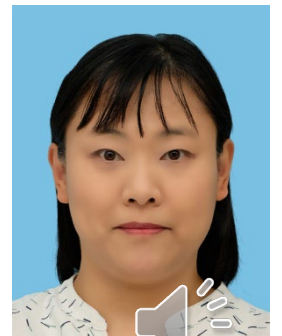


Strengthening Flood Forecasting in ASEAN Member States through Regional Trainings and Coordination

Module 5

Disaster Risk Reduction

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ICHARM, PWRI



Third United Nations World Conference on Disaster Risk Reduction (2015)

Programme

- **Intergovernmental Segment** (Ministerial Roundtables, High Level Partnership Dialogues, Plenary Meetings)
- **Multi-Stakeholder Segment** (Working Sessions)
- **Public Forum**

Participants

- **187 of 193 UN Member States with a total participants of over 140,000**



ICHARM participated in the Working session:
“Risk Identification and Assessment”

Sendai Framework for Disaster Risk Reduction

Expected Outcome

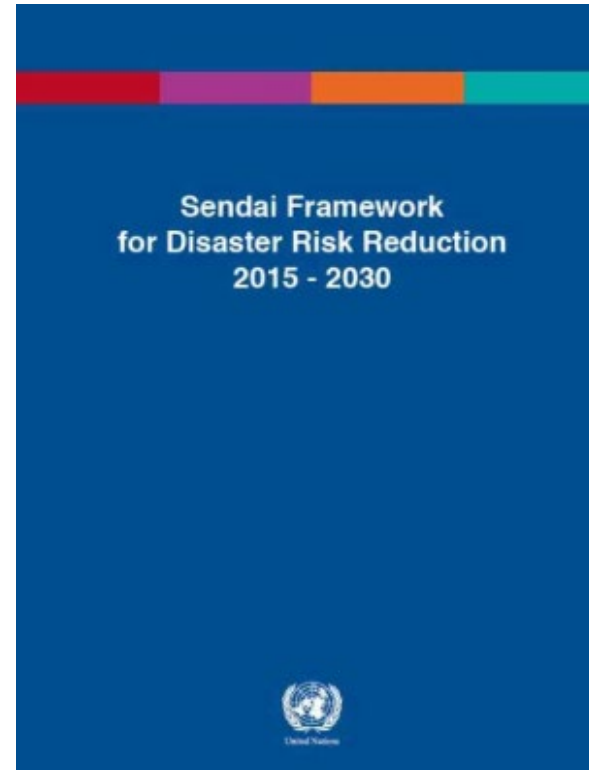
The substantial reduction of **disaster risk and losses** in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

Goal

- I. Prevent new risk
- II. Reduce existing risk
- III. Strengthen resilience

Scope

The risk of **small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters**, caused by natural or man-made hazards as well as related environmental, technological and biological hazards and risks



Source: UNDRR



Sendai Framework for Disaster Risk Reduction

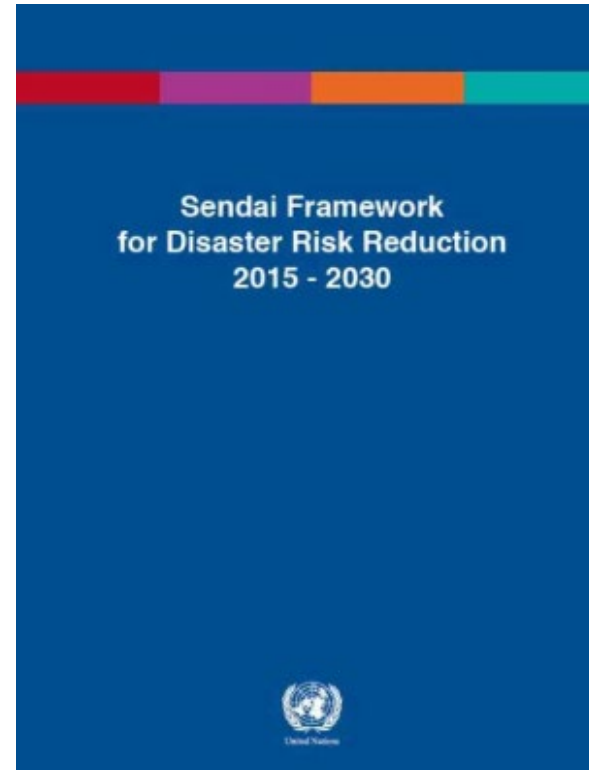
(The Four Priorities for Action)

Priority 1. Understanding disaster risk

Priority 2. Strengthening disaster risk governance to manage disaster risk

Priority 3. Investing in disaster risk reduction for resilience

Priority 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

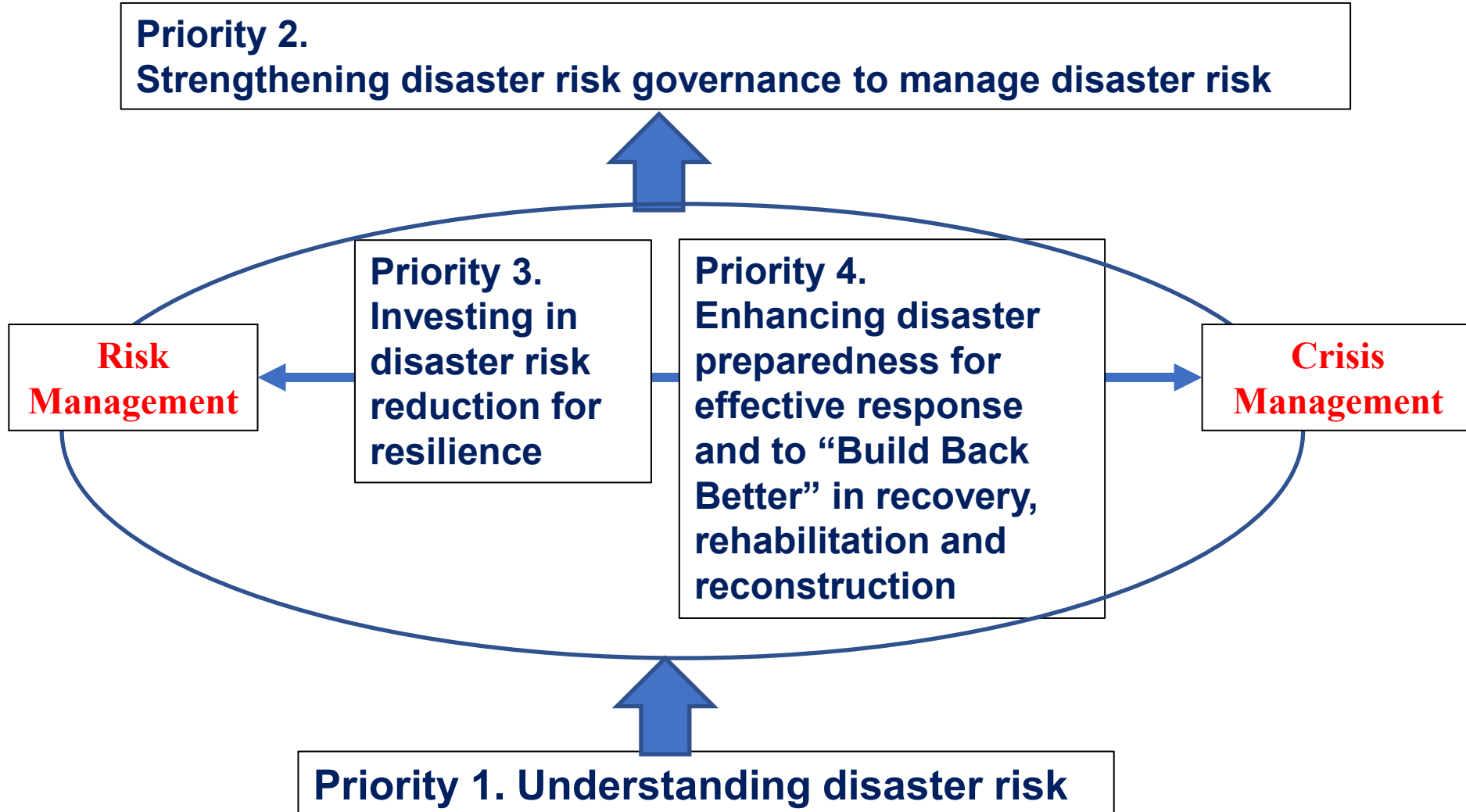


Source: UNDRR



Sendai Framework for Disaster Risk Reduction

(The Four Priorities for Action)



What is risk?

The risk can be defined as:

$$\textit{Risk} = f(\textit{Hazard}, \textit{Exposure}, \textit{Vulnerability}, \textit{Capacity})$$

Home ▶ Terminology ▶ Disaster risk

Disaster risk

The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Annotation: The definition of disaster risk reflects the concept of hazardous events and disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socioeconomic development, disaster risks can be assessed and mapped, in broad terms at least.

It is important to consider the social and economic contexts in which disaster risks occur and that people do not necessarily share the same perceptions of risk and their underlying risk factors.



<https://www.undrr.org/terminology>

Step1: Understanding Current Conditions

- ✓ Natural Environment
 - Topography
 - Land cover
- ✓ Social Environment
 - Boundary (City, community, etc.)
 - Population (Sex, age)
 - Building (Number, story, structure, floor area, occupancy, floor height)
 - Critical infrastructures
- ✓ Past flood records



Step2-1 Hazard Assessment

UNDRR Terminology:

Home ▶ Terminology ▶ Hazard

Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

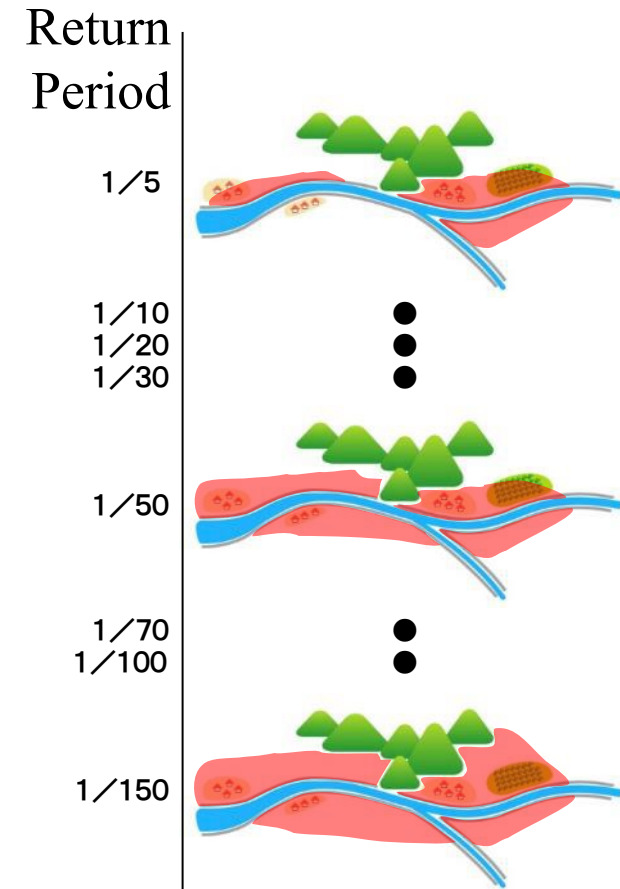
Annotations: Hazards may be natural, anthropogenic or socionatural in origin. **Natural hazards** are predominantly associated with natural processes and phenomena. **Anthropogenic hazards**, or human-induced hazards, are induced entirely or predominantly by human activities and choices. This term does not include the occurrence or risk of armed conflicts and other situations of social instability or tension which are subject to international humanitarian law and national legislation. Several hazards are **socionatural**, in that they are associated with a combination of natural and anthropogenic factors, including environmental degradation and climate change.

Hazards may be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity or magnitude, frequency and probability. Biological hazards are also defined by their infectiousness or toxicity, or other characteristics of the pathogen such as dose-response, incubation period, case fatality rate and estimation of the pathogen for transmission.

Hazard assessment is to identify the nature, location, intensity and likelihood of major hazards prevailing in a community or society.

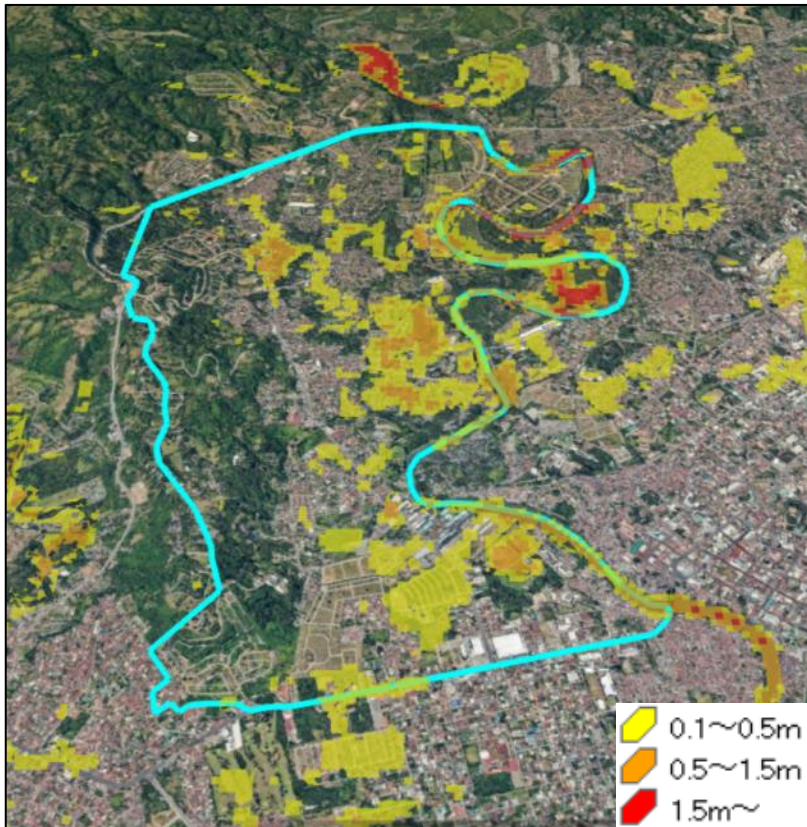
Hydrological/hydraulic simulation models are employed for estimation of flood hazard and development of flood hazard maps.

Example of Target Scale

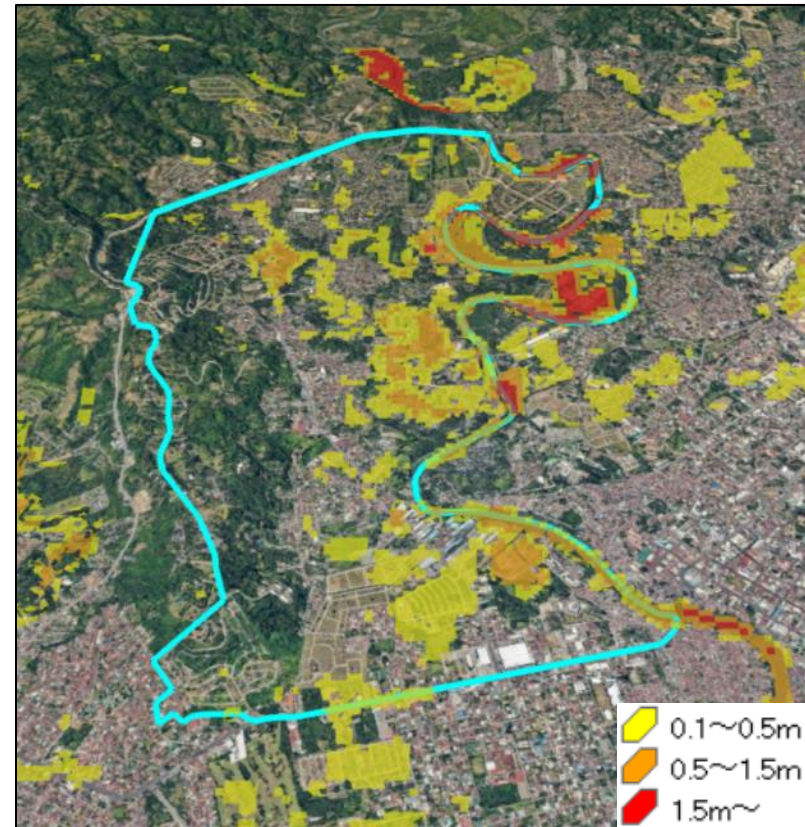


Step2-1 Hazard Assessment

Max. inundation depth with **50 years** return period



Max. inundation depth with **100 years** return period



Step2-2 Exposure Assessment

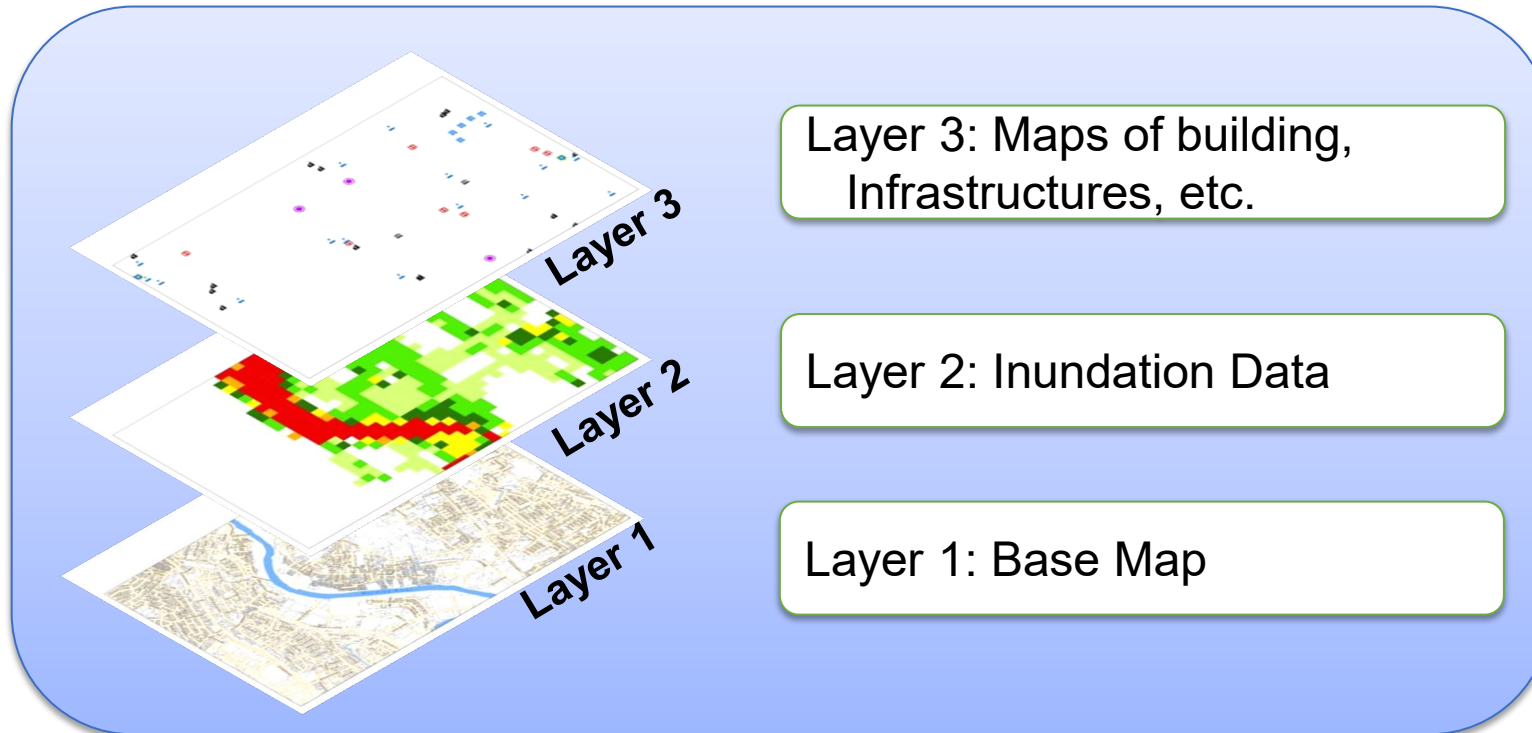
UNDRR Terminology:

Home ▶ Terminology ▶ Exposure

Exposure

The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.

Annotation: Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability and capacity of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest.



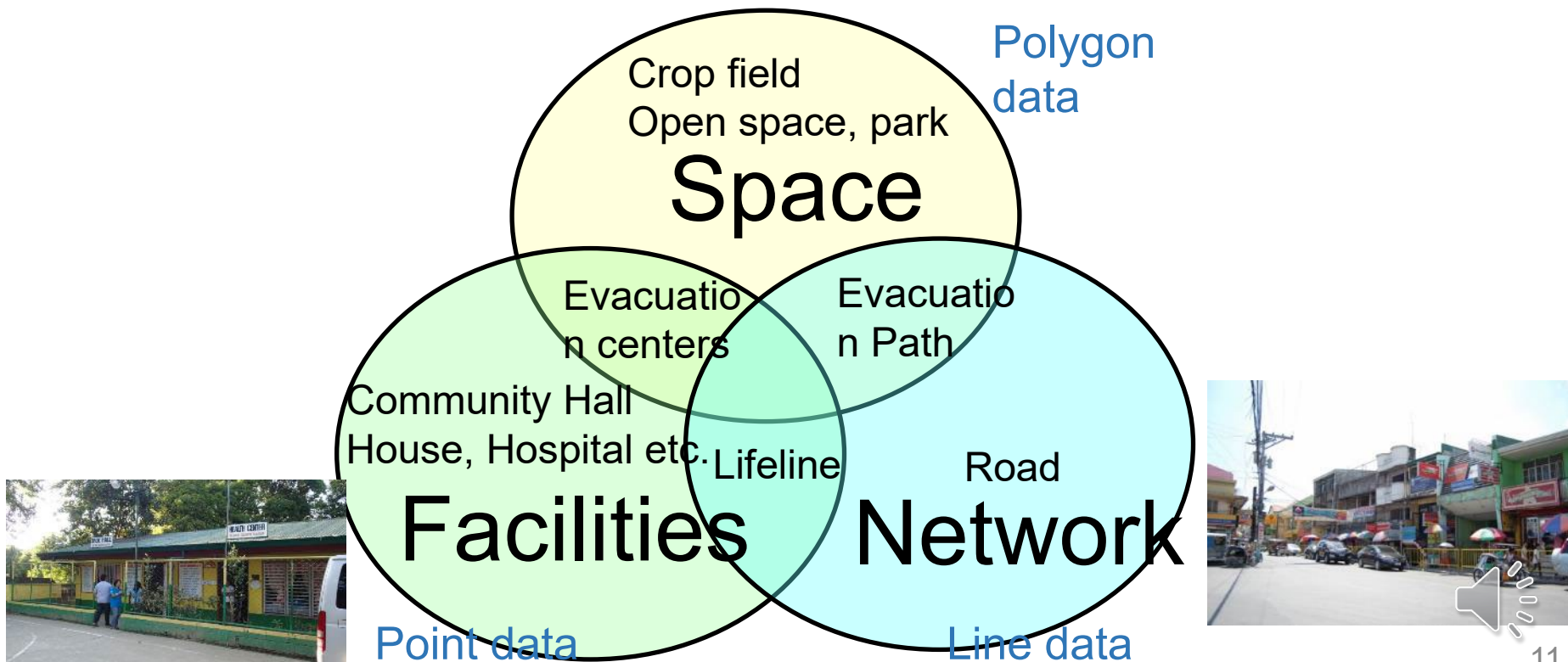
Critical Infrastructure

UNDRR Terminology:

Home ▶ Terminology ▶ Critical infrastructure

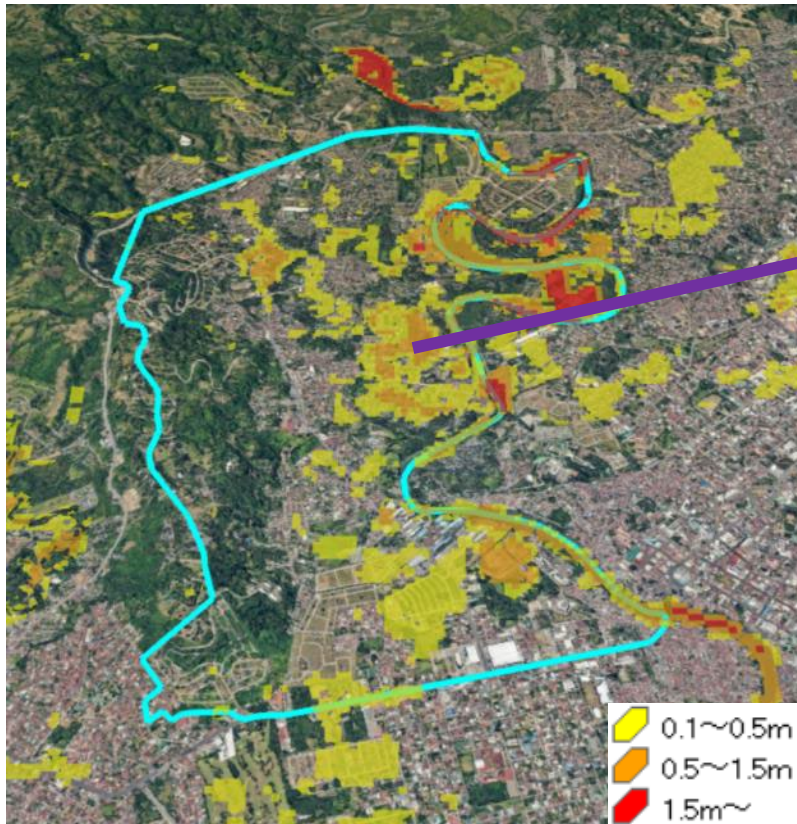
Critical infrastructure

The physical structures, facilities, networks and other assets which provide services that are essential to the social and economic functioning of a community or society.



Step2-2 Exposure Assessment

Max. inundation depth with 100 years
return period



School as evacuation site



Step 2-3 Vulnerability Assessment

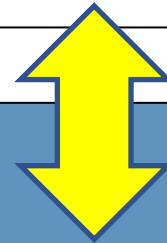
UNDRR Terminology:

[Home](#) ▶ [Terminology](#) ▶ [Vulnerability](#)

Vulnerability

The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

Annotation: For positive factors which increase the ability of people to cope with hazards, see also the definitions of "[Capacity](#)" and "[Coping capacity](#)" [↗](#) .



[Home](#) ▶ [Terminology](#) ▶ [Capacity](#)

Capacity

The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.

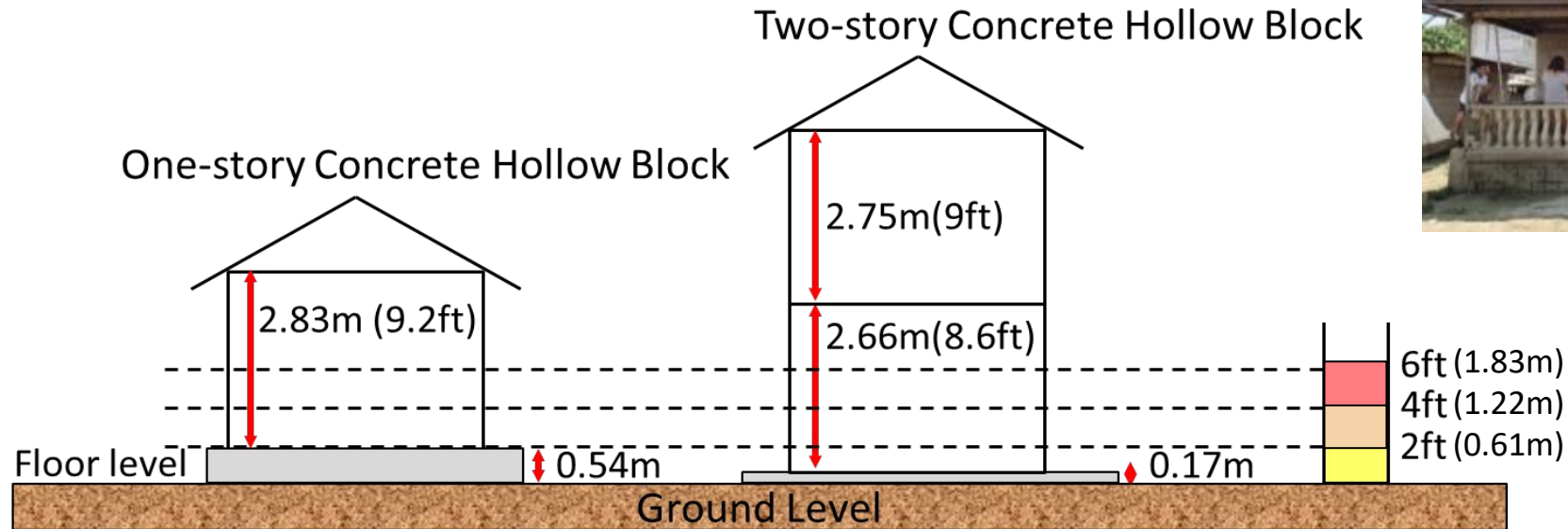
Annotation: Capacity may include infrastructure, institutions, human knowledge and skills, and collective attributes such as social relationships, leadership and management.

Coping capacity is the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks.



Step 2-3 Vulnerability Assessment

Household survey by ICHARM in Bulacan Province
in Pampanga River Basin, Philippines



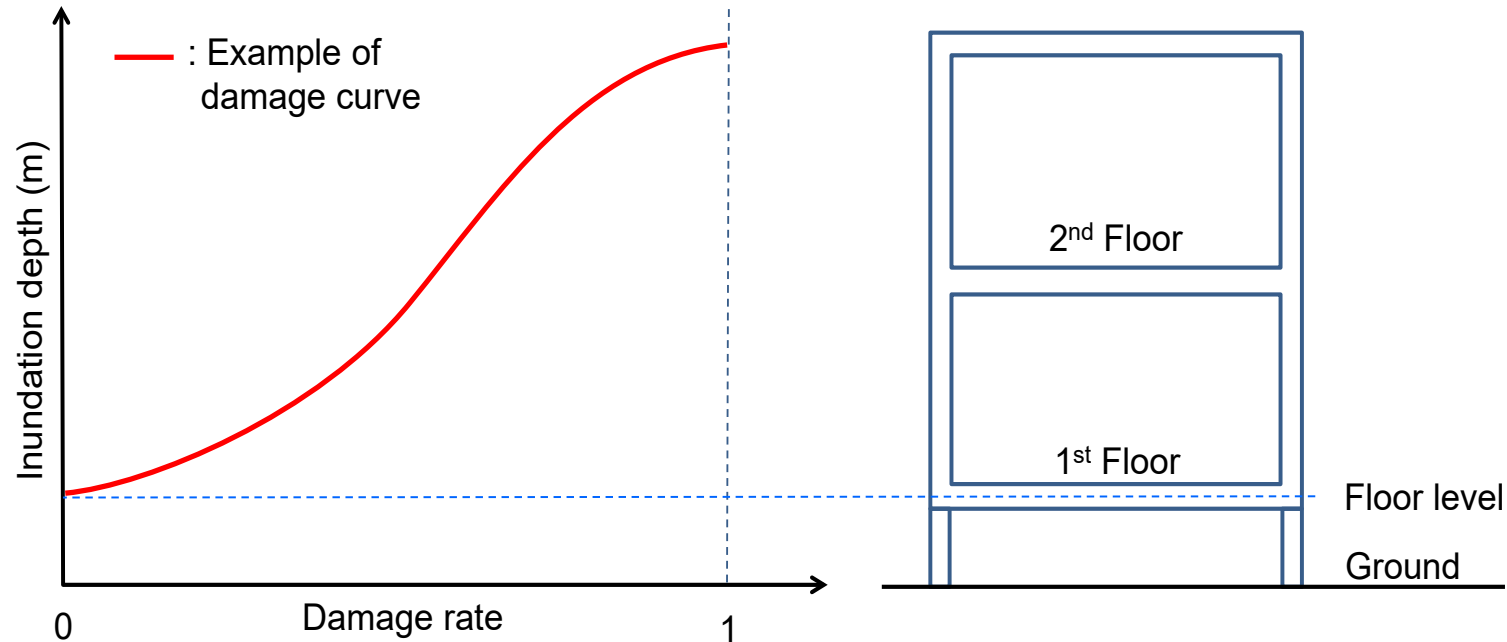
	One Story	Two Story
Yellow (less than 2ft)	No inundation	Start inundation
Orange (2-4ft)	Start inundation	Inundation
Red (more than 4ft)	Inundation	Inundation

Height of Electric Plug
from floor level: 1.27m)



Vulnerability Assessment

Generally, damage curves (fragility curves) which show a relation of inundated depth and damage are used for an estimation of flood damages.



$$\text{Damages} = \text{Exposure (people, housing etc.)} \times \text{damage ratio}$$



Step 2-4 Capacity Assessment

UNDRR Terminology:

Home ▶ Terminology ▶ Capacity

Capacity

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Boat



Generator, Emergency goods, etc.



Step3 Analyzing Flood Impact

Step 2-1
Hazard
assessment

Step 2-2
Exposure
assessment

Step 2-3
Vulnerability
assessment

Step 2-4
Capacity
assessment

$Risk = f(Hazard, Exposure, Vulnerability, Capacity)$

Develop a flood disaster scenario by Imagining what will happen at the flood disaster

Identify the gap between the current and ideal status to achieve necessary implementation of countermeasures.



Imagine what will happen for each component according to the time sequence

Component	Initial Stage (before inundation starts)	Operational Stage (During inundation)	Post Disaster Stage
Information and Communication			
Evacuation			
Housing			
Water, Food, Relief Goods			
Medical Treatment			
Transportation			
Others			





Recommended stakeholders to discuss together

Component	Recommended Stakeholders to discuss together
Information and Communication	✓ Municipal officers, river managers ✓ Community leaders ✓ Community council members related to disaster risk reduction ✓ Flood fighting corps
Evacuation	✓ Person in charge of facilities for evacuation (schools, public buildings etc.) ✓ Volunteer groups who might support the evacuation of vulnerable people
Housing	✓ Community members
Water, Electricity, Food, Relief Goods	✓ Volunteer groups who might support the life of evacuees ✓ Community groups or organizations related to life support, gender, health
Medical Treatment	✓ Officers of hospitals, health and social welfare facilities (if they exist)
Transportation	✓ Neighborhood watch groups (if they exist)
Other (if any)	✓ Agricultural associations ✓ Industrial associations



How to cope with disaster risk

