*Training/Workshop on*

*Tsunami Evacuation Maps, Plans, and Procedures and the UNESCO-IOC Tsunami Ready Recognition Programme for the Indian Ocean Member States*

*Hyderabad - India, 15-23 April 2025*

# Tsunami Evacuation Maps, Plans, and Procedures

## *TEMPP 07: Principles in Tsunami Evacuation Routes*

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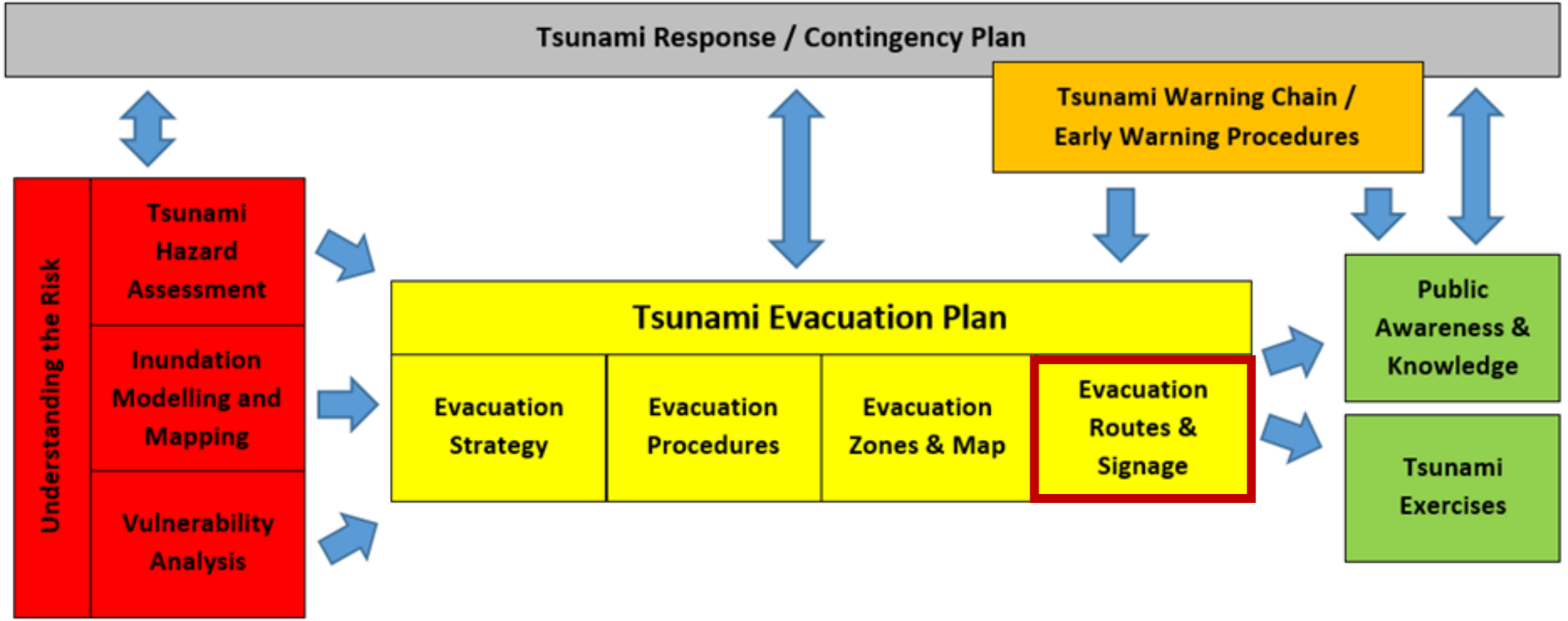
- *Harald Spahn, UNESCO-IOC UNESCAP Consultant*

# Key elements of a TEP

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# Tsunami Evacuation Route

Establishing the most appropriate routes to get out the evacuation zone and reach the assembly areas

# Evacuation Routes

- Identify suitable routes by **analysing the road network on your base map**. Online tools (e.g. OpenStreetMap) or satellite images (e.g. Google Earth) usually provide up-to date information
- You may also use GIS based **modelling tools** that help to identify optimal options
- **Involve local people from the community** who are knowledgeable of the area and to get their perspective (local particularities, habits...)

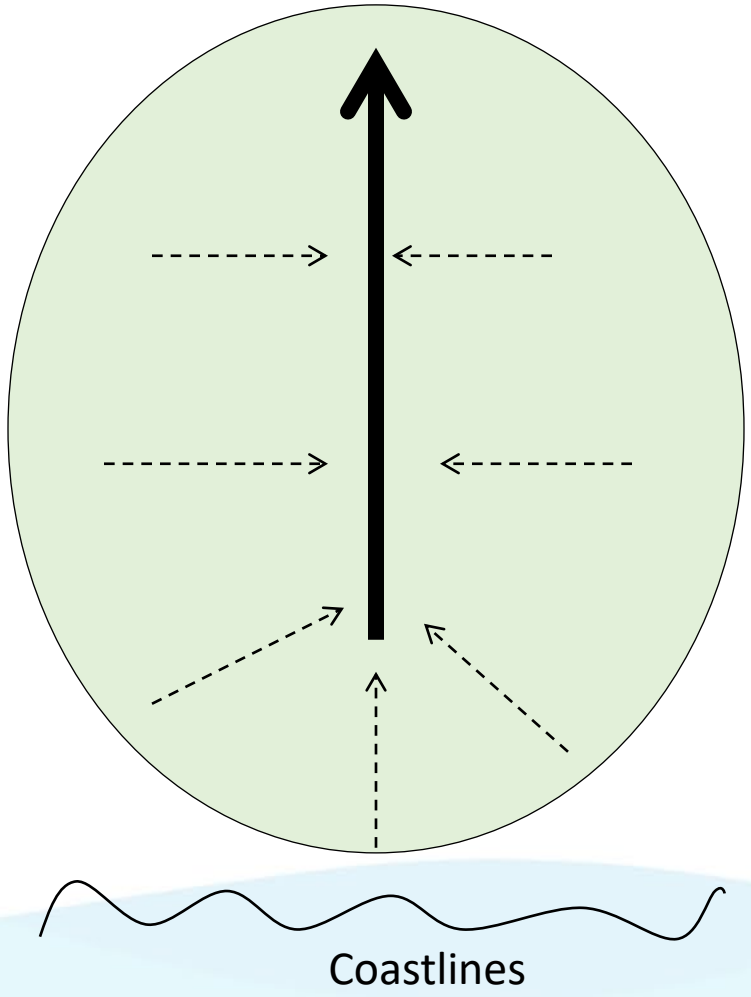
# Features of Evacuation Routes

- Main roads, smaller streets and pathways that lead evacuees **quick** and **safely** out of the evacuation zone and to designated assembly points or shelter buildings.
- Narrow and heavily used routes in densely populated areas should be Avoided to prevent bottlenecks in traffic
- **Wide** enough / best possible conditions and lead **straight out of the hazard** zone
- Avoid **bridges** that could be weakened or destroyed by a preceding earthquake,
- Avoid areas that are **prone to other hazards**: e.g., floods,  landslides, liquefaction or collapse of tall and weak buildings, roads with powerline located overhead or located near to rivers.

# Factors to be considered

- **Information of Hazards in the area**
- **Evacuation Location**
- **Land Use**
- **Road Networks:**
    1. Existing condition of road networks
    2. Road capacity
    3. Traffic
- **Pattern of People Movement During Disaster:**
    1. Travel Time
    2. Mode of Evacuation
    3. Route of movement

# Route Design




**Tendency of Evacuation Pattern**

→ to choose:

- ✓ Shortest Route
- ✓ Quickest Route
- ✓ Away from the coast line
- ✓ Main route → ***outlet of evacuee***

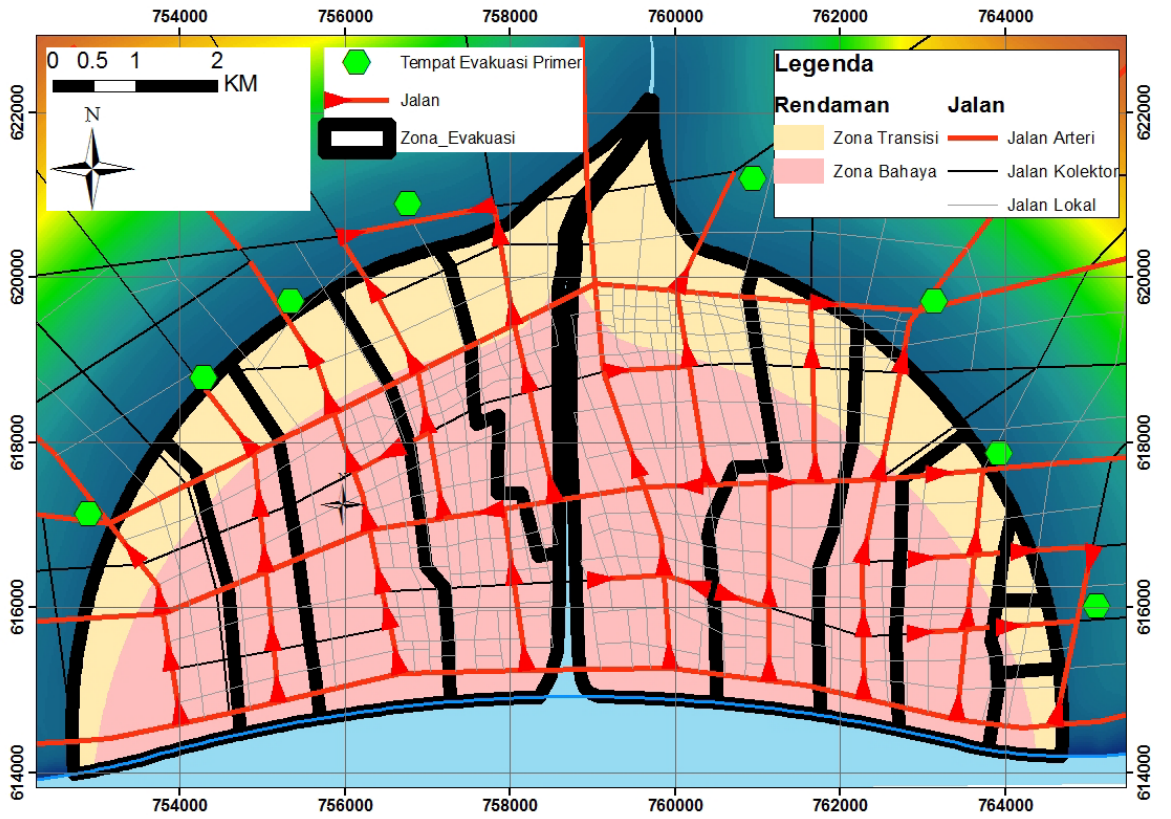
# Route Design

**Cluster for Evacuation Zone**

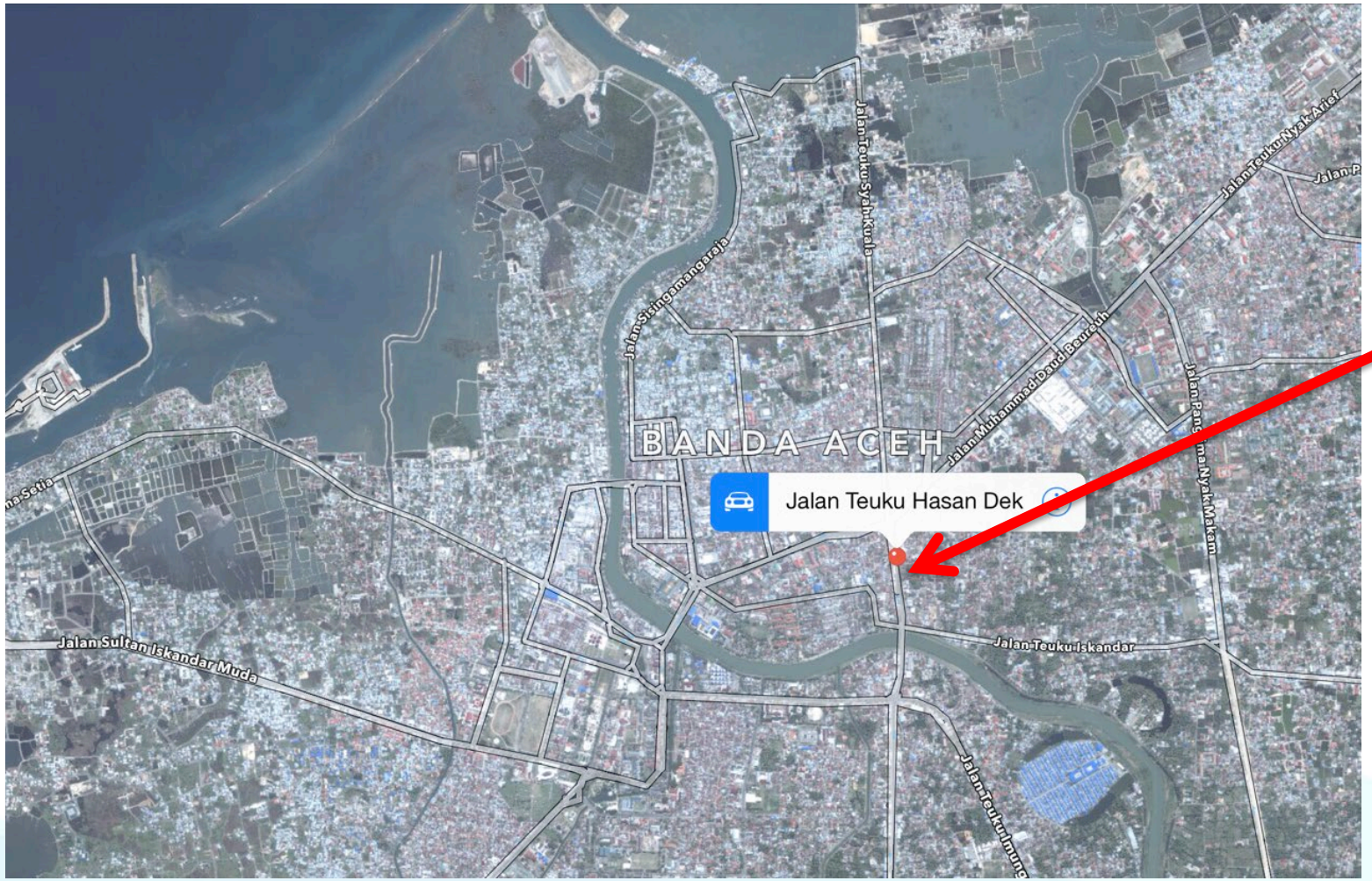
- Having one main road designated as primary evacuation route
- Define evacuation capacity where **ETE < lead time**
- ETE is **a function of number of people at risk, road width and velocity of fast walk**

**Primary Evacuation Route**

- Direct to Shelter
- Main road in the cluster



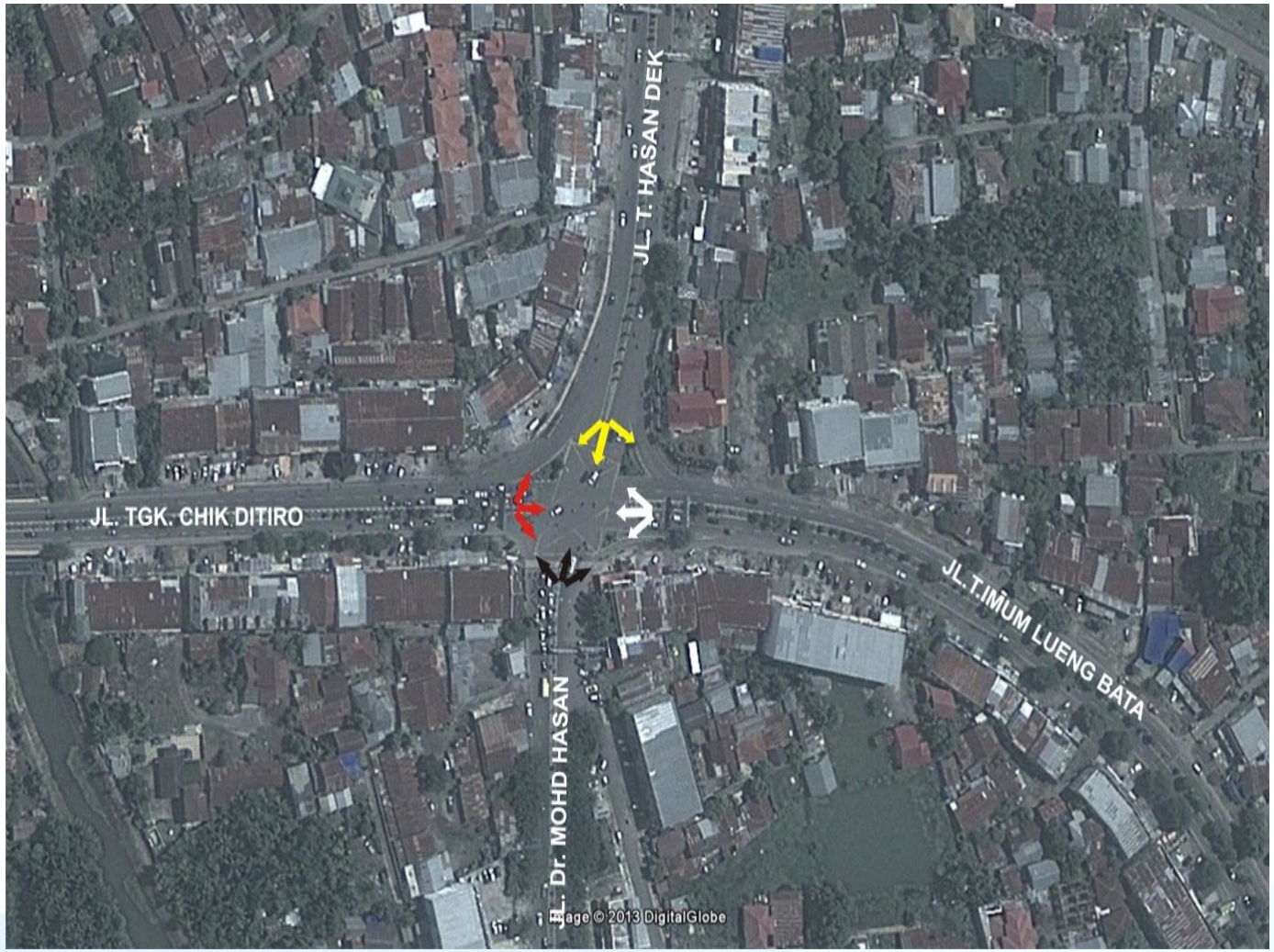
# People Behavior in Evacuation



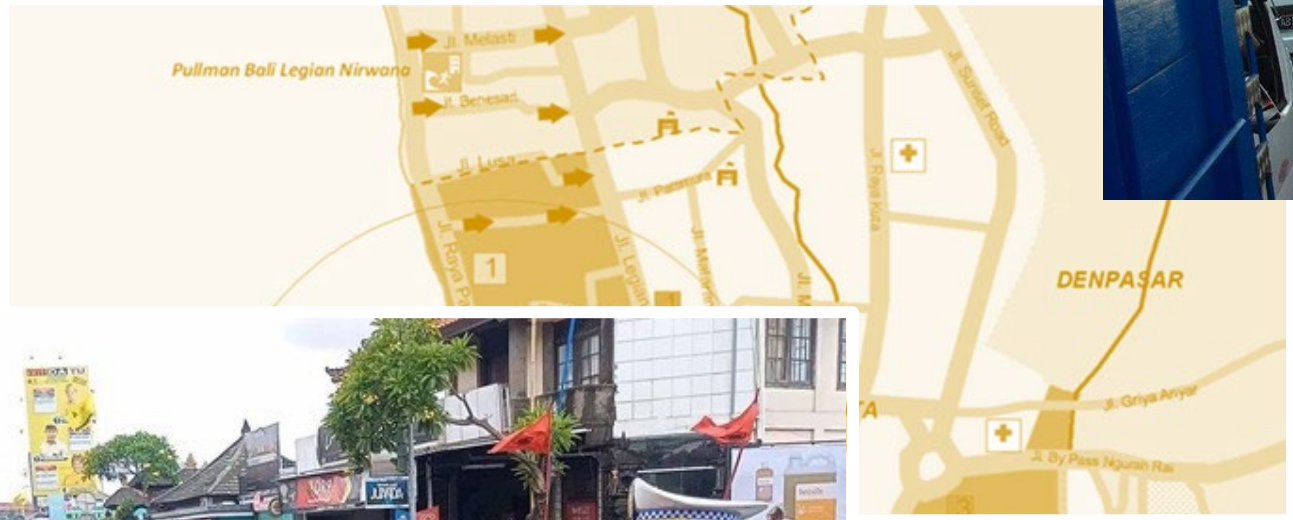


*Document of Banda Aceh Government (2013)*

# People Behavior in Evacuation



# Traffic Control





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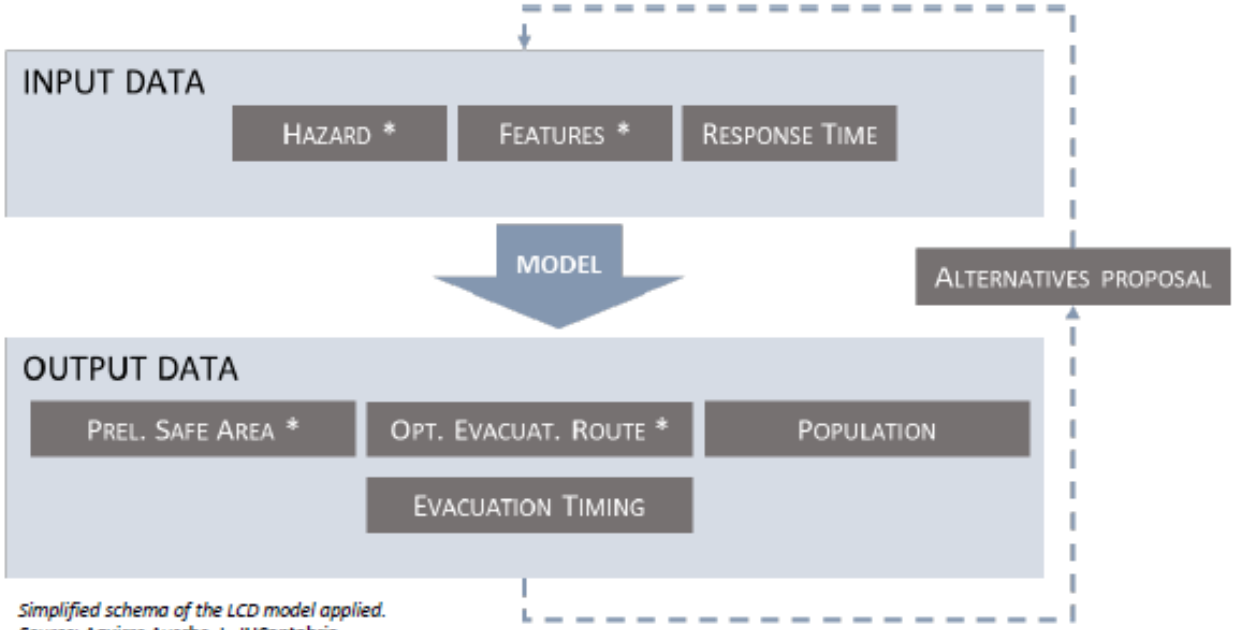
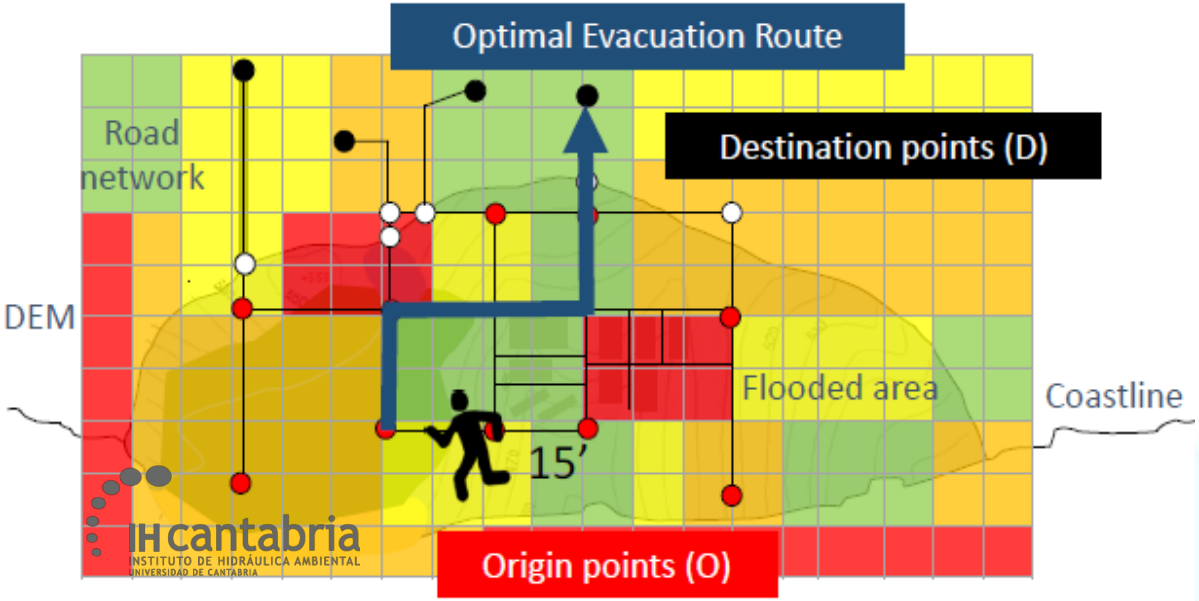
# Least Cost Distance Model
# A GIS based tool

The model helps to identify the **optimal evacuation routes** in terms of least cost in time




*Simplified schema of the LCD model applied.*
*Source:* Aguirre Ayerbe, I., IHCantabria.




As applied by IHCantabria in Larnaca, Cyprus

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# Assessment of Evacuation Routes

- **Involve local residents** to get their perspective and learn about short-cuts that can serve as evacuation routes
- **Field visits** in areas in question to get a better understanding of feasible options

- **Walk evacuation routes** to get a feeling of the time it takes to reach safe areas. As a thumb rules you might assume that people can evacuate at a speed of 1m/second
- You may recommend alternative **structural measures** to make routes more passable or constructing additional routes if existing ones are not sufficient
- While in the process of designing the map, it is best to walk along routes to the safe evacuation area or sites to identify hazards and check on ground conditions that may not be obvious on maps.

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# Thank you


***IOC/UNESCO Indian Ocean Tsunami Information Centre***
***IOTIC-BMKG Programme Office***

***Disaster Risk Reduction and Tsunami Information Unit***
***UNESCO Jakarta Office***


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