

# **Water and Settlements:**

## **Responses to Address Impact of Flooding, Typhoon, and Storm Surge**

# Objectives:

- Examine cases of flooding, typhoon and storm surges in three places in Asia.
- Examine approaches to address flooding and typhoon and its impact on settlements development.
- Draw out learnings from the different approaches.

# Flooding Situation: Vietnam

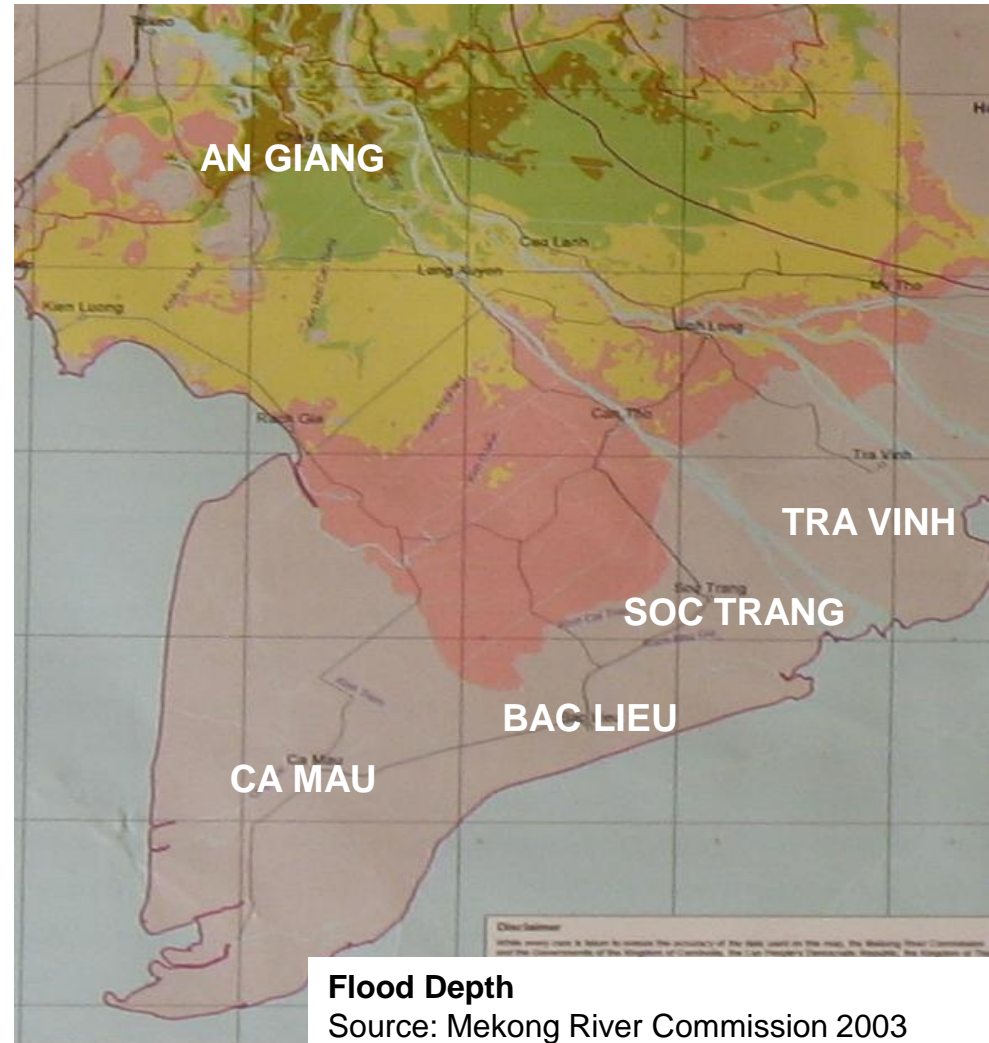
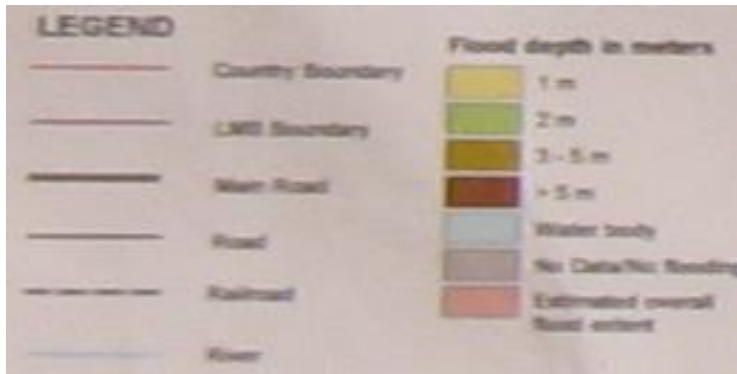
Vietnam Mekong Delta

Area: **3.9M hectares (12% of Vietnam's land area)**

Flooded area: **1.9M hectares (49%)**

Flooded area above 1m: **1M hectares (53%)**

Highest Flood level: **6m (An Giang)**



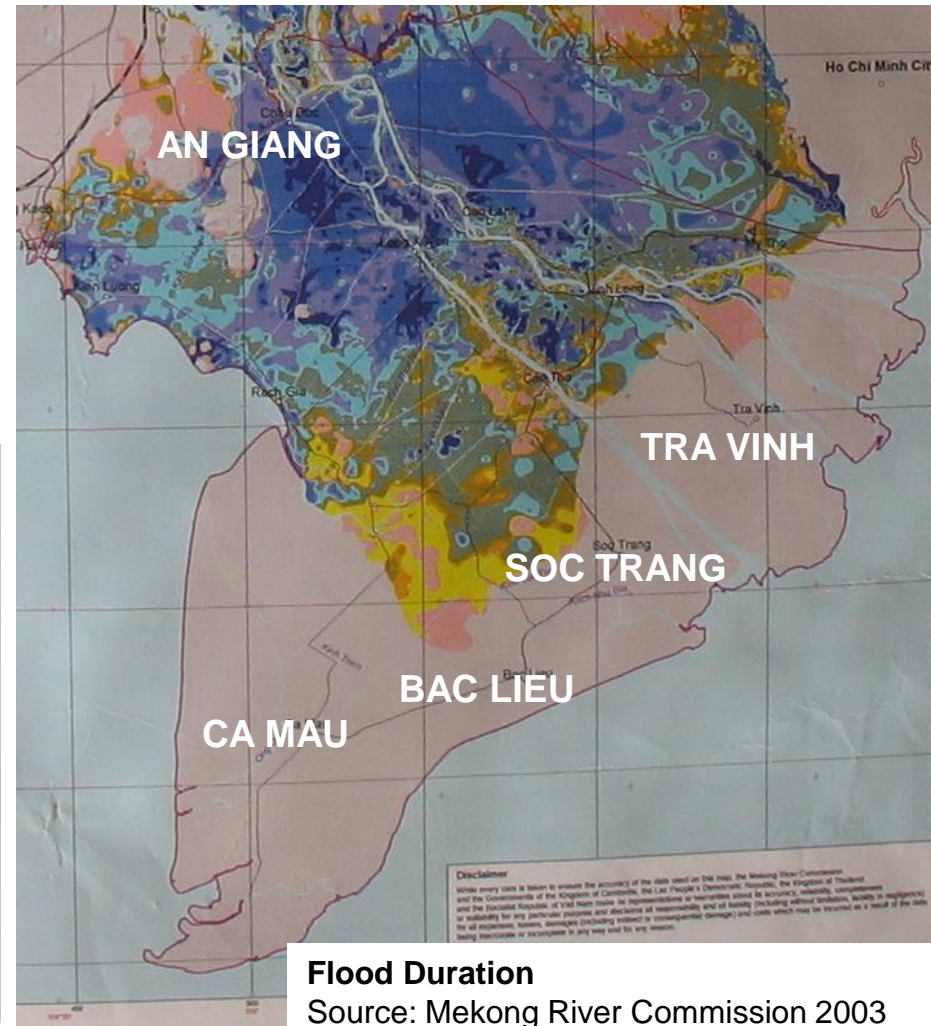
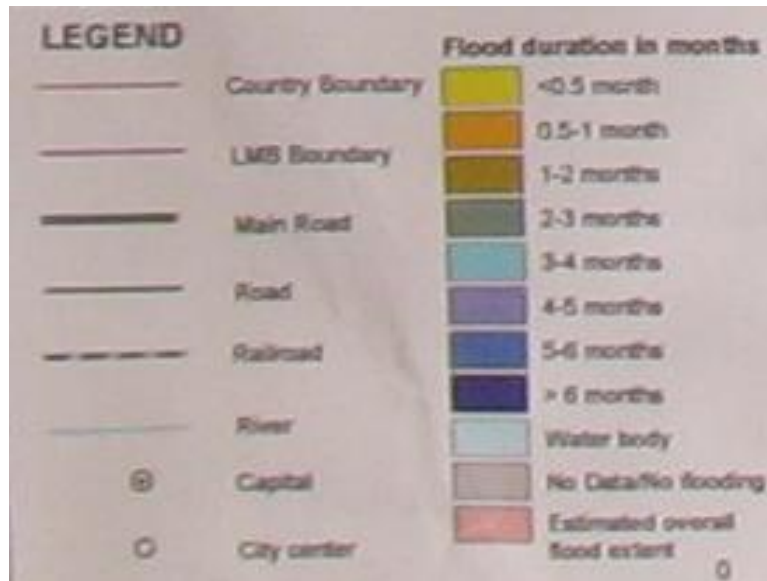
**Flood Depth**

Source: Mekong River Commission 2003

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# Flooding Situation: Vietnam

- Flooding Months: May to December
- Population - more than 16 million people (densest in the region)



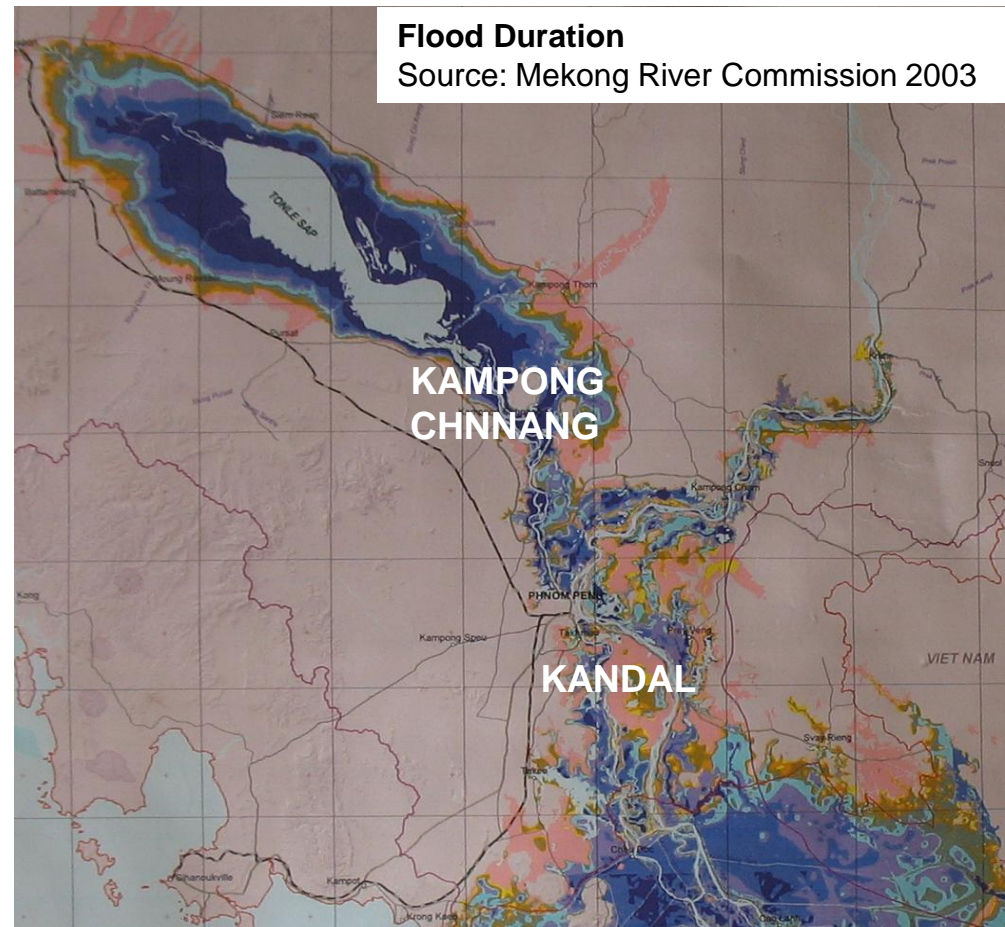
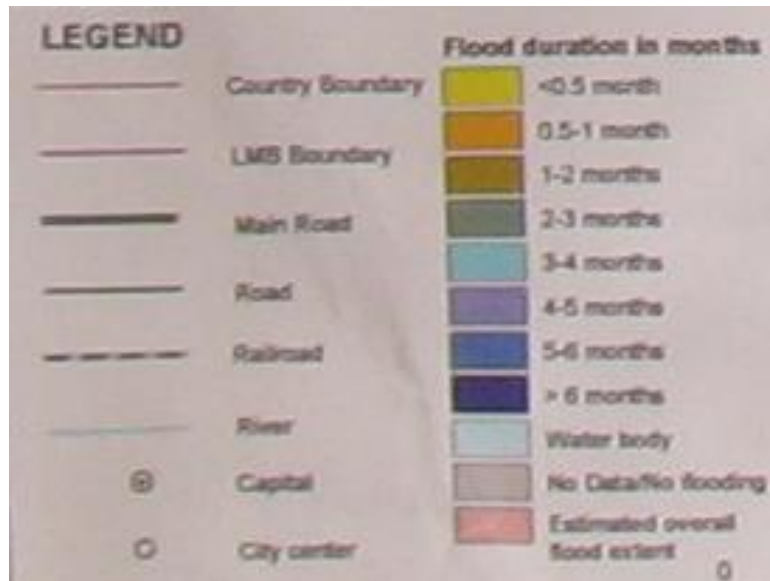
## Flood Duration

Source: Mekong River Commission 2003

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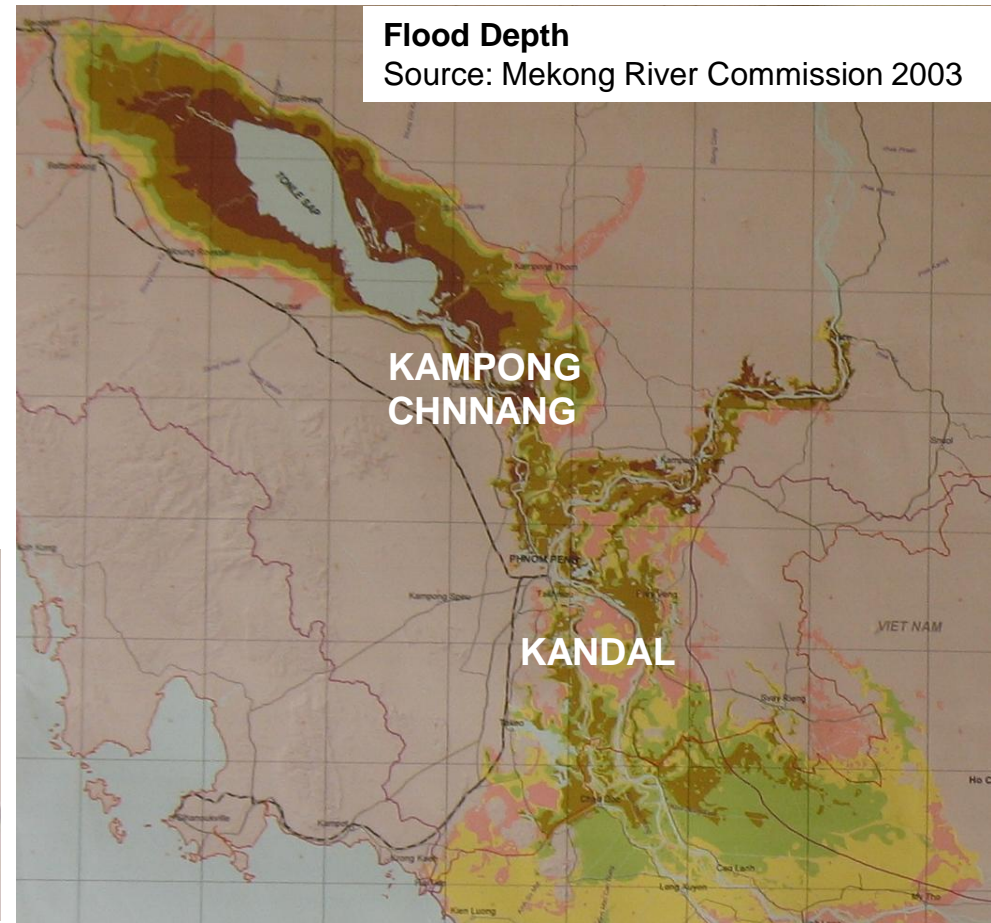
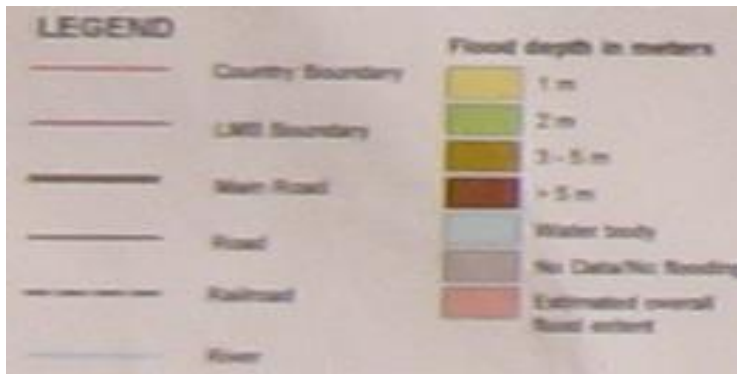


# Flooding Situation: Cambodia



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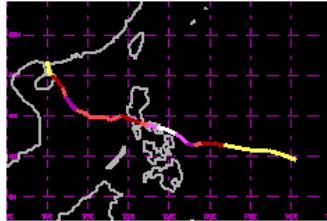
# Flooding Situation: Cambodia



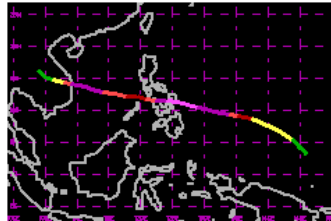
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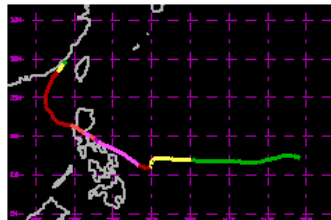
# Typhoon Path: Philippines



Sineng (Joan), 1970



Undang (Agnes), 1984



Loleng (Babs) 1998



Sources: Google Earth and Typhoon 2000.com

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## Flood Situation: Philippines

### San Mateo, Rizal



Legaspi Coastal Area



Tanza, Navotas

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## Responses in River Basin: Structural Measures

- Construction of **dams, dykes and sluices** for early flood preparedness and protection of houses and crops;
- Construction of **residential cluster/dyke (infrastructure, houses, and schools)** for the protection of people and to maintain normal lives in inundation situation.



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## Responses in River Basin: Non-Structural Measures

- Organize **emergency relief** for stricken areas during and after flooding to stabilize people's livelihood as soon as possible and get prepared for the forthcoming floods
- Organize **training courses and workshops on disaster preparedness and mitigation** for disaster management officers



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## Adaptative Responses in the River Basin:

transportation



## Floating markets



# Adaptative Responses in the River Basin: Lvea Em and Kampong Chhnang



Elevated school building/evacuation center with



Elevated haystack and houses on tall

## Houses on tall columns



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## Responses in Coastal Area: Resettlement with Integrated livelihood

- Combination of canals, fishpond and elevated housing area.
- Soil taken from fishponds and canals are used to fill the area for houses.





## Responses in Coastal Area: Resettlement with Integrated livelihood



Mangrove buffer under reforestation



Integrated livelihood in Ca Mau



General pattern of development in the resettlement site: canal, road and houses

## Non-structural Responses: Buklod TAO Capability- building on Disaster Preparedness



The Community leader explains the situation of their community during flood season using a **topographic model**.



Monitoring water level



**Nylon Rope** for towing and securing movement of people and boat during rescue operations.



## Non-structural Responses: Capability- building on Disaster Preparedness



**Fiberglass boat** made by the community for rescue operations during flood season.



**Go Bags** for packing emergency provisions (flashlight, battery, candle, match, dry clothes, water, and food) for children before moving to the **evacuation center**.



The community ensure that every kid has a **life jacket**. Life jackets are sewn by the community mothers for all the children.



## Non-structural Responses: Capability- building on Disaster Preparedness

### t r a n s e c t      w a l k



Participants made a transect walk in their community noting the condition of structures and the site, existing vulnerabilities and hazards, and the damage/impact of a recent typhoon, gusty wind and storm surge.



Collapsed wall of multipurpose hall and collapsed breakwater

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## Non-structural Responses: Capability- building on Disaster Preparedness



**Hazards and resource mapping exercise:** Workshop groups identify hazards and resources in their community. Each group presents their map to everybody to describe the situation in their community.



**Planning Exercise:** Each workshop group identifies problems they have experienced or still experiencing after the disaster, its cause/s and formulates an action plan to address the problems.

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## Non-structural Responses: Capability- building on Disaster Preparedness

### post-typhoon structures assessment



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## Non-structural Responses: Capability- building on Disaster Preparedness

### Post-typhoon structures assessment and retrofitting



# Learnings and Conclusion

- Structural approaches in Vietnam created immediate and significant impact to reduce flood and damage to life and property in the Mekong river basin. Dikes made possible rice farming even during the flood season thus improving productivity. However, big solutions can also create big problems so that it is important to look at the long-term effect of structural measures to the natural environment. The Vietnamese adaptation to living with water reduces disaster although vulnerability due to poverty must be addressed.
- In the absence of major structural measures in Cambodia, adaptive response of individual household is possible only for those who have the resources. The poorest of the poor who lives in the most fragile situation is still exposed to greater danger than those with elevated houses. Evacuation is an option but for floods lasting for about half of the year, evacuation is a semi-permanent solution that disrupts the life cycle and productivity of affected families causing them to become poorer.
- Non-structural measures require a strong organization to respond effectively during disaster. Timely and reliable information on the coming danger is very important in disaster preparedness. Availability of disaster monitoring and warning systems is very important in massive preparedness and disaster reduction. Information should reach all the affected and not only be concentrated to the leaders of

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# Thank you.