Imperative Needs to Develop
Water-related Disaster Risk Information

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What Information Is Missing in the Water-Related Disaster Risk Management?


There remains a big gap between the relatively accurate estimates by latest hydrological models and the information required to support decision making based on an evaluation of risk. The relationship between flow volume or rain intensity and expected damages, such as number of casualties, economic losses, and affected area/population, are critical but poorly studied. There is a need to establish methodologies to assess risk, considering the hydro-climatological and social conditions of the area of concern.

Compile, share, and analyze data on socio-economic damages due to water-related hazards, taking into consideration the magnitude of the hydrological hazard and the social vulnerabilities.
Water-Related Disaster Risk Management Practices at All Phases of Flood Disasters

- Normal Times
  - Monitoring
  - River maintenance & improvement
  - Preventive investment
  - Preparedness

- During Flooding
  - Forecasting & warning
  - Operation of flood management infrastructure
  - Evacuation & shelter operations
  - Flood fighting operations
  - Humanitarian aid

- After Flood
  - Emergency recovery
  - Reconstruction
  - Supports for losses & damages

Evaluation of flood risk management practices

✅ All practices and actions require data and information.

**IMPORTANT DATA & INFORMATION**

- Hydro-meteorological observations & simulation
- Condition of shelters & critical facilities
- Performances of infrastructure
- Past flood records
- Flood hazard map
- Flood risk map etc.

- Hydro-meteorological observations & simulation
- Locations of shelters & critical facilities
- Situation information
- Rapid need assessment etc.
- Past flood records
- Situation information
- Flood damage assessment etc.

etc.
1) Develop **water-related disaster risk management strategy** for decision-making using available data.

- **Identify the gaps of data and information**

2) Improve the **quantity and quality** of data and information.

- **Water-Related Disaster Risk Management Strategy**
  - Emergency actions
  - Preventive investment
Crucial Roles of Government Officers in Developing Risk Information (2)

Data/Information Requirement for Emergency Actions

- X-band data
- High-resolution image data (camera, etc.)
- Geographic data integration on GIS
- Development of network of telemetry systems
- River cross section
- Increased number of stations
- Advanced hydrologic simulation with local measurements (RRI, etc.)
- Simple method observation systems for weather and river condition
- Simplified model for hydrologic simulation with satellite rainfall data (BTOP, FID, IFAS, etc.)

Grasp the situation precisely and in a timely manner.

Example of the simple method observation system (gauging rainfall)
Crucial Roles of Government Officers in Developing Risk Information (3)

- Data/Information Requirement for **Preventive Investment**
  
  **Risk evaluation**
  - Hazard: data/information about hydrological characteristics
  - Exposure: data/information about population, assets & socio-economic activities
  - Vulnerability: data/information about socio-economic conditions and coping capacity

  ➔ **Number of casualties, socio-economic damages and affected area/population**

  ➔ **Show the current level of risk and the effectiveness of preventive investment** to policy-makers, practitioners, and the public
Crucial Roles of Government Officers
in Developing Risk Information (4)

- Hold the view that **prevention investment** is inevitable to protect people and economic growth from disasters.

- **Compile, share and analyze technical data about hazard, exposure, vulnerability, and damage at all levels.**

- **Conduct risk assessments at all levels** in order to understand how water-related disasters cause casualties and economic damages.

- Evaluate the effect of preventive investment in terms of “**information required to support decision making**”

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**Int. Research Organizations and Academia**

- Theoretical knowledge
- Hydrological models (especially, less data-dependent simulation models)
- Risk assessment tools
- Know-how and experiences
- Global datasets

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Based on UNESCO IHP 8th Phase Strategic Plan (2012), discussions at the UNISDR 4th global platform for DRR (2013), UNISDR synthesis report of consultations on HFA2 (2013), ICHARM report for HFA2 contribution (2014)
A Pilot Practice

- Collaboration between ICHARM and Government of Philippines
- Investigation of flood disaster risks in the Pampanga River Basin
Pampanga River Basin: General Features

- **Catchment Area:** 10,434 km²
- **River Length:** 260 km
- **Population:** 5.8 million
- **Average annual rainfall:** 1,155mm/year
- **At least one flooding in a year**
- **The frequency of tropical cyclone passage over the basin is about 5 in 3 years**
- **Flood prone area:** low-lying areas (approximately 2,600 km²) of the lower river basin
- **2 major dams:** Pantabangan and Angat
- **2 Swamps:** Candaba and San Antonio
Meetings for Collaboration among ICHARM and Government Offices

- **Meetings**
  - Dates: 16 – 22 June 2013
  - Government of Philippines: PAGASA, Department of Public Works and Highways, Office of Civil Defense, Bureau of Agricultural statistics, many dam offices, etc.

- **Collaboration**
  - Launch pilot activities using available government offices’ data and ICHARM’s technologies
    - Example of data available to develop flood risk information

<table>
<thead>
<tr>
<th>Hazard-related data</th>
<th>Rainfall data, water level, rating curves, dam operation data, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure-related data</td>
<td>Digital land use map, agricultural statistics, etc.</td>
</tr>
<tr>
<td>Vulnerability-related data</td>
<td>raw data of national census and local statistics, technical reports about crop growth and damages, data books for IWRM plan, etc.</td>
</tr>
<tr>
<td>Damage-related data</td>
<td>Flood disaster records such as disaster situation reports and disaster statistics, etc.</td>
</tr>
<tr>
<td>Other</td>
<td>Relevant regulations, manuals and guidelines, etc.</td>
</tr>
</tbody>
</table>
Identification of locations at higher risk due to flood from the viewpoint of human losses

- Using ICHARM’s hydrologic simulation models (BTOP, FID, etc.) and collected data to develop the formula correlating human losses and flood conditions
- Simulate the disaster for 50-yr return period condition
- Simulation results
  - The total number of affected people: 993,000 persons
  - The value of risk indicator: 301 (as an estimate correlated with the equivalent number of deaths)
  - Areas at high risk: Southern areas (municipalities in Pampanga and Bulacan provinces)
    (1) Pulian: 22 (76,000 affected)
    (2) Calumpit: 17 (60,000 affected)
    (3) Macabebe: 16 (54,000 affected)

Procedures: [data collection] → [risk calculation formula building] → [simulation]
Analyzing the **effectiveness of the Pantabangan dam** in reducing the number of affected people under 50-yr return period condition.

The number of affected people within the management zone:

- **without the Pantabangan dam**: 100,977 persons
- **with the Pantabangan dam**: 60,729 persons

*By 40% reduction (mainly, in the Cabanatuan city)*

The number of affected people within the management zone:

- **without the Pantabangan dam**: 14,000 persons
- **with the Pantabangan dam**: 1 person
Identification of locations at higher risk due to flood from the viewpoint of agricultural damages

- Using ICHARM’s methods (RRI, questionnaire survey, etc.) and collected data to develop the formula correlating agricultural damages and flood conditions - for the period September 26th to October 4th, 2011

- Simulation results

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Rice crops damages (million Peso)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reported values</td>
</tr>
<tr>
<td>Pampanga River Basin (Affected area 45,900 ha)</td>
<td>-</td>
</tr>
<tr>
<td>Pampanga Province (Affected area 15,900 ha)</td>
<td>1,376</td>
</tr>
<tr>
<td>Calumpit Municipality (Affected area 1,250 ha)</td>
<td>37</td>
</tr>
</tbody>
</table>

Procedures: [data collection] → [risk calculation formula building] → [simulation]
Thank you for your attention.

Objective of ICHARM

To be the global Center of Excellence to provide and assist implementation of the best practicable strategies to localities, nations, regions and the world to manage the risk of water related hazards including floods, droughts, land slides, debris flows and water contamination. At the first stage, the priority is flood-related disasters.