Practical methods for DRR investment acceleration through organizing DRR strategy in the local perspective
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01 – JICA’s Global Agenda for DRR and BBB

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Disaster Risk Factors

\[ R = H \times E \times V \]

Disaster is Multistage: Certain sequence among risk factors.
Extrinsic and Intrinsic factors of Disaster Risk

Disaster is Multi-dimension: Multi sector issues are involved.

- **Hazard and Exposure (Extrinsic)**
  - DRR measures to control hazard and exposure
    - Flood prevention: Improve flood control facilities, such as river levees and reservoir facilities
    - Exposure reduction: Improve town planning and ways of living to avoid damages by assuming possible flooding

- **Vulnerability (Intrinsic)**
  - Physical Vulnerability
  - Economic Vulnerability
  - Social Vulnerability

LNOB with disaggregation and capacity enhancement for the vulnerable.

Climate Change

(UNDP)
### Factors of Disaster Risk

<table>
<thead>
<tr>
<th>Disaster Risk</th>
<th>Component</th>
<th>Attributions</th>
</tr>
</thead>
</table>
| **Hazard**    | Hazard    | - Natural events  
|               |           | - Socio-natural events |
| **Vulnerability** | Exposure | - Temporal  
|               |           | - Spatial |
| **Susceptibility** |           | - Physical  
|               |           | - Economic  
|               |           | - Social  
|               |           | - Cultural  
|               |           | - Ecological  
|               |           | - Institutional |
| **Lack of Resilience** |           | - Capacity to anticipate  
|               |           | - Capacity to cope  
|               |           | - Capacity to recover |
| **Adaptation** |           | - Hazard intervention  
|               |           | - Vulnerability intervention  
|               |           | - Exposure reduction  
|               |           | - Susceptibility reduction  
|               |           | - Resilience improvement |

-Nagami et. al., (2020)

[https://www.jica.go.jp/jica-ri/ja/publication/fieldreport/l75nbg000019kzco-att/JICA-RI_FR_No.05.pdf](https://www.jica.go.jp/jica-ri/ja/publication/fieldreport/l75nbg000019kzco-att/JICA-RI_FR_No.05.pdf)
Present

- Disaster risk and actual damage associated with natural hazards are unequally imposed on developing countries.
- 56,500 deaths (1.16 per 100,000) and 3.7 billion yen (0.197% of GDP) annually among developing countries (average 2005-2017).

Trend

- Increasing hazard frequency and severity by Climate Change.
- Cross-boundary cascading damages due to globalized supply chain.
- Demands for resilient infrastructure as a prerequisite for high quality infrastructure.
- Disaster Risk is a crucial fundamental condition for “Human Security” and “SDGs”.

Strategy

- Cluster 1: Realizing pre-disaster investment for capital concentration centers, especially in mega cities.
- Cluster 2: Establishment of DRR institutions for understanding disaster risk and strengthening disaster risk governance.
- Cluster 3: Securing Build Back Better recovery in the disaster affected areas.
<table>
<thead>
<tr>
<th>Controllability</th>
<th>Hazard</th>
<th>DRR investment &amp; measures</th>
<th>Implementation Agency</th>
</tr>
</thead>
</table>
| High           | Flood, Landslide, Storm, Surge | ● **DRR Infrastructure**  
Flood control, Sediment control, Coastal conservation etc.  
● Critical Infrastructure  
Lifelines such as transportation, electricity, water supply, telecommunication, Educational/health facilities  
● Non-structural Governance, Land pooling/management, Forecasting/Early warning, Understanding of disaster risk | Main: Ministries in charge of flood/sediment control  
Main: Ministries in charge of each critical infrastructure, Local Government  
Sub: DRR organization |
| Low            | Seismic, Volcanic eruption     | ● **Critical Infrastructure**  
Lifelines such as transportation, electricity, water supply, telecommunication, Educational/health facilities  
● Private assets  
Private houses, Commercial buildings (hotel, shopping mall, Logistics/Production base)  
● Non-structural Governance, Land pooling/management, Forecasting/Early warning, understanding of disaster risk | Main: Ministries in charge of each critical infrastructure, Local Government  
Sub: DRR organization  
Main: DRR organization, Local government, Ministry in charge of Construction, Ministry of Finance, etc.  
Main: DRR organization, Local government, Ministry in charge of Construction, Hazard Monitoring Agency (such as Meteorological Agency), Local Government etc. |
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters.

9.1 Develop quality, reliable, sustainable, and resilient infrastructure, including regional and trans-border infrastructure.

11.5 By 2030, significantly reduce the number of deaths and the number of people affected due to water-related or other disasters, and substantially decrease the direct economic losses, with a focus on protecting the poor and people in vulnerable situations.

11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation of and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
### Factors of Disaster Risk

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Factor/Elements</td>
<td>Attributions</td>
<td>Naturalevents</td>
</tr>
<tr>
<td>Hazard</td>
<td>Hazard</td>
<td>Productive forces</td>
</tr>
<tr>
<td>Vulnerability</td>
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<td>Temporal</td>
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<td>Susceptibility</td>
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<tr>
<td>Adaptation</td>
<td>Hazard intervention</td>
<td>Vulnerability intervention</td>
</tr>
</tbody>
</table>

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**Cluster 1: Pre-disaster Investment on DRR and Critical Infrastructure**

**Cluster 2: Establishment of overall DRR institutions**

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Nagami et. al, (2020)

[https://www.jica.go.jp/jica-ri/ja/publication/fieldreport/175nbg000019xco-att/JICA-RI_FR_No.05.pdf](https://www.jica.go.jp/jica-ri/ja/publication/fieldreport/175nbg000019xco-att/JICA-RI_FR_No.05.pdf)
Disaster management related agency in each country that cooperated in the past

**Legend**
- Central disaster management agency
- Construction related agency
- Flood control related agency
- Meteorological related agency
- Seismic related agency

**East Asia**
- **Mongolia**
  - National Emergency Management Agency (NEMA)
  - Ministry of Construction and Urban Development (MCUD)
  - National Emergency Management Agency (NEMA)
  - National Agency for Meteorology and Environment Monitoring (NAMEM)
  - National Emergency Management Agency (NEMA)

- **Bangladesh**
  - Ministry of Disaster Management and Relief, Department of Disaster Management (DDM)
  - Ministry of Housing and Public Works, Public Works Department (PWD)
  - Bangladesh Water Development Board
  - Ministry of Defence, Bangladesh Meteorological Department (BMD)

- **Nepal**
  - National Disaster Risk Reduction Management Authority (NDRRMA)
  - Ministry for Energy, Water Resources and Irrigation (MoEWR)
  - Department of Hydrology and Meteorology (DHM)

- **Thailand**
  - Ministry of Interior, Department of Disaster Prevention and Mitigation (DDPM)
  - Ministry of Natural Resources and Meteorology, Department of Water Resources
  - Royal Irrigation Department (RID)
  - Thai Meteorological Department (TMD)

- **Myanmar**
  - Ministry of Social Welfare, Relief and Resettlement (MSWR), Department of Disaster Management (DDM)

- **Vietnam**
  - Ministry of Agriculture and Rural Development
  - Ministry of Construction
  - Federal Flood Commission
  - Ministry of Water Resources and Environment
  - Ministry of Irrigation and Water Utilization
  - Ministry of Transport

- **Pakistan**
  - National Disaster Management Authority (NDMA)
  - Ministry of Planning, Development and Reform
  - Pakistan Meteorological Department (PMD)

- **Indonesia**
  - National Disaster Management Authority (BNPB)
  - Ministry of Public Works and Housing (PUPR)
  - Directorate General of Water Resources, Ministry of Public Works and Housing (PUPR)
  - Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)

- **Philippines**
  - Office of Civil Defense (OCD)
  - Department of Public Works and Highways (DPWH)
  - Philippine Institute of Volcanology and Seismology (PHIVOLCS)

- **Japan**
  - Ministry of Agriculture and Rural Development
  - Ministry of Infrastructure and Meteorological Services
  - Ministry of Waterways and Environment

- **Regional Organizations**
  - Pacific Community (SPC)
  - Vanuatu Meteorology and Geohazards Department (VMGD)

This map is based on a UN map and modified by JICA. The depiction, use of boundaries, geographic names and related data shown on this map do not necessarily imply official endorsement or acceptance by JICA.
Disaster management related agency in each country that cooperated in the past

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Disaster management related agency in each country that cooperated in the past

Legend

- Central disaster management agency
- Construction related agency
- Flood control related agency
- Meteorological related agency
- Seismic related agency
- Volcano related agency

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Disaster Risk Assessment

Potential Damage/Disaster Risk

- High Layer Disaster Risk (Low frequency but high intensity)
- Middle Layer Disaster Risk
- Low Layer Disaster Risk (High frequency but moderate intensity)

Future Risk Increasing with Urbanization and CC

- 1/100
- 1/50
- 1/30

Disaster Risk Assessment
Quantify disaster risks with hazard intensity and frequency.

Corresponding to Step 1 of the “8 steps”
Current Reduction Level Analysis

Potential Damage/Disaster Risk

Disaster Risk Assessment
Quantify disaster risks with hazard intensity and frequency.

Position current DRR level
Position DRR status of country/region/city based on the current structural DRR measures.

Corresponding to Step 2 of the “8 steps”
**Target Risk Level Setting**

**Potential Damage/Disaster Risk**

- **High DRR Stage**
  - High Layer Disaster Risk

- **Middle DRR Stage**
  - Middle Layer Disaster Risk

- **Low DRR Stage**
  - Low Layer Disaster Risk

**Time**
- Past
- Today
- Future

**Intensive Risk Threshold** is determined by each country.

**Disaster Risk Assessment**
Quantify disaster risks with hazard intensity and frequency.

**Position current DRR level**
Position DRR status of country/region/city based on the current structural DRR measures.

**Set Intensive Risk Threshold**
Set the long-term DRR target to be attained with structural DRR measures.
Structural DRR measures have been almost saturated and more residual risk reduction with non-structural DRR measures is needed. 

⇒ Accelerating the Structural DRR investment by Public.

⇒ Mobilizing all stakeholders is also necessary.

★ These 3 Stages are the process that any country goes through.

Developed Stage: To deal with such intensive risk, not only additional structural measures such as multilayered structural measures and resilient critical infrastructure, but also non-structural measures such as early warning system and social capital enhancement is necessary.
S-curve; Differences in curves by the current Stage

Potential Damage/Disaster Risk

- High DRR Stage
- Middle DRR Stage
- Low DRR Stage

Country A

Country B

Country C

Reduced Extensive Risk

Past 30 years 20 years 10 years Today 10 years 20 years 30 years Future

Time

Intensive Hazard

Extensive Hazard
Formulation of DRR Roadmap to reach the long-term target

Potential Damage/Disaster Risk

Draw the roadmap/MP to attain the Structural DRR target

Understand the past DRR effort results referring to existing plans

Corresponding to Step 3 and 4 of the “8 steps”
Formulation of DRR Roadmap to reach the long-term target

Country X 1990

Country X 2021

Cluster 1: Pre-disaster Investment on DRR and Critical Infrastructure

Structural DRR measure should be expedited as the first priority.

Cluster 2: Establishment of overall DRR institutions

Nonstructural DRR measure can be employed to deal with the current residual risk temporally.

Corresponding to Step 5 and 6 of the “8 steps”
To facilitate DRR investment

To promote DRR investment and urban resiliency, JICA is conducting the following researching projects:

• To identify DRR investment project for flood and earthquake disaster

• To review Japanese experience on DRR measures, to study how we can adapt to the other countries

• To review and upgrade JICA’s idea on practical method for developing local DRR strategies/plans, “8 steps”

Practical method i) to understand the risk and current countermeasures, ii) to identify residual risk, iii) to list and prioritize DRR measures (following “S” curve)
To facilitate DRR investment, JICA has taken the following approach in the Philippines:

- **Minimizing Residual Risk**
  - Flood management projects in Metro Manila

- **Managing Residual Risk**
  - Preparation of Local DRR plan

**Cluster 1: Pre-disaster Investment on DRR and Critical Infrastructure**

**Cluster 2: Establishment of overall DRR institutions**

**Overarching Integration Tool = 8 Steps**
Major Flood Management Project supported by JICA in Metro Manila, Philippines

- Pasig Marikina River Channel Improvement Project I and II
- Pasig Marikina River Channel Improvement Project III
- Pasig Marikina River Channel Improvement Project IV

KAMANAVA Area Flood Control & Drainage System Improvement Project (Completed in 2012)

Metro Manila Flood Control Project-West of Mangahan (Completed in 2007)

Installation and rehabilitation of flood control operation and warning system (Completed in 1993)

Installation of Rosario Weir (Completed in 1988)

Construction of Mangahan Flood Way (Completed in 1988)

[Whole Metro Manila Area] Construction of pumping station, Improvement of drainage channel (Completed in 1988)
Effect of Ex-ante Investment on Flood Management - case of Manila, 2020 -

Implementation of Manggahan Floodway and Pasig-Marikina River Channel Improvement Project (phase II, III) significantly reduced damage from flooding during Typhoon Ulysses on November 11 - 12, 2020.

Implementation of Manggahan Floodway and Pasig-Marikina River Channel Improvement Project (phase II, III) significantly reduced damage from flooding during Typhoon Ulysses on November 11 - 12, 2020.

Damage caused by flooding:
About 62,785 million PHP (1,300 million USD)
People affected by flooding:
About 1 million

Damage caused by flooding:
About 9,811 million PHP (200 million USD)
People affected by flooding:
About 0.03 million
Overall Goal:
The project outcome is replicated in the Philippines for the purpose of reducing disaster human casualties and economic losses under NDRRMC’s initiative.

Project Purpose:
Planning, implementation and monitoring system of RDRRMPs/LDRRMPs is developed for the purpose of reducing disaster human casualties and economic losses with the necessary technical support by National DRRM system centered upon NDRRMC.
Local DRRM Plan: Disaster Risk Reduction and Management Capacity Enhancement Project Phase 2

Hazard maps / Case of Calamba City

The Comprehensive Land Use Plan of the City of Calamba 2015-2025

- flood exposure map
- Rain Induced landslide exposure map
- Earthquake induced landslide exposure map
- Ground rapture exposure map
- Liquefaction exposure map

are included

STAGE1
Disaster Risk Profile

STAGE2
Establish DRRM roadmap based on situational analysis

STAGE3
Identification of DRRM Measures

How LDRRMP will be established
Thank you

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Disaster Risk Reduction Group Director