

Tsunami Evacuation Planning using Geoinformation Technology Considering Land Management Aspect

Case Study: Cilacap City, Central of Java, Indonesia

Master's Thesis by Elyta Widyaningrum (Indonesia)

Introduction

This research aims at developing and conducting tsunami evacuation modelling using geoinformation technology and elaborating recommendations which take into account land management aspects for Cilacap City, Central of Java, Indonesia. Considering its high vulnerability to tsunami hazard, there is a high necessity for Cilacap city to reduce potential casualties by sustainable tsunami mitigation strategies. A main effort to mitigate the consequences of a tsunami disaster is to evacuate people from the hazard area before the tsunami strikes by means of either horizontal or vertical evacuation.

Research Objectives

1. To create transferable, suitable and applicable evacuation route modelling;
2. To formulate strategies and recommendations option for the further urban-coastal planning and development in tsunami prone areas;
3. To provide local/regional disaster management support system.

Research Methodology

A. Evacuation Target Points Distribution Determination

Derived from ground survey data (Cilacap building survey data), tsunami hazard zone mapping and a high scale Digital Terrain Model (DTM).

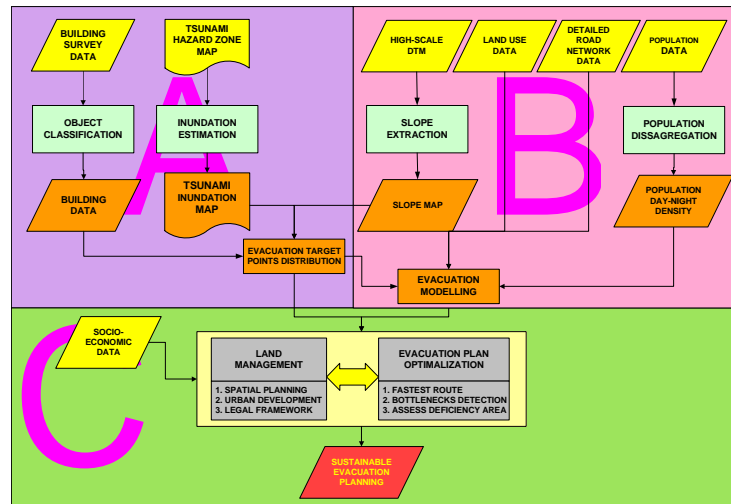
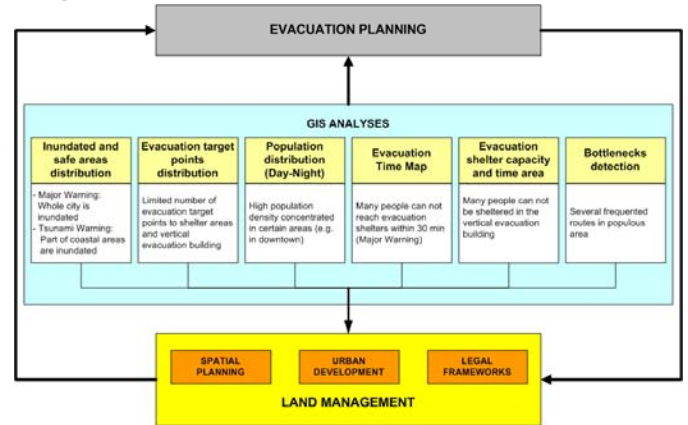
B. Evacuation Modelling

The result of sub-study A together with land use, DTM, road network and population data is used to conduct evacuation modelling.

C. Land Management and Geo-information

Sustainable evacuation planning in harmony with the dynamic of Cilacap.

Evacuation Planning Analyses and its Contribution to Land Management

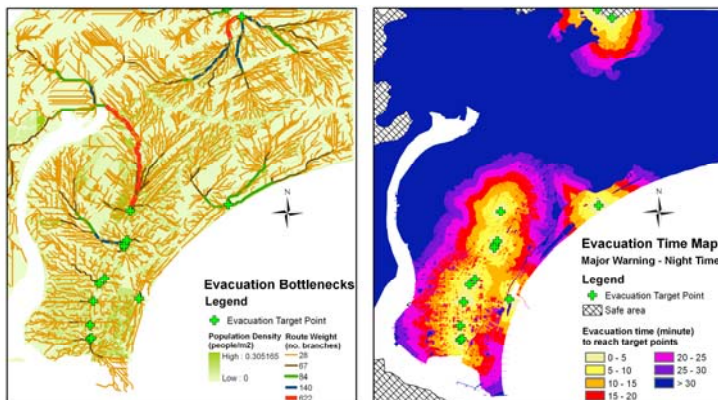


Possible Inputs for Future Cilacap Development

NO	GIS ANALYSES	POSSIBLE INPUT FOR FUTURE CILACAP DEVELOPMENT
1.	Inundated and safe areas distribution	
	The whole city is inundated Part of coastal areas are inundated	-Plan investment carefully -Enhance resilience and adaptive capacity Zoning of coastal areas
2.	Evacuation target points distribution	
	Limited number of shelter areas Limited number of evacuation building	-Areas preservation and new location selection -Building function and urban planning preservation law - Selective tax incentive -Preservation of existing building and function -Urban planning law and selective tax incentive
3.	Population distribution	
	High concentration of people in certain areas	-Redistribution of people, infrastructure and facilities -Urban planning law and selective tax incentive
4.	Time Map	
	Many people in certain areas can not reach evacuation shelters within 30 minutes	-Development of new evacuation routes -Land use planning
5.	Shelter capacity and time area	
	Many people can not be sheltered in the available buildings	-Development of new evacuation buildings -Preserve existing evacuation building
6.	Bottlenecks detection	
	Several frequented route in populous area	-Development of new routes and preserve road -Urban planning law

Research Results

The evacuation bottlenecks identification and time map in Cilacap.



Conclusion and Recommendations

The land management related recommendations consist of continuous strategies for short-term, mid-term and long-term development of Cilacap city.

Key Issues	Time Frame		
	Short-term	Mid-term	Long-term
Evacuation Planning	Tsunami vertical evacuation constructions Tsunami horizontal evacuation	more suitable shelter areas Construct new vertical evacuation buildings and life-support facilities	evacuation routes and shelters Updating evacuation routes, Reviews and analyses
Land Management	Official endorsement of suitable tsunami evacuation Scientific formulation of building codes Evacuation route socialisation to the public	Creating artificial shelter areas Implementation of Building code Redevelopment area and infrastructure Engineering in coastal areas	Implementation of disaster preparedness measures through urban planning Public Private Partnerships Urban Land Readjustment