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.

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
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 Assurances
  
- 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

Long-term Effective Impacts by Integrated Planning & Investment

- Minimize social and economic (GDP) loss by long-term development plans and projects

- Example: 1 US$ DRR investment in advance makes 5~7 US$ saving for post-disaster recovery cost

**Potential Disaster Risks**

- Long-term Spatial Management
- Mid-Long-term Investment Integration
- Land Use Plan
- Zoning Control
- Infrastructure/Public Facilities

**Time Frame**

- GDP Gap between Case 2 & Case 3
- Case 1: No Disaster Events
- Case 2: DRR management & Control, Investment
- Case 3: No DRR management & control, investment
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

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**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
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

Risk Identification Mainstreaming Disaster Risk Reduction into Urban Planning

- Long-term Socio-economic Framework
- Road & Transportation Sector Program
- Infrastructure Sector Program
- Public Service Sector Program
- Environment Sector Program including CCA

Disaster Risk Management Plan

LAND USE PLAN (SPATIAL DISTRIBUTION & ORGANIZATION)

Prioritized Projects & Programs
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

Typical Issues of Cities exposed by Natural Hazard Intensity

<table>
<thead>
<tr>
<th>Typological Urban Areas in ASEAN Cities</th>
<th>Severe Hazard Risk Prone Area</th>
<th>Frequent &amp; Light Hazard Prone Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Urban Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successive (traditional) urban settlement</td>
<td>▲ ▲ ●</td>
<td></td>
</tr>
<tr>
<td>Planned/organized settlement</td>
<td>□ ▲ ●</td>
<td>▲ ●</td>
</tr>
<tr>
<td>Organized industrial area</td>
<td>□ ▲ ●</td>
<td>▲ ●</td>
</tr>
<tr>
<td>Unplanned or illegal settlement</td>
<td>▲ ●</td>
<td></td>
</tr>
<tr>
<td>Urbanization Potential Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New / Planned Settlement</td>
<td>□ ▲ ●</td>
<td>▲ ●</td>
</tr>
<tr>
<td>New / Planned Industrial Area</td>
<td>□ ▲ ●</td>
<td>▲ ●</td>
</tr>
</tbody>
</table>

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.)
# Urban Planning & Development Measures contributing to DRR

## Key Categories for Disaster Risk Reduction (DRR)

<table>
<thead>
<tr>
<th>Category</th>
<th>At Risk</th>
<th>Urban Planning &amp; Development Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Avoidance and Elimination</td>
<td>No</td>
<td>LUP  DCI  PFD  URD  BGR</td>
</tr>
<tr>
<td>Risk (or loss) Reduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention (completely) from risks</td>
<td>Yes</td>
<td>●● ●</td>
</tr>
<tr>
<td>Mitigation of risks (if difficult prevention)</td>
<td>Yes</td>
<td>○ ● ●● ●</td>
</tr>
<tr>
<td>Preparedness (for response &amp; recovery)</td>
<td>Yes</td>
<td>○ ○ ●● ●</td>
</tr>
<tr>
<td>Segregation or alteration of exposures</td>
<td>Yes</td>
<td>○ ○ ●● ●</td>
</tr>
<tr>
<td>Risk Sharing and/or Transfer (risk finance)</td>
<td>Yes</td>
<td>-- -- ○ --</td>
</tr>
<tr>
<td>Risk Retention and Acceptance (do nothing)</td>
<td>Yes</td>
<td>-- -- -- --</td>
</tr>
</tbody>
</table>

### 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

## Contents of Presentation

### PART-2

4. Step-wise Risk-sensitive Urban Planning and Examples
### Urban Information Inputs for assumption of exposed assets in Risk Assessment

#### Urban Information/Data Inputs for Potential Exposed Assets Analyses

<table>
<thead>
<tr>
<th>Natural Conditions</th>
<th>Hazards/ Risk Mapping</th>
<th>Fragility/ Function Curve</th>
<th>Damage /its Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural (topo, resources, etc)</td>
<td>●</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Vulnerable environment (protected area)</td>
<td>●</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Natural hazards records and tracks</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Socio-economic</th>
<th>Hazards/ Risk Mapping</th>
<th>Fragility/ Function Curve</th>
<th>Damage /its Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (density, distribution)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Economic (products, enterprises, etc)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Assets</th>
<th>Hazards/ Risk Mapping</th>
<th>Fragility/ Function Curve</th>
<th>Damage /its Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings (location, height, structure)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Heritages (cultural and historical assets)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrastructure for Response</th>
<th>Hazards/ Risk Mapping</th>
<th>Fragility/ Function Curve</th>
<th>Damage /its Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities (elec. water, telecom, etc)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Key public facilities (adm, hosp, school)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Road and transportation (node, network)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

#### Key Analyses Components in Risk Assessment

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

* ○ / □ = Information and data are archived by Disaster Risk Management
2 Hazard Mapping for Appropriate Spatial Analysis and Resilient Land Use Planning

Potential Natural Hazards Risk Mapping

- Natural Conditions / Historical Records
- Potential Natural Hazards Identification
- Physical Conditions
- Natural Hazards Assessment

- Earthquake Risk Map
- Tsunami Risk Map
- Cyclone Surge Risk Map
- Flood / Inundation Risk Map
- Other Risk Map

Land Vulnerability Analysis

Land Use Planning

Risk Management

- Evacuation Routing
- Refuge / Evacuation Placing
- Rescue Center / Post Placing
- Rescue / Logistic Post Placing

Example 1: Hazard Mapping for Aceh

- Tsunami Risk
- Earthquake/Liquefaction Risk
- Flood (inundation) Risk

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

Source: The Study on The Urgent Rehabilitation & Reconstruction Plan for Banda Aceh City / JICA
Eg. Spatial Analysis for Land Use Plan utilizing Hazard Risk Data (Phnom Penh)

Example 2: Hazard Map Utilization for A Disaster Risk Management Plan/Project
### Disaster Risk Reduction into Land Use Planning Measures

#### Key Land Use Planning Measures for Resilient Cities

<table>
<thead>
<tr>
<th>Land Use Allocation</th>
<th>Disaster Risk Reduction Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1 Settlement</strong> avoiding high hazard risk area</td>
<td>PR: ●, MT: ●, RES: --, RH: ●</td>
</tr>
<tr>
<td><strong>1.2 Securing key public facilities</strong> (hosp, edc, etc)</td>
<td>PR: ●, MT: ●, RES: ●, RH: ●</td>
</tr>
<tr>
<td><strong>1.3 Providing facilities for prevention/mitigation</strong></td>
<td>PR: ●, MT: ●, RES: ●, RH: --</td>
</tr>
<tr>
<td><strong>1.4 Securing efficient &amp; resilient industrial areas</strong></td>
<td>PR: ●, MT: ●, RES: --, RH: ●</td>
</tr>
<tr>
<td><strong>1.5 Securing minimum open spaces</strong></td>
<td>PR: ●, MT: ●, RES: ●, RH: ●</td>
</tr>
<tr>
<td><strong>1.6 Retaining natural environment</strong></td>
<td>PR: ●, MT: ●, RES: ●, RH: ●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land Use Intensity</th>
<th>Disaster Risk Reduction Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1 Mitigating exposure volume by low density</strong></td>
<td>PR: --, MT: ●, RES: --, RH: ●</td>
</tr>
<tr>
<td><strong>2.2 Promoting low intensity use by open space</strong></td>
<td>PR: ○, MT: ●, RES: ●, RH: ●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land Use Classification</th>
<th>Disaster Risk Reduction Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.1 Introducing specific land use for DRR</strong></td>
<td>PR: --, MT: ●, RES: ●, RH: ●</td>
</tr>
<tr>
<td><strong>3.2 Introducing multi-purpose use for DRR</strong></td>
<td>PR: --, MT: ●, RES: ●, RH: ●</td>
</tr>
</tbody>
</table>

Legend: ● = Essential role, ○ = Supportive role, -- = not applicable

PR = Prevention, MT = Mitigation, RES = Response, RH = Rehabilitation, Reconstruction

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

Hazard Risk Assessment Mapping

Proposed Land Use with Green Belt

Source: Baticalloa Disaster Risk Reduction and Preparedness Plan/ Srilanka

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
Disaster Risk Reduction into Development Control & Incentive Measures

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

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

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**

Source: Zoning Plan for Wellington City, New Zealand
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

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

Flooding 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. 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

Source: Toward Non-engineered Construction 2016 /UNESCO

8. 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)
Thank you very much for your attention.