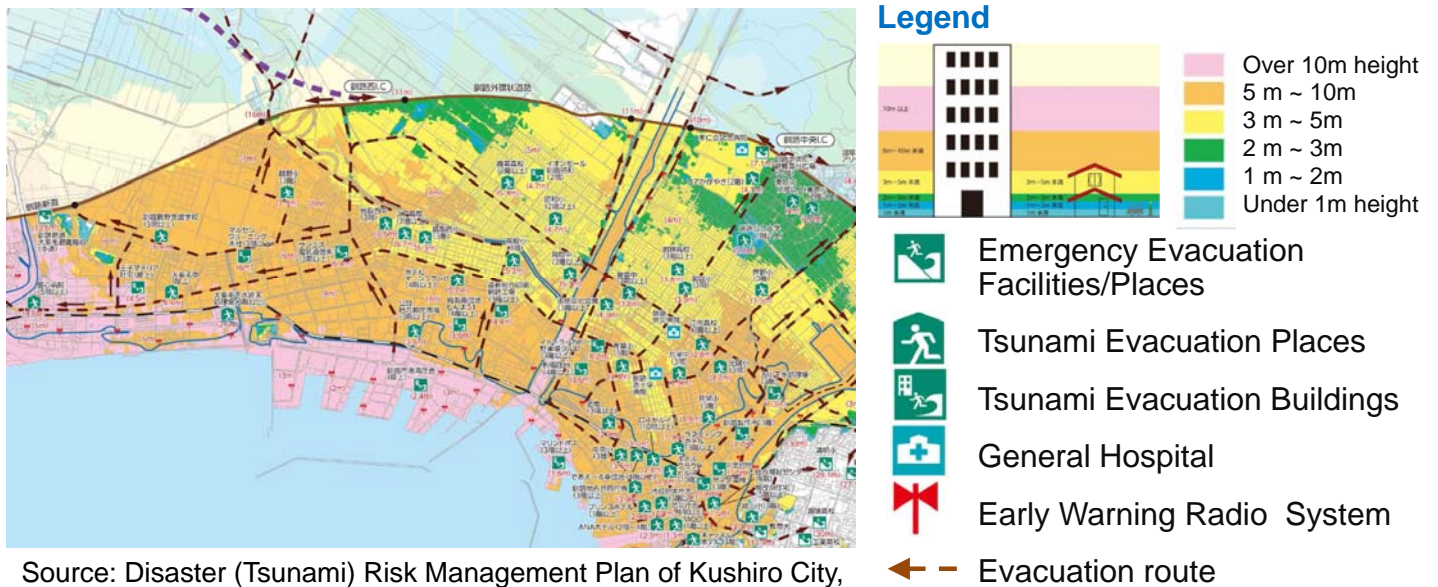
18

# 3 E Eg. Spatial Analysis for Land Use Plan utilizing Hazard Risk Data (Phnom Penh)



Source: Phnom Penh City Land Suitability Analysis / Toyohashi Univ. of Technology

# 2 E Example 2: Hazard Map Utilization for A Disaster Risk Management Plan/Project



Source: Disaster (Tsunami) Risk Management Plan of Kushiro City, Japan



Early Warning Sign for Tsunami Water Height Japan



Evacuation Route Sign for Tsunami, Banda Aceh Indonesia



Evacuation Facility for Tsunami, Banda Aceh Indonesia

# 4 Disaster Risk Reduction into Land Use Planning Measures

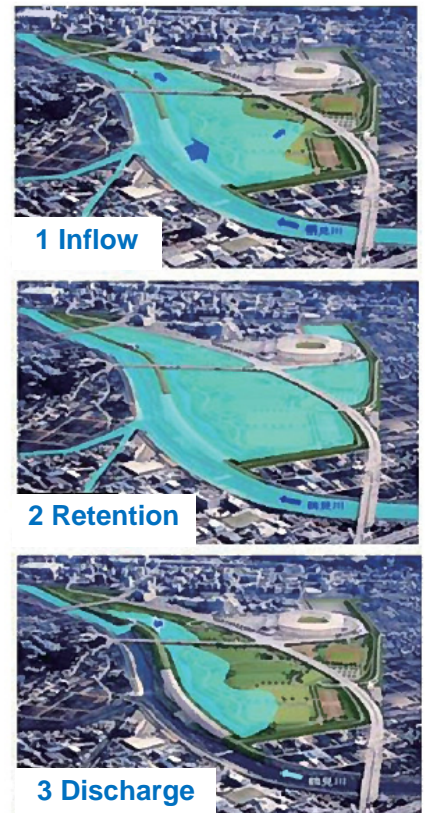
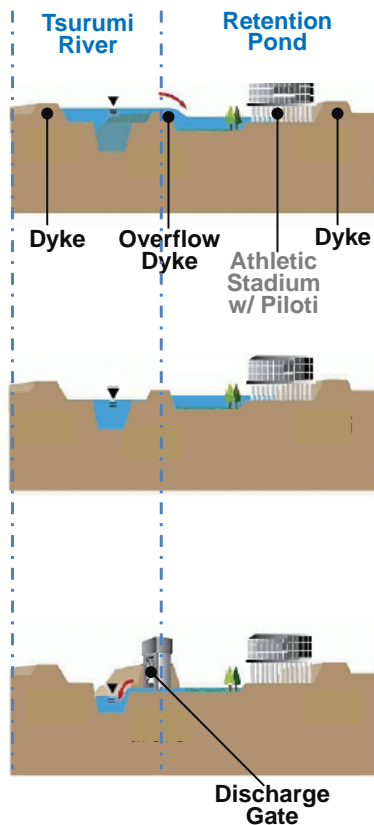
## Disaster Risk Reduction Stages

Key Land Use Planning Measures for Resilient Cities		PR	MT	RES	RH
1. Land use allocation	1.1 Settlement avoiding high hazard risk area	●	◎	--	●
	1.2 Securing key public facilities (hosp, edc, etc)	◎	●	●	●
	1.3 Providing facilities for prevention/mitigation	●	●	◎	●
	1.4 Securing efficient & resilient industrial areas	●	◎	--	●
	1.5 Securing minimum open spaces	◎	●	●	●
	1.6 Retaining natural environment	●	●	◎	◎
2. Land use intensity	2.1 Mitigating exposure volume by low density	--	●	--	●
	2.2 Promoting low intensity use by open space	◎	●	●	●
3. Land use Classification	3.1 Introducing specific land use for DRR	--	●	●	●
	3.2 Introducing multi-purpose use for DRR	--	●	●	●

Legend: ● = Essential role, ◎ = Supportive role, -- = not applicable  
 PR = Prevention, MT = Mitigation, RES = Response, RH = Rehabilitation, Reconstruction

# 4 E Eg. Land Use Allocation by Multi-purpose Public Facilities with retention pond

- Water inflowing to recreational open space beyond overflow dyke
- Water is impounded in the open space temporarily
- Water is gradually discharged back to the river through the gate

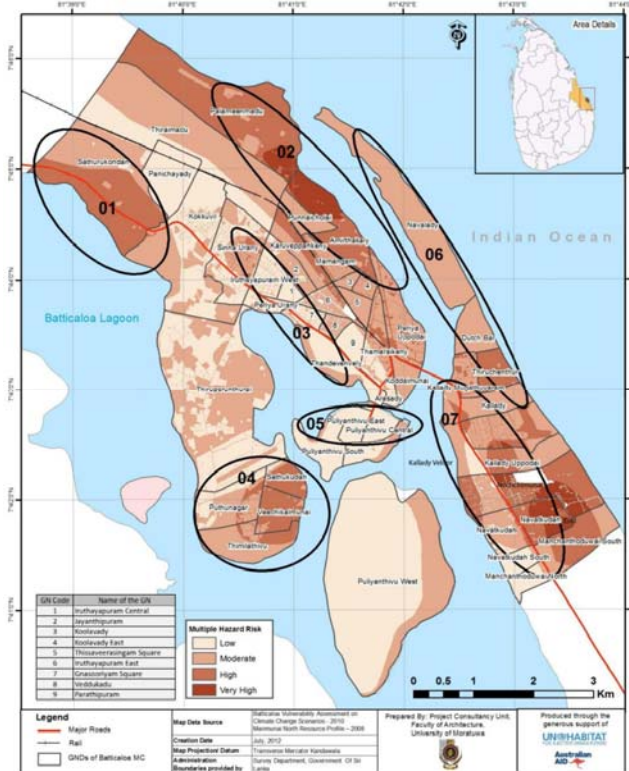


Source: Ministry of Land, Infrastructure, Transport & Tourism, Japan

**4 E**

# Eg. Land Use Change/Intervention from Settlement to Open Space

## Hazard Risk Assessment Mapping



## Proposed Land Use with Green Belt



Source: Batticaloa Disaster Risk Reduction and Preparedness Plan/ Sri Lanka

# 5 Development Control System

## Urban Growth Control Boundaries

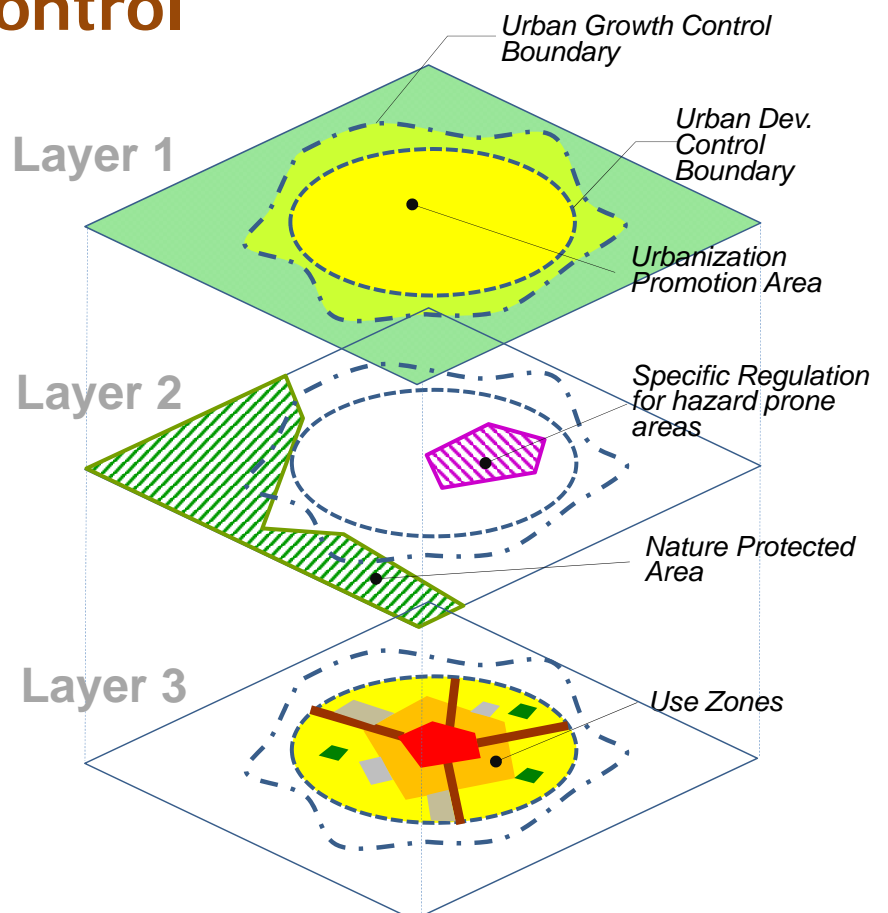
- Development restriction by boundaries
- Certain urban services within Boundary to be promoted

## Specific Control Areas

- Development restriction and management in the specific control area

## Zoning Control

- Development permit for use and form, density by each use zone



## Building Control

- Construction permit and control by all buildings

# 5 Disaster Risk Reduction into Development Control & Incentive Measures

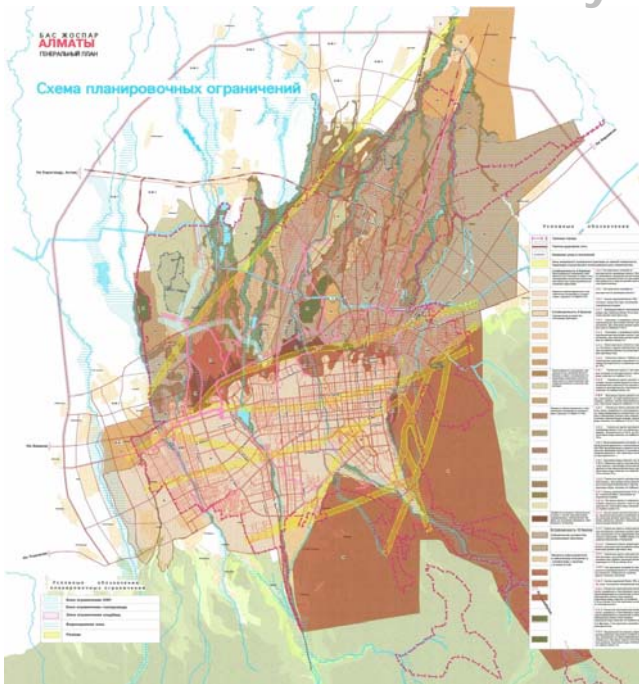
## Disaster Risk Reduction Stages

Key Development Control & Incentive Measures for Resilient Cities		PR	MT	RES	RH
1. Urban Growth Control	1.1 Ensuring urban growth control boundary	●	◎	--	●
	1.2 Strengthening urban dev. control boundary	●	◎	--	●
2. Zoning Control and Regulation	2.1 Land/building use regulation	●	●	◎	●
	2.2 Bulk / form regulation (setback, height, etc)	◎	●	◎	●
	2.3 Designation of public facilities/infrastructure	◎	●	●	●
	2.4 Designation of environment protection area	◎	●	◎	●
3. Specific Overlay Cont.	3.1 Regulation in risk areas for construction	●	◎	--	●
	3.2 Specific building form regulation in risk area	◎	●	◎	●
	3.2 Environmental area/resource protection	●	●	◎	●
4. Urban Development Incentives	4.1 Measure to promote resettlement (risk area)	●	◎	--	●
	4.2 Measure to promote urban redevelopment	◎	●	◎	●

Legend: ● = Essential role, ◎ = Supportive role, -- = not applicable  
 PR = Prevention, MT = Mitigation, RES = Response, RH = Rehabilitation, Reconstruction

# 5 E Eg. Zoning Map in consideration with natural hazard (earthquake)

Zoning Category for construction regulations by levels of seismic intensity



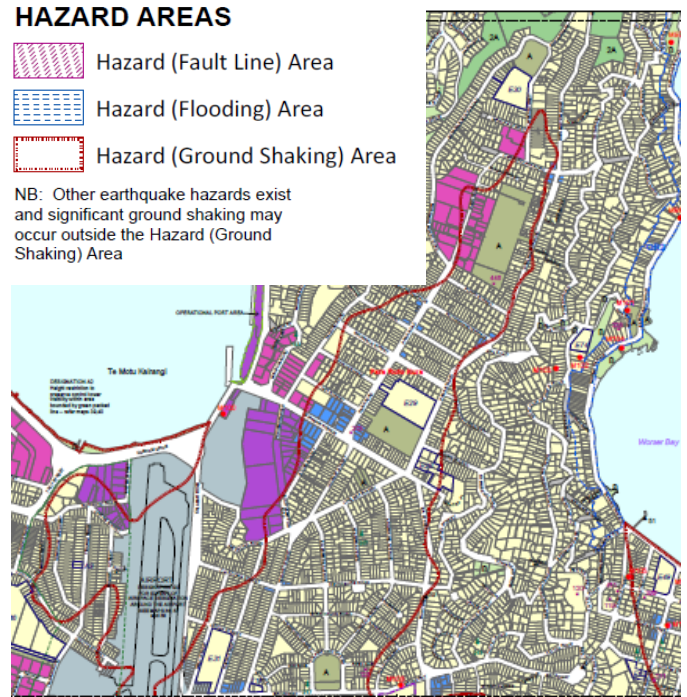
Source: Zoning Plan for Almaty City, Kazakhstan

Zoning by Indicative Hazard Area

### HAZARD AREAS

- Hazard (Fault Line) Area
- Hazard (Flooding) Area
- Hazard (Ground Shaking) Area

NB: Other earthquake hazards exist and significant ground shaking may occur outside the Hazard (Ground Shaking) Area

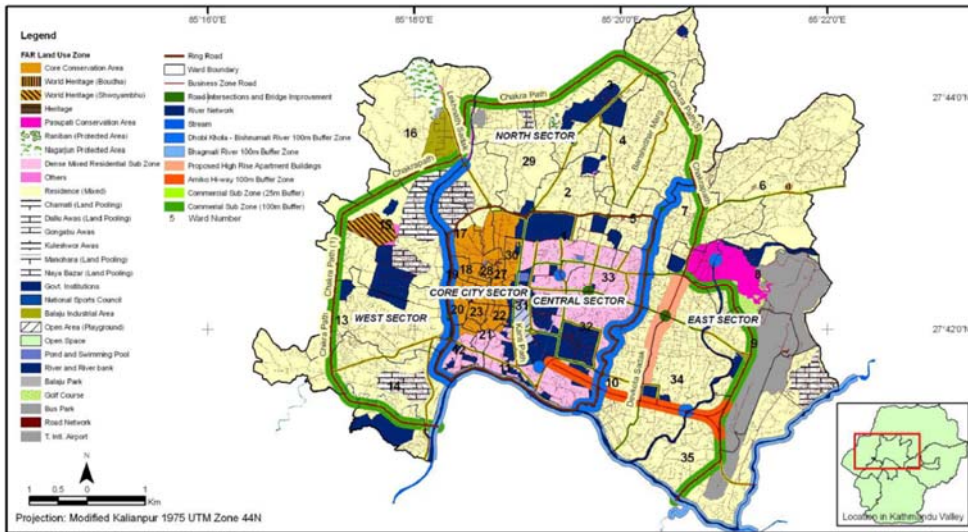


Source: Zoning Plan for Wellington City, New Zealand

# 5 E

## Zoning Plan based on Seismic Risk Assessment

### Zoning Plan for Kathmandu Metropolitan City

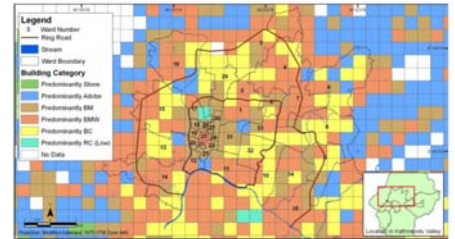


#### Key Zoning Measures

- Buffer zones (river, highway: 100m)
- Buffer zones (commercial corridor 25m/100m)
- Core conservation area

Source: Risk-Sensitive Land Use Plan (RSLUP) for Kathmandu and the accompanying Sectoral Profile and Preliminary Zone Ordinance/UNDP 2012

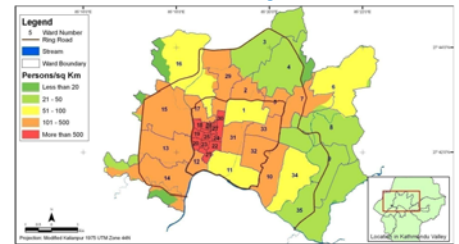
#### Building Material Inventory



#### Building Damage Assessment



#### Death Toll Density



Source: Kathmandu Valley Earthquake Risk Management Project JICA

# 6 E

## Eg. Resettlement Program for Flood-prone Areas

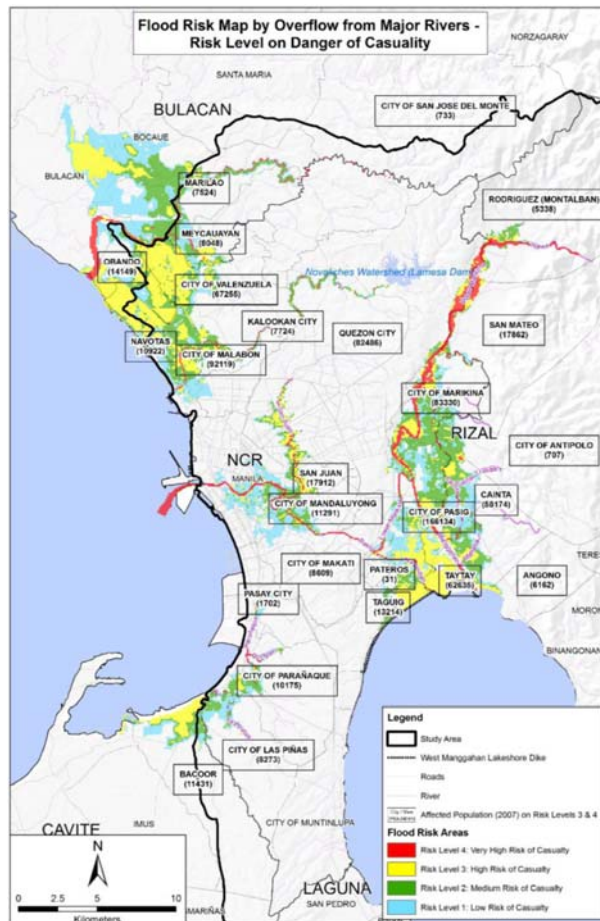
#### Project Profile

- Urban Renewal Area Program in Pasig River
- 911 housing units
- 20~25 s.q.m/unit
- 5,000 families

#### Various Public/Private Funding

Source: Master Plan for Flood Management in Metro Manila and Surrounding Areas 2012

### Flood Risk Maps in Metropolitan Manila



#### Existing Settlements along Rivers



#### Private Sector Involvement in the Resettlement Program by Various Funds



#### Construction of Housing

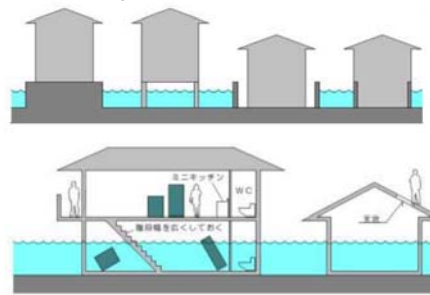


Source: National Housing Authority, Philippines

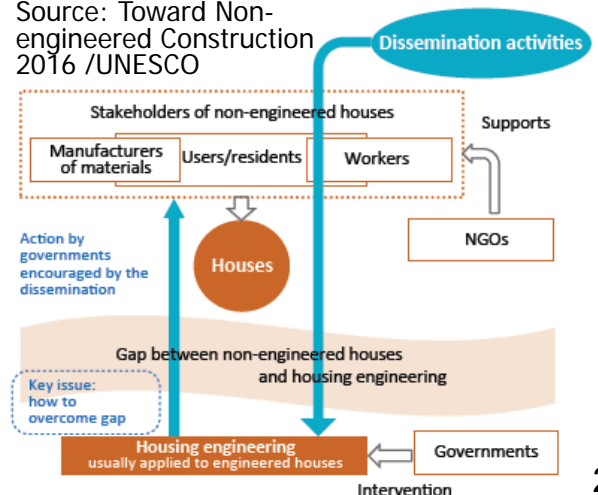
## 7 E Eg. Disaster Risk Reduction into Building Regulation Measures

- Prioritizing reinforcement for **Public Facilities** Building Structure
- Prioritize **intervention** by building regulation and **additional requirement** in hazard risk areas
- Promotion of **Resilient Non-engineered construction**
- Providing **database** for existing building conditions

Additional requirement for building regulation In flood prone area



Source: Toward Non-engineered Construction 2016 /UNESCO



29

## 8 E Eg. Financial Support System for Resettlement in hard risk area

### Buyout & Acquisition Program in NY, USA

- To purchase the properties of interested homeowners whose homes were **substantially damaged or destroyed**, but including **repaired home** by Superstorm Sandy, Hurricane Irene or Tropical Storm Lee.
- To address those who live in areas that **regularly put homes, residents and emergency responders at high risk** due to repeated flooding.
- Program by: FEMA Hazard Mitigation Grant Program (HMGP)
- Supported by: HUD Community Development Block Grant Program (CDBG)

30

**Thank you very much  
for your attention.**