TOWARDS AN INTEGRATED COASTAL DISASTER MANAGEMENT FRAMEWORK:

Bridging Conceptual and Practical Applications Using the Indonesian Legal and Planning Context as a Case Study

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STATEMENT OF CONTRIBUTION OF OTHERS

This thesis has been developed with contribution from many persons as follows:

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- Principal supervisor: A/Prof. David King
- Associate supervisor: Dr. Alison Cottrell
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DECLARATION ON ETHICS

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the National Statement on Ethics Conduct in Research Involving Human (1999) the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997), the James Cook University Policy on Experimentation Ethics. Standard Practices and Guidelines (2001) and the James Cook University Statement and Guidelines on Research Practice (2001).

The proposed research methodology received clearance from the James Cook University Experimentation Ethics Review Committee:

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ABSTRACT

Events, losses and casualties from natural disasters have been escalating and are predicted to be more severe in future due to population growth, socio-economic development, environmental degradation, and climate change impacts. In response, the new paradigm in disaster management puts more focus on pro active and mitigation action rather than response and recovery. Consequently, risk reduction efforts involve many different aspects of regulations, policies, programs, and stakeholders that create complexity in planning and implementation. Therefore, an integrated approach is a must and is internationally encouraged and set as a priority for global actions. However, the framework to facilitate that integration is lacking. Research on integrated natural disaster management has been both limited and mostly undertaken at a conceptual level.

This research tries to fill that gap, particularly for natural coastal disasters management, using the Indonesian context as a case study. The basic argument underpinning this research is that in addressing coastal disasters, an integrated approach is required between disaster management and coastal management. Integration between those two fields is essential, beneficial, and implementable within existing theoretical approaches, legislation, and planning arrangements. To validate and support that argument, four tasks, that also serve as the research objectives, are set to assess: i) existing theoretical approaches and concepts to support integration and development of a framework, ii) legislation and planning arrangements that support integration, iii) a framework to facilitate integration, and iv) application of a framework to address coastal hazards at the local government level. Quantitative and qualitative methods were applied for assessments to provide multi sources of evidence that include: i) literature review of disaster management and coastal management fields, ii) content analysis of acts and planning documents, iii) spatial analysis of coastal hazard and community vulnerability, iv) semi structured interviews with key stakeholders, and v) direct field observation.

Assessment of the literature revealed that both disaster management and coastal management are driven by concerns for sustainability. Both share many similarities within their objectives, community participation, and approaches that can be used to initiate integration. Both fields conceptually apply a cyclic adaptive planning process that is implemented using strategic and operational plans. In the legal context, Indonesian Disaster Management and Coastal Management Acts have many similarities in their planning processes that encourage integration. However, they also exhibit differences in planning document types that need harmonization to effectively implement the acts. Each act also contains limitations that require integration to successfully address coastal disasters. Spatial limitations are apparent for the Coastal Management Act that use subdistrict boundaries as delineation. For the Disaster Management Act, there is a limitation to address detailed activities such as coastal habitat preservation and community empowerment. Further support was obtained from findings of assessment of existing disaster management and coastal management plan documents. Both planning documents, at national, provincial and local levels, cannot address coastal disaster issues alone.

Findings on the application of the framework at Semarang and Pekalongan provide empirical evidence for integration. It revealed that coastal inundation and community vulnerability distribution do not match with existing boundaries of coastal areas as regulated by the act. Existing planning documents at the national and provincial are fragmented and are also minimal in addressing the issue, where in Semarang and Pekalongan mostly focusing on structural mitigation such as drainage and dam construction. Community vulnerability factors are multidimensional and cannot be addressed by only a single document. The framework application puts the inundation and vulnerability issues in a broader context where disaster management and coastal management plans play a key role together with other sectoral agencies. Application of the framework showed that both long term and short term actions are required to address coastal inundation and community vulnerability. Coastal management plans provide long term policy support within coastal strategic plans and zoning plans that have a 20 years plan period. Five areas of potential integration were also identified that include substantial, methodological, procedural, institutional, and policy aspects.

The framework encourages more assessment of approaches and methods of disaster management and coastal management to facilitate the integration. More discussion and debate have also initiated the move to establish integrated coastal management as a means for implementing coastal hazard mitigation and climate change adaptation simultaneously. The research also indicates several limitations. The inundation assessment is highly dependent on the resolution of elevation data. Different resolutions provide different results and affect management intervention. Vulnerability factors are only constructed from existing available attributes from the census data. Detailed variables could be added to provide more elements of disaster and coastal management. The framework itself assumes that all planning processes are initiated in the same time scale, but in fact they are undertaken in different time frames based on disaster management and coastal management agencies. The effectiveness of the framework also relies on the quality of responsible agencies and its staff to undertake the integration elements, which all respondents identified as the most challenging problem for disaster management agencies, at national and local levels.

This research contributes to different aspects of disaster management and coastal management fields. At theoretical and conceptual levels, the research fills the gap and need of a practical integration framework that at a conceptual level has already been proposed and developed. The integration framework provides a more detailed and in-depth analysis of: i) integration of disaster management into coastal management planning, ii) practical implementation of integrated coastal management principles, iii) integration of disaster management and coastal management within development planning, and iv) the use of integrated coastal management for coastal adaptation to climate change impacts. At a governance level, the research provides a means for government in integrating policies and programs in coastal disaster management. The framework provides a reference for streamlining different regulations, policies and planning in coastal disaster management. At a regional level, the Indonesian case study gives lessons and reference to other countries in addressing coastal disasters. Globally, the research assists in achieving its existing agenda to reduce risk from natural disasters particularly strengthening and improving policy and planning levels.

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CHAPTER 1
INTRODUCTION

1.1. Pressure in Coastal Areas from Human and Natural Hazard

World population and economic growth in coastal areas have been increasing for many decades. Based on UN-Habitat report, 3,351 cities are located in coastal zones and almost 90% of the largest cities (35 out of 40) are either in coastal zones or situated along a river bank (UN-HABITAT 2008). According to the UN Atlas of the Ocean more than half of the world's population lived within 200 km of the coastline in 2001 (UN 2011). That growth needs a lot of support in the form of human capital, space, raw materials, and energy which in turn trigger many consequences and problems. These have been emerging in the form of conflict among users, pollution, habitat changes, and environmental degradation that threaten coastal development sustainability.

To respond to the above issues, the main objective of coastal management is to harmonise different interests and to address the negative impacts of human uses in coastal areas. In that regard, an integrated approach for coastal zone management is an essential tool (Cicin-sain and Knecht 1998). Theoretically, integrated coastal management (ICM) is defined as a continuous and dynamic process to make decisions for the sustainable development of coastal resources to accommodate the need for resource uses and protection (Cicin-sain and Knecht 1998). It evolved from early development in the 1980s to a maturing process as integrated coastal management by 1990s (Vallega 1999). Since then, the application of ICM has been increasing and becomes public policy that is accommodated in national and local laws and regulations. For example, the USA enacted the Coastal Zone Management Act in 1972 and Indonesia enacted Coastal and Small Islands Management Act in 2007.

Dealing with human-sourced problems is not enough since coastal hazards also contribute to existing pressure. Erosion, flooding, cyclones, earthquakes, and tsunamis are the most common phenomena. Previously, those events were not a problem when many coastal areas were free from inhabitants. However, as those coastal hazards have more chance to intersect with settlement, housing, infrastructure, and economic activities, the potency of coastal disasters has escalated. Since then, humans have to

address both their negative impacts on coastal areas and reduce loss from natural hazards to sustain their livelihoods.

Coastal hazards cannot be eliminated because that is outside human capacity. But impacts of the hazards can be minimised by appropriate design, development and knowledge of risk elements (McEntire, Fuller et al. 2002). There are four possible actions to reduce the impacts (Quarantelli 1986): 1) preventing the hazard from happening, 2) mitigating the effects if the hazard occurs, 3) responding properly during events i.e. emergency and community response, and 4) recovering from the damage and losses i.e. post disaster recovery and reconstruction. Those four elements constitute major disaster management activities nowadays and have become major disaster management programs.

Meanwhile, problems have been escalating due to climate change impacts that bring pressure and challenge to coastal development. Climate change in coastal areas will compound with existing pressures and problems and affect humans and their environment directly and indirectly (IPCC 2007). Sea level rise will increase the risk of coastal inundation, erosion and ecosystem losses (Nicholls, Wong et al. 2007). Coral reefs, mangroves and species that are sensitive to water submergence and temperature change will be affected. Research in the Caribbean shows that 32% of the total current beach area for marine turtle nesting could be lost with a 0.5-m rise in sea level (Fish, CÔTÉ et al. 2005). And eventually, all of those conditions will lead to habitat damage and less resilience of coastal environments and communities to cope with disasters.

Understanding these situations provides a strong argument that a single disciplinary and sectoral approach is not enough to address coastal management and disaster issues. The Indian Ocean tsunami showed that the unsustainable uses of coastal areas exacerbated damage and impacts of the tsunami (UNEP 2005; Kay 2006). To anticipate future coastal disaster events, ICM would play an important role in maintaining coastal environmental integrity and contributes to risk reduction (Narcise 2005). Meanwhile, awareness to address both disaster management and climate change impacts also has been raised by a number of experts such as O'Brien et al (2006), Alleyene (2007) and also international communities such as the UN Food and Agriculture Organization (2008).

1.2. ICM and Disaster Management

ICM and disaster management are related and closely connected to achieve coastal sustainability. Coastal hazards can eliminate development and economic activities in a short period of time e.g. tsunami and flood. On the other side, coastal management could lead to more resilient communities and environments by maintaining coastal habitats and productivity.

The inclusion of environmental issues is important because environmental losses and degradation will lead to a reduction in the capacity to provide services for food, protection and environmental services. Protecting environmental resources such as wetlands, sand dunes, coral reef, coastal vegetation, and other ecosystem features will increase the capacity of coastal environments and communities to reduce the impacts from disasters that make it an important part of disaster mitigation activities (Godschalk, Beatley et al. 1999). The role of coastal habitats such as mangroves in reducing coastal hazards is important. During the Indian Ocean tsunami 2004, coastal areas with high density of mangroves e.g. the West of Bengal India were not damaged by the tsunami (Nath, Roy et al. 2008). Coastal forests have been used to protect coastal communities from extreme wind, abnormal high tides, flying sand and tsunamis on Japanese coasts (Edward, Terazaki et al. 2006). If coastal natural protection from forests, mangroves and coral reefs is combined with community awareness, it will provide not only free protection from natural hazards but also increase the coastal habitat health, productivity and fisheries that eventually increase environmental and community resilience.

On the other hand the environmental degradation very often is caused or induced by human uses such as improper land use and destructive resources extraction. It is not only disaster that could create environmental losses, but also human activities. If these two actors are coupled the impact of disaster will be very high. From this point of view, mitigating coastal hazard impacts also means maintaining the sustainability of coastal area development (El-Masri and Tipple 2002). Both fields also faced similar challenges and problems in maximising their programs and resources.

An ongoing trend in disaster management is also increasing the linkage. It was started in 1990s when the UN established an International Decade for Natural Disaster Risk

Reduction (IDNDR). The objectives were to reduce loss from natural disasters all around the globe by concentrating risk reduction efforts, incorporating risk management in government policies, and shifting reactive efforts to prevention actions (UN/IDNDR 1999). The old approach in hazard management was emergency response, rescue and rehabilitation. Under the new approach, the response and recovery paradigm in disaster management has been shifted to mitigation and risk reduction (Godschalk, Beatley et al. 1999; Pierce 2003), in particular to incorporate mitigation, preparedness, response, and recovery (Cutter, Mitchell et al. 2000; Briceño 2004). The change is also a result of consideration that protective measures are expensive and create ecological side impacts (Plattner 2005). Risk reduction has become as important as recovery and rehabilitation.

In the context of an integrated approach for disaster risk reduction, the role of the Hyogo Framework for Action has been essential. HFA gave direction to all countries in developing activities to reduce the risk from disaster. These priorities ensured that disaster risk reduction would be adopted as national and local priorities, with "a strong institutional basis for implementation, through identifying, assessing and monitoring disaster risks and enhancing early warnings, that use knowledge, innovation and education to build a culture of safety and resilience at all levels to reduce the risk and to strengthen disaster preparedness at all levels" (HFA, 2005).

This conceptual and practical linkage could be used to facilitate the integration between ICM and disaster management. Disaster risk reduction responsibility is now shared by all stakeholders and is part of development activities in coastal areas. Human activities in coastal areas must not degrade the environment's capacity to absorb hazards or increase risk from hazards. It means that coastal hazard response by single agencies i.e. disaster management agency has to be changed to partnership and collaborative measures with all partners. Within that point of view ICM is essential because coordination, integration, and collaboration among stakeholders in coastal areas are its core ideas.

ICM and disaster management could get many benefits from integration. ICM could protect communities from coastal hazards by maintaining natural system integrity to preserve healthy coastal ecosystems (UNEP 2005). Sustainability is encouraged by integrating social, economic and environmental interests that will maximise and sustain

the benefit of coastal resources for community (Cicin-Sain 1993). Moreover, ICM's aim to reduce coastal environmental degradation and community poverty is essential to coastal disaster risk reduction (Olsen and Christie 2000).

Disaster risk reduction supports the integration with ICM from its hazards and vulnerability assessment approach. Information from hazard areas and risk distribution are important for coastal management e.g. zonation, permits and licences for new development. Coastal hazard analysis also provides information on technical activities in coastal management such as in the process of conservation planning, (Allison, G.W, S.D. Gaines et al. 2003). Importantly, information on coastal disaster risk assessment could assist the development of ICM policy and programs.

However, a difficult task still lies ahead to make integration a reality. The real challenge comes from the fact that in practice ICM and disaster management are regulated differently thus creating different planning requirements and agency arrangements. For example, Japan established a Coastal Act in 1953 and Disaster Countermeasure Basic Act in 1961. The USA has separate acts but established a new amendment for the Disaster Management Act of 2000 to complement the Coastal Management Act 1972. Sri Lanka and India issued their Disaster Management Acts in 2005 separately from coastal management regulations. Indonesia enacted separate Disaster Management Act and Coastal and Small Island Management Act in 2007.

The essential thing that is missing now is a framework and practical approach to implement and harvest integration benefits (literature map for this issue is presented in Appendix 1). Lacking experience and examples as to how both fields could be integrated in real planning and development practice will hinder the integration idea. Without the availability of a framework that is practical and in harmony with real planning processes, the benefits of integration between ICM and disaster management will remain only a concept.

1.3. The Challenge for Integration

ICM and coastal disaster mitigation have been seen as separate issues. They have not worked together to reduce the risk and increase the capacity of human and natural systems to coastal disasters. Partly it is because both fields have different scientific

foundations and history. Coastal management has been developed on resource and habitat conservation and disaster management on risk management. In practical implementation both fields are fragmented by different laws and agencies. ICM also faces difficulties in responding to natural disasters that need immediate action e.g. for rehabilitation and reconstruction (Kay 2006). On the other hand, coastal disaster mitigation programs often focus on structural mitigation and reduction of social vulnerability but do not address the coastal environmental integrity e.g. habitat conservation and rehabilitation.

The need and benefit of integration are still in the conceptual state but the requirement is real. As mentioned above, it is a complicated task because it is difficult to show real implementation of ICM for disaster risk reduction in coastal areas. A lot of work and research on coastal hazards are excluded from ICM analysis e.g. tsunami mitigation (Dengler 1998; Eisner 2005; Jonientz-Trisler, Simmons et al. 2005), coastal flooding mitigation (Elsner, Mai et al. 2003), cyclone mitigation by Paul and Rahman (2006) and sea level rise by Harvey, Clouston et al. (1999). ICM programs mostly address coastal resource management such as fisheries management (Bunsick 1999), marine protected areas (Agardy 1993; Balgos 2005; Cicin-Sain and Belfiore 2005; White, Eisma-Osorio et al. 2005), marine pollution management (Linton and Warner 2003), and habitat protection and rehabilitation (e.g. Gordon, Reams et al. 1998; Lewis Ill, Clark et al. 1999; Ledoux, Cornell et al. 2005).

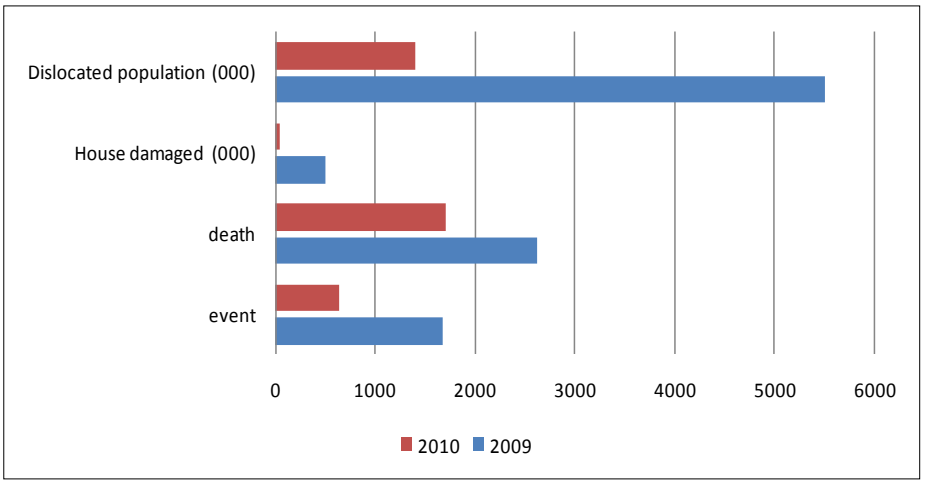
1.4. Indonesian Context

1.4.1. Coastal Management and Disaster Management Issue

Indonesia is an archipelagic country where coastal and marine resources play an essential role for the nation and its people. More than 60% of Indonesian's districts are in coastal areas (Dartoyo 2004) that put significant pressure on coastal environment and habitats. Unsurprisingly, coastal habitats are in danger where more than 68% of Indonesian coral reefs are in a damaged condition (LIPI 2011). Meanwhile, a number of problems are still emerging in the form of over fishing, habitat degradation, pollution, conflict among users, and coastal disasters (MMAF 2010). Those conditions have made coastal management a paramount need for the nation in order to achieve marine and coastal sustainable development (Dahuri and Dutton 2000).

The specific development of coastal management in Indonesia started from 1995. Previous activities in relation to fisheries, environmental issues, and community development were undertaken but did not address specific issues of coastal resources management. It has been facilitated mainly through foreign donor projects. Enactment of the Coastal and Small Island Management Act in 2007 provided a strong and systematic foundation for ICM implementation, in particular through its planning process arrangements. ICM would be part of development planning and is mandated at national and local levels. It is not just a project that lasts only during the project period.

For disaster management, issues of vulnerability and hazard impacts are still overwhelming. According to the Indonesian Disaster Management Agency/BNPB (2011), there were more than two thousand disaster events from 2009 – 2010 that dislocated more than six million people in Indonesia (Figure 1.1). For coastal hazards, there were 55 tsunami events with a source in Indonesia from 1900s to 2011 that killed more than two hundred thousand people (NGDC 2011). Other chronic hazards are also prominent in the form of coastal erosion, pollution, and inundation which are going to be exacerbated by climate change impact.



Source: (BNPB 2011)

Figure 1.1. Number of disaster events and losses in Indonesia 2009 - 2010

The vulnerability of coastal communities is also high such that all catastrophic and chronic coastal hazards can potentially become a disaster. There are more than 10,000 coastal villages in Indonesia (14% of total national villages) that are prone to

earthquakes, tsunamis, floods, cyclones, extreme waves and landslides (BPS 2008). More than 30 million of Indonesia's population are under the poverty line and more than 60% of them live in rural areas including coastal villages (BPS 2010). They have little access to social and economic services and rely on subsistence activities. The degradation of coastal resources will not only jeopardise their livelihood but also diminish their protection from natural hazards.

1.4.2. New Opportunity and Problem

Disaster management initiatives and awareness in Indonesia have been strengthened and influenced by a number of big events such as tsunamis, volcanic eruptions, and floods. It reached a peak in 2007 with enactment of the Disaster Management Act No. 24/2007 where a new paradigm in disaster management was applied. Interestingly, coastal disaster events, in particular the tsunami of 2004, also triggered awareness for a comprehensive coastal management regulation that accommodates coastal hazards in its arrangement. It was during that time that the Coastal and Small Island Management Act No. 27/2007 was enacted. Both acts provide new direction to develop resilient coastal communities that can survive and recover from natural hazards in future.

However, arrangements and requirements in disaster management and ICM acts create further problems in relation to human capacity, planning processes, and resource allocation. Complexity in the planning process is an immediate implication since both acts oblige governments to conduct coastal management and disaster management planning. The disaster management act requires the establishment of disaster management agencies at national and local levels to carry out a number of planning activities. The act also requires local government to develop disaster management plans that are coordinated by disaster management agencies. Meanwhile, the coastal management act requires integrated coastal management planning at national and local levels. Existing marine and fisheries agencies are responsible for the whole process and implementation.

In regard to coastal disasters, overlap between issues, programs, resource allocation, and locus of activity between disaster management and ICM are inevitable. From that point of view, both fields have to avoid: i) duplication and contradiction of strategies and programs at all planning levels ii) reduction of the effectiveness of the plan, iii)

programs attributed to the wrong level of authority and mandates, and iv) important programs that are missed from the plan. A number of considerations are also needed to be taken into account during the implementation of the coastal management and the disaster management act. Firstly, there is a big challenge since implementation will be facilitated by a planning process at the local level where capacity, funding, and human resources are still a big issue. Secondly, to anticipate those problems, coastal disasters need to be addressed as a shared responsibility and to be solved through collaborative actions. Thirdly, for coastal disaster management, risk reduction activities are benefited by ICM since it is multi-sector approach that covers coastal social, economic, and environmental programs.

Consequently, integration between ICM and disaster management is crucial. An integrative approach is needed to develop ICM and disaster management plans. In turn it requires a framework to allow the integration of all stakeholders in coastal and disaster management planning because each level of government, agencies, and sectors have their own role, responsibility, and mandate according to both acts.

1.5. Research Goals and Objectives

The research goal is to support sustainable development in coastal areas by providing a framework to integrate disaster management and ICM based on interconnected issues and mandates of the disaster management and coastal management using Indonesian acts and applied at different levels, types, and content of planning. The subsequent objectives are:

1. to assess existing theoretical concepts and approaches as reference for integration between disaster management and ICM.
2. to evaluate and examine integration feasibility using the Indonesian context by:
    a. analysing common arrangements and overlapping elements between the Indonesian Disaster Management Act and Coastal Management Act that demand integration.
    b. developing a framework for integration between coastal management and coastal disaster mitigation planning.
3. to assess the practicality of the framework if applied to the local government planning context using Semarang City and Pekalongan City coastal inundation issues as case studies.

4. to assess benefits of integration in terms of: i) long-term policy and program commitment ii) support from stakeholders, and iii) efficiency of time and financial aspects.

1.6. Research location

Research was carried out in Indonesia with Pekalongan City and Semarang City used as case study locations (Figure 1.2). Both locations are in Central Java Province and demonstrate complexity and the need for integration between ICM and disaster management to address coastal hazards. They function as centres for administration and economy, undertake multi sectoral development, and represent the interconnectedness of planning from district, province, and central government.

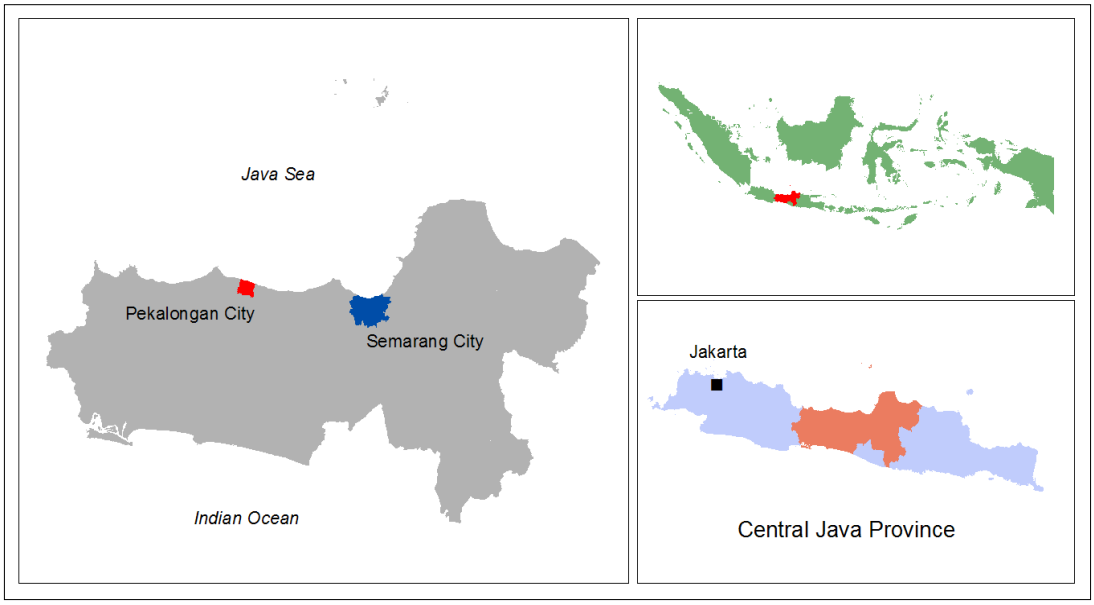


Figure 1.2. Research locations

1.7. Expected Output and Outcome

This research produced a number of outputs that include:

1) literature review on existing concepts and approaches to disaster management and ICM,
2) content analysis of the Indonesian coastal management and disaster management acts,

3) accountability, compatibility, and functionality analysis of coastal management, disaster management plans and development plans towards community resilience to disaster,
4) framework for integration between disaster management and ICM,
5) vulnerability analysis of case study locations to coastal hazards,
6) potential benefits from the framework application in optimising programs and funding to reduce coastal community vulnerability to disaster.

The outputs will contribute to a number of outcomes as follow:

a. Local and national interest; the research will assist government in formulating regulations and guidelines for disaster management and coastal management acts in Indonesia. Case study analysis will give reference for coastal district/city in fulfilling the acts' obligations by optimising existing regulations and resources at national and local levels.
b. Regional interest; as most of the Indian Ocean countries enacted disaster management acts after the Indian Ocean tsunami of 2004, the Indonesian context in implementing coastal management and disaster management acts could benefit countries in the region in terms of lessons learned, planning problems and the integration challenge.
c. Global agenda; the research supports the international agenda on disaster risk reduction especially to address organizational, legal and policy frameworks (governance issue) as one of the gaps and challenges identified in the five main areas of the Hyogo Framework for Action 2005 – 2015.
d. Conceptual analysis; the research will contribute and add to existing knowledge on coastal management and disaster management fields especially in the context of integration between two approaches.

CHAPTER 2

RESEARCH DESIGN AND GENERAL METHODOLOGY

The research is designed to apply different levels of contexts that include: i) conceptual level, ii) legal level, and iii) practical level. Each context supports specific and different arguments and ideas which are then distributed in different chapters. The case study method is used to examine how integration could be applied using existing concepts, legal, and real problems and issues in Indonesian ICM and disaster management. That method is preferred for research that applies the "how" question and focuses on real life problems and contexts that need multiple sources of evidence and triangulation in the analysis (Yin 2009).

2.1. Research Question

The major question is how ICM and disaster management planning can be integrated to reduce risk from coastal disasters and climate change impacts and get benefits from knowledge, practice, and approaches that have been developed. More detailed questions are:

1. How could existing concepts and approaches in ICM and disaster management be used as a reference for integration?
2. Using Indonesian ICM and disaster management regulations as an example, what are the arrangements and overlapping elements that demand and allow integration for implementation?
3. Are act mandates and planning documents accountable, compatible, and functional to each other to reduce social vulnerability and increase resilience to coastal hazards?
4. Is a framework for integration that is produced by the research, based on existing theoretical and Indonesian legal and practical contexts, operational and implementable?
5. How does the integration maximise existing programs and funding to address natural disasters in coastal areas by framing the issues in a broader context?

2.2. Research Framework and Propositions

2.2.1. Framework

To answer the research questions and meet research objectives, a specific research framework and methodology are applied to examine theoretical, legal and practical contexts. Specific units of analysis are used to fit the research framework. At the theoretical level, literature and existing practices in disaster management and ICM are used. For the legal context Indonesian disaster management and ICM act are evaluated. Finally, at the practical level, ICM, disaster management, and development planning documents at national, provincial, and local levels serve as units of analysis. Each level is completed with a proposition and a chapter that covers that analysis. Results from conceptual, legal, and practical analysis are used as a basis to develop the integration framework. This framework is then tested and applied in two Indonesian cities i.e. Semarang City and Pekalongan City. Application at the local level is important to examine if the framework is applicable and operational.

As this research was qualitative research, the researcher was considered as part of analysis instrument (Fink 2000). In the analysis of Indonesian disaster management and coastal management integration, the researcher's roles are: i) defining the appropriate documents that are relevant for analysis, ii) identifying and determining key stakeholders at national and local levels that are involved and actively participated in the process of Indonesian Disaster Management and Coastal Management Act formulation, iii) determining the relationship between findings from policies, programs, and planning documents on Indonesian disaster management and coastal management, iv) to generate a general picture of integration between disaster management and coastal management from different sources of evidence, v) evaluate how the findings and results are relevant with institutional arrangement, planning process, and financial system in Indonesia.

2.2.2. Propositions

Five research propositions are presented at each analysis level to guide data collection, analysis, and discussion with each allocated to respective chapters (Figure 2.1). Firstly, the integration of ICM and disaster management is conceptually and theoretically feasible and beneficial. To support this proposition, a literature review is carried out using existing disaster management and ICM concepts, elements, and approaches.

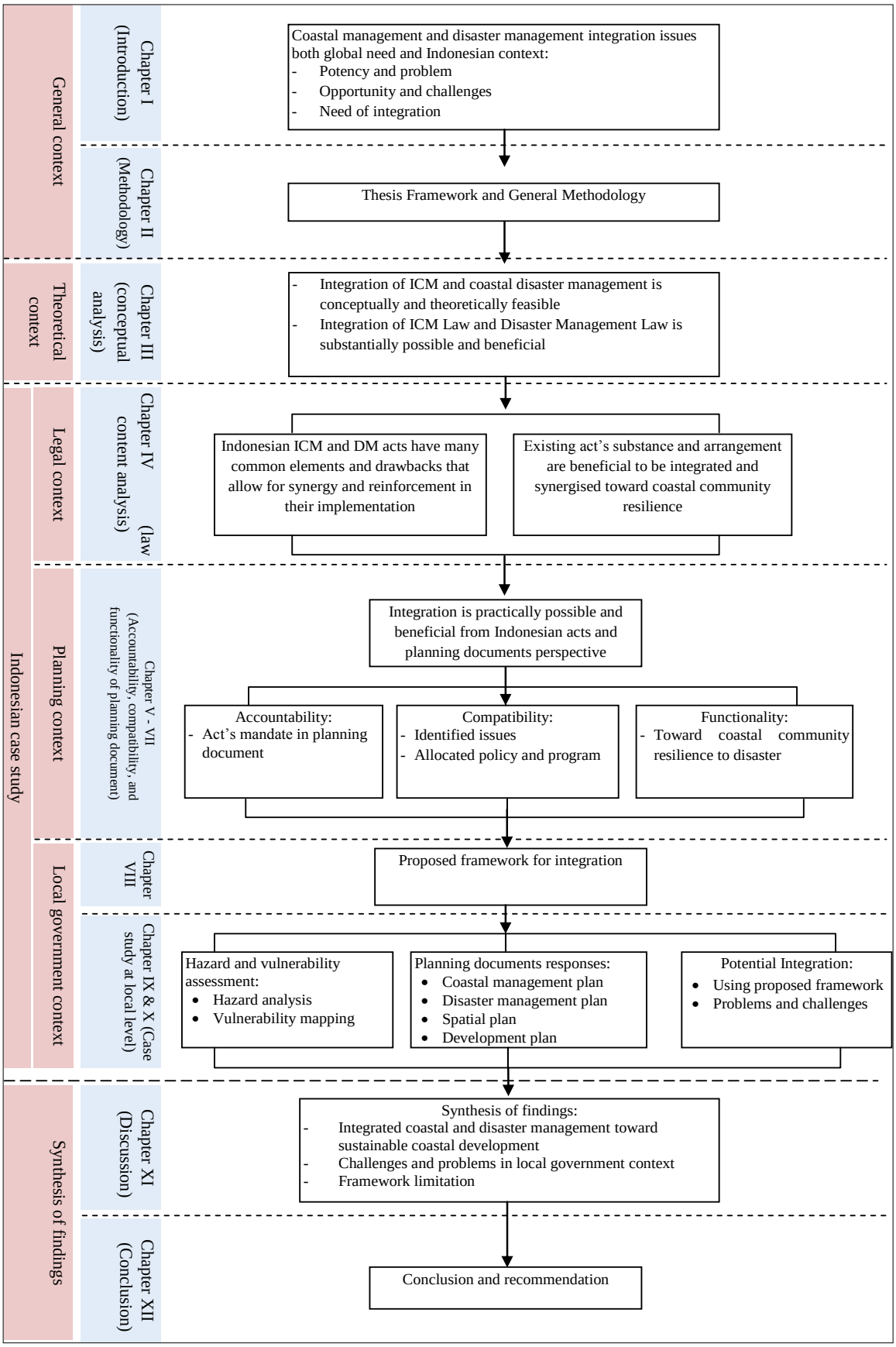


Figure 2.1. Research framework and chapter allocation

The conceptual basis gives a foundation to build an integration framework that in turn needs to be adjusted and harmonised with existing arrangements under disaster management and ICM regulations. This analysis is allocated to Chapter 3 - Theoretical and conceptual basis for integration.

Secondly, existing disaster management and ICM regulations have common elements, arrangements and shortcomings that allow for synergy and enforcement. This analysis is carried out to support findings at the conceptual level against real life examples by assessing the Indonesian Disaster Management and Coastal Management Act. Emphasis is given to examining content and contextual meanings of its mandate, arrangement, and planning process to see any similarities, overlaps, and contradiction. The findings are used as a reference for integration framework development. It is allocated to Chapter 4 – ICM and Disaster Management Act Content Analysis.

Thirdly, there is no single planning document from disaster management, ICM, and development plans that could address all coastal community vulnerability issues. This analysis is carried out to know how real documents in disaster management, ICM, and development planning deal with coastal disaster issues. This will complete the analysis of conceptual and legal contexts which are considered insufficient to produce a robust integration framework. Three major aspects of disaster management, ICM, and development plan documents at national, provincial, and local levels are examined: i) its accountability against the act's arrangements and mandates, ii) its policy and program compatibility, and iii) its functionality toward coastal resilience to disaster. Those three elements are covered in Chapter 5, 6, and 7.

Fourth, integration between disaster management and ICM is feasible by using a framework that is developed in accordance with theoretical, legal, and practical contexts. To produce that framework, all analyses from conceptual, legal, and real planning contexts are used. This framework is presented and described in Chapter 8 – Proposed Conceptual Framework for Integration.

Fifth, the framework is operational, applicable, and beneficial for local government in implementing the Coastal Management and Disaster Management Acts in particular to address coastal hazards. The proposed integration framework is tested and verified using real local government development contexts at Semarang and Pekalongan City. GIS analysis is used to show the distribution of inundated coastal areas, existing social vulnerability, coastal management boundaries, and analysis if those elements match with existing development planning and policy in both locations. Findings and results from both locations are presented in Chapters 9 and 10.

2.3. General Methodology

The general methodology is described in this chapter while detailed and complete explanation is allocated to its respective chapter as required. Analysis was applied to spatial and non spatial data. Spatial data were used for analysis that requires spatial consideration such as distribution of coastal hazards, social vulnerability, and spatial plans. Non spatial data were required to show more evidence from census data, planning documents, laws and regulations, and semi structured interview results.

2.3.1. Material and Data

Data were collected through four sources of evidence: 1) documentation, 2) archival records, 3) interviews, and 4) direct observation. Multiple sources of evidence are essential to provide complete information which is impossible to be acquired from one source (Yin 2009).

a. Documentation

A number of types of documentation are evaluated to inspect relevance and need for integration between ICM and disaster management (Table 2.1). Documents were an important source for analysis and used as major sources for legislation, planning, and development policy. It also provides thorough information at national, provincial, and local levels with specific temporal and spatial aspects.

Table 2.1. Documentations as source of evidence

No.	Document title/type	Specification/format	Sources
1.	Coastal management plan of: a. National government b. Central Java Province c. Semarang City d. Pekalongan City	Non spatial	• Ministry of Marine Affairs and Fisheries • Agency for marine and fisheries at Central Java and Semarang and Pekalongan City
2.	Disaster management plan of: a. National government b. Central Java Province	Non spatial	National and Central Java Disaster Management Agency
3.	Development plan: a. Long term development plan b. Mid term development plan	Non spatial	National, provincial, and city development and planning board
4.	Pekalongan and Semarang City spatial plan	Spatial	Pekalongan and Semarang City
5.	Act: a. Indonesian Coastal Management Act No. 27/2007 b. Indonesian Disaster Management Act No. 24/2007	Non spatial	Indonesian government
6.	Topographic base map: - Administration - Hydrology - Contour - Buildings and land use	Spatial, 1:25,000 scale Digital format	Bakosurtanal (Indonesian Agency for Survey and Mapping)
7.	Ikonos image	Geo rectified, WGS 1984 - 4 bands (RGB and IR) for Pekalongan - 1 band for Semarang City	- Ministry of Marine Affairs and Fisheries, Indonesia - http://sim.nilim.go.jp/GE/
8.	Digital Elevation Model (DEM) data	Raster, elevation data 90m spatial resolution	SRTM DEM data http://hydrosheds.cr.usgs.gov/

b. Archival Record

Two types of archival data are used: census data and financial budget records (Table 2.2). The use of archival records on census and budget are essential to support the analysis since the implementation of development plans and programs depends on the allocation of funding. Budget allocation also serves as a proxy for consistency and commitment of the planning documents. Census data are used to calculate social vulnerability and to provide information on coastal community profiles, disaster events, and coastal village conditions. Budget records are analysed and matched against social vulnerability factors and distribution.

c. Semi-structured Interviews

The results and findings are supported by semi structured interviews that were conducted at national, provincial, and local levels. Nineteen key resource persons were interviewed on disaster and coastal management issues within their respective areas (Table 2.3). The interviews were undertaken to have more detailed information and

insight from key stakeholders and in particular to gain an understanding of the context of policy, planning process, and development program in relation to disaster management and coastal management. This kind of information is usually not available in formal documents. Interviews also provide a chance to explore personal views on existing policies and programs that the respondents will not state it in his/her formal position.

Table 2.2. Archival records as source of evidence

No.	Type of data	Specification	Sources
1.	Census data: - Village potential/capacity census data	 - 2008 - Data at village level	 - Indonesian Statistic Agency
2.	Budget allocation record for: - Central Java Province - Semarang City - Pekalongan City	 Fiscal year of 2011 Fiscal year of 2010 Fiscal year of 2009	 Central Java Province Semarang City Pekalongan City

Table 2.3. Semi structured interview respondents

No.	Level	Agency	Number of respondents
1.	National	1) The national disaster management agency 2) The ministry of marine affairs and fisheries 3) The ministry of home affairs 4) The national agency for planning and development 5) Indonesian association of coastal management expert	1 2 1 1 1
2.	Provincial	1) Central Java agency for marine and fisheries 2) Central Java agency for disaster management 3) West Sumatra planning and development agency 4) West Sumatra marine and fisheries agency 5) Diponegoro University, Semarang 6) Andalas University, West Sumatra 7) Bung Hatta University, West Sumatra	2 1 1 1 1 1 1
3.	Local	1) Pekalongan University 2) Pekalongan and Semarang agency for marine and fisheries 3) Pekalongan agency for planning and development 4) Padang tsunami preparedness community	1 2 1 1

The results from semi structured interviews were used to support findings on: i) legislation on disaster management and coastal management, ii) gaps and challenges in disaster management and coastal management, and iii) requirement of integration in Indonesia for disaster management and coastal management.

d. Direct Observation

Direct observation was conducted to inspect existing environmental conditions, inundation, and community life in coastal areas of Semarang and Pekalongan. Field

observation was to investigate the distribution of coastal inundation at both locations. Documentations in the form of photographs were collected to support findings. Field documentation provides strong evidence on the impacts of coastal hazards to support spatial analysis and vulnerability assessment. It was also useful in presenting and communicating the results to the public.

2.3.2. Analysis

A data triangulation approach was used to analyse multiple sources of evidence to corroborate findings on disaster management and ICM integration needs and problems (Figure 2.2). Triangulation was used as it allows a broader range of evaluation, converging lines of inquiry, and more accurate and convincing findings (Yin 2009). The combination of documents, archive data, interview results, and spatial analysis complement each other and cover the limitations of each method. For example, existing policy and program in disaster management and coastal management usually are well constructed within the documents but their implementation can be validated only through allocated budget of key government agencies. How programs and funding address the right vulnerable communities can be validated through spatial analysis.

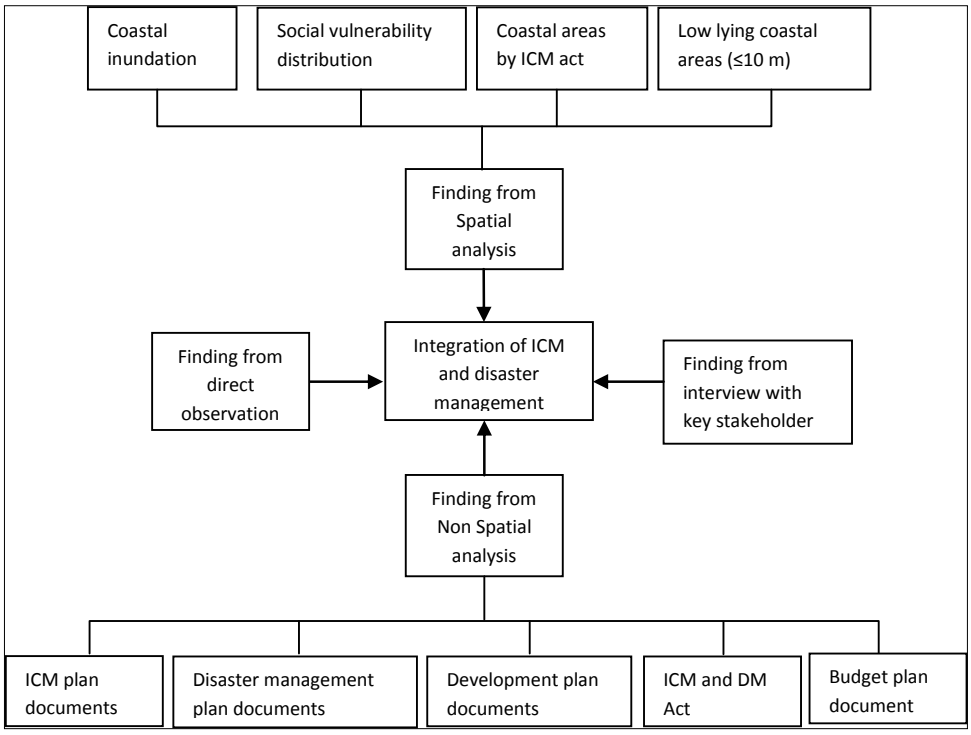


Figure 2.2. Triangulation analysis approach

1) Spatial analysis

Spatial assessment of coastal management and disaster management contexts are carried out using ArcGIS 9.3 software to produce and display information on:

i) coastal area delineation where the coastal management act is applied to be overlaid with administrative boundaries,
ii) coastal areas below 10 m for regional level (province) and less than 1 meter for city level to indicate vulnerable areas for sea level rise and coastal inundation hazards,
iii) existing land uses, infrastructure, and settlement in coastal low elevation areas,
iv) social vulnerability information and its distribution at village level, and
v) displaying and overlaying all results using GIS operations.

2) Non Spatial Analysis

Non spatial analysis is applied to existing documents that are essential for ICM and disaster management implementation.

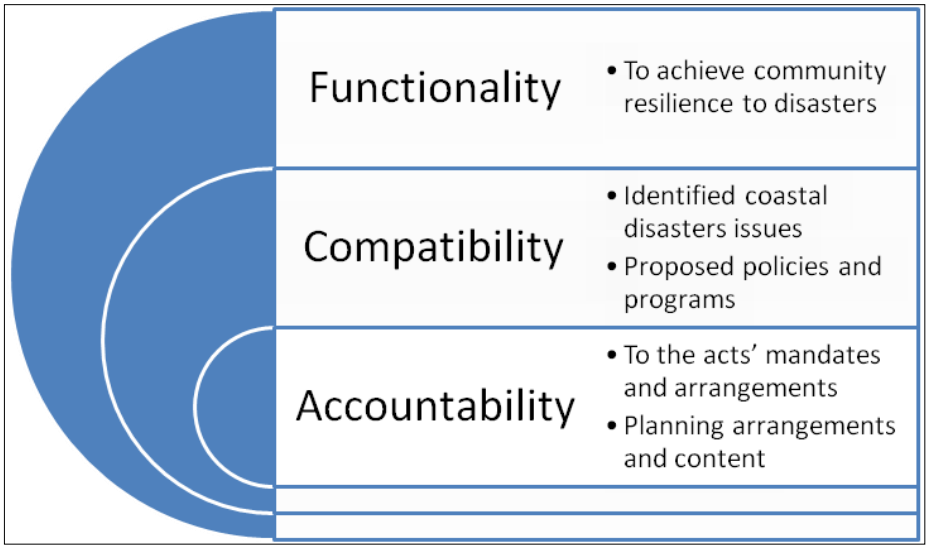
a. Qualitative Content Analysis

This method is used where a systematic analysis is carried out to examine documents and texts by assigning categories or themes as its properties (Qu, LiisaTahvanainen et al. 2009). Themes that were applied to acts' contents include: i) structure and scope, ii) planning mandates, iii) key activities, iv) public role, and v) integration with development planning.

b. Accountability, Compatibility, and Functionality Analysis

Analysis is carried out to evaluate all documents against three basic criteria as modification and extension from Alexander (2005): i) accountability, ii) compatibility, and ii) functionality. Accountability analysis is to examine if documents are in accordance with the act's mandate and obligation. Each document is examined against coastal management and disaster management acts' mandates. The mandates include obligation of planning document types, its contents, and how the document is developed. Compatibility analysis is to evaluate if planning documents are interrelated and supportive of each other. All policies and programs stipulated in the document are analysed based on its support and responsiveness to coastal management and disaster management. Functionality evaluation is to assess if documents strongly support coastal community resilience to disaster.

All identified issues, policies, and programs that are accommodated by the document are evaluated based on coastal community resilience to coastal disaster characteristics. Schematic analysis is shown in Figure 2.3. While that analysis is focused on response from planning documents, additional analysis is carried out to examine if existing budget allocation is in accordance with vulnerability factors.



Source: adapted from Alexander (2005)

Figure 2.3. Accountability, compatibility, and functionality analysis

2.4. Conclusion

This chapter has described all material, data, and methods that were applied to this research. Spatial and non spatial analyses were used to address research questions and to provide multi evidence to support the integration between disaster management and coastal management planning. Four different contexts were examined; theoretical, legal, planning, and practical using existing regulations, documents, and planning at national, provincial, and local levels. The next chapter examines the first context integration need by reviewing existing theories and approaches in disaster management and coastal management to provide a conceptual basis for integration between two fields.

CHAPTER 3

THEORETICAL AND CONCEPTUAL BASIS FOR INTEGRATION

3.1. Introduction

This chapter addresses research question number 1, to know if existing concepts and approaches in ICM and disaster management are feasible to be applied and used as a reference for integration. Concepts, definitions, elements, and processes of ICM and disaster management are reviewed (complete result of its assessment is presented in Appendix 2). The opportunity for integration is examined. Four major themes are covered in the analysis: i) concepts and definitions, ii) principal elements and components, iii) planning approaches, and iv) implementation approaches.

3.2. Concept and Definition

3.2.1. Disaster Management

a. Meaning of Disaster

The definition of disaster is varied and has been proposed from different points of view to conceptualise it. Terms and definitions are exclusively based on a human point of view. Quarantelli (1986) argued that disaster is not a physical happening but it is a human event. It means that disaster happens only when hazard agents i.e. flood and earthquake strike human property (Godschalk, Beatley et al. 1999; McEntire 2007). From that understanding, two important criteria are needed to determine an event as disaster: 1) intersection of hazard agents with human uses, and 2) overwhelming damage and losses. Those criteria imply that natural events will not be regarded as a disaster unless they create physical, life, and economic loss (Godschalk, Beatley et al. 1999; Schwab, Eschelbach et al. 2007). More importantly, its impacts are beyond community and government capacity to cope (Schwab, Eschelbach et al. 2007).

There is no exact limit of damage and losses to be regarded as disaster. A number of attempts have been carried out to give more detail definition e.g. number of fatalities in the Bradford Disaster Scale (A.Z. Keller, H.C. Wilson et al. 1992) and economic loss by Stahel (2000). Numbers of criteria are also used by the Emergency Events Database (EMDAT) to define an event as a disaster. It must meet one of these parameters: 10 or

more casualties, 100 or more people are affected, emergency declaration, and international call for assistance (EMDAT 2008).

More general and practical definitions are needed for common reference. It will help global efforts for disaster risk reduction as the number of disasters has been increasing that make international collaboration to reduce global community risk from disaster essential. To provide a common framework, the United Nations defines disaster as:

> "a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources" (UN/IDSR 2002, p. 3).

The UN definition reflects most considerations in disaster criteria. It covers human, economic, and environmental losses. There is a clear limitation where losses could be considered as disaster or not which is society's capacity to cope. If losses are beyond the capacity then it will be regarded as a disaster. Additionally, inclusion of environmental losses in the definition is important. Its losses and degradation will lead to a reduction in the capacity to provide food, protection and environmental services that are important for recovery and future events.

In practice, many countries define disaster in similar terms in their disaster management laws. In the USA, disaster is defined as a natural catastrophe which causes damage of sufficient severity and magnitude (USA-DMA 2000). The South African Disaster Management Act defines disaster as a progressive or sudden, widespread or localised, natural or human-caused occurrence which causes or threatens to cause social, economic, and physical damage that disrupts community life and exceeds the capability of authority and society to cope with their own resources (South-African-DMA 2002). In Australia, the Queensland State Disaster Management Act defines a disaster as a serious disruption to a community, caused by the impact of an event, that requires a significant coordinated response by the State and other entities to help the community recover from the disruption (Queensland-DMA 2003). Indonesia defines a disaster as an event or series of events that threaten and disrupt life and livelihood of the community which is caused by nature and or human factors that create loss of life, environmental and property damage and psychological impact (Indonesia-DMA 2007).

b. Disaster Management

Generally, disaster management is an approach to reduce the disaster impact, in particular to minimise losses. According to UN/ISDR (2002) disaster management is defined as:

> The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards (p. 3).

That definition puts decision making, policy, and strategy as key elements which are also major parts of government functions. Very often in a disaster situation the management term is replaced with emergency management. Institutions such as Emergency Management Australia (EMA) and the Federal Emergency Management Agency (FEMA) in the USA define emergency management as a managerial function that is mandated to establish and develop the framework to allow activities before, during and after disaster events that reduce communities' vulnerability to hazards and enhances their capacity to cope with disasters, which address emergency management plans, structures and stakeholders (FEMA 2007; EMA 2008).

Disaster management covers many ranges of activities and approaches in particular when it deals with multi dimensions of drivers and impacts. Disaster risk reduction should not focus on specific hazards with limited specialists or agency, but instead treat it in the broader context of community development and target the underlying cause of vulnerability (Handmer and Dovers 2007). Complexity in disaster management aspects have been recognised by international communities, initiatives, and organizations (Table 3.1). Disaster management cannot be separated from issues of environmental management, poverty reduction, and general development activities.

To create an effective disaster management system is a difficult challenge for all societies even for developed countries such as the USA (Gerber 2007). Disaster management also requires different facets of integration such as vertical integration between government levels, horizontal coordination between sectors and between local governments, and between the stages of disaster management (Gerber 2007). Effective

policy approaches to address many activities within different government levels' responsibility has been a concern for a long time and remains a big task for disaster management research (Gerber 2007).

Table 3.1. Disaster management that cover multidimensional of development

Disaster management dimension	International initiatives
Natural and environmental management and national development	Barbados programme of action for sustainable development of small island developing states (BPOA 1994)
Environmental degradation and vulnerability to disaster relation to human settlement program	Istanbul declaration on human settlement (UNCHS 1996)
To increase interaction between natural resources management and risk reduction, integrate risk assessment result into development plans, and implement risk reduction in all levels of activities	International decade for natural disaster reduction programme forum (IDNDR-PF 1999)
To develop and implement an interdisciplinary and inter-sectoral approaches to reduce climate change impacts and incorporating risk reductions into national process	The UN millennium declaration road map (UNMD 2001)
To integrate vulnerability and adaptation options with development strategy and implementing comprehensive disaster management policies and actions	Programme of action for the least developed countries for the decade 2001 - 2010 (LDC-POA 2001)
To establish link between development and disaster management system	Bonn ministerial declaration and recommendations for action on freshwater (BMD 2001)
To develop and implement integrated, multi hazards, and inclusive approach to address vulnerability	World summit on sustainable development (WSSD 2002)
To integrate disaster risk reduction into all legal, policy, and planning instrument and put risk reduction as central feature in development plans to address all dimensions of vulnerability	28th International Conference of the Red Cross and Red Crescent Societies (ICRC 2003)
To integrate climate change impacts reduction within disaster reduction strategies particularly to vulnerable elements	Bali action plan of COP 13 UNFCCC (BAP 2007)
To ensure that disaster risk reduction is prioritised and implemented within national and a local development	Priorities for action 2005- 2015 to build the resilience of nations and communities to disasters (HFA 2005)

Disaster management policy has not been developed to address long term policy development and is focused on short term response and prevention that make any effort for the development of strategic approaches to broaden the policy time horizon problematic (Handmer and Dovers 2007). Changing trends in policy emphasis from focusing on hazards and events to managing vulnerability and applying solutions from social and development processes also support the need for application of disaster management within the broader development context (Handmer and Dovers 2007).

c. Emergency Management

Emergency management is a specific activity in organizing and managing resources and responsibilities during the emergency situation, especially in preparedness, response and rehabilitation (UN/ISDR 2002). In many disaster management laws, an emergency is defined as an activity during the event to rescue and to reduce losses especially human casualties (e.g. South-African-DMA 2002; Queensland-DMA 2003; Indonesia-DMA 2007).

d. Mitigation

All activities both structural i.e. physical construction and non-structural e.g. policy, regulation, awareness that are undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards are categorised as mitigation (UN/IDSR 2002). This definition is similar to the one proposed by Godschalk, Beatley et al. (1999), that define hazard mitigation as a number of actions that are taken in advance to reduce the risk and impacts of hazards to human life and property. Mitigation involves many activities taken in advance to reduce disaster losses. These include planning, developing strategy, and implementation of plans (Schwab, Eschelbach et al. 2007).

Prioritising hazard management and its mitigation action is difficult, because the hazard event is very difficult to predict, compare to real problems in the community such as health, education, and poverty. Two approaches are proposed or should be chosen to address disaster risk, generic and specific approaches(Handmer and Dovers 2007). Generic actions include activities to reduce the risks to disasters that address community and environmental resilience. Specific approaches target specific actions to specific hazards for example construction of shelters to protect from tsunamis or cyclones. Generic hazard management has advantages such as: i) this approach supports and increases the success of specific approach actions, ii) increases resilience to all hazard types, iii) have multiple goals in socio-economic aspects.

The last point is very pertinent for developing countries where issues of socio-economic developments are prominent for communities and politicians. Allocating significant amounts of resources to hazard mitigation is perceived as unnecessary amid the high poverty, unemployment, and problems in food supply. This is supported by

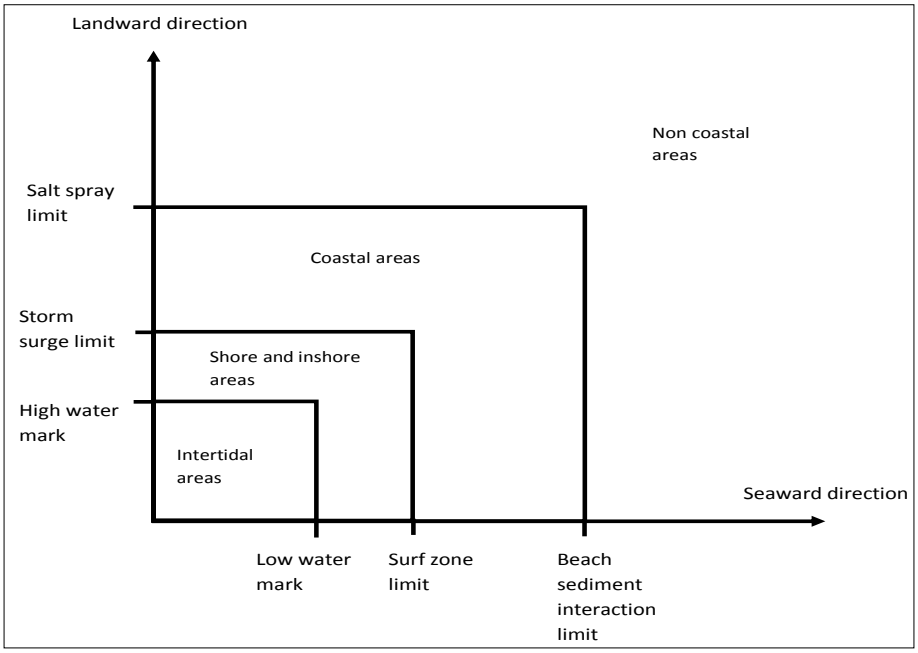
international agreements and initiatives that require disaster risk reduction as part of the development practice (as shown in several initiatives at Table 3.1.). As t disaster and climate change adaptation becomes a development issue and undergoes interaction with many different sectors, planning documents, agencies, policies, programs, and activities, the integration is required even more.

However, specific approaches are also appropriate when the protection is very urgent and highly supported by the community (Handmer and Dovers 2007). Specific attention needs to be given to specific approaches: i) cannot address the underlying vulnerability, ii) only mitigate the hazard impacts, and iii) provides a false sense of security for community. The last point is pertinent for Semarang that allocated significant funding to build dams and flood channels, which in return gave confidence to the local authority to allocate development plans in hazardous areas because it is assumed that the hazard will be eliminated or mitigated by the dam and flood channels. Specific approach is, in legal, planning, and practice, under the disaster management agency responsibility(Handmer and Dovers 2007). That is why it is more favourable to disaster managers.

3.2.2. Coastal Management

a. Coastal Areas

Definitions of coastal areas or zones are varied and depend on what criteria are used either physical or policy interest (Duxbury and Dickinson 2007). Hildebrand and Norrena (1992) define the coastal zone as an area with the most intensive interaction between sea and land. More detailed and complex definitions cover all areas in the land that are still in interaction with the bio-physical component of the sea (Davis and Fitzgerald 2004). The ideal boundary should consider all coastal resource boundaries that in fact never correspond with administrative or political boundary (Beatley, Brower et al. 2002). However, since coastal areas are dynamic in time and space, there is a difficulty to set an exact boundary. Every area will have different physical conditions that create different boundaries (Figure 3.1). Therefore, very often administrative boundaries are used to apply and guide decision making and policy (Kay and Alder 2005).



Source: adaptation from Kay and Alder (2005)

Figure 3.1. Boundary of coastal areas based on physical condition

b. Coastal Management

Conceptually, coastal management is an approach to manage all activities conducted by all users in coastal areas (Kay and Alder 2005). Kay and Alder also highlighted that the concept is developed from a combination of general approaches in urban planning and resource management. Multiplicity in users, interests, sectors, stakeholders, decision makers are key characteristics of coastal management that need to be addressed to achieve sustainability in coastal areas (Ramsar 2007). The only way to achieve that is through an integrated approach.

c. Integrated Coastal Management

ICM is a management system that is characterised by integrative, holistic, and interactive planning processes to address the management issues in coastal areas to minimise conflict, maintain environmental functions and services, and facilitate inter sectoral development approaches (Thia-Eng 1993). ICM is also defined as a continuous and dynamic process to make decisions for sustainable development of coastal resources to meet the need for resource uses and protection (Cicin-sain and Knecht 1998). In practice ICM is characterised by multiple use management and multi sectoral activities where the implementation depends on coordination among stakeholders (Tobey and Volk 2002). ICM does not replace sectoral planning and management but

tries to link and integrate and harmonise all sectors or subject plans (e.g. fisheries, tourism, and marine transportation) to respond and achieve goals and directions (Cicin-Sain 1993; Ramsar 2007).

Such definitions reflect previous definitions of coastal areas, in particular the fact that resources are interconnected and linked and interaction with human activities is intensive. Development in coastal areas in the form of industry, fisheries and agriculture will change the ecology of coastal systems and in many cases create conflict between the actors (Cicin-sain and Knecht 1998).

3.3. Principle Elements and Components

3.3.1. Disaster Management

How disaster management definitions translate into real activities is described by Godschalk, Beatley et al (1999) and Mileti (1999) who divided disaster management in four stages: i) mitigation, ii) preparedness, iii) response, and iv) recovery. Those elements also create the disaster management cycle (Figure 3.2). All of these elements involve decision making, organization, and policy during the process of planning, implementation, and monitoring. To give an easy understanding McEntire (2007) described mitigation as all prevention and loss reduction activity, preparedness as all efforts to increase readiness, response as activities during the event to protect human life and property, and recovery as returning affected people to pre disaster or even better condition.

Source: (Godschalk, Beatley et al. 1999) and (Mileti 1999)

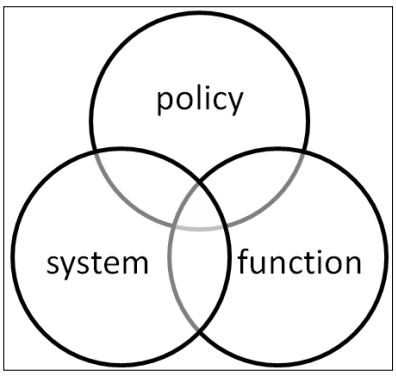
Figure 3.2. Disaster management activity

However, those four elements are without criticism. There are at least six drawbacks to this concept (Crondstedt 2002): 1): it defines disaster management in a linear cycle, 2) it gives delineation and barriers for each element, 3) it could gives unnecessary emphases to each element, 4) it puts all elements in the same importance, 5) it implies implementation of the disaster management in a sequential order and 6) it gives too much attention to hazard (physical concern) and overlooks the social aspects.

Mitigation is one of the main parts of disaster management that takes place before the event. Its objective is to reduce or eliminate the risk of natural hazards to human life and properties (Godschalk, Beatley et al. 1999). It covers very broad activities and could be implemented through structural activities i.e. physical construction and non structural e.g. land use, legislation, policy and education (UN/ISDR 2002). Under the mitigation phase many development sectors and actors could contribute and play important roles to reduce potential losses.

3.3.2. Integrated Coastal Management

ICM is a process of decision making that is characterised by three aspects: use, development, and protection of marine and coastal areas and resources (Cicin-Sain 1993). To deal with those three aspects, conceptually their integration is needed for coastal management (Figure 3.3): integration of system, function, and policy (Thia-Eng 1993).



Source: (Thia-Eng 1993)

Figure 3.3. Integration elements of ICM

System integration recognises that coastal areas have a temporal and spatial dimension e.g. between land and sea ecosystems, between seasonal changes and between social and economic factors. Functional integration seeks the harmonisation of different planning, sector activities and stakeholder interests. Policy integration ensures that all national and local ICM programs are consistent with each other and in harmony with national and local development plans.

Sorensen (1997) suggested more complete integration that consists of four dimensions: 1) vertical (national and local government), 2) horizontal (between sectors), 3) land and sea ecosystems, and 4) between sciences. GESAMP (1996) puts the integration in four elements: i) geographical, ii) sectoral, iii) temporal, and iv) political/institutional. To address coastal hazards, Isobe (1998) has proposed more extensive elements of integration to be accommodated under ICM: i) coastal ecology, ii) human uses, and iii) disaster prevention.

3.4. Planning Approach

3.4.1. Disaster Management

To capture the essence of disaster management planning, this illustration gives a clearer understanding:

> Imagine you are an emergency manager in a small coastal town along the Atlantic Ocean. The National Hurricane Centre in Florida has just predicted that a hurricane will make landfall a few miles south of your town in less than 72 hours. What steps should you take in the time remaining to prepare for this storm? What actions should you have taken weeks, months, and even years ago to make sure your community is safe from a hurricane like the one that is headed your way now? (Schwab, Eschelbach et al. 2007 p.2)

Reducing loss and casualties in advance is the essence of disaster management planning. It is carried out in all disaster management stages or components and mainly to prevent, respond, and recover from disaster impacts that require policy development and implementation (Leaning and Kris 2008). Detailed planning requirements of each element are shown in Table 3.2. Generally, it is called a disaster mitigation plan for activities carried out before the event. Prior to and during the event is covered in disaster preparedness and response plan. Activities after the event are arranged under the recovery plan. However, it should be taken into account that all four planning stages should happen and be reinforced simultaneously during the crisis event (King 2006).

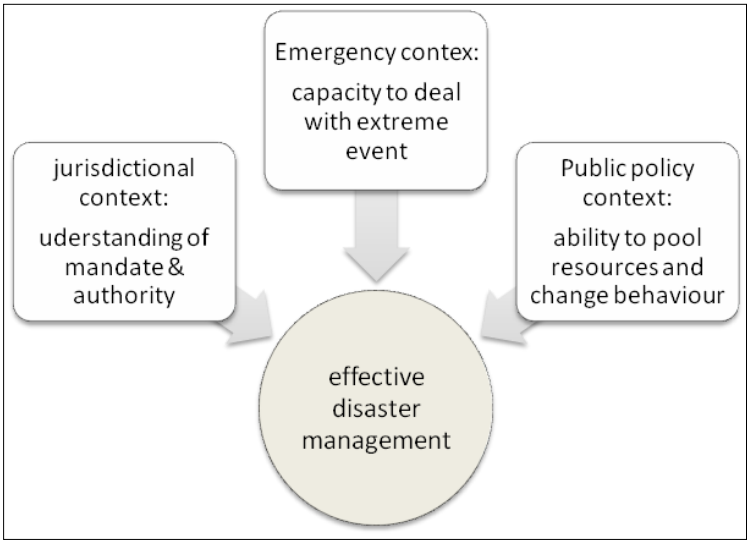
Table 3.2. Planning requirements at each disaster management stage

Disaster management stage	Planning requirement
Prevention/mitigation	Planning to address disaster risk: - hazards and vulnerabilities assessment - Risk protection, reduction, and elimination - Structural, infrastructural, and non structural activity
Preparedness	a. Planning to prepare for disaster event: - all phases of disaster response - operational response - building capacity before event b. Planning to increase resource capacity: - education - training and drills - warning and evacuation - monitoring and evaluation
Response	Planning to response: - Rescue and recovery activities - Need actions before, during, and post event
Recovery	Planning for recovery process: - Reconstruction - Resettlement - Restore vital support system (short term) - Return life to normal (longterm)

Source: modified from Mileti (1999) and Leaning and Kris (2008)

The function of disaster management planning is to get communities and governments ready and prepared for a disaster event. Moreover, the plan could serve as education and guidance for the community and government to make correct decisions on their development which eventually will reduce their vulnerability to disaster (Schwab, Eschelbach et al. 2007).

Plans provide goals, structures, and strategies to reduce losses by pooling resources, changing practice or behaviour, that increase risk, through public policy and organization jurisdiction or mandate (Perry and Lindell 2007). Therefore, they emphasise that in disaster management three main considerations are essential to be taken into account make it effective (Figure 3.4).



Source: (Perry and Lindell 2007)

Figure 3.4. Three contexts for effective disaster management planning

3.4.2. Integrated Coastal Management

An ICM plan addresses management issues on resources that are located in coastal land and water. There are two types of coastal management plans: subject or sectoral plans and integrated plans (Kay and Alder 2005). A sectoral plan is a plan that addresses a single issue or sector e.g. coastal fisheries or mining, while an integrated plan aims to integrate various sectoral or subject plans. An integrated plan facilitates harmonization and integration of resource management and uses that are conducted by different agencies (Cicin-Sain 1993).

To apply that planning approach, to guide and direct day to day activity and development in coastal areas, ICM uses strategic and operational plans (Kay and Alder 1999). Strategic and operational documents have specific attributes that make them different (Table 3.3). Strategic plans generally are broader in time and spatial perspectives than operational plans that are more applied.

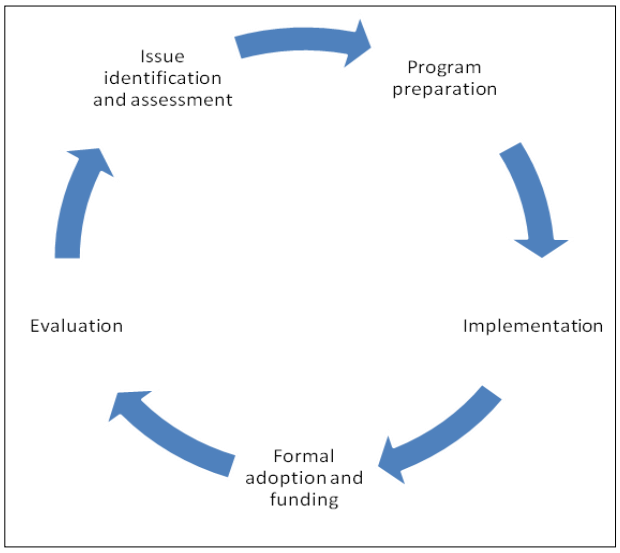
In its application, GESAMP (1996) described ICM planning as an adaptive management approach consisting of 5 steps (Figure 3.5). Those steps also reflect the nature of ICM as an adaptive management approach. Each complete step (called one generation) gives better understanding of the nature, governance, socio-economic problems, and stakeholder's points of view and are incorporated in the next plan

generation. This adaptive approach also stresses the need for sustainability and continuity of the program (Olsen and Christie 2000).

Table 3.3. The difference between ICM strategic plans and operational plans

Strategic plan	*Operational plan*
• Highest order of planning • Need more detail plan to implement • Provide guidance for coastal management • Broad and long term objectives • Define structure and approach to reach the objectives • Multidimensional and multi objective	• Real implementation • Allocation of financial and human resources • Requirement of resources to meet the objectives • Specific goal in specific areas is formulated

Source: (Kay and Alder 1999)



Source: GESAMP (1996)

Figure 3.5. Five steps in ICM implementation

Using previous categories, issue identification and program preparation could be accommodated in a strategic plan. Meanwhile, implementation, formal adoption, and evaluation are part of the operational plan. Integrated planning comes into action to make sure issues and programs are identified, implemented, and evaluated based on vertical, horizontal, ecosystem, and science and management interests.

3.5. Implementation Approach

3.5.1. Disaster Management

There are a number of specific activities that are carried out within disaster management. The ones that take place before the event include hazard assessment, vulnerability assessment, and risk assessment. The analyses will be used as a basic reference for disaster prevention, mitigation, and preparedness. Those three elements are necessary in the development of disaster mitigation plans in many disaster management acts (e.g. USA-DMA 2000; South-African-DMA 2002; Indonesia-DMA 2007). In implementing disaster management activities, eight principles are highlighted (FEMA, 2007) namely: comprehensive, progressive, risk driven, integrated, collaborative, coordinated, flexible, and professional. It is clear that the principles put integration and coordination among the most important elements in disaster management.

a. Hazard analysis

Hazard analysis or assessment is a process of identification, studying and monitoring of any hazard to determine its potential, origin, characteristics and behaviour (UN/ISDR 2002). This information is important in reducing losses and would be the essence of mitigation programs (Alcantara-Ayala 2002). In the USA, hazard identification is a core element in national hazard mitigation programs along with risk assessment (Cutter, Mitchell et al. 2000). Inundation maps of tsunamis or floods are an example of the hazard analysis result that are important to show affected areas that intersect with human population, assets and land use. Maps that are used in this assessment are base maps, land cover and elevation and topography (El-Raey, Fouda et al. 1997).

b. Vulnerability analysis

Vulnerability assessment is the next step following evaluation of hazard potential, probability, and exposure. According to UN/IDSR (2002), vulnerability is the condition of communities where their physical, social, economic, and environmental factors make and increase their susceptibility to disaster. Four variables represent all categories that can be influenced by natural hazards. The different views are related to the specific variables that represent those broad concepts. According to Clark (1998), vulnerability is a function of two attributes: (i) hazard exposure and (ii) ability to cope. In more

analytical expression, he suggested that vulnerability should be assessed in three stages: exposure (hazard potential), resistance (during the event) and resilience (post hazard).

The environment is one important element in reducing or increasing hazard impacts even though it is less discussed than other variables. The interplay between people and the environment is also pointed out by Bankoff (2003) as an important aspect in understanding flood hazard in metropolitan Manila. In coastal areas, the vulnerability of communities also changes based on the interaction between the community and coastal environments that alters its stability (Bush, Neal et al. 1999). The Indian Ocean tsunami 2004 showed that the degradation of coastal environments in term of mangroves, sand dunes and coral reefs exacerbated the tsunami effect and slowed the recovery process (Levy and Gopalakrishnan 2005).

According to Cutter, Boruff et al. (2003), there is general consensus about the major factors that influence social vulnerability. These include lack of access to resources and political power, social capital, social networks, beliefs and customs, building age, type and density of infrastructure and lifelines. Lack of access to resources includes information, knowledge and technology. A complete matrix for vulnerability assessment has been proposed by Scira Menoni (1996), but still problems are encountered; the weighting of each element of vulnerability is subjective and needs support from real surveys on the impact of disaster on each element.

However, there is a dilemma between promoting growth through development and the need for hazard precaution (Handmer 1995). Vulnerability changes as time passes. The changes in population, city development, tourism, and economic growth could create more complicated conditions (Baker, Deyle et al. 2008). To articulate this context McEntire, Fuller et al. (2002) proposed the term “invulnerable development” as development activities that are implemented in such a way as to reduce the vulnerability. This concept implies that the development and hazard are interrelated, the hazard can deter the development and development can increase or decrease hazard risk. To achieve this concept he suggested altering cultural attitudes to disaster, linking development to vulnerability reduction, and building emergency management institutions. Therefore, the long term strategies and sustainable principles for development are essential in disaster risk reduction.

Authorities need to know not only the hazard potential but also the vulnerability of the community to develop mitigation actions (Montoya and Masser 2005). Vulnerability assessment is important because the hazard impacts are different from place to place and from one group of people to another. There are four variables that make communities vulnerable: (i) physical, (ii) social, (iii) economic and (iv) environmental. The impacts depend on the vulnerability that is determined by how close the population is to the hazard source and their economic and social characteristics (Cutter, Mitchell et al. 2000).

Vulnerability assessment serves as essential approach in reducing the risk from disasters. Within the disaster management, vulnerability is one element that can be managed while the hazard itself is beyond human capacity to control. Ability to reduce vulnerability will determine the magnitude of hazard impacts and it's manifestation into disaster. In this regard, several guidelines and manuals on quantifying community vulnerability have been proposed (Cutter, Boruff et al. 2003; Dwyer, Zoppou et al. 2004; Rygel, O'Sullivan et al. 2006; Iglesias, Moneo et al. 2009).

The selection of Social vulnerability index (SoVI) that has been developed by Cutter, Mitchell et al. (2000) has been based on: i) the purpose of vulnerability in this research to serve as basis for integration between coastal management and disaster management, ii) applicability with the Indonesian context, and iii) practicality to be applied at local level. More importantly, refer to five classifications and criteria of indicators revealed by Fenton and MacGregor (1999 p.37), the SoVI results provide indicators that are:

- Informative: to describe the social system and the changes taking place
- Predictive: to provide informative indicators of the social system
- Problem-oriented: particularly toward policy situations and actions in disaster risk reduction
- Program evaluation: to monitor the progress and effectiveness of policies on disaster risk reduction
- Target delineation: to identify geographical areas or population subgroups toward which disaster management and coastal management policy is directed.

c. Risk analysis

Based on the definition by UN/ISDR (2002), risk analysis or assessment is:

" A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend" (UN/ISDR 2002, Annex 1 p. 6)

This definition implies that natural hazard risk potency is different from one area to another area depending on their vulnerability. Clark (1998) and Wood and Good (2004) emphasized that risk assessment results allow all parties to focus limited resources on areas or places that have the highest priority for evacuation, recovery, or rehabilitation. Moreover, according to Wu, Ye et al. (2004) the ultimate goal of hazard risk assessment is to reveal different areas with different risk potential to each hazard. FEMA (2007) emphasises that disaster management should be driven by sound risk management that includes hazard identification, risk analysis, and impact analysis to prioritise and allocate available resources. There are some different approaches in definition and in the calculation of risk but in principle they are similar in the application of their approach (table 3.4).

Table 3.4. Risk calculation method

No.	Risk definition	Source
1	Hazard x Vulnerability x Manageability	Shook (1997)
2	Hazard x Vulnerability x Value	Papadopoulos et al. (1998)
3	Hazard probability x vulnerability	Ferrier and Haque (2003)
4	Hazard x Element Exposed x Vulnerability	Dwyer, Zoppou et al.(2004)
5	Hazard x Vulnerability x Time	Hennecke et al. (2004)
6	Hazard probability x Extent of impact	Plattner (2005)
7	Hazard probability x Vulnerability x Impact x Exposure	Hollenstein (2005)

All the methods are similar except Papadopoulos who considered the value of elements (house, property, etc) in his formula. By doing this he can calculate the potential of economic loss from a tsunami event. However, it absolutely depends on the availability of data such as price, insurance premium, and tax rate to make it work properly. According to these approaches and methods it is concluded that there is no prescriptive method but a generic one that can be used and adjusted based on the research objectives

under local conditions. It is also pointed out by Schroter, Polsky et al. (2005) that we need a general approach that can be improved when it is implemented.

The expression of risk implies that the increase or decrease of each element will influence the degree of risk. Therefore, the calculation of risk by multiplying each sub variable of vulnerability should be considered carefully because this multiplication will give a low value if one of the involved factors is very low (Rashed and Weeks 2003). Therefore adding instead of multiplying is another possibility. Another possibility is producing each sub variable separately so the dominant sub variable can be identified (McLaughlin, J.McKenna et al. 2002).

d. Mitigation

Having information on hazard, vulnerability, and risk is essential for emergency managers to conduct mitigation actions. There are a number of tools or approaches potentially to be implemented as mitigation actions. Mileti (1999) elaborated five tools to achieve sustainable hazard mitigation. Firstly, land use planning to avoid future loss from building, settlement, and economic activity. It is done by keeping out people and property from hazard prone areas, maintaining environmental capacity, and strengthening resilience; secondly, building codes to make all constructions more resistant to hazard; thirdly, insurance that will give protection to the community from financial loss. Fourthly, warning systems include prediction and forecasts which allow community to make preparation and decision. Fifthly, intervention on structural or engineering aspects, provide specific designs, standards, and protection from hazard.

3.5.2. Coastal Management

There is no single approach in coastal management and planning. Each approach could be used in a specific situation or to address a specific problem or in combination to cope with more complex ones. Generally, approaches in coastal management could be grouped into administrative, social, and technical techniques that originate from many different disciplines e.g. environmental resource management and urban planning (Table 3.5). Similarly, Biliana Cicin-Sain (1993) elaborated a number of approaches that concern specific issues or programs as an ICM implementation approach (Table 3.6). At least two techniques are directly correlated with disaster management: i) zoning, and ii) risk and hazard assessment. Zoning is a part of land use planning that is

important for disaster management. Risk and hazard assessment are part of disaster management elements whereas in coastal management it is also recognized as an important approach. Approaches relate to maintaining coastal services and functions e.g. habitat protection and conservation are very important for disaster resilience.

Table 3.5. Tool in implementation of ICM

Administrative tool	Social tool	Technical tool
• Policy and legislation • Guideline • Zoning • Regulation and enforcement	• Customary practice • Collaborative and community-based management • Capacity building • Recreational and tourism management	• Environmental impact assessment • Risk and hazard assessment • Landscape analysis • Economic analysis

Source: (Kay and Alder 2005)

Table 3.6. Approaches in ICM implementation

Coastal areas	Activity harmonization	Coastal stewardship	Protection and public safety	Promotion concern
• characterization of coastal resources and uses • zoning • anticipation of and planning for future possible uses • public education	• understanding on multiple uses and their interactions • conflict resolution • mitigation for adverse impacts	• environmental assessments • assessments of relative risks • establishment and enforcement • protection and improvement of water quality, protected areas • conservation and restoration of coastal marine environments	• reduction of vulnerability to natural disasters • regulation of development in high risk areas e.g. setback lines	• economic incentives

Source: (Cicin-Sain 1993)

3.6. Discussion

Integration between disaster management and ICM is feasible using its elements, planning, and implementation. This integration is not impossible since both have the same goals i.e. sustainability of human life. However, disaster management puts human life as its top priority and concern.While ICM does not state that the protection of human life is a dominant goal it can be assumed that all government management policies must avoid any actions that bring harm to humans. In disaster management and ICM approaches, two main elements are shared: 1) reducing human and natural vulnerability to coastal hazards and 2) increasing human and natural capacity to cope and recover from disaster. Moreover, conceptually ICM already recognised that coastal

disaster is part of the essential issues to be addressed in an integrative way by all stakeholders (Cicin-Sain 1993; Isobe 1998; Kay and Alder 2005).

Those similarities will be the core of the integration and be covered by mitigation plans for disaster management and strategic and operational plans for ICM. Coastal management will give and ensure the effort to achieve sustainability of marine and coastal resources. Vital resources such as coral reefs, mangroves, seagrass, sand dunes, and coastal vegetation have been protecting and securing coastal communities from coastal hazards and also provides many livelihoods for subsistence families who are highly vulnerable to coastal hazards. On the other hand, coastal disaster mitigation aims to reduce human vulnerability and increase human and natural systems' ability to cope and recover from coastal hazards.

Integration provides broader and more comprehensive views of problems for coastal areas. Coastal managers must be interested in developing information of hazard impacts for their areas and the need to incorporate this information into coastal strategic and operational planning. The disaster manager also benefits from vertical and horizontal integration of government levels, between scientific and management aspects, and between ecosystems that are used in the coastal management plan consultation. The information on socio-economic and coastal resource conditions is also important in determining the vulnerability of coastal communities to hazards. The coastal strategic plan that operates for the long-term i.e. 25 years gives security and sustainability for disaster mitigation amid political changes in local government.

There are a number of similarities between the two fields, for example the cyclic process of planning, the adaptive planning approach, and implementation tools. Integration could be applied using ICM and disaster management attributes (Table 3.7). According to its nature, ICM provides a broader context since it covers social, economic, and environmental programs. Protection and coastal community safety from coastal hazards are part of ICM approaches. Meanwhile, disaster management focuses on reducing losses from hazard events through mitigation, preparedness, response, and recovery. However, it is also appropriate to see ICM as part of the mitigation program if it is looked at in a broader context.

Table 3.7. Integration between ICM and disaster management using their attributes

	Attributes to be used for integration		
	Element	Planning document	Implementation tool/approach
Disaster management	• Mitigation • Recovery	• Mitigation plan • Recovery plan	Hazard, vulnerability, and risk analysis
ICM	• Integrated planning • Sectoral integration • ICM cycle: ✓ Issue identification ✓ Program preparation ✓ Implementation	• Strategic plan • Operational plan	• Habitat protection and conservation • Coastal zoning and setback • Preserving coastal services and function • Coastal hazard mitigation

ICM will strengthen disaster mitigation plans and programs by incorporating coastal hazards into the ICM planning document. Strategic plans that have a long period e.g. 25 years will identify and prioritise coastal hazards in the long-term coastal development policy and program. This policy is implemented using ICM tools that include: 1) restricting development in hazardous areas, 2) maintaining coastal habitats that could serve as protection, 3) preserving coastal resources that are essential for community livelihoods and knowing communities that are most vulnerable to coastal hazards.

Those arrangements will be managed through coastal management plans by a number of types of legislation e.g. licences, permits and building codes. Actions to reduce risk will be facilitated through the coastal operational plan. Specific coastal community empowerment programs will be guided by vulnerability and risk assessment that is conducted under the disaster management program. Finally recovery activities are carried out in full awareness of building more resilient communities for future events by incorporating both ICM and disaster management concerns.

3.7. Conclusion

This chapter has elaborated and structured major elements, principles, approaches, and tools that are used and developed by ICM and disaster management. Many similarities and overlaps have been found and elaborated. It is also shown that both ICM and disaster management could use their own attributes to work together to reduce coastal community vulnerability and disaster risk. Conceptually, mitigation and recovery

phases are two stages where ICM input could give utmost benefit using its strategic and operational plan documents. Reversely, ICM could benefit from hazard, vulnerability, and risk assessment provided by the disaster management program in allocating sectoral activities, land uses, coastal community strengthening, and resource management. However, in reality ICM and disaster management are structured by different regulations and implemented by different lead agencies.

The question is how conceptual integration and benefits can be translated into real practice using real regulation in both fields. This concern will be presented and discussed in the next chapter.

CHAPTER 4

CONTENT ANALYSIS OF INDONESIAN COASTAL MANAGEMENT AND DISASTER MANAGEMENT ACT

4.1. Introduction

The Indonesian Disaster Management Act and Coastal Management Act created new complexity for local government planning in particular to address coastal natural disasters where coastal management and disaster management arrangements are applied simultaneously. That needs significant resources to implement all acts' mandate and obligation. The problem is inevitable since a lack of resources (human and financial) is one of the basic causes of unsuccessful development programs in Indonesia.

To increase the success and to benefit from the enactment of the legislation and importantly to meet its objectives, streamlining and simplification in the form of integration of its mandate was essential. Conceptually, integration between the coastal management and disaster management fields has been discussed in Chapter III. The results show that integration is possible and beneficial and encourages integration in both fields using existing concepts and theories. In reality i.e. regulation level, integration has to be carried out using existing arrangements in the acts. How that integration could be applied is discussed in this chapter.

Evaluation is carried out to assess mandates and arrangements of Indonesian Coastal Management and Disaster Management Acts according to three major themes: i) comparison with existing conceptual and theoretical approaches, ii) similarities and differences, and iii) support to coastal community resilience to disaster. Those three themes are considered important to show objectively that both disaster managers and coastal managers could not just rely on their mandates as regulated by the act to address coastal disaster issues. The result of this chapter gives a legal foundation to a development integration framework.

4.2. Objective

The objective of this chapter is to analyse Indonesian Coastal Management and Disaster Management Acts in regard to their: i) arrangement and potential shortcomings, ii)

similarities and differences, and iii) support to coastal community resilience. To achieve that objective a number of questions have be established to guide the assessment:

1. What are existing arrangements and potential drawbacks of the Disaster Management and Coastal Management Acts in comparison to existing conceptual and theoretical approaches in those two fields?
2. What are the similarities and differences between the Disaster Management and Coastal Management Acts in relation to their scope and major mandates?
3. What are the planning mandates in the Disaster Management and Coastal Management Acts that require their integration during the implementation to achieve coastal community resilience to disaster?

4.3. Comparison with Existing Theoretical Concept

The acts' arrangement, scope, and important terms are compared and analysed in relation to existing concepts and theories in coastal management and disaster management fields to see any similarities and differences. Further analysis is carried out to see if the differences could provide better understanding of the concepts or issues that could lead to potential problems for the implementation of the act.

4.3.1. Definitions

Coastal management is defined by the act as a process of planning, utilisation, monitoring, and control of coastal and small island resources among sectors, national and local governments, land and marine ecosystem, and science and management for community welfare (Figure 4.1). As discussed in the previous chapter, there is no single definition of integrated coastal management among scholars. As a summary from a number of conceptual definitions, integrated coastal management could be defined as a participatory, dynamic, integrative, holistic, and interactive planning process to facilitate multiple use management and multi sectoral activities toward the sustainability of coastal resources (Thia-Eng 1993; Cicin-sain and Knecht 1998; Tobey and Volk 2002; Westmacott 2002).

That broad definition is also applied in the Indonesian Coastal Management Act. It recognises different actors in the planning process, interconnection between ecosystems, and the influence of science and management. The act tries to facilitate those different

elements to achieve coastal resource sustainability. Therefore, according to the Indonesian Coastal Management Act, integrated coastal management in practice can be rewritten as a state of art facilitation of all stakeholders, managing different ecosystem characteristics, and optimising science contributions through planning, utilisation, and monitoring evaluation toward an optimum coastal resource uses for conservation, social, and economic interests.

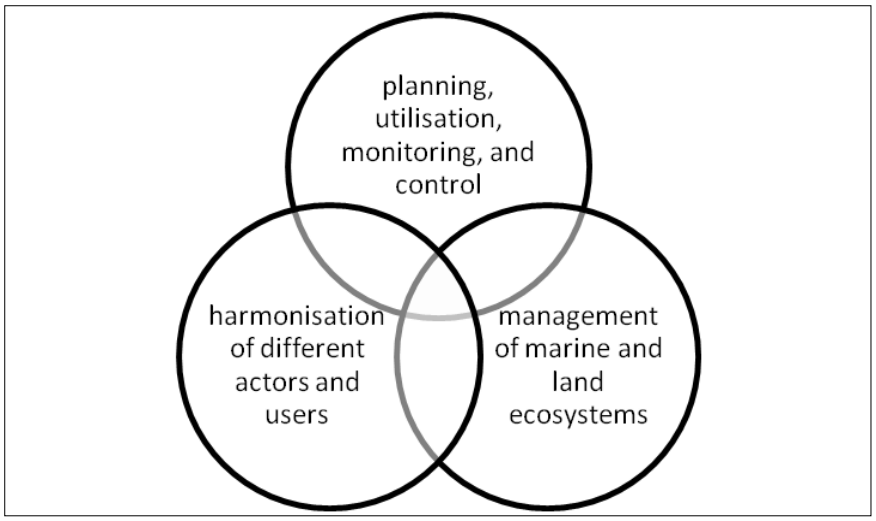


Figure 4.1. Core elements of the Indonesian Coastal Management Act

In consequence, the act obliges six integrations (Figure 4.2) to be achieved: 1) between national and local government, 2) between local governments, 3) between sectors, 4) government, private, and community, 5) land and marine ecosystems, 6) science and management. Those six integrations are in line with conceptual integration in coastal management that lies within geographical systems, sectoral functions, science, and government policy (Thia-Eng 1993; GESAMP 1996; Sorensen 1997). To let those integrations happen, four hierarchal planning documents are obliged i.e. strategic plan, zoning plan, management plan, and action plan. Regular review and revision need to be carried out to accommodate recent developments, issues, and opportunities. That arrangement implies that Indonesian ICM planning applies an adaptive management approach and structures it as a cyclic process.

Indonesia's four levels of hierarchal planning are different from existing ICM conceptual planning and cycles but could still be put together (Figure 4.3). Both

strategic plans and operational plans are accommodated by Indonesian ICM act. The zoning plan is categorised both as a strategic plan as it gives a long term direction for coastal land use, and also as an operational plan as it regulates activities that are allowed and not allowed in each zone. Since the documents have a long period i.e. 20 years for the strategic plan and zoning plan, application of the cycle is not clear. However, the arrangement in the Indonesian act is affirmative because all documents are already formal and legal which means the ICM program has no need to be formally adopted and funded such as in the GESAMP cycle.

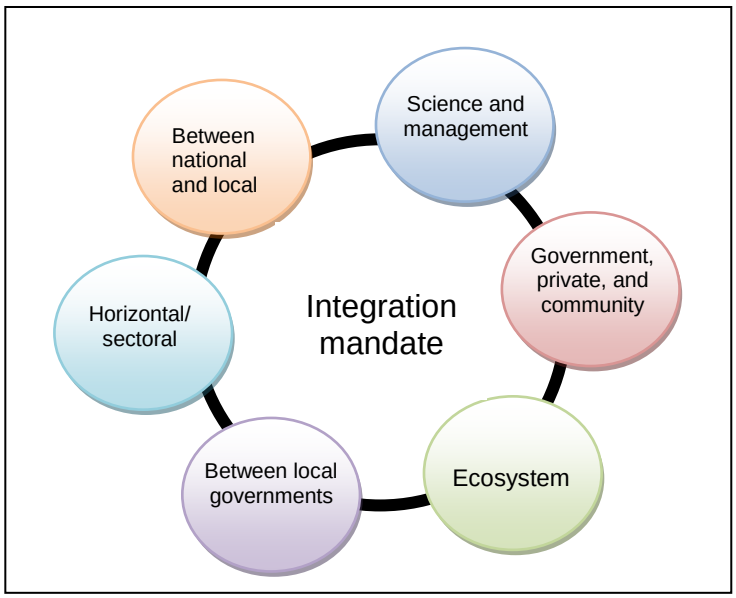
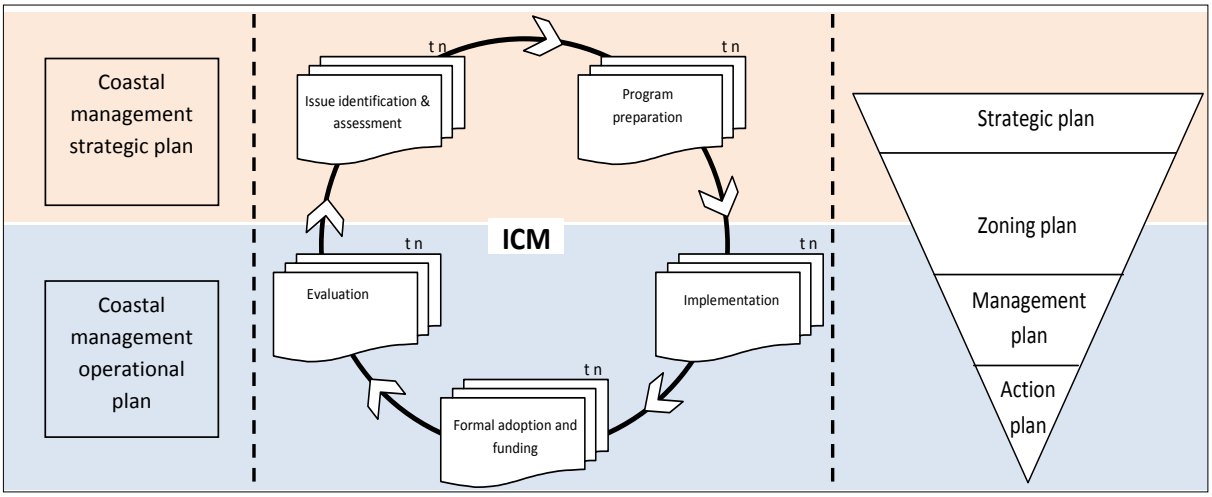


Figure 4.2. Six integrations mandated by the Indonesian Coastal Management Act



Kay & Alder (2005) GESAMP (1996) Indonesian ICM Act (2007)

Figure 4.3. Comparison of Indonesian ICM planning with existing concept

Meanwhile, the Indonesian Disaster Management Act defines disaster as an event or series of events that threaten and disturb community life and living which are caused by natural and anthropogenic factors, that create loss of life and environmental, property, and psychological impacts. That definition reflects most considerations of disaster criteria from human fatalities, losses of economic resources, and environmental degradation. The inclusion of environmental losses in the Disaster Management Act, which is reinforced by the Coastal Management Act, is important because environmental losses and degradation will lead to a reduction of the capacity to provide services for human wellbeing (UN/ISDR 2002; UNEP 2009).

However, the definition in the Indonesian Disaster Management Act does not include community capacity to cope with hazard impacts as a limitation (Figure 4.4). This exclusion is similar to the definition in the USA (USA-DMA 2000) and in the Australian State Disaster Management Act (Queensland-DMA 2003), but it is different from the definition of disaster by the United Nations (UN/IDSR 2002), South Africa Disaster Management Act (South-African-DMA 2002), and the Indian Disaster Management Act (India-DMA 2005).

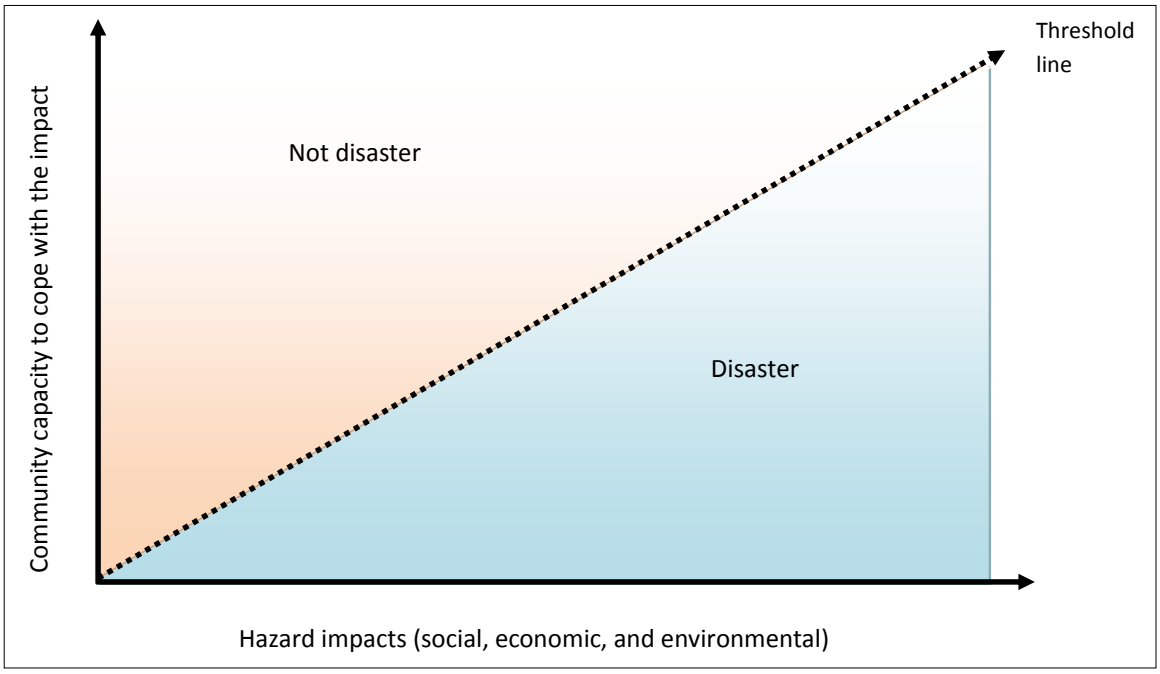


Figure 4.4. Correlation between hazard impacts and capacity to cope to define an event as a disaster.

Another important definition is disaster management itself. The act defines disaster management as a series of efforts that include policy development, disaster prevention, emergency response, and rehabilitation (Figure 4.5). The definition is in accordance with UN/ISDR (2002), Godschalk, Beatley et al. (1999) and ADRC (2005). Those elements involve decision making, organization, and policy during the process of planning, implementation, and monitoring. Further detailed comparison between the Indonesian Coastal Management and Disaster Management Acts definitions and other definitions are shown in Tables 4.1 and 4.2 respectively. Comparison is also made with other countries' acts and international organisations.

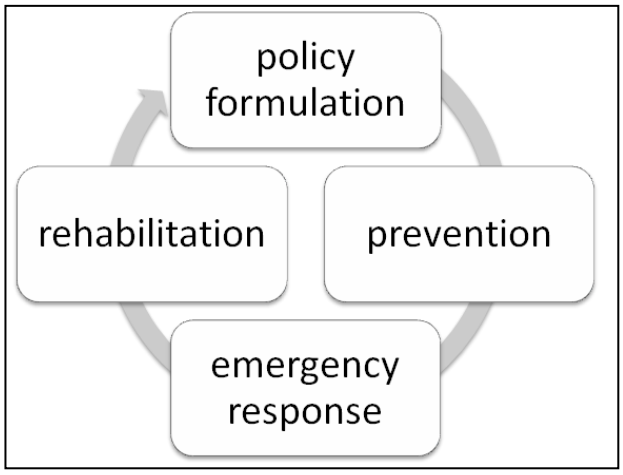


Figure 4.5. Indonesian disaster management definition with four major elements

4.3.2. Implications

A number of differences between the act's definitions and arrangements with existing concepts could potentially create problems for implementation. For example in the Coastal Management Act, four documents need to be developed. This is high compared to other coastal management plan arrangements in other countries. Moreover, the four documents have to be developed through public consultation and supported by best available data. In particular the zoning plan has to be legalised by local regulations. That arrangement is potentially discouraging or gives too much burden to local government that is already required to carry out other planning work under different acts.

Table 4.1. Comparison between the Indonesian Coastal Management Act's definition and others

Terms	Indonesian ICM Definition	Other law or organisation	Difference and Any Potential implication
Coastal water	• Sea that is bordered with land and includes 12 nm seaward from coastline • Sea water that connects coast and islands, estuary, bay, shallow water, wetland, and lagoon.	• Queensland waters to the limit of the highest astronomical tide (Queensland 1995) • those waters, adjacent to the shorelines, which contain a measurable quantity or percentage of sea water, including, but not limited to, sounds, bays, lagoons, bayous, ponds, and estuaries (USCZM-Act 1972)	• The act does not specify how to determine the coastline if it is based on low tide or high tide. • Many coastal areas in Indonesia have different coastal morphology from low lying to steep.
Coastal area	Transitional areas between land and marine ecosystem which is influenced by changes at land and sea.	• the interface or transition areas between land and sea, including large inland lakes, diverse in function and form, dynamic and do not lend themselves well to definition by strict spatial boundaries (FAO 2010) • the coastal waters and the adjacent shore lands that are strongly influenced by each other and in proximity to the shorelines (USCZM-Act 1972) • coastal waters or all areas to the landward side of coastal waters in which there are physical features, ecological or natural processes or human activities that affect, or potentially affect, the coast or coastal resources (Queensland 1995)	• no major difference, however Indonesian coastal management law excludes large lakes from its definition as part of coastal areas
Coastal disaster	Incident caused by natural event or human action that change coastal physical and or biological condition and cause loss of life, property, and or damage in coastal and small island areas		• Definition of coastal hazard in Coastal Management Act covers both rapid onset e.g. tsunami and slow onset e.g. coastal erosion and sea level rise inundation
Coastal management	a process of planning, utilisation, monitoring, and control of coastal and small island resources among sectors, national and local governments, land and marine ecosystems, and science and management for community welfare	• a dynamic, continuous and iterative process that is designed to promote sustainable management of coastal zones (EU-Commission 1999) • the protection, conservation, rehabilitation, management and ecologically sustainable development of the coastal zone	• the act definition is not explicitly mentioned as an iterative process, but the arrangement of coastal management plan documents require periodical review and revision • requirement to endorse the document as a formal planning product will secure political and financial commitment
Coastal management plan documents	The coastal management is implemented through four hierarchal documents: strategic plan, zoning plan, management plan and action plan	• coastal management is implemented through state coastal management plan and coastal management district (Queensland 1995) • coastal management plan is the only document mandated by the Coast Conservation Act in Sri Lanka (Sri-Lanka 1981) • State coastal management plan (USCZM-Act 1972)	• Indonesian coastal management plan document that consist of 4 documents need time and much effort to develop which could discourage the local government
Law jurisdiction	12 nautical miles seaward and coastal subdistrict landward	• 3 nautical miles seaward and generally 1 km landward (NSW 1979) • 2 km seaward and mean high water line landward (Sri-Lanka 1981) • State water seaward and highest astronomical tide landward (Queensland 1995)	• Indonesia is using administrative boundary as a limit of coastal areas landward. This will vary from place to place depending on the shape of the subdistrict boundary e.g. perpendicular or parallel to coastline.
Stakeholder in coastal areas	Coastal resources users who have interest directly to optimise the uses of coastal resources that include fishermen both traditional and modern, aquaculture farmer, tourism operator, fishing businessman, and coastal community	• those who have an interest in or are affected by a decision, have influence or power in a situation, interests in an issue of monetary, professional, personal, or cultural, or can arise from a host of other motivations (NOAA 2007). • individuals and groups, which may affect or be affected by the coastal decision (McGlashan and Williams 2003)	• Similarly, Indonesian ICM law does not explicitly mention groups that may be affected by the law's arrangement. This could exclude other communities that live outside coastal areas but have an interest in coastal issues e.g. tourism.

Table 4.2. Comparison between Indonesian Disaster Management definition and others.

Terms	Indonesian DMA Definition	Other definition	Difference and Any Potential implication
Hazard	The law uses disaster threat instead of hazard that is defined as an event or incident that could cause disaster and in	• A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UN/ISDR 2002)	• The definition in Indonesian DMA is simple and should refer to disaster definition to understand if an event or incident could be categorised as hazard or not.
Emergency management	Activities during the disaster event to address negative impacts of disaster that include rescue and evacuation of victims and property, provision of basic needs, protection, refugee care, rescue and restoration of infrastructure and lifeline	• a specific activity in organizing and managing of resources and responsibilities during the emergency situation, especially in preparedness, response and rehabilitation (UN/ISDR 2002) • activity during the event to rescue and relief to reduce the loss especially human casualties (South-African-DMA 2002; Queensland-DMA 2003; Indonesia-DMA 2007) • managerial function charged with creating the framework before, during and after the event within which communities reduce vulnerability to hazards and cope with disasters and cover plans, structure and stakeholders (FEMA 2007; EMA 2008)	• Indonesian DMA only defines the emergency response • Arrangements on organisation and management of emergency activity are regulated in emergency management plan
Disaster prevention	A series of activities carried out to eliminate and or reduce disaster threat.	• Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters (UN/ISDR 2002)	• No difference
Mitigation	a series of activities to reduce disaster risk through physical construction, awareness, and capacity building to cope with disaster	• All activities both structural i.e. physical construction and non-structural e.g. policy, regulation, awareness that are undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards (UN/IDSR 2002). • a number of actions that are taken in advance to reduce the risk and impacts of hazards to human life and property (Godschalk, Beatley et al. 1999)	• No difference, however, in article 47 point 2, mitigation is carried out by implementation of: 1) spatial planning, 2) building regulation and infrastructure building, and 3) education, outreach, and training. It excludes the broad scope of mitigation that covers many aspects e.g. environmental protection.
Disaster risk	Potential loss caused by disaster in certain areas and time period that include death, injury, sickness, life threat, loss of safety, damage or loss of property, and disturbance of community activity	• The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions (UN/IDSR 2002).	• Environmental damage is not included as risk in Indonesian DMA and it shows that focus in given mostly to the human point of view
Preparedness	a series of activities that is carried out to anticipate disaster through organising and appropriate and right actions	• Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations (UN/IDSR 2002).	• No difference
Recovery	a series of activities to return community and environmental conditions by re functioning institutions, infrastructure, and lifeline through rehabilitation	• The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors (UN/IDSR 2002)	• The definition does not explicitly mention a better or stronger condition to be achieved by the recovery process to cope with future disaster. However, detail on re-build better principle is outlined in the article.
Disaster prevention	a series of activities to reduce or eliminate disaster risk through reducing disaster threat or vulnerability	• The outright avoidance of adverse impacts of hazards and related disasters (UN/IDSR 2002)	• No difference
Disaster vulnerability	geological, biologic, hydrologic, climatologic, geographic, social, cultural, political, economic, and technological characteristics and conditions at certain locations for specified time periods that reduce the capacity to prevent, absorb, achieve preparedness, and reduce the capacity to cope with negative impact of certain hazards	• the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UN/IDSR 2002)	• No difference, however, the law defines vulnerable people as elderly, children, and women, in very minimal terms and only focuses on emergency response activities (stated in article 26).

The limitation of coastal areas is based on coastal subdistrict boundaries which have spatial consequences since the shapes of coastal subdistricts are not alike. It also could overlook ecosystem interconnections between land and marine, in particular for subdistricts where the boundary is very narrow and parallels the coastline. Certain hazards such as cyclones and tsunamis will exhibit different effects according to different geographic conditions e.g. ground elevation. For low lying areas, the vulnerable community is very often spread beyond the coastal subdistrict boundary that will make them excluded from the ICM program.

In disaster management, the limitation of mitigation by these three activities will reduce the effectiveness of the disaster management plan. Another significant problem is related to the definition of vulnerable people that is focused on emergency response and search and rescue activity. Underlying socio economic and physical factors that contribute to community vulnerability will not be addressed properly. Inconsistency also appears in defining risk, where the disaster risk does not include environmental damage while in the disaster definition environmental damage is explicitly mentioned.

In relation to coastal disaster, the definition of disaster in the Coastal Management Act is more accommodative for coastal chronic hazards such as erosion and coastal inundation. This strengthens existing definitions that are mentioned in the Disaster Management Act. As climate change will induce sea level rise, more chronic hazards will be manifested in coastal areas compounding existing erosion, coastal inundation and sanitation or pollution problems.

Finally, the disaster definition that does not include community ability to cope with the impact has significant implications. This on the one side gives more flexibility and protection to communities from all types of disaster impacts. However, government has many limitations especially on capacity and availability of resources which make that arrangement inappropriate. It is very clear in the case where the community itself still could manage the impact and has no need of significant assistance from government.

4.4. Similarity and Difference

Assessment of similarities and differences in the act's scope and planning framework is important to understand any potential overlap and integration needed during its implementation.

4.4.1. Structure and scope

The Coastal Management Act consists of 17 chapters and 80 articles (Table 4.3). The planning chapter covers seven sections and 9 articles and the utilisation chapter contains six sections and 30 articles (Figure 4.6.). The monitoring and control chapter consists of 3 sections and six articles. The disaster mitigation chapter covers 4 articles.

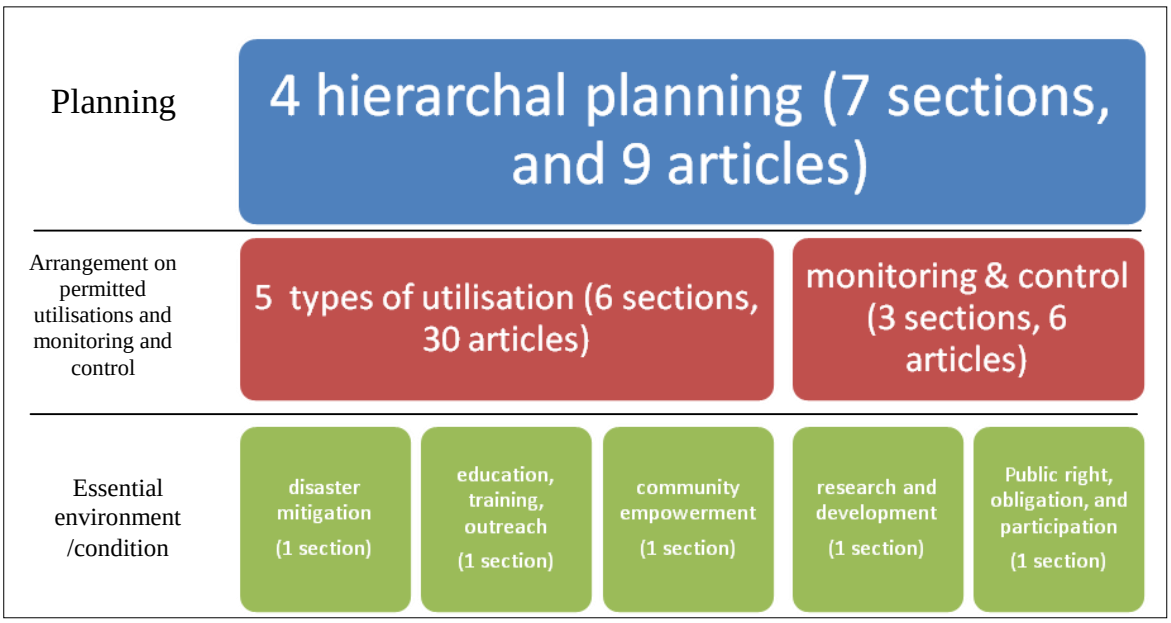
Table 4.3. Structure of Indonesian Coastal Management Act

Chapter	Regulation	Article number
1	General condition/definition	1 – 2 (2)
2	Goal and basis of law	3 – 4 (2)
3	Coastal and small islands management process	5 – 6 (2)
4	Planning	7 – 15 (9)
5	Utilisation	16 – 35 (10)
6	Monitoring and controlling	36 – 41 (6)
7	Research and development	42 – 46 (5)
8	Education, training, and outreach	47 – 49 (3)
9	Authority	50 – 55 (6)
10	Disaster mitigation	56 – 59 (4)
11	Public right, obligation, and participation	60 – 62 (3)
12	Community empowerment	63 (1)
13	Dispute settlement	64 – 67 (4)
14	Class action	68 – 69 (2)
15	Investigation	70 (1)
16	Administrative sanction	71 – 72 (2)
17	Criminal sanction	73 – 75 (4)
18	Transitional provision	76 – 78 (3)
19	Closing clause	79 – 80 (2)

Source: (Indonesia-CZMA 2007)

The Coastal Management Act is operated in specified spatial and administrative boundaries. Article 2 of the act stipulates that acts' arrangements are applied to coastal areas which are limited to coastal subdistrict boundaries landward and 12 nautical miles seaward (Figure 4.7). The Indonesian limitation of coastal areas is categorised as a policy oriented definition that is adopted to implement ICM within geographical limits (Kay and Alder 2005). Clear boundaries will increase the success of implementation. Additionally, a small area allows all stakeholders to learn and implement ICM policy and management intervention in manageable boundaries (GESAMP 1996).

These spatial and administrative arrangements have advantages and disadvantages. The advantage is it allows easy allocation of programs especially in considering the budgeting and planning system in Indonesia where all government programs and funding have to be channelled through government structures and agencies. This arrangement is also very useful for monitoring and evaluation purposes. On the other hand, there is a disadvantage because administrative boundaries are very often or most likely different from natural ecosystem boundaries.



Source: (Indonesia-CZMA 2007)

Figure 4.6. Indonesian the Coastal Management Act structure

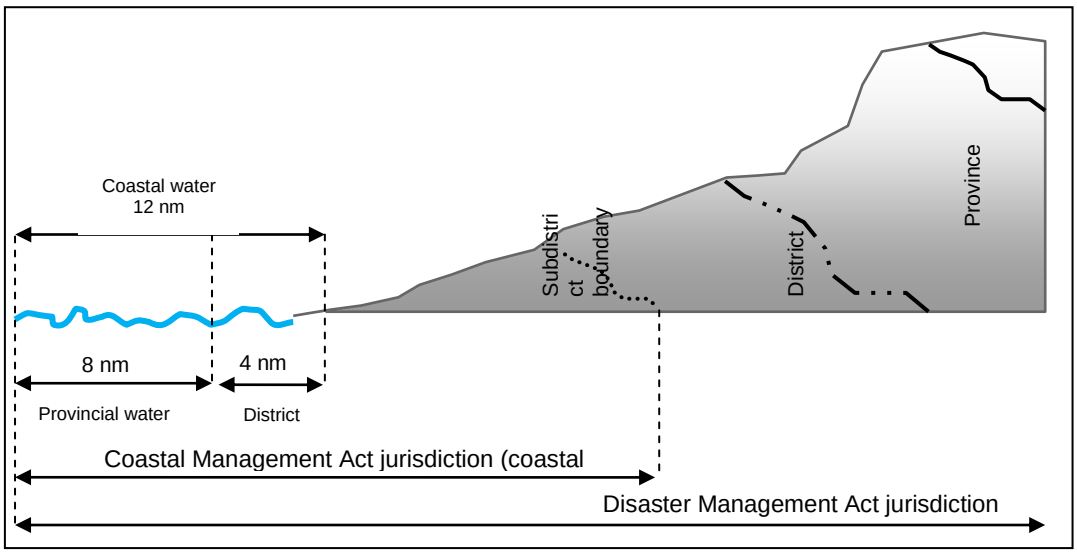
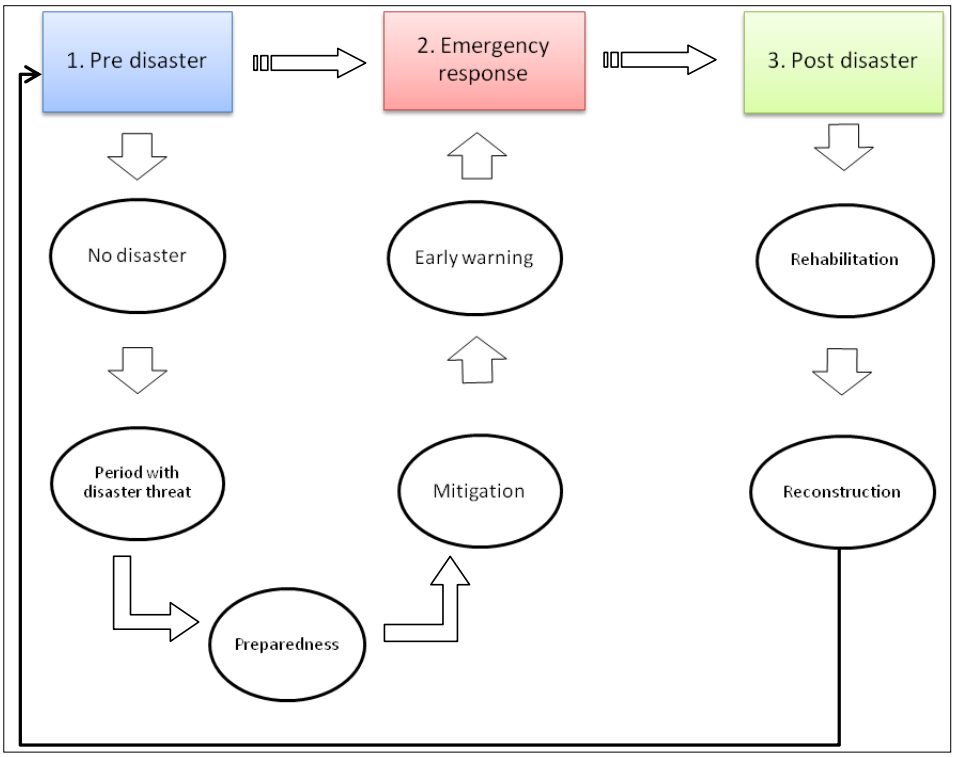


Figure 4.7. Geographical scope difference between the Indonesian Coastal Management and Disaster Management Acts.

The Coastal Management Act also gives different geographical authority between national, provincial, and local government in relation to utilisation permits of coastal water. National government has an authority to issue permits for activities that are located within trans-provincial water. Provincial government has an authority within 12 nautical miles, but 1/3 of provincial jurisdiction or in general 4 nautical miles is given to district governments.

In comparison, the Disaster management Act consists of 13 chapters and 85 articles. Generally, it is divided in three phases with subsequent activities: pre disaster, emergency response, and post disaster (Figure 4.8). Pre disaster events cover 14 articles (34 – 47), emergency response includes 9 articles (48 – 56), and post disaster covers 3 articles (57 – 59). Detailed chapters and articles are shown in Table 4.4. From a geographic point of view, the disaster management act covers all areas within Indonesian jurisdiction (see Figure 4.7). All types and sources of disaster from land to sea are part of the law's arrangement. In contrast coastal management law is applied within a narrower boundary both landward and seaward.



Source: (Indonesia-DMA 2007)

Figure 4.8. Three disaster management phases according to act's arrangement

In the case of a coastal disaster, where the hazard threat and vulnerable people are located in coastal areas, both acts are applied and require integration in their implementation. The integration is more apparent in relation to natural hazards that have spatial coverage such as flood and tidal inundation where administrative boundaries can exclude vulnerable people from coastal management programs. Since both acts have specific arrangements and obligations for development of planning documents, understanding of its potential problems and consequences is essential to optimise the available resources that are always limited.

Table 4.4. Structure of the Indonesian Disaster Management Act

Chapter	Regulation	Article number
1	General condition/definition	1 (1)
2	Goal and basis of law	2 – 4 (3)
3	Mandate and responsibility	5 – 9 (5)
4	Institutional arrangement	10 – 25 (16)
5	Public right and obligation	26 – 27 (2)
6	Private sector and international agency role	28 – 30 (3)
7	Disaster management implementation	31 – 59 (29)
8	Financing and management of disaster assistance	60 – 70 (3)
9	Monitoring	71 – 73 (3)
10	Dispute settlement	74 (1)
11	Criminal sanction	75 – 79 (5)
12	Transitional provision	80 – 82 (3)
13	Closing clause	83 – 85 (3)

Source: (Indonesia-DMA 2007)

4.4.2. Mandate and Planning Arrangement

The Coastal Management and the Disaster Management Acts mandate and regulate planning documents and activities to address coastal management and disaster management issues.

a. Mandate

The Coastal Management Act gives mandates and authorities for national and local government to coordinate, integrate, and implement coastal and small island management. The Minister of Marine Affairs and Fisheries at national level is authorised to coordinate the national program of coastal and small island management. At the local level, agencies that are responsible for marine and fisheries jurisdictions have a similar mandate and authority, but at provincial and district level.

The roles and coordination that need to be carried out by national government include: i) evaluation of other sectoral agency plans to be in harmony with integrated coastal and small island management, ii) evaluation of sectoral, local, and private planning that are inter-provincial and take place at national strategic areas, iii) national accreditation, iv) recommendation to issue permits for activities that are under other sectoral agency mandates, v) provision of data and information for coastal and small island management which is inter provincial and at national strategic areas. Meanwhile, local government has similar roles but implemented within provincial and district jurisdictions.

Meanwhile, for disaster management, national and local government are the responsible parties for disaster management implementation (Article 5). National government is responsible for: i) risk reduction and its integration with the development plan, ii) community protection from disaster according to justice and minimum service standards, iii) disaster impacts recovery, iv) budget allocation, and v) documenting disaster impacts and threats.

To allow implementation of its responsibility, national government has mandates to: i) formulate disaster management policy and planning in harmony with national development policy, collaboration with international agencies, regulation of technology use that has a potential for disaster, prevention of excessive natural resource exploitation, ii) declare the disaster level and status as national or local, iii) control fund raising activities.

Meanwhile, local government is responsible for: i) fulfilling community and refugee rights, ii) protection of the community from disaster, iii) reduction of disaster risk and its integration with the development program, and iv) allocating sufficient funding. The mandates for local government are: i) formulation of disaster management within its jurisdiction in accordance with local development policy, ii) formulation of disaster management policy and planning in harmony with local development policy, collaboration with other local governments, regulation of technology use that has a potential for disaster, prevention of excessive natural resource exploitation, and iii) management of fund raising.

Disaster management is implemented through the National Disaster Management Agency (NDMA) and Local Disaster Management Agency (LDMA). The tasks of NDMA are to: i) provide guidelines and direction, ii) establish standards and needs of disaster management, iii) public information and reporting. With those kinds of tasks, the role of NDMA are to formulate and establish policy on disaster management and refugee treatment with fast, effective and efficient measures, and to coordinate the implementation of disaster management in an integrated, planned, and coordinated way.

LDMA is established at the local level with a similar structure to NDMA. However, the establishment is mandatory for provinces and optional for district/city. The functions are to: i) formulate guidance and direction for local disaster management based on local policy and national disaster management agency, ii) set up standards and needs for disaster management at the local level, iii) formulate, establish, and inform the disaster vulnerability map, iv) formulate standard procedures for local disaster management, and v) implement the disaster management program.

However the implementation will require strong leadership and coordination as many related agencies also have mandates on disaster management (Table 4.5).

b. Planning Process

In coastal management, local government is required to develop all four coastal planning documents. Local government and private sector propose the development of the four coastal management documents with public participation and involvement during the formulation process. Additionally, local government has to distribute and disseminate the draft of planning documents to the public for comments, inputs, and revisions. The District/city government submits its final coastal management documents to provincial and national government for comment and input. Provincial government also submits provincial coastal management plan documents to the national government and all its districts. All documents have to be formulated and developed based on the best available data and information. Therefore, it is an obligation to manage data and information of coastal areas and disseminate to all stakeholders.

Furthermore, the act also mandates the government to provide incentives to the implementation of integrated coastal management through accreditation programs.

Accreditation is a procedure to recognise activities that are consistent with coastal management standards. It includes evaluation, awarding, and providing incentives to voluntary coastal management programs that are proposed by local government, community, and the private sector.

Table 4.5. Specific tasks and responsibilities of each ministry

No.	Agency/ministry	Authority/task
1	Coordinating Ministry For Social Welfare	Coordinate inter ministerial programs and activities on disaster management
2	Ministry Of Internal Affairs	Controlling and facilitation of local government in relation to disaster management
3	Ministry Of Foreign Affairs	Support disaster management programs that are involved with international partners
4	Ministry Of Defence	Ensure safety of disaster areas during emergency and post disaster
5	Ministry Of Law And Human Right	Improve and harmonize laws and infrastructure in relation to disaster management
6	Ministry Of Finance	Provide funding for disaster management pre, during, and post event.
7	Ministry Of Energy And Mineral Resources	planning and controlling mitigation activities for geological and man-made related geological disasters.
8	Ministry Of Agriculture	planning and controlling mitigation activities for drought and agriculture related disasters.
9	Ministry Of Forestry	planning and controlling mitigation activities for forest and land fires
10	Ministry Of Transportation	Supporting transportation needs during disaster events
11	Ministry Of Marine Affairs And Fisheries	planning and controlling mitigation activities for tsunami and coastal erosion
12	Ministry Of Public Works	- Conduct spatial planning that is responsive to disaster risk - Preparing locations for evacuation - Recovery processes on public infrastructure
13	Ministry Of Health	Medical services planning includes medicine and medical staffing
14	Ministry Of Social Affairs	Planning on food, clothing, and basic need for refugees
15	Ministry Of Communication And Informatics	Planning and controlling emergency communication facilities and post disaster efforts.
16	Ministry Of Labour And Transmigration	Relocation of communities to safer locations.
17	Ministry Of Research And Technology	Conduct research and analysis to support disaster management planning prior to and during an event and rehabilitation and reconstruction
18	Ministry Of Cooperation And Small And Medium Business	Facilitate economic recovery after a disaster event in particular for poorer groups.
19	Ministry Of Environment	Planning and controlling prevention, information, and early warning in environment related disaster prevention.
20	Ministry Of National Development Planning	Supporting development programs that are responsive to disaster risk.
21	Ministry Of Housing	Coordinating housing development for disaster victims
22	National Army	Assisting in emergency and search and rescue.
23	Indonesian Police	Assisting search and rescue and protect property of refugees.
24	National Search & Rescue	Assisting national agency during search and rescue.
25	National Survey And Mapping Agency	Planning and coordinating disaster risk mapping with other ministries.
26	Agency For Meteorology And Climatology	Monitoring disaster potency in relation to meteorology, climatology, and geo physic.
27	Agency For Technology Assessment & Application	Assisting in assessment and application of technology for disaster management.
28	Indonesia Agency For Science	Assisting in assessing science that relates to disaster management.
30	National Space And Aeronautic Agency	Providing spatial data and analysis from satellites and remote sensing.

Source:(BNPB 2010)

Meanwhile, in disaster management, national and local government develop disaster management plans under the coordination of the disaster management agency. NDMA provides guidance and standards for plan development. The act does not regulate explicitly how the planning process and approval is carried out. The act also does not clearly arrange the public consultation process during the plan development, which in the Coastal Management Act is clearly regulated.

4.4.3. Type of Planning Document

a. Coastal Management

1) Coastal Strategic Plan

The coastal strategic plan is defined as a plan that contains cross sectoral policy directions for certain management areas by establishing broad goals, objectives, strategies, and appropriate targets and indicators. This document serves as a basis for the development of the other three documents. The vision and mission that are going to be achieved in certain coastal areas and time frames are also stated.

Major contents of the document are identified issues, strategic programs, priorities, and performance indicators. It provides long term guidance for local stakeholders to develop their coastal areas within 20 years. However, every 5 years a review and revision is required to update issues and to evaluate its progress for further improvement. It gives opportunities to local government and stakeholders to improve the plan by recognising recent developments, issues, and interest. More importantly, an adaptive management approach allows the coastal management plans to be less than perfect in the early development due to limitations on experience, availability of data and information, and available resources in the field, and then to be enhanced and improved over a period of time.

2) Coastal Zoning plan

The coastal zoning plan directs coastal resource utilisation in each management unit accompanied by establishment of spatial structure and design that contains permitted and non permitted and by-permit-only activities. This document provides guidance for resource allocation and uses in coastal areas and small islands for provincial and district government. This document can be seen as a spatial translation of the strategic plan. Major resources and issues are put in the spatial reference map. The document has a 20

year period, needs to be updated and reviewed every 5 years, and legalised by the local House of Representatives.

The provincial coastal zoning plan contains a general allocation of coastal areas while district government develops more detailed space allocation. The provincial coastal zoning plan contains: 1) coastal space allocation as general uses areas, conservation areas, strategic areas for national interest, and sea lane corridor, 2) information on interconnectivity between land and marine ecosystems in a bioregion, 3) marine space utilisation, and 4) prioritisation of marine areas for conservation, social, and economic interests. Meanwhile, district/city coastal zoning plans include: i) detailed space allocation within general use areas, conservation areas, strategic areas for national interest, and sea lane corridor, ii) interconnectivity between coastal and small islands ecosystems in a bioregion.

3) Coastal Management plan

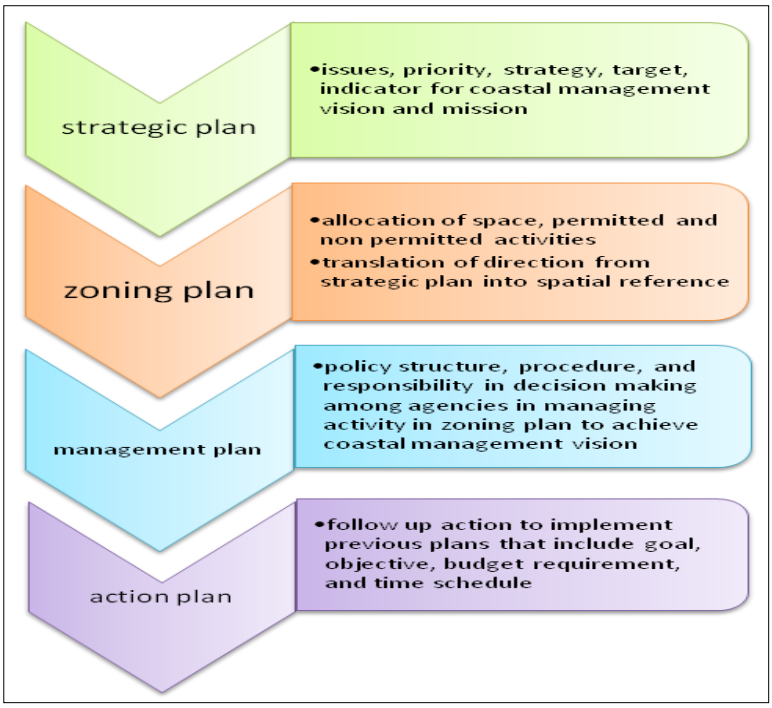
The coastal management plan describes policy structure, procedure, and responsibility to integrate decision making among government agencies on resource utilisation or development activities in the zoning plan. This document provides guidance for coordination, monitoring and resource management. The document has a five year period and needs to be updated and reviewed at least once. The document contents include: i) policy on regulation and administrative procedures of allowable and prohibited resource utilisation, ii) priority of resource utilisation in accordance with coastal and small island characteristics, iii) ensuring that public inputs are accommodated, iv) reporting mechanism and availability and accessibility of data and information, v) ensuring availability of human resources to implement the policy and program.

4) Coastal Action plan

The coastal action plan is the last document in the planning arrangement for Indonesian coastal management. It is defined as a coordinated follow up action to implement the coastal management plan that include goals, objectives, budget requirements, and time schedule for one or several years. This document consists of all implementation actions that are required to achieve the vision and mission of coastal area development. The

document has 1 – 3 year periods that provide flexibility in adjusting activities based on available resources.

The position of each document in hierarchal planning is shown in Figure 4.9, while the content summary and requirement of all four planning documents is shown in Table 4.6. As a hierarchal planning system, the strategic plan has to be developed first to provide strategic guidance for the coastal management policy and program. The zoning plan applies the strategy spatially and the management of activities in each zone is arranged in a management plan. Finally, the action plan implements the policy and program in real actions to achieve the goals and objectives of coastal management. This kind of sequential planning process requires coastal managers to understand thoroughly the complexity of issues from different geographical scopes, government level, and flexibility to accommodate new emerging issues (Kay and Alder 2005).



Source: (Indonesia-CZMA 2007)

Figure 4.9. Position of each Indonesian ICM planning document and its main content

Table 4.6. Summary of coastal management document content and requirement

Document	***Type***	***Content***	***Requirement***		
			Data/information/process	*Main actors*	*Public role*
Strategic plan	Strategic	- Longterm policy direction - Intersectoral policy - goal, objective, strategy, and appropriate target and indicator	- Marine and coastal habitat and its problems - Socio economic profile of coastal community - Coastal biophysical information - Land use	- Marine and fisheries agency - Planning and development agency - Sectoral agency	Clarifying issues and related policy and program during public consultation
Zoning plan	Strategic and operational	- Space and resources allocation for socio economic utilisation, conservation, and rehabilitation - Permitted, not permitted, and by permit activities	- Detailed coastal and marine biophysical information - Land/marine use and land/marine suitability - Existing land/marine uses - Traditional and *adat* practice/right - Potential development of coastal area	- Marine and fisheries agency - Planning and development agency - Other sectoral agency	- Comment and input for zoning plan - Ensuring community and or *adat* (indigenous) rights are accommodated
Management plan	Operational	- Policy on administration and regulation of coastal resources utilisation - Priority scale of resource uses - Accommodation of public input - Reporting - Human resources capacity development	- Information on agreed priority, strategy, and program within strategic plan - Role and responsibility of each agency - Agreed space and resource allocation within zoning plan - Mechanism for monitoring and reporting	- Marine and fisheries agency - Planning and development agency - Other sectoral agency	Reporting any incidents or activities against the law
Action plan	Operational	Activities from each sector to achieve agreed vision and mission of coastal management	- Indicators - Sector role, responsibility, and activity - Location, amount of funding, type of activity	- Marine and fisheries agency - Planning and development agency - Sectoral agency - Private sector - Community	- Participating in implementation of plan - As beneficiary of activity - Assist in monitoring and reporting the progress

Source: act analysis

b. Disaster Management

Three planning documents are obliged within the three phases of disaster management, pre disaster, emergency response, and post disaster.

1) Disaster Management Plan

This plan is mandated during the pre event period where there is no disaster and contains: i) identification and assessment of disaster threat, ii) understanding of community vulnerability, iii) analysis of potential impact of disaster, iv) disaster risk reduction options, v) mechanism for preparedness and disaster management, vi) allocation of task, authority, and available resources. The document has a five year period and could be evaluated periodically.

2) Risk Reduction Action Plan

This document consists of action plans from all sectors to reduce risk from disasters by reducing the hazard impact, vulnerability, and by increasing capacity. Those actions include: i) identification and monitoring of disaster risk, ii) participatory planning, iii) develop a disaster awareness culture and increase commitment, and iv) application of physical and non physical intervention and regulation. The time period is three years and can be reviewed at any time if necessary.

3) Emergency Plan

The emergency plan is used as a reference and guidance for emergency situations. It needs to be developed and tested for disaster impact. There is no arrangement for time period and review of the document by the act.

In contrast with ICM planning documents, three disaster management plans are not in a hierarchic structure. It is more cyclic in form where each cycle is a continuation from the previous one and influenced by disaster events (Figure 4.10). The content summary of all three planning documents and its requirements are shown in Table 4.7.

Source: (Indonesia-DMA 2007)

Figure 4.10. Three disaster management planning documents as mandated by the act

Table 4.7. Summary of disaster management planning document content and requirements

Document	***Type***	***Content***	***Requirement***		
			Data/information	Main actors	Public role
Disaster management plan	Strategic	- identification and assessment of disaster threat, - community vulnerability, - potential impact analysis of disaster, - disaster risk reduction options, - mechanism for preparedness and disaster management, - allocation of task, authority, and available resources	- Hazard analysis and its potential affected areas - Socio economic profile and its vulnerability - Risk analysis - Capacity, available resource - Institutional setting, community role	- Disaster management agency - Planning and development agency - Sectoral agency	- Providing input, and comment, and participation in all planning processes - Monitoring document implementation
Risk reduction action plan	Operational	- Action plan from all sectors to reduce risk from disaster by reducing hazard impact, reducing vulnerability, and increasing capacity	- Existing capacity in all levels - Hazard type and coverage - Social and economy vulnerability - Environmental and habitat conditions	- Disaster management agency - Planning and development agency - Sectoral agency	- Participating in plan formulation process
Emergency plan	Operational	- Guidance for emergency response actions	- Capacity, available resource, Institutional setting, community role - Early warning system, evacuation measures	- National/local disaster management agency - Local government - Sectoral agency	- Participating in preparedness activity

Source: (Indonesia-DMA 2007)

4.4.4. Key Activity on Coastal Management and Disaster Management

The acts have clear arrangements for key activities to implement coastal management and disaster management. Type of activities, actors, and procedures are regulated to ensure acts' arrangements are complied with.

a. Coastal Management

The act regulates five types of activities for coastal and small island resource utilisation. Both for economic and non economic interests, the act has clear conditional arrangements before those activities could be permitted. The act uses utilisation terms in a broad way not only on social and economic aspects but also rehabilitation and conservation activities. Those activities include: i) coastal surface and water column utilisation, ii) utilisation of small islands and their surrounding water, iii) conservation, iv) rehabilitation, and v) reclamation.

1) Economic Utilisation of Coastal Water

All types of economic utilisation of coastal and small islands waters have to have coastal water utilisation rights or permits. The permit allows economic utilisation of the surface and the water column. The permit is not granted in conservation areas, fisheries sanctuaries, sea lanes, seaports, and public beaches. Technical, administrative, and operational requirements are also applied for proposed activities.

Technically the proposal should be consistent with coastal zoning plans and management plans of the location and has to consider analysis of potential damage to the ecosystem. The zoning plan serves as a filter to select appropriate economic activities that comply with the designated zone and is not contradictory with other uses in the same or adjacent zones. Meanwhile, the management plan guides the day to day management activities and how the coordination, monitoring, and reporting are carried out. To safeguard community interests, public consultation is mandatory and is carried out proportionally to the scope of the activity.

For administrative concerns, the proposal has to include operational plans that are in line with the environmental carrying capacity and mechanism for monitoring, surveillance, and reporting. Finally, during the operation, the permit holder has to: i) empower the local community, ii) recognise, honour, and protect *adat* (indigenous) community rights and or local community, iii) consider public access to the beach and estuary, iv) rehabilitate degraded habitats in the location.

2) Small Islands Resources Utilisation

Utilisation of small island resources is limited to non exploitative activity due to its fragility. It includes conservation, education and training, research and development, mariculture, tourism, sustainable fisheries, organic farming, and poultry. If an existing community has used the resources for its livelihood, the permit is granted only after consultation with the community facilitated by local government.

3) Conservation

Conservation is one utilisation type that is regulated by the act and it should be part of the coastal zoning plan. Conservation is intended to provide protection to coastal resources to balance economic uses. That is one of the main aspects of ICM as a

continuous and dynamic process to make a decision for sustainable development of coastal resources to meet the needs for resource use and protection (Cicin-sain and Knecht 1998).

Four conservation objectives are covered which include: i) protecting sustainability of coastal and small islands ecosystems, ii) protecting migratory routes for fish and marine biota, iii) protecting marine biota habitat, and iv) protecting traditional cultural sites. Moreover, to mitigate coastal disasters, the act mandates the establishment of a setback area as part of conservation activity. The coastal setback area is defined as an area along the coastline having a width proportional to the coastal characteristics with a minimum distance of 100 m from the highest water mark. Local government has to establish setback areas in accordance with characteristics of topography, biophysics, hydro oceanography, economy, and culture.

Setback areas serve as protection from: i) coastal hazards such as tsunamis, erosion, storms, and flooding, ii) degradation of coastal ecosystems such as wetland, mangrove, coral reef, sea grass, sand dune, estuary, and delta. Setback areas also have to maintain existing public access and drainage and sewerage systems.

4) Rehabilitation

Rehabilitation is carried out by national and local government and every individual that benefits from coastal and small island areas directly or indirectly. The scope of rehabilitation includes: i) biological resource enrichment, ii) habitat rehabilitation, and iii) protection of natural growth of marine biota.

5) Reclamation

Reclamation is permitted only to increase benefit or additional value of coastal and small island areas from technical, environmental, and socio-economic points of view. Reclamation has to consider the local community's socio-economic life, the balance between utilisation and conservation of coastal and small island environments, and technical requirements in mining, dredging, and stock-piling materials.

b. Disaster Management

The disaster management act regulates three major phases but does not describe clearly the criteria for each sub phase. Each phase has specific arrangements and activities.

1) Disaster Management Planning

Disaster management planning is established by national and local government in accordance with their responsibility as discussed in the previous section. The agency for disaster management coordinates the planning activity. Major activities that need to be planned include hazard analysis, vulnerability analysis, and risk analysis. The results determine possible risk reduction activities that need to be managed and coordinated within the authority of all sectors and stakeholders.

The plan is also obliged to be integrated with existing development plans to optimise available resources, programs, funding, and projects that are usually very limited. Integration with existing development plans also increase the effectiveness of the plan if it becomes unfeasible due to lack of funding. This is true for disaster risk reduction options which are usually part of a sectoral program e.g. education, social, health, and natural resource management. It implies that the role of disaster management agencies during the pre event is mostly centred on coordination.

2) Risk Reduction

Disaster risk reduction is intended to reduce the severe impacts of disaster. The result from risk analysis is used as a basis for understanding and monitoring of community risk to disaster. Communities and stakeholders with a potential risk are involved in the planning process to increase their commitment, preparedness and awareness of risk reduction programs. The applied activities could be in structural and non structural measures and the role of sectoral agencies is essential.

3) Disaster Prevention

Disaster prevention is intended to avoid disaster events, where it is possible, by proactive activity. The act mandates disaster management agencies to identify and understand hazard sources and define any options to prevent it becoming a disaster. Prevention from man-made disasters is also required by controlling and monitoring of the exploitation of natural resources and technology uses that could lead to a disaster.

4) Preparedness

Preparedness is conducted to ensure fast and accurate actions are carried out to cope with disaster events. It is implemented by developing preparedness plans and testing them periodically. To facilitate appropriate responses, early warning systems are installed and their function tested. Disaster management agencies are obliged to have logistic stock, materials, and equipment that are essential during the disaster. At community level, preparedness is developed by education and training and provision of evacuation sites. Included in the preparedness is maintenance of recent data and information and standard procedures during an emergency.

5) Early Warning

Early warnings are needed to deliver fast and accurate actions to reduce potential impacts and prepare emergency response. It covers activities such as: i) disaster indication monitoring and analysis, ii) decision making and information delivery, and iii) community action.

6) Mitigation

Finally, to reduce the disaster impact, mitigation actions are carried out through: 1) implementation of the spatial plan, 2) regulation of development, infrastructure, and building, and 3) education, outreach, and training.

There are a number of problems with these mitigation activities. First it is actually part of the risk reduction program and should not just be limited to three activities that may create confusion in the link between mitigation and risk reduction programs. Second, the law explicitly mandates that mitigation is carried out during the period where disaster impact is a real threat, which implies the disaster will happen in a relatively short time compared to the no event period. However, those three mitigation activities take time to give effect in reducing the risk.

Since the mitigation actions overlap with disaster risk reduction activities, implementation arrangements of disaster management during this process are confusing. As a disaster is defined as an event that creates loss to community, two main factors are involved. First the disaster threat or hazard itself, is in the form of natural or unnatural events. Second, the community is vulnerable to disaster because of its proximity to the

hazard location and socio-economic attributes that influence their capacity to cope with and recover from disaster. Major activities in this phase, that are regulated in Article 44 – 47 of the act, are mainly on physical points of view and focus on the hazard only. Attention to the socio-economic vulnerability that could exacerbate disaster is very limited or even lacking. Moreover, there is no clear explanation to differentiate between times of no disaster and those of disaster threat.

7) Emergency Response

Emergency response is a fast and accurate action to be taken during the event. The act obliges certain activities that include: i) rapid and accurate assessment of the location, damage, and resources, ii) declaration of disaster status, iii) evacuation and rescue, iv) basic needs supply, v) protection to vulnerable groups, and vi) recovery of vital infrastructure and lifeline.

During an emergency situation, basic needs that have to be provided include clean water, sanitation, food, clothes, medical services, psycho-social counselling, and shelter. Vulnerable groups are prioritised during rescue and evacuation, as well as provision of medical and psycho-social services. However, as mentioned previously, the description of vulnerable groups by the act is only from an emergency situation point of view and includes disabled, elderly, children, and women.

8) Post disaster Rehabilitation And Reconstruction

Rehabilitation is intended to repair the environment, infrastructure and lifelines, housing, psychological recovery, medical services, conflict resolution, and recovery of society and economy, law and order, and governance. After the rehabilitation process is completed reconstruction is carried out in a better way than before to increase the capacity to cope with future disasters. It includes reconstruction of infrastructure and lifelines, social and community infrastructure, regenerating social cultural life, application of the right design and tools that are stronger and better able to cope with disaster, participation of the public, economy and culture, and community services. One responsibility that is part of national government but not for local government is to recover conditions from the disaster impact. The act does not explain what conditions are needed to be recovered, but this has many consequences for national government from technical and financial aspects.

4.4.5. Public Role

Public participation is important for disaster management, in particular to strengthen their individual, socio-economic, and political elements (Mathbor 2007) and combine scientific input and local understanding about the hazards (Frazier, Wood et al.).

1) Coastal management

Chapter II, article 4 point c of the act states that the objective of the Coastal Management Act is to strengthen community participation and initiatives to achieve justice, balance, and sustainability in coastal and small islands management. The community has an equal opportunity to participate in planning, implementation, and monitoring of coastal management program (Article 62). Chapter III, Article 12 point (c) stipulates that the management plan has to guarantee that public input and comment as a result of public consultation are accommodated. This arrangement is important to avoid any attempt to use public consultation just as a formality. Article 14 point (2) in the same chapter also mentions that the community has to participate in the formulation of four planning documents. And Chapter IV, Article 7 point (4) obliges the government to involve the community in the process of coastal management planning formulation.

To put that community role into action is an obligation of government. The concept of planning documents has to be disseminated to the public for comment and input (Article 14 point 3). In addition, all data and information on coastal and small island management is a public document and therefore can be accessed and used publicly. Results of research and development of coastal and small island resources are open to the public (Article 44). Encouragement to conduct research and development that recognise and honour traditional and local wisdom for coastal resource management is mandated by the act (Article 42 point 2). Communities and individuals also have the right to carry out research and development. Individual and community groups are allowed to propose certain areas that are important for their social and economic life to be designated as a conservation area (Article 28, point 7).

2) Disaster management

In comparison, participation in the planning process of disaster management is accommodated through the involvement of professional communities in the disaster management agency directive structure. Directive structure functions to formulate

policy, monitor, and evaluate disaster management. The members of this component include government officers and professionals from the community (Article 14 and 22).

Meanwhile, for other groups than the professional community, every individual and or legal entity has the right to participate in planning, operation, and maintenance of the health assistance program. During the planning process they have the right to participate in decision making of disaster management especially if it is related to their life and community. However, the practical involvement of community in the planning process is not regulated by the act. The assurance that the public input is accommodated in the plan is not guaranteed as it is mandated in the Coastal Management Act through the management plan document.

4.4.6. Access to Resources and Information

The arrangements for coastal management and disaster management need not limit community access to resources. It is important as most coastal communities rely on coastal resources for their livelihood.

a. Coastal management

The act provides a community a right to express their objection to any coastal management program that could limit their access to coastal resources (Article 60). Referring back to main coastal management activities, three activities that potentially limit community access are: 1) utilisation permit, 2) zoning plan, and 3) conservation areas.

For a utilization permit, according to Article 60, the community has a right to: i) get compensation for any loss caused by the utilisation permit, ii) conduct coastal resource management based on *adat* (indigenous) law which is not against the formal law, iii) get benefit from the coastal management program, iii) conduct a class action for any activities in coastal and small island areas that damage their lives, iv) get compensation for any loss caused by coastal management activities. Those arrangements, in particular point (iii) and (iv), are essential for man-made disasters in coastal areas. Any damage and losses caused by projects that potentially lead to disaster will be compensated. Additionally, public consultation has to be carried out before any permit could be given to utilise coastal waters. This is to make sure that the proposed activity is agreed and

beneficial to the community. In the small island context where many traditional and *adat* communities live and use the resources, the permit is granted only after consultation with them (Article 23 point 5).

In regard to zoning, chapter IV, article 9 point (3) states that the zoning plan is developed by considering social and cultural dimensions. It has to allocate community's space and access to utilise coastal and small island resources for social and economic purposes. Meanwhile, for conservation, it could be designated to protect traditional practices in fisheries or cultural traditional sites. It will increase conservation benefits and reduce any potential conflicts with traditional uses.

b. Disaster management

Meanwhile, in disaster management, the community has a right to receive required resources during disaster event. Community has a right to get protection from hazards and fulfilment of their rights as victims and refugees during the disaster event (Article 6 and 8). Moreover, Article 26 and 27 of Chapter V, stipulate that individuals and or legal entities have rights to: a) have protection and safety, especially for vulnerable groups, from disaster, b) get education, training and skills in disaster management, c) get information on disaster management policy, d) participate in planning, operations and maintenance, and decision making, e) monitor the implementation of disaster management plans, f) get the basics needs for disaster victims and compensation from loss that are caused by construction failure.

During the event, government has to provide evacuation and rescue to the affected community, provide basic needs, and protect vulnerable groups (Article 48, 52 - 55). After the event social, economic, and cultural conditions have to be rehabilitated and reconstructed (Article 58 and 59). To assist affected communities, government could provide soft loans for economic recovery and financial assistance (Article 69).

4.4.7. Integration with Development Planning

Both the Disaster Management and the Coastal Management Acts oblige their planning documents to be in harmony with existing development plans and spatial plans. According to the Act No. 25/2004 of the National Planning System, there are three types of planning: i) long term, ii) mid term, and iii) annual or short term. In relation to

coastal management documents, the strategic plan is required to be part of existing local development plans and recognises interest both for local and national government (Article 8 of the Coastal Management Act). Furthermore, integration and harmonisation with existing spatial plans is required while developing the zoning plan. Meanwhile, integration of disaster management into development plans is carried out by incorporating disaster management components into national and local development plans. Additionally every development activity that could create a disaster has to be completed with a disaster risk analysis. The national agency on disaster management formulates risk analysis requirements and monitors its compliance. Enforcement is carried out by implementation of the spatial plan, safety standards, and sanctions.

Obligations to integrate with existing planning strongly affirm the need for the integration between coastal management and disaster management plans. More importantly, the integration need is implied by the act arrangement itself where both acts' activities complement each other in relation to coastal disaster risk reduction.

4.5. Achieving Coastal Community Resilience

Implementation of the Coastal Management and Disaster Management Acts will lead to community capacity to withstand, cope and recover from coastal hazards which means community resilience. However, certain parts like risk assessment and disaster management plans, are lacking in coastal management arrangement but are fully regulated by the Disaster Management Act. On the other side, environmental protection, rehabilitation, and resilience are mostly accommodated in the Coastal Management Act. These differences require both acts to work together to fill their own gaps and benefit from each other's arrangements. Contributions of each act's arrangements toward coastal community resilience to disaster are shown in Table 4.8.

Table 4.8. Characteristic of disaster resilient community to cope with and recover from coastal disaster

Thematic area	Component of resilience (US-IOTWS 2007; Twigg 2009)	Arrangement	
		DM Act	ICM Act
Governance	• Commitment on political and policy include planning and priority	• Article 5 – 9, government responsible and has mandate to implement disaster management • Planning documents include: i) disaster management plan, ii) risk reduction action plan, iii) preparedness plan	• Law mandates government to: i) protect, conserve, rehabilitate, utilise, and enrich coastal and small island resource, ii) create synergy between national and local government in coastal resources management, iii) strengthen community participation and initiatives, and iv) improve community social, economy, and cultural values. • Four hierarchal planning documents are obliged.
	• Availability of legal and regulatory system	• Law regulates and arranges disaster management at national and local level	• National/local government and community have clear rights and obligation for coastal resource management
	• Integration with development planning	• Article 35 point d oblige incorporation of disaster management into development plan	• Coastal management plans must be part of national/local development and spatial plan (article 8 – 13)
	• Integration with emergency response and recovery	• Article 48 – 56, emergency response in part of disaster management process	• Not stipulated
	• Institutional arrangement, allocation of responsibility	• Stipulated in disaster management plan	• Arrangement for coastal resource uses, rehabilitation, conservation, monitoring, and evaluation is stipulated
	• Partnership and community participation	• Community involve in all disaster management processes	• Community involved in all planning process and the accommodation of community input is guaranteed in management plan
	• Program is monitored transparently and in participatory way	• Government responsible for monitoring (Art. 71) and community could request financial audit (Art. 72)	• Monitoring and evaluation is carried out by government and public (article 36)
	• Collaboration among sectors and different government level	• Sectors are involved during planning, emergency, and rehabilitation and reconstruction phase under national/local agency on disaster management	• Sectors are involved as team work during planning process and implement the action plan in accordance with its sector tasks and mandate
	• Technical and financial support for community action	• Government allocate sufficient funding for disaster management (article 60 – 61)	• The plan is implemented through sectoral activities that are agreed and integrated in action plan.
Risk assessment and management	• Hazard, vulnerability, and risk assessment, data availability, and capacity	• Hazard, vulnerability, and risk assessment is mandatory content in disaster management plan (article 36 point 4 and 37)	• Assessment in not stipulated in the law, however, mitigation is mandatory in all coastal resources utilisation plan (article 56). This requires assessment on hazard impact, vulnerability of community and environment, and risk reduction measures
	• Appropriate scale of assessment and covers all element of risk	• Not stipulated	• The scale for provincial plan is 1:250 k and 1:50 k for district/city. This influences level of detail for all assessments includes mitigation measures.
	• Participatory risk assessment	• Not stipulated • Not stipulated in detail, community participate in formulation of risk reduction plan	• Not stipulated

Thematic area	Component of resilience (US-IOTWS 2007; Twigg 2009)	Arrangement	
		DM Act	ICM Act
	• Risk reduction through vulnerability reduction and resource management	• Vulnerable group is limited in emergency response activity (elderly, children, etc). Resource management is focused on avoiding exploitation that lead to disaster	• Coastal management intends to improve coastal environment and community social, economic, and cultural life.
	• Health, social, economical, and physical protection from disaster	• Part of disaster risk reduction (article 37 point 2)	• Setback area is part of conservation to protect coastal environment and community from coastal hazards
Resources management	• Implementation, monitoring, and evaluation of resources management • Sensitive resources or habitat that vulnerable to disaster or potentially support community resilience are protected and maintained • Community is actively engaged in planning and implementation	• Not stipulated and act only give general environmental and resources management which are part of disaster prevention	• Four hierarchal planning documents contain coastal resources management where its monitoring and evaluation are carried out by government and public • Mitigation is mandatory for every activity appropriate to its scale and impact • Critical habitat conservation and rehabilitation are mandatory to national/local government • Community participate in planning and implementation process for conservation and rehabilitation
Land uses	• Land uses incorporate measure to reduce risk from disaster	Land uses is part of disaster prevention (article 38), risk reduction (article 42) and mitigation (article 47)	• Coastal zoning balances between utilisation purposes and protection function of resources • Setback area for coastal hazard protection is mandatory
Knowledge and education	• Public knowledge, awareness, and skill • Education, training, and research • Information is managed and shared	• Education and training is part of pre disaster management program (article 43), preparedness (article 45), and mitigation (article 47) • There is no specific regulation on data and information management	• Research and development and education, training, and outreach is mandatory to improve coastal and small island management capacity • Obligation of government to manage, update and disseminate data and information on coastal management to public
Preparedness and response	• Organisation capacity and coordination mechanism with clear role and responsibility • Early warning is in place, understood by community, and could effectively warned vulnerable people • Preparedness and emergency plan that include resource and infrastructure • Response and recovery	• Detailed arrangement is regulated in Government Regulation No. 21/2008 • A series of preparedness activity is obliged to ensure disaster management readiness • Covered by emergency response plan • Logistic and equipment management system is established by national and local disaster management agency • Warning are relayed to public by all means of communication (TV, radio, newspaper)	Not stipulated

Source: Indonesian Disaster Management and Coastal Management Act documents analysis

4.6. Discussion

The enactment of the Disaster Management and the Coastal Management Acts in Indonesia has been influenced and fostered by regional and global concerns in these fields. The great Indian Ocean tsunami culminated in the awareness and need for coastal management along with disaster management, which was marked by the enactment of both acts in 2007. Similar developments also established in other countries in the region e.g. enactment of disaster management acts in India and Sri Lanka in 2005.

Both acts change previous coastal management and disaster management practices in Indonesia. New planning processes, coordination, document types, and activities are mandated and in particular for disaster management, a new agency i.e. disaster management agency is established at national and local levels. Meanwhile, for coastal management, the agency for marine and fisheries has a bigger responsibility and authority in planning and management of coastal areas than before. That creates many consequences for local development practices. For instance, coordination of coastal management at national level is mandated to the Ministry of Marine Affairs and Fisheries where at provincial and district/city level it is carried out by local agencies that are responsible for marine and fisheries management.

The problem is apparent during the act implementation because local agencies in marine and fisheries have no experience or capacity to coordinate and integrate all other sectors. Interviews with Pekalongan City Marine and Fisheries Agency revealed that they consider themselves as just one of the local sectors. They did not do coordination functions and used to be organised by the Pekalongan City Planning and Development Agency. The coordination mandate has a potential overlap with existing coordinating institutions i.e. national/local planning and development agency. Additionally, the new planning process and development of four documents for coastal management gives more challenges to local government. These four documents have to be in harmony with local development plans and improve existing practice in local development planning.

Meanwhile, for disaster management, the establishment of disaster management agencies at the local level will give additional financial and administrative burdens. It is considered part of the reason why the agency is mandatory at provincial but optional at district level. Similar potential problems are also found in the planning process. The

mandate of disaster management agency to coordinate disaster management planning and implementation overlaps with local planning and development agencies.

Coupled with existing gaps and drawbacks from each act's arrangement in achieving coastal resilience to disaster (as shown in Table 4.7), integration of both acts is required. There are a number of reasons why that integration is essential. First, to ensure both programs are part of daily practice in development and not just a stand alone or add on program. Second, as resources at the local level, both financial and human, are very limited, integration will reduce costs. Third, more importantly, integration will avoid exclusivity of the program that creates resistance from other sectors.

For planning purposes, integration will benefit both coastal managers and disaster managers. First, integration will streamline the documents' development and reduce the duplication of planning processes that in return will reduce the cost and optimise existing resources. Second, as both coastal management and coastal disaster management acts have the same locus, in case of coastal disaster, the integration is encouraged by the fact that the main activities of both acts are interconnected as shown in Table 45 and 4.6 Third, many potential benefits could be acquired from the integration as both acts aim at coastal use sustainability.

4.7. Conclusion

The content of Indonesian disaster management and the Coastal Management Act has been influenced by existing theoretical approaches in both fields which are reflected in the acts' terms, scope, and arrangements. However, a number of arrangements potentially create challenges and problems for their implementation e.g. definition of coastal areas and obligation to develop four hierarchical documents in the Coastal Management Act and definition of disaster, disaster mitigation and vulnerability group in the Disaster Management Act.

In relation to coastal disasters, the acts' scopes and mandates influence and inter-correlate with each other. Problems in geographic boundaries, where coastal areas are limited into coastal subdistricts, could be covered by the Disaster Management Act. Similarities in areas of risk reduction and community empowerment potentially benefit each other. This will not only streamline the acts' implementation but also reduce

existing burdens for local government to conduct planning. According to planning requirements, integration is best executed through both strategic and operational plans. Pre disaster event planning is the most suitable phase where integration with coastal management activities will create optimum impacts to reduce coastal disaster losses. It could be carried out using all four hierarchical documents in the Coastal Management Act and disaster management plan and risk reduction action plans for the Disaster Management Act.

However, the above analysis concerns the legal content and context of coastal management and disaster management acts. As both coastal management and disaster management acts have been passed since 2007, it is important to examine the existing response from coastal management plans, disaster management plans, and development plans. Examination of existing planning documents are also important to show that practically coastal disaster issues could not be addressed by a single plan and need collaboration. The finding will strengthen the feasibility, legality, and practicality of integration of coastal management and disaster management planning.

How existing planning documents translate and apply the acts' arrangements to address coastal hazard problems is presented in the next chapter.

CHAPTER 5

ACCOUNTABILITY OF DISASTER MANAGEMENT AND COASTAL MANAGEMENT PLAN TO THE ACTS' MANDATES AND ARRANGEMENTS

5.1. Introduction

In the preceding chapter (Chapter IV) it has been shown that a coastal management or a disaster management act in isolation could not work to reduce coastal disaster risk. Both acts mandate and regulate disaster risk reduction through their planning documents. Therefore, it is essential that planning documents respond to coastal management and disaster management issues properly. A proper response would reduce the disaster risk and sustain development. However, since national and local governments have limited resources and have to struggle with economic development and poverty issues, coastal management and disaster management could be overlooked.

In this context of juxtaposition of environmental, social, resources, and hazards, a systematic risk reduction program is essential and fully mandated by the Indonesian Disaster Management and Coastal Management Act. The programs are manifested in a myriad of activities that concern all development sectors e.g. providing health services, education, infrastructure, awareness, training, environmental management, and habitat conservation. Such a wide range of activities, however, could not be incorporated into a single planning document or single sectoral agency. Collaboration or harmonization of activities, in particular between coastal management and disaster management plans, is inevitable.

Given the importance of planning documents in addressing coastal disaster issues, it is important to know if existing plans are in accordance with existing mandates and obligations of both the Disaster Management and the Coastal Management Acts. This chapter examines how the existing Indonesian national and local disaster management and coastal management plans address and accommodate coastal management and disaster management arrangements in content and substance. The results show, through objective and factual findings, that there is an urgent need for integration or collaboration among those planning documents to achieve coastal community resilience.

5.2. Objective

The objective of this chapter is to analyse existing national, provincial, and local coastal management and disaster management plans with regard to their compliance with mandates and obligations stipulated in the Coastal Management and Disaster Management Acts. Two questions are addressed:

1. Do existing plans accommodate obligations and mandates of coastal management and disaster management acts?
2. What substantive components of these acts are missing in each planning document and how could coastal management and disaster management plan documents complement each other toward coastal community resilience to disaster?

5.3. Planning Documents for Analysis

These are four coastal management plans and three disaster management plans that have been required of provincial and local governments. The national government has the same obligation for the disaster management plan but the Coastal Management Act does not oblige any national coastal management plan. Even though the coastal management and disaster management acts were enacted in 2007, fulfilment of their mandates in the form of formulation of planning documents is still limited (Table 5.1).

Table 5.1. Status of planning documents that are mandated by the acts

Mandate / Level	Planning document type						
	Disaster management			Coastal management			
	Disaster management plan	Risk reduction action plan	Preparedness plan	Strategic plan	Zoning plan	Management plan	Action plan
National	√	√	-	na	na	na	na
Central Java Province	-	√	-	√	-	-	-
Local case study:							
1. Pekalongan	-	-	-	√	√	-	-
2. Semarang	-	-	-	-	-	-	-

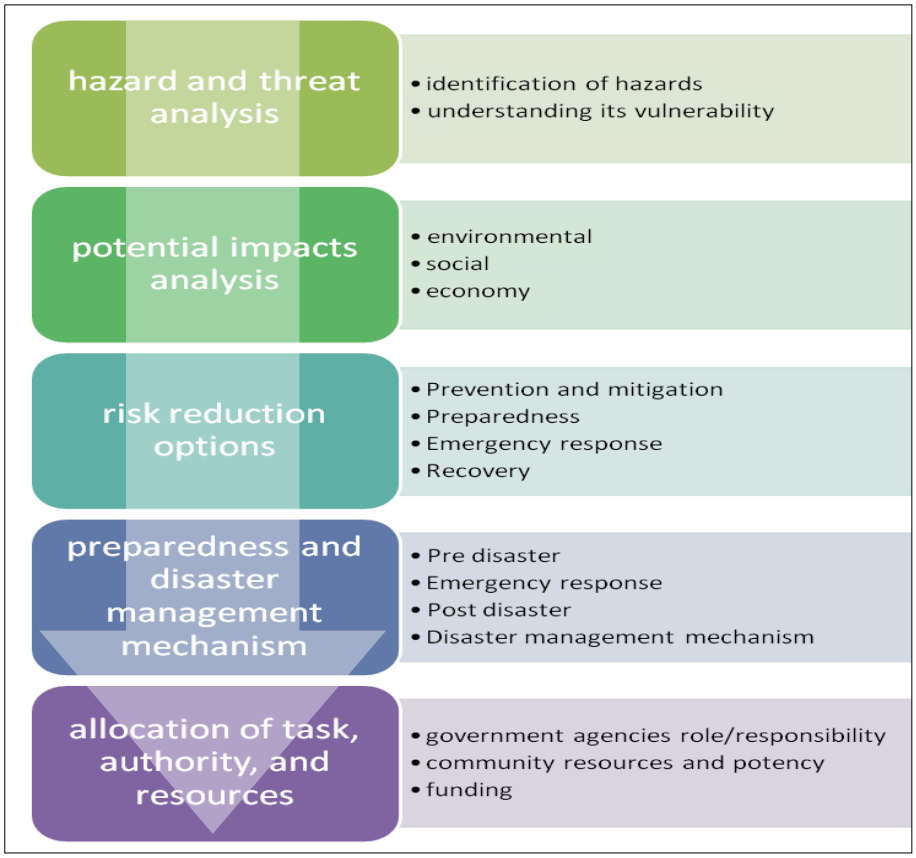
na: not applicable/not mandated

The Disaster Management Act does not require the formulation of a risk reduction action plan. The risk reduction action plan is regulated under Government Regulation No. 18/2008 of the Implementation of Disaster Management. Consequently, the Central Java Province risk reduction action plan will not be evaluated since it was developed in 2007 before the establishment of that regulation.

5.4. Content and Substance of Documents

5.4.1. Disaster Management Plans

According to Article 36 point 4 of the Disaster Management Act, disaster management plans should include six elements: i) identification and assessment of disaster threat, ii) understanding of community vulnerability, iii) analysis of potential impact, iv) options for risk reduction, v) mechanisms for preparedness and management, vi) allocation of tasks, authority, and available resources. Implementation of those six elements will also guide the development of a disaster management plan on a sequential basis (Figure 5.1).



Source: analysis of the Disaster Management Act's arrangement

Figure 5.1. Guideline for development of disaster management plan

However, the content of existing national disaster management plans do not follow and specifically explain those six elements which in turn, creates problem for document examination. Additionally, the documents also do not follow the guidelines developed by the National Agency for Disaster Management (Table 5.2). It is clear that the guideline structure is exactly in accordance with those six elements mandated by the Disaster Management Act.

Table 5.2. The structure of disaster management plan guidelines and national plan

Structure of disaster management plan	
Guideline (BNPB 2008)	**National disaster management plan (BNPB 2010)**
a. Introduction b. Disaster management planning c. Identification and assessment of disaster threat and vulnerability d. Analysis on potential impact e. Options for disaster risk reduction: • Prevention and mitigation • Preparedness • Emergency response • Recovery f. Mechanism for preparedness and disaster management • Pre disaster • Emergency response • Post disaster • Disaster management mechanism **g.** Allocation of task, authority, and available resources	a. Introduction b. General information of disaster • Hazard/threat • Vulnerability • Risk c. Issues, challenge, and opportunity d. Disaster management policy e. Program f. Funding and budgeting g. Monitoring and evaluation

Even though the guideline is intended for provincial and local government, the national disaster management plan should follow the same structure for two main reasons: 1) there is no significant content difference and separation between the national and local government disaster management plans, and 2) different structures cause confusion and problems for cross referencing to examine if plans are supporting each other. If there is a difference, it should be only on detail of analysis and adjustment based on the local context e.g. national plan uses broader and less detailed data but provides perspective and guidance for further detailed analysis in the local plan. To be consistent with the act's mandate, content analysis in the next sub section/chapter will be based on steps and arrangements as seen in Figure 5.1 and Table 5.2.

a. Hazard and Threat Analysis

The disaster management plan identifies ten major natural hazards in Indonesia that need to be anticipated (Table 5.3). Most of those natural hazards listed are rapid onset types and only drought and erosion are slow onset. Those are considered very limited if compared to all potential coastal hazards that are threatening coastal communities (Table 5.4). Coastal hazards include chronic and episodic hazards caused by human-caused actions and natural events that not only threaten coastal communities but also the health and stability of coastal ecosystems (US-IOTWS 2007).

Table 5.3. Major natural hazard as identified by national disaster management plan

Type	Natural hazard
Geological hazard	i) earthquake, ii) tsunami, iii) landslide/land movement, iv) mount eruption
Atmospheric hazard	v) flooding, vi) drought, vii) land erosion, viii) forest fire, ix) extreme wave, x) coastal erosion, and extreme weather (e.g. cyclone, storm)

Source: (BNPB 2010)

Table 5.4. List of potential natural hazards in coastal areas

Coastal Natural hazard		Cause
• Tsunami • Earthquake • Storm • Storm surge • Flooding • Landslide/land movement	Rapid onset	• Natural • Natural • Natural • Natural • Natural and human • Natural
• Chronic pollution • Shoreline erosion • Sea level rise • Climate variability and change • Coastal resource degradation	Slow onset	• Human • Natural and human • Natural and human • Natural and human • Human

Source: US-IOTWS (2007)

The National Disaster Management Plan provides information for each type of hazard on: i) hazard prone areas and ii) historical records of hazard events. That information is considered very limited as there are at least four key features that need to be elaborated and assessed for hazard understanding (Benson, Twigg et al. 2007): 1) location and extent, 2) frequency and probability, 3) intensity and severity, 4) duration and predictability. In regard to coastal flooding or inundation and erosion, the plan does not provide enough information on its threat and prone areas. Better information is given for extreme waves where location, potency, and threat are described. Coastal erosion is only described in association with an extreme wave incident (Table 5.5).

Table 5.5. Coastal natural disasters and their accommodation in the National Disaster Management Plan

Hazard	Information to be Accommodated in Disaster Management Plan as Mandated by the Disaster Management Act					
	Identification and assessment of disaster threat	Vulnerability	Potential impacts	Options for risk reduction	Preparedness and disaster management mechanisms.	Allocation of tasks, authorities, and available resources
Tsunami	- Prone areas are identified in 150 districts within 25 provinces - 110 tsunami events were recorded from 1800-2006	Not available	Not available	a. Mitigation and prevention - Mapping of tsunami prone areas, tsunami risk, and monitoring. - Non structure and structure mitigation. - Research and development.	Not available	Main agency : - Agency for meteorology and climatology - Ministry of energy and mineral resources - Ministry of marine and fisheries - Indonesian Science Agency
				b. Preparedness - Development of contingency plans. - Outreach, training, and trial.		Main agency : - National disaster management agency - Agency for meteorology and climatology - Ministry of energy and mineral resources - Ministry of social affairs
				c. Early warning - Developing tsunami early warning system		Main agency : - Agency for meteorology and climatology
				d. Emergency response - Improvement of emergency response capacity		Main agency : - National disaster management agency
Flooding	- Prone areas are identified in 166 districts within 28 provinces - No separation between coastal and non coastal areas	Not available	Not available	a. Mitigation and prevention - Identification and monitoring of flood risk - Non structure and structure mitigation - Research and development	Not available	Main agency : - Ministry of public works - Agency for meteorology and climatology - Agency for technological assessment and application

Hazard	Information to be Accommodated in Disaster Management Plan as Mandated by the Disaster Management Act					
	Identification and assessment of disaster threat	Vulnerability	Potential impacts	Options for risk reduction	Preparedness and disaster management mechanisms.	Allocation of tasks, authorities, and available resources
						- National survey and mapping agency
				b. Preparedness - Development of contingency plans. - Outreach, training, and trial.		Main agency : - National disaster management agency
				c. Early warning - Developing early warning system for flooding		Main agency : - Ministry of public works
Extreme wave and erosion	- Triggered by tropical cyclone - Prone areas are identified in 15 provinces	Not available	Increasing coastal erosion	a. Mitigation and prevention - Identification and monitoring extreme wave risk - Non structural (non physical) and structural (physical) mitigation. - Research and development	Not available	Main agency : - Ministry of marine and fisheries - Agency for meteorology and climatology - Ministry of public works - National space and aeronautic agency
				b. Preparedness - Outreach and training		Main agency : - National disaster management agency
				c. Early warning - none		

Source:(BNPB 2010)

b. Understanding of Community Vulnerability

Findings in Chapter IV showed that there is inconsistency between the Disaster Management Act definition of vulnerability and how that is regulated the article. According to the act's definition in Article 1, vulnerability has a number of elements (Table 5.6). However, in Article 26, vulnerable people are defined only as elderly, children, disabled people, and women.

Table 5.6.Vulnerability element based on act's definition

Element	Vulnerability factor	Impact
Physical and environmental	- geology - biology - hydrology - climatology - geography	- characteristic and condition at certain location
Non physical	- social - cultural - political - economical - technological	- reduce the capacity to prevent, absorb, achieve preparedness, and reduce the capacity to cope with negative impact of certain hazard

Source: Indonesian Disaster Management Act 24/2007

The disaster management plan uses a number of variables to calculate a physical, a social and economic vulnerability index (Table 5.7). However, the vulnerability index itself is not provided in the document. Therefore, it is difficult to determine how vulnerability is distributed through the country. Further assessment shows that a vulnerability map is in the national risk reduction action plan. In relation to coastal areas, there is no explanation of how the community is vulnerable to existing threats or hazards. Coastal communities are among the poorest population groups in Indonesia and vulnerable to coastal disaster and climate change impacts.

Table 5.7. Vulnerability variables adopted in the disaster management plan

Variable	Sub variable
Physic and environment	- proximity to hazard sources
Social	- population and density - labour force - health - education
Economy	- local GDP - local revenue - economic growth - poverty

Source:(BNPB 2010)

c. Potential Impact Analysis

The national disaster management plan does not provide any analysis of potential impacts of disaster to develop appropriate and potential mitigation options. In relation to coastal hazards, the plan only describes their source, at risk areas, and record of loss from previous events with very little information on potential impacts from the social, economic, and environmental perspective (Table 5.8). That kind of information is missing not only for coastal natural hazards but also other natural hazards. Finding from the content analysis of the Disaster Management Act in Chapter IV also showed that there is no arrangement of detail or mapped at a scale needed to be used in disaster management plans at national, provincial, and local level.

Table 5.8. Coastal natural hazard description in national disaster management plan

Natural hazard	Prone areas	Potential impact
Tsunami	Map shows record of tsunami event from 1800 - 2006	None
Flooding	Northern part of east coast of Sumatra, western part of north coast of Java, West Kalimantan, South Kalimantan, South Sulawesi, and Southern part of Papua	- None - Provide record of previous loss from 2001-2005 that include loss of life, road damage, agriculture loss
Extreme wave and erosion	North coast of Java, Sumatra, West and East Nusa Tenggara, North Sulawesi, Maluku, and Papua	None

Source:(BNPB 2010)

d. Risk Reduction Options

Similar to potential impact analysis, the national disaster management plan does not elaborate on disaster risk reduction options. Information on risk distribution for each natural and man-made hazard is provided in a spatial map. However, there is no explanation of any activities, programs, or actions that could be carried out to reduce risk from each hazard. General risk reduction programs are covered within Chapter V (Program) of the plan, but since every natural hazard has its own characteristic e.g. tsunami is different from drought or erosion, specific risk reduction options are needed. An indication of risk reduction options would provide a sound basis for further development based on local conditions and capacity. Every type of natural hazard needs specific analysis to provide adequate understanding for stakeholders to undertake appropriate actions (Table 5.9). Unfortunately, the existing disaster management plan does not cover that thoroughly.

Table 5.9. Example of disaster risk reduction for a coastal storm case study

Hazard behaviour	Vulnerable element	Potential impact	Policy response
• Seasonal and un predictable in speed and direction of wind • Influenced by global atmospheric level • More severe due to climate change	• Low lying coastal flood plain areas/settlement • High population with inequality in income and access to land • Livelihood that is highly influenced by spatial and temporal constraint e.g. fishing, tourism, subsistence farming • Rural hinterland adjacent to coastal areas	• Immediate impact from wind and wave action • Erosion and saltwater intrusion effect could prolong • Associated heavy rainfall	• General: providing better access to livelihood resources, social protection, governance, spatial planning • Specific: establishment of warning system, construction coastal shelter

Source: Wisner et al. (2004).

e. Preparedness and Disaster Management Mechanisms

The Disaster Management Act defines preparedness as a series of effective, appropriate, and organized efforts to anticipate disaster while disaster management is a series of efforts that include policy formulation, disaster prevention, emergency response, and rehabilitation. Unfortunately, the national disaster management plan does not provide a clear explanation on arrangements and mechanisms for preparedness and disaster management.

Detailed activities for preparedness are described in Article 45 point 2 of the act, that include seven activities: i) formulation and testing of emergency management plans, ii) organizing, deployment, and examination of an early warning system, iii) preparation and supply of basic needs, iv) organization, outreach, training, and simulation of emergency situation, v) preparation of evacuation location, vi) formulation of data, information, and updating of emergency response, vii) supply and preparation of materials and equipment for infrastructure and lifeline recovery. None of those seven activities are described in the plan, in particular the mechanism on how to carry out those seven activities.

f. Allocation of Tasks and Authority

The disaster management agency collaborates with all ministries and agencies to address many activities from prevention, mitigation, emergency response, and rehabilitation. Each line ministry has roles and responsibilities as described by the national disaster management plan (as mentioned at Table 4.5).

Potential problems caused by a lack of disaster management mechanisms are apparent after examining the allocation of tasks and authorities. In reality, it is the sectoral agencies/ministries that undertake real work in risk reduction, through their development programs. Working with all ministries and agencies requires clear mechanisms especially to undertake policy formulation, disaster prevention, emergency response, and rehabilitation in effective, appropriate, and organized efforts to anticipate disaster. In a tsunami disaster for example, the early warning system for tsunami is supported by the Agency for Meteorology and Climatology but for environmental issues e.g. protection of mangroves and coral reefs is handled by the Ministry of Marine Affairs and Fisheries, Ministry of Forestry, and Ministry of Environment (Table 5.11).

Table 5.10. Tasks and partners for the National Disaster Management Agency

Task/activity	Collaboration partner
Emergency response and search and rescue	- National army - Indonesian red cross - National search and rescue
Refugee management	Ministry of social affairs
Disaster prone areas mapping	- National agency for survey and mapping - Line ministry that responsible for certain hazard
Early warning	a. Geological disaster: - Ministry of energy and mineral resource - Agency for meteorology and climatology b. Hydro meteorology disaster: - Ministry of public work - Ministry of forestry - National space and aeronautic agency - Agency for meteorology and climatology c. Supporting research: - Ministry of research and technology - Agency for technological assessment and application - Indonesia Agency for Science - University
Environmental related disaster management	- Ministry of environment - Ministry of marine affairs and fisheries - Agency for meteorology and climatology
Epidemic disease management	- Ministry of health - Ministry of agriculture
Education and awareness	- Ministry of education - Ministry of religion affairs - Mass media
Research	- Related ministry for certain disaster - Ministry of research and technology - Agency for technological assessment and application - Indonesia Agency for Science - University

Source:(BNPB 2010)

These arrangements are identified in the act itself (Chapter IV Institutional Arrangements). However, disaster management plans need to provide more detail to

make the arrangements operational. For example, during a no disaster period, every ministry has responsibility to conduct risk reduction through its routine development program. There is, however, no clear division about which activities should be undertaken by the agency and which ones by the line ministry. Consequently, overlapping and duplication efforts are an inevitable result that potentially creates inefficiencies.

Potential problems have been anticipated, and the national disaster management plan provides an appendix that contains priorities, programs, line ministries, and budgets. Nevertheless, that appendix is still not clear enough to represent the seven elements that have to be addressed by disaster management plans through preparedness and management of disasters. For example, the plan does not provide arrangements as to how each sectoral ministry provides their resources to support emergency response.

5.4.2. Risk Reduction Action Plan

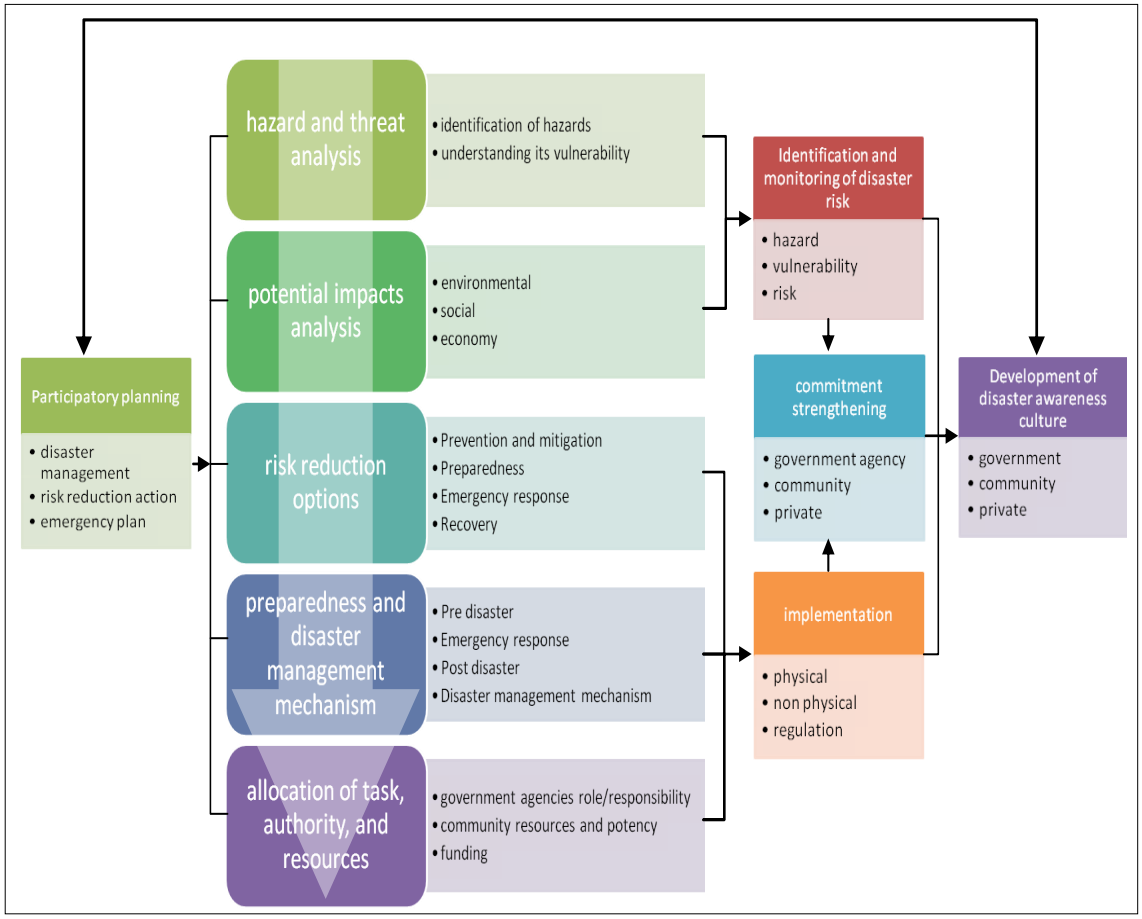
Disaster risk reduction is undertaken within five groups of activities regulated by the Disaster Management Act 24/2007. In addition, the disaster risk reduction action plan has its own structure making it difficult to know if those five main activities are incorporated in the plan (Table 5.12). To be consistent with the Act's arrangement, a compliance analysis was carried out based on Article 37.

Table 5.11. Comparison between risk reduction activities mandated by the act and the structure of the existing risk reduction action plan

Risk reduction activities (Article 37)	Structure of national risk reduction action plan
I. Identification and monitoring of disaster risk II. Participatory planning III. Development of disaster awareness culture IV. Commitment strengthening V. Implementation of physical and non physical measures and regulations	I. Introduction II. Condition of disaster • hazards • vulnerability • capacity • risk III. Basis for risk reduction IV. Lessons learned on risk reduction V. Evaluation on risk reduction action plan 2006-2009: VI. Disaster risk reduction actions • Priority • Approach on prioritization, program, and activity • Risk reduction action plan • Grouping of actions • Risk reduction matrix VII. Implementation VIII. Monitoring and evaluation

Source: act documents analysis

As mentioned previously, the Disaster Management Act does not require formulation of a risk reduction action plan. The risk reduction action plan is regulated under Government Regulation No. 18/2008. Article 18 point 1 of that regulation obliges national and local governments to develop disaster risk reduction action plans. However, there is no explanation about the content of the risk reduction plan. Moreover, there are no guidelines for the development of risk reduction action plans in terms of format and structure. Some elements of the risk reduction action plan are simply a rewriting of elements in the disaster management plan. Logically, risk reduction actions should be a translation of disaster management plans. Both documents also must be strongly interconnected (Figure 5.2).



Source: act document analysis

Figure 5.2. Conceptual interconnection between disaster management plan and risk reduction activity as mandated by Disaster Management Act

Based on the above framework, information from hazard, vulnerability, and risk assessments are monitored and a specific agency is mandated to conduct that monitoring. Implementation through physical and non physical measures is based on

analysis of risk reduction options based on each agency/ministry's mandate. Commitment is required to sustain the program and ensure risk reduction activity funding. Awareness and education campaigns are conducted along with participatory planning approaches for the development and implementation of the plans.

a. Identification and monitoring of disaster risk

The National risk reduction action plan recognises six major hazards in Indonesia based on frequency and level of impacts (Table 5.13). Four other hazards specifically extreme waves, coastal erosion, forest fire, extreme weather and land erosion which are in the National Disaster Management Plan are excluded. If this reflects the priority of issues, then it could be concluded that coastal disasters, particularly chronic ones are not considered in the national risk reduction priority. Unfortunately there is no explanation why the two documents have different natural hazards lists. Moreover, with regard to coastal natural hazards, it is only tsunami that is listed in the action plan. Flooding is listed but from river and rain sources with little information on tidal activity. Extreme waves, coastal erosion, and extreme weather are not incorporated in the action plan.

Table 5.12. Six natural hazards identified by the national risk reduction plan

1. Earthquake 2. Tsunami 3. Landslide/land movement 4. Flooding 5. Mount eruption 6. Drought	Other natural hazards occurring in the disaster management plan but excluded from the risk reduction action plan: ✓ *Extreme wave and coastal erosion* ✓ *Land erosion* ✓ *Extreme weather* ✓ *Forest fire*

Source: (Bappenas 2010)

Important information for identification of and monitoring activities is missing for example,: 1) how to monitor those six hazards, 2) which agency is responsible for monitoring, 3) what type of information is required for monitoring, and 4) dissemination of information to other agencies and the public. Hazard information that needs to be monitored includes location and extent, magnitude and probability, distribution or movement, severity, and duration.

b. Participatory Planning

Participatory planning is guaranteed by the Act as part of community rights. In the risk reduction action plan it is highlighted as a new approach in development of the plan.

Risk reduction is not only a government responsibility but it is also everybody's interest. The risk reduction action plan places community as an active subject in disaster management. However, findings from Chapter IV showed that there is no arrangement for the conduct of public participation or consultation for disaster management planning.

c. Development of Disaster Awareness

Disaster awareness is listed under research, education, and training programs in the risk reduction plan document. However, there is no elaboration on the development of a culture of awareness.

d. Commitment Strengthening

Commitment strengthening is also listed under community participation and capacity improvement. However, there is no specific plan for the development and strengthening of commitment to disaster risk reduction. An action plan for each sector could be considered as a way to secure sectoral commitment. However, commitment should not only be regarded in the sector's funding allocation but also policy, regulation, and priority.

e. Implementation of Physical and Non Physical Measures and Regulation

The national risk reduction action plan provides a complete matrix that shows the risk reduction program for 2010 – 2012 and the risk reduction program for each national agency/ministry. Five major natural hazards are prioritised and will be addressed by seven programs and 33 actions that were originally mandated in the Act (Table 5.14).

These remains room for improvement, in particular for coastal disasters. Taking tsunami as an example, there is no clear and systematic direction for implementation of risk reduction actions. Analysis of the national risk reduction action plan for tsunami is shown in Table 5.15. There are twelve activities out of 33 possible actions that will be undertaken to reduce tsunami risk up to 2012.

Resources are limited, therefore tsunami mitigation actions should be directed to the most vulnerable areas, the most vulnerable communities, and reflect availability and (lack of) capacity to cope with tsunami. What can be seen from Table 5.15 is only a list

of tsunami risk reduction activities by different government agencies, NGOs, and universities. Even the number of activities does not correlate with the risk level for tsunami at each location that is listed in the risk reduction action plan. For example, areas such as Bali, East Java, and North Sulawesi have a higher number of high risk districts for tsunami than West Sumatra but they have less risk reduction activity (Figure 5.3). Similarly, Papua has no high risk district for tsunami but is going to receive a higher number of activities for all other locations except for Nusa Tenggara. West Sumatra and Padang City have most diverse and active program among other locations because of the threat for tsunami subsequent to the Indian Ocean tsunami in 2004. However, it is not necessarily that other locations are less vulnerable to tsunami. These consideration are absent from the plan.

Table 5.13. Seven programs and 33 actions in the national risk reduction action plan

Seven programs	list of 33 actions
1) Regulation and institutional capacity strengthening	1. Coordination of tasks, authority, and resources
2) Disaster management planning	1. Identification and assessment of hazards 2. Conduct disaster risk analysis 3. Identification of disaster risk reduction actions 4. Formulation of planning document and regulation
3) Prevention and mitigation	1. Identification and monitoring of disaster risk 2. Implementation of physical and non physical measures and disaster management regulations 3. Identification and understanding of hazards 4. Controlling of use and management of natural resources that could potentially create disaster 5. Controlling and implementation of spatial plans 6. Environmental management 7. Development regulations and building design 8. Infrastructure development
4) Research, education, and training	1. Development of disaster awareness 2. Monitoring of technology uses that could potentially become disasters 3. Conduct training, outreach, and education
5) Community participation and capacity improvement	1. Improvement of understanding of community vulnerability 2. Planning of community participation in disaster management 3. Commitment strengthening 4. Strengthening community social resistant
6) Early warning	1. Monitoring of disaster symptoms 2. Analysing of disaster symptoms 3. Decision making 4. Information dissemination 5. Action implementation
7) Preparedness	1. Development of mechanism for preparedness and management of disaster 2. Development and test of emergency management plans 3. Organisation and deployment of early warning systems 4. Supplying and preparation of basic needs 5. Organising, outreach, training, and simulation on emergency mechanisms 6. Evacuation location preparation 7. Data and information development and updating of standard procedures for emergency response 8. Preparation and supply of materials for infrastructure and lifelines recovery

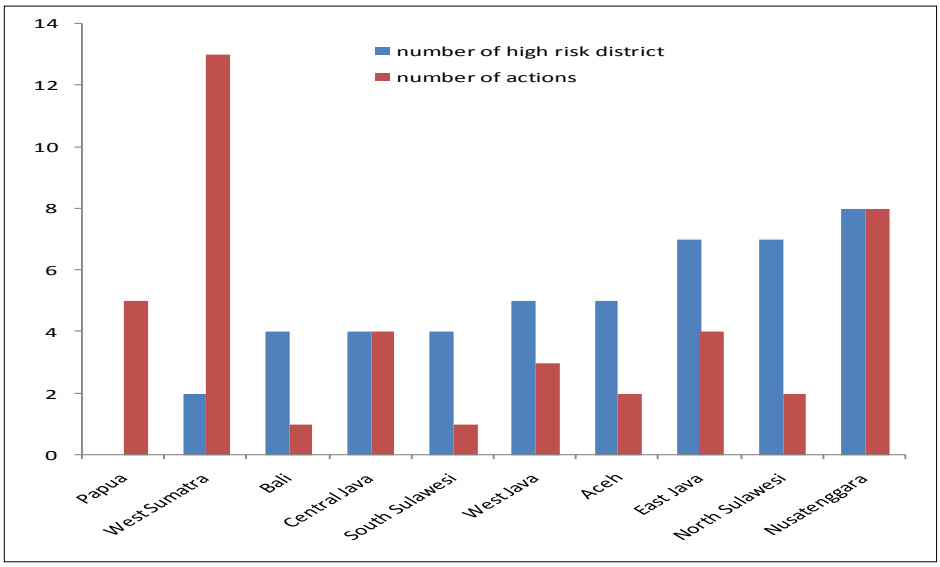
Source: (Bappenas 2010)

Table 5.14. List of tsunami risk reduction activities under the national risk reduction action plan for 2010 – 2012

Activity	Target	location	Implementing agency
1. Planning and legislation	1) Mitigation plan for earthquake and tsunami	30 locations	Ministry of Marine Affairs and Fisheries (MMAF)
	2) Norms, procedures, and standards for coastal disaster mitigation		MMAF
	3) Coastal strategic plan based on coastal disaster mitigation	West Sumatra and East Nusatenggara	MMAF and National Disaster Management Agency (NDMA)
2. Technology monitoring	1) Monitoring of movement and deformation pattern of the earth's crust	West Sumatra, Bengkulu, North Sumatra, and Aceh	Indonesian Science Institute
3. Education, outreach, and training	1) Airport authority preparedness for all natural hazards in particular for airports that are close to coastal areas		Ministry of Transportation
4. Identification and understanding disaster threat	1) Identification and establishment of tsunami inundation maps/areas.	Not specified	Agency for Meteorology, Climatology and Geophysic
	2) Development of a disaster awareness culture	30 locations	MMAF
	3) Mapping of tsunami prone areas.	10 locations (Banten, Central Java, East Java, North Sulawesi, South Sulawesi, Bengkulu, Lampung, Southeast Sulawesi, Bali, West Java)	Ministry of Energy and Mineral Resources
	4) Tsunami risk analysis	5 location (Banten, Central Java, East Java, Lampung, West Sumatra)	
	5) Identification of secondary disasters from tectonic earthquake event	West Papua, Maluku and East nusatenggara	Ministry of Public Works
	6) Indonesian tsunami zones	Indonesian	Bandung Institute of Technology
5. Environmental management	1) Coastal green belt planting for tsunami mitigation	12 locations (West Sumatra, West Nusatenggara, East Java, Central Java, Bengkulu, Yogyakarta, West Java, East Nusatenggara, Southeast Sulawesi, Lampung, Aceh, North Sulawesi, Papua)	MMAF
	2) Coastal vegetation planting	Central Java, East Java, West Java, Banten, and West Nusatenggara	
6. Infrastructure	1) Development of vertical evacuation structure for tsunami event	West Sumatra/Padang city	NDMA, Padang University, Bandung Institute of Technology
	2) Infrastructure for earthquake and tsunami monitoring	10 regional centres	Agency for Meteorology, Climatology and Geophysic
	3) Operation and maintenance of buoy monitoring for tsunami	Indian ocean, Banda Sea, Maluku Sea, and Java Sea.	Agency for Technology Assessment and Application
7. Monitoring of	1) Assessment of local capacity in tsunami warning	Sulawesi, East Nusatenggara, Papua, West Sumatra,	Indonesian Science Institute

Activity	Target	location	Implementing agency
disaster symptoms	chain system	and Bengkulu	
8. Analysis of disaster monitoring result	1) Evaluation of cause and impact of earthquake tsunami	Not specified	Agency for Meteorology, Climatology and Geophysic
	2) Development and deployment of tsunami early warning system	Aceh	Bandung institute of technology
9. Decision and declaration of disaster status	1) Assessment of local capacity in tsunami warning chain system toward national guidelines for tsunami early warning system	Sulawesi, East Nusatenggara, Papua, West Sumatra, and Bengkulu	NDMA, MMAF, Indonesian Science Institute, Ministry of Research and Technology, Agency for Meteorology, Climatology and Geophysic, Ministry of Home/Internal affairs
10. Information dissemination	1) Assessment of local capacity in tsunami warning chain system for socialization of national guidelines for tsunami early warning	Sulawesi, East Nusatenggara, Papua, West Sumatra, and Bengkulu	Indonesian Science Institute
	2) Availability of tsunami evacuation signs	Padang City, West Sumatra	Andalas University
11. Improvement of community vulnerability understanding	1) Tsunami simulation in Padang City for elementary school	Padang City	Andalas University
12. Participatory planning for disaster management	1) Availability of participatory disaster management	All disaster prone areas	NDMA
	2) Establishment of tsunami evacuation trainer group	Padang City	Andalas University

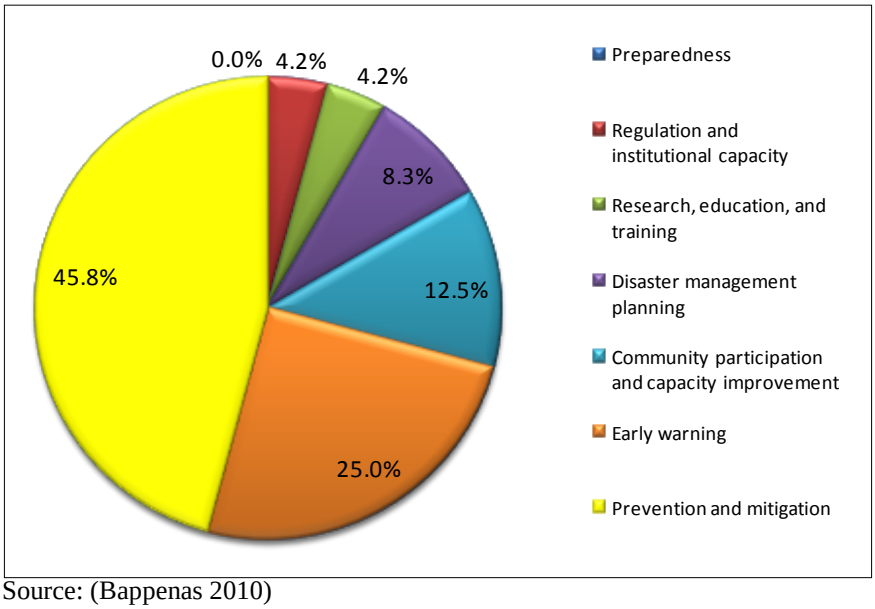
Source: (Bappenas 2010)



Source: (Bappenas 2010)

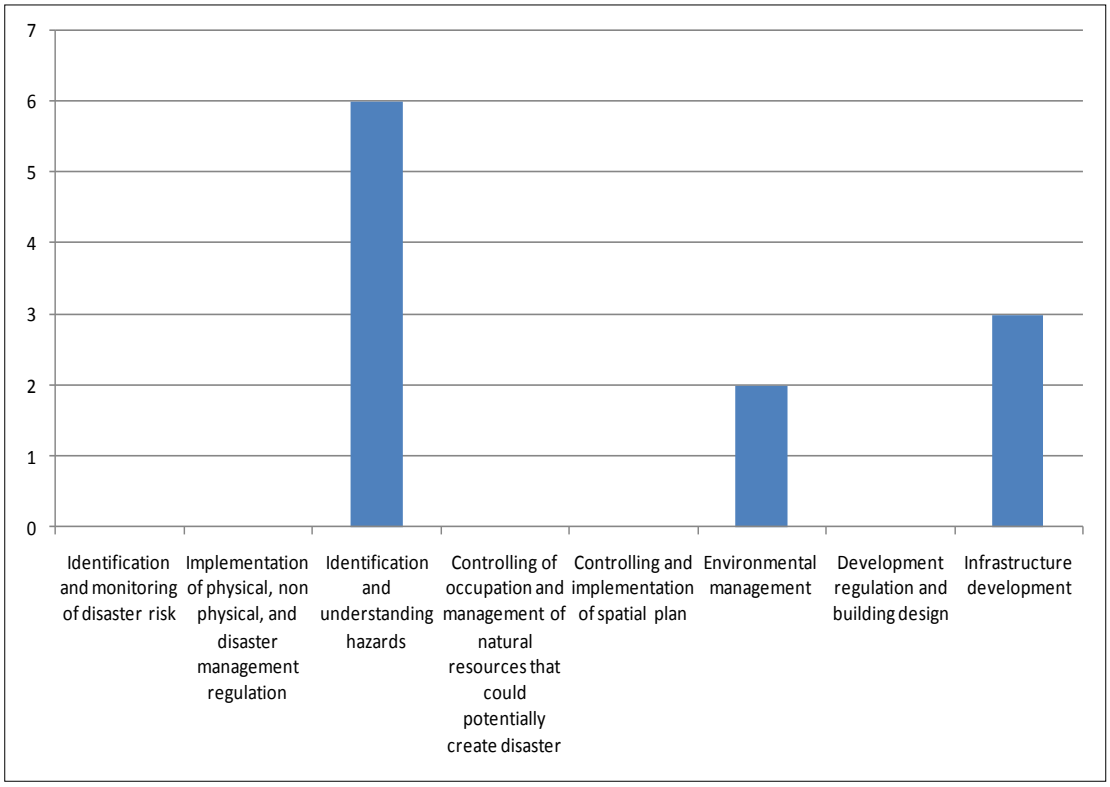
Figure 5.3. Number of high risk districts for tsunami and activities that are programmed

Detailed assessment of the relationship between seven programs and 12 actions for tsunami disasters indicates that 45% is dedicated to prevention and mitigation and less than 5% for regulation and institutional capacity and research, education, and training (Figure 5.4). Prevention and mitigation are covered by three activities (Figure 5.5).



Source: (Bappenas 2010)

Figure 5.4. Break down of seven programs in tsunami risk reduction action plan



Source: (Bappenas 2010)

Figure 5.5. Number and types of tsunami prevention and mitigation program

No further information could be obtained on the risk reduction action plan document to explain those figures or answer critical questions such as why there are only three out of eight activities as mandated by the act that are to be implemented by 2012. There is no identification of tsunami risk and monitoring, controlling and implementation of appropriate spatial plans, nor building codes to be developed and applied.

This section ends the content analysis of the national disaster management plan document and the national risk reduction action plan document. The next sub section discusses and presents findings on the content analysis of the coastal management plan documents.

5.4.3. Coastal Management Strategic Plan

The coastal management strategic plan is one of four planning documents that need to be developed by local governments. As mandated by the Coastal Management Act, the coastal management strategic plan is required to have specific characteristics and

content (Table 5.16). Additionally, the coastal strategic plan is a cross sectoral, long term, and directive document.

Table 5.15. Coastal strategic plan characteristics regulated by the act

Type of document	Content	Mechanism
• Cross sectoral • Policy direction • Applied in certain management area	• Goal • Objective • Strategy • Target • indicator	• Review and revised every 5 years • Public consultation

a. Central Java Province Coastal Strategic Plan

The structure of the Central Java Province Coastal Strategic Plan includes five elements: 1) introduction, 2) formulation process, 3) issues and problems, 4) vision and mission, and 5) analysis. Major content for each element is shown in Table 5.17. The structure does not explicitly assign specific chapters for strategies, targets, and indicators.

Table 5.16. Elements and contents of the Central Java Province Coastal Strategic Plan

Structure/element	Major content
1. Introduction	- background - problem statement - goal and objective - scope of work - legal basis
2. Formulation process	- Phases and steps of document formulation - Formulation process
3. Issues and problems	- Major issues in social, cultural, economic, and environmental
4. Vision and mission	- Vision and mission - Goal and objective
5. Analysis	- Strength, weakness, opportunity, and threat analysis

Source: (DKP-Jateng 2010)

Cross sectoral characteristics of the document are mentioned in the introduction where the coastal strategic plan is considered essential to: 1) integrate sectoral planning, 2) address management overlapping, 3) minimise conflict of interest and authority, and 4) optimise coastal and marine resources. Those four characteristics are translated into goals and objectives that cover institutional, economic, ecological, and social interests (Table 5.18).

Table 5.17. Central Java Province coastal strategic plan goal and objectives

Goals	Objectives
1. Ecological	To achieve sustainability of coastal and small island resources
2. Economic	To improve coastal community prosperity through optimising sustainable coastal resources use
3. Institutional	To improve coordination and integration between government, community, and stakeholders
4. Social	To strengthen community participation and self sufficiency in coastal resources management

Source: (DKP-Jateng 2010)

b. Pekalongan City Coastal Strategic Plan

Similarly, Pekalongan City has developed its coastal strategic plan. The plan has been endorsed and legalised under a City Major decree. The structure of Pekalongan Coastal Strategic Plan is similar to the one in Central Java Province as shown in Table 5.19. However, it follows and accommodates all contents that are mandated by the act.

Table 5.18. Pekalongan coastal strategic plan structure

Structure/content	**Review mechanism**
1. Introduction 2. Conditions of Pekalongan coastal areas 3. Identified issues 4. Strategic plan • Vision and mission • Goal • Management issues, target, indicator, strategy, program, and key implementing agency 5. Implementation 6. Review, monitoring, and evaluation	- Every five years or every new issue is identified - Based on achievement of performance indicators

Source: (Pekalongan-City 2008)

The main strategic plan elements such as vision, mission, goal, target, and indicator are based on an understanding of Pekalongan coastal areas and issues identified that need management interventions. Cross sectoral and policy direction characteristics are clearly mentioned in general and specific objectives of the coastal strategic plan (Table 5.20). Specific objectives provide a more detailed direction to be achieved by all stakeholders. Incorporation of economic, ecological and social cultural objectives reflects the sustainable development elements for coastal management in Pekalongan.

Table 5.19. General and specific objectives of Pekalongan coastal management plan

General objective	Specific objective
a. To provide rationale and direction for utilisation of common resources and addressing existing and future issues b. To link annual program with policy development and existing priority issues c. To encourage government to be more responsible in budget utilisation based on outcomes d. To consider existing issues to be addressed by policy maker and used during community consultation e. To develop partnerships between governments, sectoral agencies, and communities to address priority issues	a. Economic - To improve economic life of coastal community by providing and developing new livelihoods for coastal communities particularly fishermen - To develop fishing business from capture, culture, and processing b. Social and cultural - To improve human resources quality in coastal areas especially in fisheries science and technology - To improve community awareness on coastal resources sustainability c. Ecological - Improvement of fish and non fish resources and mangroves - Developing mangrove conservation areas d. Institutional - Formulating local regulation on community and environmentally based coastal resource management - Developing coastal management institutions in districts, sub districts, and villages - Minimising conflict of authority and resource utilisation - To achieve integrated program and sustainability

Source: (Pekalongan-City 2008)

5.4.4. Coastal Zoning Plan

According to Article 9 of the Coastal Management Act, the zoning plan has to guide the utilization of coastal and small island resources and to be compatible with existing spatial plans.

a. Pekalongan City Coastal Zonation Plan

Pekalongan City has developed a coastal zoning plan which is one of the most advanced in terms of implementation in the Central Java Province, despite the plan not having been legalised by the City Parliament. The objectives of the coastal zoning plan are to: i) allocate coastal areas in accordance to suitable utilization and avoid activities that are not supportive of each other, ii) subdivide coastal areas into zones according to development priority in that area, iii) develop zones and sub zones based on resources, carrying capacity, utilization function, conservation, and defence and safety. The structure of Pekalongan City coastal zoning plan is shown in Table 5.21.

Table 5.20. Content of Pekalongan coastal zoning plan

Structure/content
1. Introduction 2. General overview of Pekalongan coastal areas 3. Zoning plan • Allocated zones: 1) conservation zone, 2) general use zone, 3) specific use zone, and 4) sea lane zone. • Objective of zones • Management guide for zones 4. Review of existing city spatial plan and integration with coastal zoning plan

Source: (DPPK_Pekalongan 2010)

From its structure and goals, the Pekalongan City coastal zoning plan is considered to have followed requirements that are mandated by the Coastal Management Act. Zoning is going to shape and direct all development in Pekalongan City for the next 20 years. Therefore, harmonization with the existing city spatial plan, that has a similar time period, is outlined in the plan.

5.5. Process of Document Development

Having information on the document development process is important from a number of considerations: 1) to know where overlaps in timelines and processes happen and provide potential integration and support, 2) to identify main actors and stakeholders that contribute to document development. Similar timelines, actors and stakeholders provide a strong reason for streamlining the process and efforts.

a. National Disaster Management Plan

The plan is developed by involving key stakeholders at the national level, especially related ministry/agency and non government organizations. The National Disaster Management Agency coordinated all document development processes while integration with national mid term development plans is supported by the National Agency for Development Planning.

Two task groups were established during the document development phase: i) advisory group, and ii) technical group. The advisory group consists of officers from related ministries and agencies supported by experts from universities and practitioners. This

group directs all the analysis processes for hazards, vulnerability, risk, and development of risk reduction programs at the national level. Meanwhile, a technical team consisting of experts from universities worked on hazard, vulnerability, and risk assessments.

b. National Disaster Risk Reduction Action Plan

The national/local Disaster Management Agency has to ensure the development of a disaster risk action plan that is inter-sectoral and inter-regional. In practice, that document is established by a national forum on disaster risk reduction. It is undertaken after the national disaster management plan is established. The same process is also applied at the local level. Six phases have been conducted for the national risk reduction action plan development. These include: 1) data and information collection, 2) focus group discussion to establish outline, 3) drafting, 4) public consultation, 5) final drafting, and 6) legalization.

c. Coastal Management Plan

Development of the coastal management plan is guided by Minister of Marine and Fisheries Decree No. 16/2008 of the Planning on Coastal and Small Island Management. According to that decree, steps for document formulation include all sectors and require a minimum of two public consultations (Table 5.22).

Table 5.21. Steps and phases in development of coastal management plans

Step	Document			
	Strategic plan	Zoning plan	Management plan	Action plan
1. Establishment of working group	✓	✓	✓	✓
2. Survey, data collection, and identification of potency	✗	✓	✗	✓
3. Sector program inventory	✗	✗	✓	✗
4. Formulation of preliminary document	✓	✓	✓	✓
5. Sector collaboration	✗	✗	✓	✗
6. 1st public consultation	✓	✓	✓	✓
7. Pre final document	✓	✓	✗	✗
8. 2nd public consultation	✓	✓	✗	✗
9. Final document	✓	✓	✓	✓
10. Legislation	✓	✓	✓	✓

Source: (MMAF 2008)

The Central Java Province coastal management strategic plan has been developed through several public discussions. Generally, similar steps are followed (Renstra-PWP-Jateng 2009): i) establishment of technical team, ii) public consultation, iii) formulation of conceptual document, revision, agreement, and iv) distribution of document for further input and comment. Similar steps were carried out by Pekalongan City. Initially, five task forces were established to address five major issues: i) integrated planning, ii) coastal defence, iii) coastal pollution, iv) community empowerment, and v) legal and institutional aspects. Issues are gathered from local consultation at the subdistrict level. Public consultation was conducted after the first draft from the task forces. For Pekalongan City coastal zone plan, there is no information about the processes that have been taken to develop the plan.

5.6. Discussion

The Disaster Management Plan has been formulated as required by the Disaster Management Act. The plan still has many problems in particular regarding: i) consistency with the Act's arrangement, ii) compliance with guidelines, iii) coverage of hazard and vulnerability information and iv) consistency with the risk reduction action plan.

In relation to content and substance of coastal hazards, the National Disaster Management Plan also needs many improvements. At least three major drawbacks are identified. First, there is no information on: i) coastal hazard vulnerability, ii) potential problems caused by coastal hazards, and iii) mechanisms for coastal disaster management and preparedness. Second, risk options are very limited and are not based on clear understanding of hazards, vulnerability, and potential impacts. Third, there is no allocation of resources for coastal disaster management despite being essential for certain events that affect infrastructure and lifelines e.g. tsunami. Information on availability of heavy machinery for transportation and excavation for example is essential.

Another important consideration that is missing from the plan is the impact of climate change in coastal areas. There is no information on potential sea level rise influence on frequency and severity of flooding and coastal erosion. This a major flaw since erosion and coastal inundation are major threats from climate change that could result in large

numbers of refugees from low lying coastal areas in particular (IPCC 2007). As many Indonesian cities and densely populated areas are in coastal lowlands, the consequences of coastal inundation and erosion will be intensified in the future. Exacerbated by climate change impacts, those problems will threaten coastal sustainability.

The Central Java Province has many coastal districts that are prone to coastal erosion because of a sediment type that is dominated by sand (BPDAS-PemaliJratun 2006). In particular for Semarang City research shows that tidal inundation/flooding and land subsidence have resulted in significant problems and threats for community and city development into the future (Kobayashi 2004; Wibowo 2006; Anggraini 2007; Marfai and King 2007; Marfai and King 2008).

The National Disaster Management Plan needs to consider climate change impacts as part of disaster management issues. The climate change impact need to be viewed within the development context and integrated within the disaster management policy because climate change, disaster management, and development influence each other (Prasad, Ranghieri et al. 2008). Since this issue is not accommodated in national disaster management plans, there will be no significant mitigation and risk reduction programs. Coastal disasters that are triggered by climate change impacts could be the greatest problem facing Indonesia, especially when coupled with existing community vulnerability, intensive economic and population growth, and coastal habitat degradation. In this regard, coastal management plans could fill the gap by incorporating climate change impacts to plans using the Act's mandate to carry out coastal disaster mitigation. Accommodating climate change impacts into coastal management plans will also address the problem of inability of the Disaster Management Act to accommodate chronic hazards because they define disaster in terms of episodic events such as earthquake, volcanic eruption and tsunami.

Currently, the coastal management plan documents are very limited, and analysis of compliance could not be undertaken thoroughly. The Coastal Management Act provides general arrangements for the coastal management strategic plan. There is more detail and technical arrangements for the coastal zoning plan. Existing coastal strategic plans in Central Java Province and Pekalongan City have followed the structure, content, and characteristics of the document as regulated by the Coastal Management Act. The

strategic plan document also addresses coastal disasters as a major issue for their areas. This is considered very important as accommodation of coastal disaster in national and provincial disaster management plans is limited. For coastal zoning, Pekalongan City has developed a plan and its substance follows the Act's arrangement. Compatibility with the existing city spatial plan is also elaborated. However, the plan has not been legalised by Pekalongan City parliament. As long as the plan is not legalised, it is difficult to implement and enforce its arrangements.

In relation to the document formulation process, both national disaster management plans and risk reduction action plans have been developed through several consultations among government agencies and stakeholders. The National Disaster Management Agency and National Planning and Development Agency have been the lead agencies during the formulation and consultation process. The Ministry of Marine Affairs and Fisheries also participated in the process and provided essential input in particular regarding coastal disaster mitigation. The coastal management plans in Central Java and Pekalongan City were also developed through public consultation and discussion. As development of the coastal management plan has been guided by clear regulation i.e. ministerial decree, more systematic and structured processes were applied than was the case for disaster management plan. It is also clear that development of the coastal management plan required a more complex and longer process than that for the disaster management plan.

5.7. Conclusion

This chapter has examined the extent to which both disaster management and coastal management plans comply with the Acts' mandate and arrangements in particular regarding planning elements and processes. A number of essential elements for coastal disasters are missing from the disaster management and risk reduction action plan. The missing components are a consequence of the problems of the Disaster Management Act itself, and inconsistency between the disaster management plan document and the risk reduction action plan document.

The coastal management plan could, and should, fill the missing elements using coastal disaster mitigation obligations that are mandated by the Coastal Management Act. This

will encourage both coastal managers and disaster managers to consult each other and interact actively during plan development. Additionally, having similar key agencies in developing planning documents provides support for integrating the process.

However, a remaining need is to examine how existing plans identify, prioritise, and allocate actions to address coastal disaster issues in Indonesia. This will identify how existing gaps are not only found in the Act's compliance but also in planning documents' policy and programs. This examination and assessment is presented and discussed in the next chapter.

CHAPTER 6

COMPATIBILITY OF ISSUES, POLICY, AND PROGRAMS OF EXISTING PLANNING DOCUMENTS TO ADDRESS DISASTER RISK

6.1. Introduction

The previous chapter concluded that to effectively reduce coastal disaster risk, arrangements in the Disaster Management and Coastal Management Acts cannot be implemented separately. Moreover, existing disaster management plans and coastal management plans do not fully comply with the Disaster Management and Coastal Management Acts' arrangements and there are opportunities to undertake greater interaction between coastal managers and disaster managers to address coastal disaster issues.

Analysis also showed that there has been a considerable effort to reduce the risk to coastal communities from disasters through development plans, coastal management plans, and disaster management plans both at the national and local levels. Integrated programs taking into account many different plans and government levels are essential since disasters are not only caused by natural hazards but also a combination of social, political, and environmental settings that require comprehensive understanding and efforts (Wisner, Blaiki et al. 2004). However, since both coastal management and disaster management are new and still developing in Indonesia, it will take some time for national and local government to have a comprehensive understanding of the issues and incorporate appropriate policies and programs into their planning documents. In Chapter V it was shown that at a very basic level (i.e. the acts compliance), existing plans are still weak.

Given the increasing importance of planning documents to address coastal disaster risk, it is necessary to the extent to which existing plans are capable of addressing coastal and disaster management issues. Synergy is required in the long term and mid term plans and between national and local programs. A synergised response in the form of development activities will provide resilient lifeline systems, social and economic services, buildings, and environmental services to protect communities from disaster (Godschalk, Beatley et al. 1999).

This chapter examines how existing Indonesian national and local plans accommodate coastal management and disaster management issues in their identified issues, policies, and programs.

6.2. Objective

The objective of this chapter is to evaluate if planning documents correlate and are supportive of each other in addressing coastal disaster problems in Indonesia. Three questions are addressed:

1. What are existing policies and programs in the long term and mid term development plan, disaster management plan, and coastal management plan in relation to coastal management and disaster management at national and local levels?
2. What policies and programs are missing in the above planning documents and how do those documents complement each other to support coastal disaster management?

6.3. Compatibility of Issues and Programs

6.3.1. Long Term Development Plan

Considering its central position and the time frame of the long term development plan, incorporation of coastal disaster issues will provide stronger commitment to long term policy and development.

a. National Level

The national long term development plan (RPJPN) is enacted through Act No. 17/2007 which has a time frame of 2005 – 2025. This document reflects and translates the objectives of the national constitution. It provides guidance for development of national mid term development plans, local long term development plans, and the president's vision and mission. RPJPN identified nine major issues and challenges for Indonesia over the next 20 years (Table 6.1). Based on those nine major issues and challenges, eight national targets have been derived to serve as directive guidance for the next 20 years (Table 6.2).

Table 6.1. Issues and challenges identified by RPJPN

Aspect	Issues/challenge
1. Social and cultural	- High population growth - Human resource development - Health and education levels that are still low
2. Economy	- Coping with sustained impact from the economic crisis of 1997 - Poverty and unemployment reduction
3. Science and technology	- Improvement of research and technology uses for development, energy, food, environmental problem, natural disaster
4. Infrastructure	- Problems in access, quality, and coverage of infrastructure for irrigation, transportation, energy, and information. - Reducing infrastructure damage from unsustainable practices e.g. sedimentation from deforestation
5. Politic	- Potential impacts from a democratic system e.g. social conflict and tension - New relationship framework between national and local government - Improvement of public participation in the political process
6. Security and defence	- Impacts of the repositioning of the national army and police - Improvement in the defence system
7. Law and apparatus	- Impacts of the constitution modification - Good governance
8. Region and spatial plan	- Enforcement of spatial plan - Developments that neglect sustainability, carrying capacity, and hazard prone areas, - Short economic perspective that exploits resources and lead to environmental problems and risks from disaster - Conflict between sectoral agencies at the spatial level - Low access to resources for marginal people and locations - Improvement of outer island that serve as state boundary
9. Environment and natural resources	- Degradation, pollution, unsustainable exploitation and impacts of climate change - Anticipation of food, energy, and water crises - Utilisation of marine resources is still low due to human resources, institutional problems, local capacity, and science and technology uses - Resource use conflict between local governments - Implementation of sustainable development practices

Source: (RPJPN 2007)

Table 6.2. Eight target and directive guidance for RPJPN

Target and directive guidance
1. Moral, ethical, and civil Indonesian community
2. Competitive nation toward more prosperous and welfare community
3. Democratic, just, and lawful Indonesia
4. Safe, peaceful, and unified Indonesia free from internal and external threat
5. Just and equitably distributed development
6. Sustainable Indonesia
7. Self reliant, advanced archipelagic country based on national interest
8. Enhancement of Indonesian role in international forums

Source: (RPJPN 2007)

As indicated in Table 6.1, disaster management is explicitly mentioned in issues number 3, 8, and 9: i) science and technology, ii) regional and spatial plan, and iii) environmental and natural resources. However, another two issues also influence disaster management: 1) social and cultural (high population growth and health status), and 2) economy (poverty reduction). In addition, in term of coastal management issues,

five issues are identified in the document and mainly fall into environmental and natural resource aspects: i) lack of optimised resource use, ii) governance problems, iii) low capacity, iv) technology limitations, and v) development of small islands. Climate change impacts are also highlighted in RPJPN issues under environmental and natural resources.

Natural disaster mitigation is elaborated under target number six to achieve a sustainable Indonesia. Under that target, other directive instructions are also specified that support disaster management (Table 6.3). In relation to coastal disaster mitigation, RPJPN emphasises the development of a disaster mitigation system and an early warning system over the next 20 years. For direction number eight i.e. natural disaster mitigation, further detailed direction includes: 1) development policy that is based on environmental conditions, 2) development of the capacity and application of early warning systems, 3) education and information dissemination on disaster vulnerability, 4) identification and mapping of disaster prone areas, and 5) development of regional planning that is aware of and responsive to natural disasters.

Table 6.3. Direction under target number six to achieve sustainable Indonesia

Longterm direction	Specific development direction
To achieve sustainable Indonesia	1. Optimising renewable resources 2. Management of non renewable resources 3. Securing energy supply 4. Protection and conservation of water resources 5. Development of marine resources potential 6. Improvement of value added tropical natural resources 7. Management of diverse natural resources 8. Natural disaster mitigation 9. Control of pollution and environmental degradation 10. Improvement of natural resources management capacity

Source: (RPJPN 2007)

b. Provincial Level

The Central Java Province has established a long term provincial development plan (RPJPD) for the 25 years (2005 – 2025). The overall goal of RPJPD is to achieve a Central Java that is independent, advanced, prosperous, and sustainable. The structure is different from the national document where specific identification of issues and problems is not undertaken. Instead, issues are implied in the six major targets that have been identified to achieve development objectives.

Disaster management have very limited consideration at the provincial level. Central Java RPJPD only describes disaster management issues briefly in the document's targets (under target number 4, optimum environmental and natural resources management) (Table 6.4) but directions to achieve those targets are not provided. In terms of vulnerability reduction, many targets are supportive of social and economic vulnerability reduction (Table 6.5). Most of those targets are part of development activities that are implemented by sector agencies.

Table 6.4. Six major targets of Central Java RPJPD

Target	Indicator
Optimum environmental and natural resources management	- environmental conservation that is reflected in preservation of environmental functions, carrying capacity, and recovery to support social and economic development - improvement of natural resources quality - improvement of community awareness and attitude in natural resource management and natural disaster impact reduction

Source: (Bappeda-Jateng 2005)

Table 6.5. Vulnerability reduction related program in RPJPD

Target	**Specific program**
Human resource development	- Improvement, equity, and reduction of gaps between areas, ages, and gender and expansion of education service, - Improvement of health status, access, and quality of health services
Economy	- Development of financial services and infrastructure in rural areas to provide financial support for economic activity and poverty reduction - Improvement of agriculture sector efficiency, modernisation and value added to develop rural areas, poverty eradication, and food security - Improvement of community welfare through transmigration program
Poverty reduction	- improving income distribution - community empowerment - expansion of economic opportunities of the low income population
Politic and Governance	- assessment of community needs by community themselves and assisted by government and NGO - improvement of interregional cooperation - improvement of rural community empowerment - policy development that is based on assessment and analysis and supported by data and information
Infrastructure	- Health housing for low income groups - Drainage system and garbage management - Integrated spatial development that considers sustainability and based on spatial plans
Prosperous, safe, peaceful, and united community	- Improvement of community prosperity and life quality - Poverty reduction through community empowerment - Millennium development goal achievement - Women's empowerment to achieve gender equity in law, regulations, and policy

Source: (Bappeda-Jateng 2005)

c. Local Level

1) Pekalongan City

Pekalongan City has developed its long term development plan for 2005 – 2025 with the vision to achieve a Pekalongan City that is advanced, independent, and prosperous. The document was developed based on an understanding of existing issues and problems. Issues and challenges analysis was undertaken by evaluating Pekalongan strengths, weaknesses, opportunities, and threats (Table 6.6). Natural hazards are recognised as a threat and weakness that affect the city's long term development.

Table 6.6. Issues and challenges for Pekalongan City long term development

Elements	Issues/challenges		
	Governance	Social and economy	Environment and natural resources and hazard
Strength and opportunity	- Improvement of public service to stakeholder - Good governance that is supported by professional staff	- More access and opportunity for stakeholders to participate in public service - Human resource development - Development of strong economy based on partnerships between large and small economic actors	
Strength and threat	- Pro public policy development - Development of policy to anticipate environmental degradation and natural disaster - Improvement of government transparency and accountability	- Controlling population growth, provision of basic need, and public service - Development of strong economy to address social welfare problems	- Improvement of community awareness on environmental sustainability and natural resource management to raise awareness and prevent natural disaster
Weakness and opportunity	- Regulation and capacity to improve governance - Objective to achieve good governance	- Economic partnerships to develop community based economy - Improvement of economic conditions to reduce poverty and social welfare problems - Population growth control	- Arrangement and development of areas based on spatial planning to reduce land conversion from productive to un-productive land. - Improvement of environmental sustainability awareness to reduce natural resources exploitation and natural hazard.
Weakness and threat	- Improvement of government performance	- Distribution and expansion of basic services - Development of economic condition to address unemployment, poverty, and social problems	- Improvement of spatial plan and environmental management

Source: Pekalongan planning and development agency (2008)

To achieve the city's long term development vision, five key targets and the related guidance for development have been established. Disaster management is

accommodated in the target of providing infrastructure and integration in areas of management, spatial plans, environment, and natural resources (Table 6.7). Implementation of disaster management aspects are undertaken in each mid term development period (Table 6.8). In relation to coastal disasters, the major issues are: 1) limited areas for conservation, 2) increasing coastal erosion, 3) limited waste water processing, 4) tidal inundation and coastal flooding, and 5) pollution. For coastal management, the long term development plan does not give specific direction for the development of Pekalongan coastal areas. In contrast, the fisheries sector is given greater consideration because of its potential to increase local revenue and welfare.

Table 6.7. Five major target in Pekalongan City long term development plan

Target	Directive development
To provide infrastructure and integration in areas management, spatial plan, environment, and natural resources	- Development of transportation access, fulfilment of community housing, telecommunication, and information management - Land use planning, integrated regional development, Land administration and efficient management - Sustainable development, pollution, and environmental degradation management - Improvement of community awareness, attitudes, and behaviours to manage the environment and natural resources and disaster impact reduction

Source: Pekalongan planning and development agency (2008)

Table 6.8. Disaster risk reduction program in Pekalongan City directed for each midterm development phase

Mid term phase	Direction
2005 - 2009	- reduction of disaster risk through community education and improvement of community institutions.
2010 - 2014	- emphasis on application and development of simple technologies
2015 - 2019	- concentration on pollution and environmental degradation management, - improvement of community awareness, institutional strengthening, and development of disaster mitigation and management system
2020 – 2024	- control environmental pollution and degradation to improve environmental carrying capacity - strengthening the disaster management system

Source: Pekalongan planning and development agency (2008)

2) Semarang City

The vision for Semarang City during 2005 – 2025 is to achieve a Semarang City that is highly capable in trade and services. Four missions were established to achieve that vision: 1) to realise economic growth that is efficient, productive, and equitably distributed, 2) to develop good governance, 3) to improve community development, and 4) to undertake area development and infrastructure in a sustainable way. A number of

issues have been identified where coastal hazards are major problems and manifest in the form of coastal inundation, erosion, accretion, and seawater intrusion (Table 6.9). Coastal management issues generally arise from coastal hazards that create problems in relation to coastal land and environmental degradation, drainage, slum areas, and pollution management.

Table 6.9. Long term development issues identified in Semarang City

Area/Aspect	Issues
City topography	- Balanced development over the three main topographic areas: coastal areas, low lying areas, and hilly areas
Population	- a high population growth - population growth control, improvement of quality, distribution, and provision of infrastructure - poverty reduction
Education	- limited educational service and quality
Health	- professionalism of health workforce, improvement of health infrastructure, development of health behaviour and culture
Economy	- to improve economic growth - reduce vulnerability of economic structures - investment and economic infrastructure are still limited
Governance	- improvement of government performance - development of public service
Science and technology	- application of science and technology to improve public service
Water resource	- over extraction of groundwater that induces land subsidence - limited clean water services - drainage problems, flooding, and tidal inundation management
Spatial plans	- consistent implementation of city spatial plan - utilization and control of allocated zone/space
Environment	- degradation of coastal area caused by erosion, sedimentation, accretion, sea water intrusion, and tidal inundation - land conversion from agriculture to non agriculture - slum areas as a result of coastal areas inundation and degradation - pollution from industrial activities and households - community awareness of environmental management

Source: (Bappeda_Semarang 2009)

Based on the vision, missions, and issues, the document provides direction and guidance implementation within the 25 year period (Table 6.10). Disaster management is accommodated in the mission to achieve sustainable regional and infrastructural development. Flooding and tidal inundation is reflected in environmental issues. The coastal management program is not specifically directed, but includes management of the impacts of coastal hazards. Identified impacts include coastal area degradation caused by erosion, sedimentation, and inundation.

Table 6.10. Direction for Semarang City long term development plan 2005 – 2025

Mission	Directive program
1. Economic growth that is efficient, productive, and equitably distributed	- Developing city economic structure, distributing economic activity - Improvement of labour quality, investment, and economic infrastructure
2. Good governance	- Improvement of public service, quality of bureaucracy, human resources - Provision of law and regulations and enforcement - Improvement of public rights, awareness and participation
3. Sustainable regional and infrastructural development	- To achieve effective spatial plans - Natural resources management and clean water supply - Housing, sanitation, and waste management - Drainage management to address flooding and tidal inundation - Development of effective and efficient road network
4. Development of high quality human resources	- Improvement of community health - Development of city tourism sites, coastal tourism, cultural and historical, and infrastructure - Equitable distribution of education services - Prevention, management, and reduction of social problems by empowering the community, poor groups, children, and women - Strengthening community institutions and participation in development

Source: (Bappeda_Semarang 2009)

d. Plan Compatibility

Translation of disaster management and coastal management issues and programs from RPJPN into provincial and local RPJPD is weak and is very clear in the case of the Central Java Province plan. Disaster issues are not addressed in specific policies and programs even though awareness of disaster risk will be strengthened. Detailed elaboration is, however, accommodated by Pekalongan and Semarang City, with specific coastal natural hazards identified as going to be addressed. Complete analysis is shown in Table 6.11. Similarly, coastal management issues are not clearly elaborated in provincial and local level long term plans. Even though RPJPN provides strong policies and programs, its translation in to provincial and local plans is very limited. Fisheries are the only issue that is addressed by both planning levels. Climate change issues are even more neglected as there is no specific elaboration in provincial and local long term plans.

6.3.2. Mid term Development Plan

As long term development plans provide a 20 year time frame direction for national and local development, the implementation is divided in to five year periods. That five year period is accommodated in mid term development plans and generally also accommodates changes in political leaders (president, governor, and major/regent) because elections take place every five years.

Table 6.11. Compatibility of disaster management and coastal management issues and policy/programs in national, provincial, and local long term development plans

	National		Provincial		Local	
Area/element	**Issue**	**Policy/program**	**Issue**	**Policy/program**	**Issue**	**Policy/program**
Disaster management	- Technology support - Recognition of hazard prone areas - Resources exploitation - Climate change impact	- Achieving an Indonesia that is safe and peaceful - Improvement of technology for disaster management	Reduction of natural disaster impacts	- No specific policy and program - To achieve awareness about disaster risk reduction	Pekalongan City: - Anticipation of environmental degradation and natural disasters Semarang City: - Flooding from river, rain, and drainage problems	1) Pekalongan City: - Improvement of awareness, attitudes, and behaviour about disaster impact reduction - disaster risk reduction through education, community institutions, application of technology, and disaster management system 2) Semarang City - Management of drainage to anticipate flooding and tidal inundation
Coastal management	- Limited marine and coastal resource uses - Human resource and institutional problems - Local capacity and science and technology development	Achieving an archipelagic country that is strong, self reliant, and advanced: - Infrastructure development of Indonesian islands - Marine science technology development - Marine resources based economic development	Limited to fisheries resources management	- Improvement of fisheries production and fishers social and economic life - Rehabilitation of fisheries habitat	1) Pekalongan City: - Focused on fisheries development 2) Semarang City: - Degradation of coastal areas - Slum areas caused by coastal erosion, accretion, and flooding	1) Pekalongan City: - Strengthening fisheries development - Empowerment of fishers communities 2) Semarang City - Addressing impact from coastal erosion and flooding
Coastal disaster	- Not specific but incorporated in natural disaster and implied in climate change impacts	- Reducing coastal disaster impacts and marine pollution - Development of disaster mitigation and early warning system for coastal areas	None	None	1) Pekalongan City: - Conservation - Coastal erosion and flooding - Pollution 2) Semarang City: - Erosion - Accretion - Tidal flooding	Implied in disaster management policies/programs

Source: planning documents analysis

a. National Level

The national midterm development plan (RPJMN) provides more detailed issues and challenges for Indonesia over the next five years (2009 – 2014) (Table 6.12). Most of these challenges relate to economic perspectives. In relation to disaster management, a number of considerations are accommodated by the plan to reduce disaster risk: 1) economic development should not jeopardise the environment since environmental degradation will lead to health problems, food scarcity, water and sanitation issues, and exacerbate climate change impacts, 2) natural hazards are considered potentially to be severe in future due to climate change, and 3) social and economic vulnerability of the poor, those with limited economic capacity, the marginalised, and isolated communities are acknowledged and addressed in the plan.

Table 6.12. Issues and challenges identified in RPJMN

Aspect	Issues/challenge
Economy	- Maintain and increase economic growth - Inclusive growth that will reduce poverty, strengthening marginalised groups, increase household resilience from shock - Provide capacity and equal access to the economy
Inter-regional concerns	- More dispersed economic development - Reduce inter-regional gaps in the economy and development
Human resources	- Labour skills, competence, and ability - Increasing job opportunities through economic development
Environmental concerns	- Balance between economic growth and environmental conservation - Climate change will increase challenges and problems in particular to natural hazard and food security
Infrastructure development	- Support agriculture revitalization for food supply - Reduce sanitation and pollution problems - Provide access of isolated people to economic activities and basic facilities
Science and technology	- Improving science and technology capability
Bureaucracy	- Improvement of bureaucratic functions
Democracy	- National consolidation to improve implementation of democracy - Improvement of decentralization processes - Improvement of local government capacity
Legal efficacy	- Law enforcement

Source: Source:(RPJMN 2010)

Moreover, support to disaster management is also strong in the mid term development plan where it is set as a priority to be implemented over the next five years. Under environmental and natural disaster priorities, the national government commits to implement four major programs: 1) increasing management capacity of peat land and forest to mitigate climate change, 2) controlling environmental degradation, 3) establishment of early warning system for natural hazards, and 4) improvement capacity

to overcome disaster. Additionally, other priorities are interrelated with disaster management in particular to reduce social vulnerability (Table 6.13).

Table 6.13. Midterm Development Plan's priority and support to vulnerability reduction

Priority	Specific program	Vulnerability reduction
Education	- Increasing access to education for the enhancement of welfare of the people, - Education program is directed to achieve economic growth, availability of skilled manpower and competence	Positive
Health	- increasing community and environmental health - expanding availability of clean water, reducing slum areas - increase of a life expectancy and achieving Millennium Development Goals (MDGs) targets in 2015 - National Health Insurance for all poor communities	Positive but need appropriate implementation in terms of location and target the groups most exposed to risk and disaster
Poverty reduction	- improving income distribution - community empowerment - expansion of economic opportunities of the low income population	Positive and specifically targeted to vulnerable group i.e. poor and those with low capacity
Food security	- increase food security - revitalization of agriculture toward food self-reliance - increasing the income level of farmers - conserving the environment and natural resources	Positive but fish as major source of protein for coastal community needs more attention in food security program
Infrastructure	- integrated spatial planning - flood control development	Positive but protective structures only constructed for flooding

Source:(RPJMN 2010)

The midterm development plan also accommodates marine and coastal area development. It provides general guidance for achieving integrated regional development between land and sea development which is what ICM is all about. The document also recognises that marine and coastal area development requires understanding of many aspects. That is why it is clearly stated in the document that:

> The development of sea regions is implemented through an integrated regional approach by taking into account aspects of geology, oceanography, biology or biodiversity, habitats, and potency of mineral and energy, fisheries, marine tourism, maritime industry, transportation, and technology (RPJMN 2010- p. 70).

b. Provincial Level

The Central Java Province mid term development plan is established for the period 2008 – 2013. The vision is for a Central Java community that is more prosperous. Similar to the long term plan, there is no specific chapter or part that describes issues and problems. Problems are implied in eight objectives and targets which have been set to realise the vision (Table 6.14). Natural resource management is clearly targeted to

reduce disaster risk that is supported by science and technology input. Accommodation of disaster risk reduction is addressed from the beginning because the mid term development plan is based on a number of national and provincial regulations and documents of which the Central Java Disaster Risk Reduction Plan 2008 is one.

Table 6.14. Eight objectives and target to be achieved from 2008 – 2013 in Central Java

	Objective
1.	To improve human resource quality in all aspects
2.	To achieve empowered and competitive community for a self independency
3.	To optimise natural resources based on Central Java spatial plan, research, science, and applied technology to reduce disaster risk and to achieve prosperity
4.	To utilise local economic potential through local, regional, and inter-regional cooperation
5.	To develop local economic business networks
6.	To improve capacity, competency, and professionalism of government apparatus
7.	To improve democracy and human rights
8.	To strengthen government administration through information, communication, and technology

Source: (Bappeda-Jateng 2008)

This plan is an adaptation of provincial long term development plans. Programs are developed in four major areas based on provincial authority that is regulated under Government Regulation No. 38/2007 on Division of Government Affairs between national, provincial, and local governments. Those four programs are: 1) mandatory programs, 2) optional programs, 3) decentralisation, and 4) general government tasks.

For mandatory programs, there are 26 areas that belong to provincial authority where eight programs explicitly describe and or relate to disaster management and coastal management issues (Table 6.15). Meanwhile, another 18 areas are indirectly related to risk reduction. As it can be seen, many related disaster management programs are dispersed across different sectors without specifically directed priorities or targets. Addressing issues through day to day development programs across all sectors is considered more systematic and better structured to provide strong programs for disaster and coastal management.

Table 6.15. Disaster and coastal management issues in eight programs of the mid term development plan of the Central Java Province

	Issue	Policy	Program	Specific target
Public work	• Infrastructure for flooding and coastal protection is not optimal • Infrastructure for north coast and south coast is still limited	• Improvement of flooding infrastructure and coastal protection to protect strategic areas, production centres, and housing • Reduction of infrastructure gaps	• Flood control and coastal protection • Urban and rural infrastructure improvement • Improvement of infrastructure in disaster prone areas to support disaster management activity	Coastal protection along 47 km to reduce coastal critical areas to erosion from 157 km to 110 km
Development planning	• Cooperation and synergy of interregional development • Infrastructure and natural resources development planning • Coordination and planning for disaster prone areas	• Improvement of cooperation and synergy between districts and cities • Optimise planning for natural resources development and hazard prone areas	• Enhancing development cooperation • Development planning for infrastructure and natural resources and hazard prone areas	• Establishment of cooperation forum for districts and cities • Availability of planning document for infrastructure and natural resources and hazard prone areas
Transportation	• Technology, information, communication, meteorology, and search and rescue for disaster management	• Improvement of search and rescue operation	• Development of search and rescue program	• Capacity improvement for search and rescue, • disaster management information system • technology input for search and rescue and disaster management
Environmental management	• environmental degradation • low awareness and law enforcement • carrying capacity of environment has been exceeded	• mainstreaming sustainable development principles • controlling, monitoring, and law enforcement for pollution	• controlling pollution and environmental degradation • rehabilitation and restocking of natural resources • improvement on local wisdom, community, and apparatus in disaster prevention and environmental preservation	• implementation of pollution control • improvement of law implementation • availability of data and information on natural resources, hazard prone areas, and environmental quality
Marine and fisheries	• low capacity in human resources, coastal communities and coastal resources management • law enforcement and monitoring is weak • reduction in capture fisheries due to destructive fishing gear, and degradation of vital fish habitat, • acceptable aquaculture practices still lacking • coastal habitat degradation caused by pollution, human, and natural hazards	• improvement of human resources and community institutions • improvement of monitoring and community roles • campaign on sustainable fishing gear • rehabilitation of coastal habitats through physical and vegetation approaches • environmental awareness campaign	• coastal community empowerment • coastal community participation in controlling and surveillance of marine and coastal resources • development of capture and aqua culture fisheries • rehabilitation and conservation of marine and coastal habitats	• improvement of coastal economic activities • activation of community monitoring and surveillance groups • increase in capture fishing and aquaculture • improvement of coastal habitat quality through mangrove plantations, coral reef rehabilitation, and fish re-stocking in conservation areas
Housing	• housing not appropriate for living both in urban and rural areas • low understanding, awareness, and participation in development, management, improvement of housing	• provision of housing for rural areas • empowerment of community organisation	• Understanding of community on healthy and hazard-safe housing • Improvement of capacity and capability of community in d disaster preparedness	• Improvement of housing quality • Improvement of community understanding of risk reduction
Social	• High number of people that have social problems • Implementation of disaster management in pre, during, and post disaster is not optimal due to lack of capacity, infrastructure, and efforts on prevention and preparedness	• Improve management of social problems • Improve quality of disaster management that is planned, coordinated, and integrated	• Social welfare services and rehabilitation • Empowerment of social welfare institutions • Disaster management implementation	• Reduce the number of groups with social problems • Improve capacity of social welfare institutions • Improve capacity on prevention, preparedness, and risk reduction from disaster • Improvement of rescue and evacuation of disaster victims, refugee management, rehabilitation and reconstruction, and logistics supply
Energy and mineral resources	• Ground water management • Negative impacts of mining activities for environment • High potential for geological hazards • Awareness of hazard mitigation is still low	• Water conservation • Application of good mining practices • Improvement of information availability of geological hazard prone areas and development of mitigation system	• Improvement of human resources • Development of ground water management • Development of natural and geological hazard mitigation • Identification of geological hazard prone areas	• Rehabilitation and conservation of groundwater • Availability of maps for landslides and tsunamis • Relocation of housing affected by landslides • Geological information for 15 district/city • Warning system and education on geological disaster

Source:(Bappeda-Jateng 2008)

c. Local Level

1) Pekalongan City

Pekalongan City mid term development plan for 2005 – 2010 has a vision to achieve a religious community that based on trade, industry, and tourism, and is unified, harmonious, law abiding, healthy, safe, just, and prosperous. To reach that vision nine development priorities, which also serve as issues that need to be addressed, have been established (Table 6.16).

Table 6.16. Priority for 2005 – 2010 mid term development in Pekalongan City

Priority	Direction
1. General public services	- Improvement of community participation in development, intercity cooperation, - Increase city revenue
2. Order and peace	- Improvement of law and regulation compliance, community awareness, coordination, and human rights issues
3. Economy	a. Economy, trade, and industry: simplification of business permits, improvement of information and infrastructure and business climate, development of small and micro enterprises. b. Marine and fisheries: development of businesses in marine and fisheries sector, improve human resources quality, investment, and access to financial schemes.
4. Environment	- Pollution and environmental degradation management, improvement of regulation and institutional coordination, and awareness campaigns
5. Housing and public facility	- Maintaining available services of irrigation, road, bridge, canals, transportation, housing, and city utilities for community social and economic activity
6. Health	- Empowerment of community capacity in health, improvement of extent and quality of health service, and research and development on health issues.
7. Tourism and culture	- Integrated development of tourism sites/destinations, improvement of cooperation between tourism actors, community participation, and tourism information.
8. Education and religion	- Improvement of education, religious, and sporting activities, facilities, and infrastructure.
9. Social protection	- Improvement of access to social services, women roles and health, and management of social problems.

Source: (Bappeda_Pekalongan 2005)

There is no particular elaboration of disaster management in those nine priorities. Related activities are allocated in order and peace, and social issues (Table 6.17). The greatest focus is emergency response and post disaster activities such as social rehabilitation, recovery, and emergency activities. There is no direction for disaster risk reduction activities. Similarly, coastal management issues are not highlighted in the document, and only fisheries development is addressed. Coastal greening and cleanup

programs are part of mid term programs but there is no specific effort to address existing problems in coastal flooding and inundation as mentioned in the Pekalongan long term development plan.

Table 6.17. Accommodation of disaster management and coastal management in Pekalongan City mid term development plan

Priority		Program
1. Disaster management	Order and peace	- Facilitation of disaster management task force - Monitoring of conflict and disaster prone areas
	Social protection	- Management of disaster evacuation and aid post/sites - Provision of basic need for disaster victims
2. Coastal management	Economy sub priority marine and fisheries	- Application of marine and fisheries technology - Pekalongan river dredging - Promotion for investment in marine and fisheries - Beach clean up - Coastal vegetation planting - Coastal community housing arrangement

Source: (Bappeda_Pekalongan 2005)

2) Semarang City

Semarang City has established a mid term development plan for 2005 – 2010. Similar to Pekalongan, the new mid term plan for 2010 – 2015 has been under preparation during the field work and is not yet available for analysis. The vision is to develop Semarang as a metropolitan city that is religious and based on trade and services. To implement that vision, six major development sectors or areas are prioritised for 2005 – 2010 (Table 6.18). Coastal hazards, in particular coastal inundation and flooding, are accommodated in priority number five under environmental management issues. Coastal management is also given as priority, especially to rehabilitate degraded coastal areas due to erosion and pollution.

Those priorities are incorporated into sector development programs that cover all the six missions mentioned. Disaster management is accommodated in two programs. The first program is to strengthen political, social, and cultural aspects to improve disaster management practices and capacity that are still weak and which need to be addressed during the five year period. The second program is in environmental and natural resource management and pays attention to natural hazards, specifically coastal inundation and flooding. Coastal management, however, is not specifically addressed by the document. Coastal management issues that are already identified such as coastal hazards, pollution, and environmental degradation are not appropriately reflected in

indicative programs. Directions for development of Semarang coastal areas, currently dominated by industry, shipping port, power plant, and housing, are not provided.

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Table 6.18. Six priorities to be developed in Semarang City for 2005 - 2010

Priority/Major issue		Direction
1.	Strengthening community economy	- Strengthening local institutions, rollover funding, and development of supporting infrastructure
2.	Public service	- Empowerment of staff and realization of effective governance that is supported by appropriate infrastructure
3.	City infrastructure	- Improvement of quality and capacity of city infrastructure and development of city perimeter - Improvement of investment and supporting local economic activity
4.	Human resources	- Expansion and equal access to education and health in particular for poor communities
5.	Environmental management	- Ensuring sustainability of development - Management of coastal inundation and flooding - Rehabilitation of degraded coastal areas and critical land and pollution management
6.	Culture	- Inclusion of local culture in school curriculum - Improvement of traditional art and culture - Conservation of historical buildings and sites

Source:(RPJMD-Semarang 2005)

d. Plan Compatibility

1) National Plan

The national mid term development plan (RPJMN) generally identifies more detailed issues and challenges taking directions from long term development plans (Table 6.19). From that table it is clear that both national long term and mid term development plans strongly support natural hazard management, coastal management, and integrated approaches to implementation of national development.

However, a number of inconsistencies persist. For example, RPJPN has explicitly prioritised early warning and mitigation system for coastal hazards, but in the mid term plan those programs are not addressed. Additionally, climate change issues, and adaptation in particular, are not given sufficient attention and only addressed in mitigation aspects of the forestry sector. Finally there is no systematic approach and timeframe to achieving priorities in RPJPN by the mid term development plan.

Table 6.19. Compatibility of disaster management and coastal management issues, programs, and priorities in national long term and mid term development plans

	Disaster Management		Coastal Management		Integrated development	
Area/Element	**Issue**	**Program/priority**	**Issue**	**Program/priority**	**Issue**	**Program/priority**
Long term plan (RPJPN)	- Existing development often neglects natural hazard prone areas - Unsustainable resources exploitation that will lead to environmental problems and risk from disaster - Improvement of research and technology uses for development, energy, food, environmental problem, natural disaster	1) environmentally based policy, 2) development capacity and application of early warning, 3) education and information dissemination on disaster vulnerability 4) identification and mapping of disaster prone areas, 5) regional planning that is aware and responsive to natural disaster	- Degradation, pollution, and unsustainable exploitation and impact of climate change - Utilisation of marine resources is still low due to human resources, institutional problems, local capacity, and science and technology use	1) Multi-sector, integrated, and comprehensive utilisation 2) minimising conflict, 3) maintain sustainability, 4) integrated policy between land and marine sectors, 5) integrated with national development strategy 6) develop disaster mitigation system and early warning system for next 20 years	- Conflict between sectoral agencies in space utilisation - Resource uses conflict between local governments - Implementation of sustainable development practices	- regional planning that is aware and responsive to natural disaster - integrated policy between land and marine sectors - integrated with national development strategy
Mid term plan (RPJMN)	- Climate change will increase challenges and problems in regard to natural hazard and food security	1) increasing management capacity of peat lands and forests to mitigate climate 2) change, establishment of early warning system for natural hazards, and improvement of capacity to overcome disaster	- Balance between economic growth and environmental conservation	1) maintain and conserve marine environment and its law enforcement, 2) pollution control from industry and households, 3) watershed management, 4) aquaculture development 5) minimising risk from pollution and habitat degradation	- Reduce inter-regional gaps in economy and development	integrated regional development between land and sea development

Source: planning document analysis

2) Provincial Plan

At the provincial level, the mid term development plan provides better elaboration of disaster management than the long term development plan (Table 6.20). Coastal disasters, in particular flooding and erosion, are also prioritised at the provincial level. Attention is still focused on rapid onset events, in particular geological and volcanic hazards. However, understanding of weaknesses in disaster management at pre, during, and post event gives legitimate reasons for the development of the Central Java disaster management plan (still in preparation at the time of this research).

Similarly, for coastal management issues, the mid term development plan provides better and more complete elaboration than in the long term development plan. The long term plan only prioritises fisheries development, while the mid term plan also tries to address issues of pollution, habitat degradation, conservation, and even coastal natural hazards. Awareness of coastal hazards impacts that potentially degrade coastal resources and development support for coastal disaster management in Central Java Province.

3) Local Plan

Compatibility between the long term and mid term development plans at the local level is presented in Table 6.21. Pekalongan disaster management is limited in the mid term development plan. There is no program to address disaster management issues and priorities that are elaborated in the long term development plan which are to develop community attitude, behaviour and awareness of disasters and improve community education and information on disaster risk. For coastal management, even though the long term development plan only specifies fisheries development, programs on coastal rehabilitation and pollution management are also accommodated.

Table 6.20. Compatibility of disaster management and coastal management issues, programs, and priorities in the Central Java long term and mid term development plans

	Disaster management		Coastal management		Remark
Document	**Issue**	**Program/priority**	**Issue**	**Program/priority**	
Provincial Long term plan (RPJPD)	Reduction of natural disaster impact	- No specific policy and program - To achieve awareness about disaster risk reduction	- Limited to fisheries resources management	- Improvement of fisheries production and fishers social and economic life - Rehabilitation of fisheries habitat	Even though the long term development plan does not provide direction for disaster management, the mid term development plan could develop a number of programs to address disaster management issues.
Provincial Mid term plan (RPJMD)	- Infrastructure for flooding and coastal protection - Coordination and development planning for disaster prone areas - search and rescue - disaster management in pre, during, and post disaster is not optimal - Awareness of hazard mitigation is still low	- Coastal protection to reduce erosion - Development planning for infrastructure and natural resources and hazard prone areas - Development of search and rescue programs - improvement of local wisdom, community, and apparatus in disaster prevention - Development of natural and geological hazard mitigation - Identification of geological hazard prone areas	• low capacity in coastal resources management • law enforcement and monitoring is weak • destructive fishing gear and degradation of vital fishing habitat • appropriate aquaculture practice still lacking • coastal habitat degradation caused by pollution, human, and natural hazards • low awareness in protecting and conserving coastal ecosystems	• coastal community empowerment and participation in controlling and surveillance of marine and coastal resources • development of aquaculture and capture fisheries • rehabilitation and conservation of marine and coastal habitats	Coastal management issues are more detailed in the mid term development plan with specific guidance from the long term development priorities/programs

Source: planning document analysis

Table 6.21. Compatibility of long term and mid term development plan for Pekalongan and Semarang City for disaster and coastal management

	Issue/priority		Program/directive	
	Long term plan	Mid term plan	Long term plan	Mid term plan
1. Disaster Management a. Pekalongan	spatial plan, environment, and natural resources management	specific issues not addressed	- Improvement of community awareness, attitude, and behaviour to manage environment and natural resources and impact reduction - reduction of disaster risk through community education and institutions	- Facilitation of disaster management task force - Monitoring of conflict and disaster prone areas - Management of disaster evacuation and aid post/sites - Provision of basic needs for disaster victims
b. Semarang	degradation of coastal areas caused by erosion, sedimentation, accretion, sea water intrusion, and inundation	Management of coastal inundation and flooding	Drainage management to address flooding and tidal inundation	To improve management practices and capacity to address coastal inundation
2. Coastal Management a. Pekalongan	Fisheries development	development of businesses in marine and fisheries sector	- Strengthening and empowering coastal communities and fisheries activities	- Application of marine and fisheries technology - Coastal habitat rehabilitation and pollution and sanitation management
b. Semarang	Coastal degradation from inundation and flooding		Addressing impact from coastal erosion and flooding	- Rehabilitation of degraded coastal areas and critical lands - Pollution management

Source: data analysis

For Semarang City, specific hazards are prioritised such as coastal flooding or inundation. Both disaster management and coastal management programs accommodate coastal flooding in their priorities. Disaster management focuses on measures to abate flooding such as drainage systems, and coastal management is to address rehabilitation of coastal habitats degraded by inundation and erosion.

6.3.3. Disaster management Plan

a. National Level

The national disaster management plan identified a number of issues and problems that vary from institutional arrangements to scientific and technological concerns (Table 6.22). Within governance issues, major problems are coordination, integration, and awareness of disaster risk reduction. Most sectoral agencies still see disaster

management as a separate and unrelated program from their sectoral development. New paradigms that place prevention and mitigation as the main agenda need to be educated among all stakeholders and government levels.

Table 6.22. Major issues in disaster management

Issues	Main causes or impacts
Performance of disaster management is not optimal	- all stakeholders are not yet ready to anticipate disaster events - many losses and casualties - coordination and collaboration problems
Disaster recovery is not optimal	- different information of casualties, damage, and losses - difficulty in allocating medical forces, aid, and reconstruction program funding
Institutional problems	- existing organisations are still focusing on emergency response and not yet oriented to prevention and risk reduction - awareness of risk reduction through development programs is limited - risk reduction actions that are planned and programmed is limited
Participation	- government and non-government organisations are still the main actors in disaster events - participation from community groups is limited or lacking - development of community groups in essential
Science and technology	- science and technology use for risk reduction is still limited.
Planning	- comprehensive disaster management plan is lacking - different agencies produce different plans/guidelines
Minority and marginality issue	- gender, poor group, and marginal communities are still overlooked

Source: (BNPB 2010)

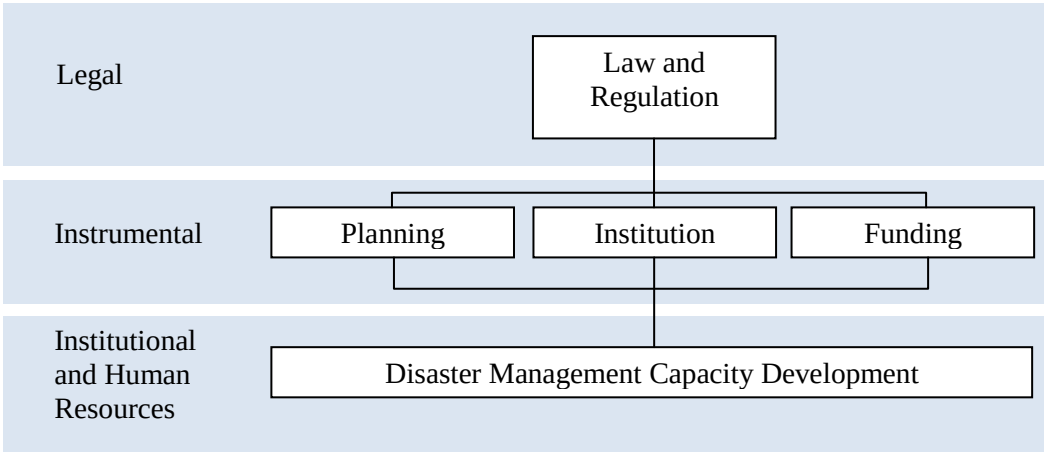
Based on the above issues and challenges identified, the national disaster management plan sets eight strategies (Table 6.23). In line with those eight strategies, the national disaster management plan establishes a disaster management system with five main components currently under development in Indonesia (Figure 6.1). That system has been developed to anticipate and address disaster management issues and guide strategies implementation.

Seven programs are set to implement those pillars and strategies that include: 1) strengthening of legislation and institutional capacity, 2) integrated disaster management plans, 3) research, education, and training, 4) improvement of community and stakeholder participation and capacity in risk reduction, 5) prevention and mitigation, 6) early warning, and 7) preparedness. Additionally, two programs are also developed during and post disaster events: 1) emergency response, and 2) rehabilitation and reconstruction. Those nine programs are the main component of the Indonesian national disaster management plan to be implemented from 2010 – 2014.

Table 6.23. Eight strategies in Indonesian national disaster management

Strategy	Identified target
1. Strengthening disaster management regulation frameworks	- formulation of regulation and standard of procedures - formulation of disaster management plans from national to local level - improvement of disaster management agency capacity - enhancement of collaboration and coordination between agencies, governments, and stakeholders
2. Integration of risk reduction program into development plans	- integration into mid term development plans, government work plans, strategic plans and work plans of sectors at national and local level - risk reduction programs would be part of regular development activities and not a stand alone program
3. University empowerment	- university could provide and facilitate disaster management capacity development - using science and technology to support disaster management based on local context
4. Community based disaster management	- improvement of community participation in high prone areas
5. Establishment of quick response task forces	- to provide emergency response support
6. Risk reduction for groups with special need	- target gender, children, poor community, minority and marginal group, and disabled people
7. Enhancement of non government organisations	- stronger cooperation and collaboration between government and non government organisations in risk reduction programs and preparedness.
8. Enhancement of private roles	- training and capacity development - active participation in risk reduction forums - provide and facilitate risk transfer (insurance)

Source: (BNPB 2010)



Source: (BNPB 2010)

Figure 6.1. Five main components of the disaster management system in Indonesia

At the operational level, the risk reduction action plan 2010 – 2012 provides detailed activities to address disaster issues in Indonesia. There are five areas or themes that are prioritised which are adopted from the Hyogo Framework for Action 2010 – 2015

(Table 6.24). Those priorities are implemented through seven programs as mentioned above.

Table 6.24. Priority for risk reduction action plan 2010 – 2015

Area/theme of priority
1. Disaster risk reduction is set as national and local priority
2. Identification, assessment, and monitoring of disaster risk and early warning system
3. Culture building for safe and resilient communities using knowledge and innovation
4. Reducing risk factors
5. Strengthening preparedness and response at all levels

Source:(Bappenas 2010)

b. Provincial Level

Central Java Province has not yet developed a disaster management plan. The only document that is directly related to disaster management is the Provincial Disaster Risk Reduction Action Plan that was formulated in 2008 and has a time period of five years. The action plan is also legalised by Governor Decree to strengthen its position among other documents. Nine priorities are established with several program directions (Table 6.25).

Table 6.25. Nine priorities of the Central Java disaster risk reduction action plan

Priority issues	Program direction
1. Identification and monitoring of disaster risk	- Assessment, inventory, identification, and monitoring Exploration of local wisdom that is specific to each areas need to be carried out
2. Participatory planning	- Form network, collaboration, and coordination to increase effectiveness and reduce duplication
3. Development of disaster awareness culture	- Information management to develop awareness
4. Commitment strengthening	- Monitoring to evaluate that physical, non physical, and regulation area carried out effectively
5. Disaster mapping	- Mapping of hazard prone areas, community potential, community vulnerability, local wisdom, government capacity, and available resources
6. Information dissemination	- Disseminate disaster risk to all stakeholders
7. Strengthening capacity	- Education, training, preparing infrastructure and regulation support
8. Institutional strengthening	- Education and training to develop integrated planning, monitoring and evaluation, and implementation skill e.g. disaster mapping
9. Technology development	- Development of early warning technology - Development of information technology for disaster management

Source: (Pergub88 2008)

Implementation of those nine priorities is undertaken by using all available authorities that belong to the provincial government as regulated by Government Regulation No. 38/2007 on Division of Government Affairs between national, provincial, and local governments (Table 6.26). It is similar to the approach that is undertaken for the provincial mid term development plan.

Table 6.26. The Central Java Province disaster risk reduction actions

Sector/agency	Pre disaster	During event	Post disaster
Education	- Early age education - Basic education - Elementary education	No actions were allocated	No actions were allocated
Health	- Improvement of community health - Health resources - Disease prevention and management - Develop a healthy environment - Improvement of community nutrition	- Disease prevention and management - healthy environment - Improving health access and service	- Disease prevention and management - Improving health access and service to community
Public works	- Flooding control and coastal protection	No actions were allocated	- Rehabilitation and maintenance of infrastructure - Development and management of irrigation network and wetland - Improvement of urban and rural infrastructure - Improve water and sanitation
Housing	- Development of safe housing	No actions were allocated	Housing rehabilitation
Spatial plan	- Spatial planning - Spatial utilisation and controlling	No actions were allocated	Spatial utilisation and controlling
Development planning	- Local development planning - Improvement of local development planning capacity	No actions were allocated	No actions were allocated
Transportation	- Post, telecommunication, meteorology, and search and rescue	N No actions were allocated one	No actions were allocated
Environmental	- Conservation and protection of natural resources - Rehabilitation and restocking - Pollution and environmental degradation control	No actions were allocated	No actions were allocated
Land	- Land management (ownership, occupation, utilisation)	No actions were allocated	No actions were allocated
Women and children empowerment	- Institutionalising gender concerns in development	Child protection and wealth	Protection of child welfare
Social	No actions were allocated	No actions were allocated	Social service and rehabilitation
Internal politics and nation unity	- Local regulation formulation - Law awareness - Improvement of security, law and order	No actions were allocated	No actions were allocated
Local autonomy, general governance administration	- Implementation of general government service	Government apparatus infrastructure	- Implementation of general government service - Government apparatus infrastructure
Food security	- Improvement of food security	Improvement of food security	No actions were allocated
Rural areas empowerment	- Community development - Community institution strengthening	Strengthening community institution	No actions were allocated
Statistics	- Development of local data and information	No actions were allocated	No actions were allocated
Communication and information	- Development of communication, information cooperation, and mass media	No actions were allocated	No actions were allocated
Forestry	- Forest management and utilisation - Forest conservation and rehabilitation	No actions were allocated	No actions were allocated
Energy and mineral resources	- Mining and ground water management - Development of natural disaster mitigation and geology	No actions were allocated	
Agriculture	No actions were allocated	No actions were allocated	Agribusiness development Farmer wealth improvement
Trading	No actions were allocated	No actions were allocated	Trading and small industry development

Source: (Pergub88 2008)

It is clear that all programs are derived from the Central Java Mid term Development Plan and placed into the timeframe appropriate for pre to post disaster. This approach is considered useful because: i) risk reduction programs need commitment from all agencies, and ii) each sector should take responsibility based on their authority, main roles, and functions. However, there are a number of consequences of using that approach. From the advantage point of view, all disaster risk reduction programs are secured and to be implemented by all related sectors because it is part of their roles and responsibility. Commitment to programs and funding is another positive advantage. From the disadvantage point of view, there is a potential for the program not to focus on addressing specific issues, challenges, and prioritised locations or vulnerable groups.

The disadvantages are more apparent when trying to determine how the nine priorities that are mentioned in Table 6.25 can be achieved. For example, the first target is to identify and monitor disaster risk through: i) assessment, inventory, identification, and monitoring to mitigate disaster, and ii) exploration of local wisdom that is specific to each area. However, none of those activities are accommodated in action plans. For target number five, disaster mapping, there is no action to be found in Table 6.26 even though several actions are already directed such as mapping of hazard prone areas.

c. Plan Compatibility

Both the national disaster management plan and provincial risk reduction action plans agree on a number of critical issues to be addressed by both planning documents: i) institutional strengthening and capacity improvement for disaster planning, management, and recovery, ii) participation from stakeholders, and iii) technological input for disaster management. Further examination is difficult to undertake since the Central Java Province has not developed its disaster management plan. Additionally, neither Pekalongan nor Semarang City has a disaster management plan.

6.3.4. Coastal Management Plan

Analysis was undertaken for national, provincial, and local levels. At the national level, it is based on Ministry of Marine Affairs and Fisheries strategic plan 2010 – 2014. For Central Java Province and Pekalongan City it is based on their coastal strategic plan documents. Semarang City has not developed their coastal management plan.

a. National Level

The strategic plan for national marine and fisheries development is a translation from the national long term and mid term development plans for the marine and fisheries sector. It is directly related to the goal to achieve an archipelagic Indonesia that is independent, advanced, strong, and based on national interests. A number of issues are identified along with potential programs to address the problems (Table 6.27).

Table 6.27. National marine and fisheries development identified issues and problems

Issues	Required action
Degradation of fisheries resources caused by pollution, habitat degradation, destructive fishing, destructive & over fishing, and illegal fishing	- Conservation and rehabilitation of coastal habitat & environment - Development of aquaculture to support fish production - Consideration on environmental conditions and quality to support capture fisheries and aquaculture
Fishers productivity is low caused by small fishing fleet, financial access, and limited fishing infrastructure	- Rehabilitation of fishing infrastructure e.g. harbour and supported by skilled human resources
Compliance with fish product quality for export is still low due to limited infrastructure	- Improvement of infrastructure, standards, and human resources in fish product quality checking
Optimising surveillance and monitoring of marine and fisheries resources	- Strengthening surveillance, coordination, and community participation - Application of vessel monitoring system
Conflict of resources use	- Improvement of conflict resolution - formulation of law and regulation for marine and fisheries resource
Coastal disasters that damage fishing infrastructure, community property, and loss of lives	- coastal disaster mitigation for areas that serve as fishing centres - development of environmental and coastal hazard friendly infrastructure in coastal areas - coordination and collaboration with all sectors

Source: (MMAF 2010)

However, the plan vision for Indonesia to become the largest marine and fisheries producer by 2015, gives more emphasis to economic factors than other elements for next five years. Coastal disaster mitigation is not part of marine and fisheries development objectives even though it is recognised as a major issue (Table 6.28.)

b. Provincial Level

The provincial coastal management strategic plan identified issues and problems in five themes (Table 6.29): 1) governance, 2) natural hazards, 3) coastal fisheries, 4) coastal environment, and 5) socio-economics. Additionally, there are four goals to be achieved: i) ecological, ii) economic, iii) social, and iv) institutional.

Table 6.28. Objective and targets for marine and fisheries development 2010 – 2014

Objective	Target
strengthen human resources and institutions	- Laws and regulations are in accordance to national and global needs and implemented in an integrated way between sectors, national, and local government - Integrated, accountable, and timely planning, implementation, and monitoring evaluation that are based on recent data and information - Human resources that meet the requirement
manage marine and fisheries resources sustainably	- Optimum and sustainable use of marine and fisheries resources - Habitat and species conservation are managed sustainably - Development of small island to be highly economic island - Elimination of illegal, unreported and unregulated fishing and destructive activities for marine and fisheries resources
increase productivity and competitiveness	- Development of *minapolitan* or fish-based region with bankable activity - All marine and fisheries production centres have primary product, implement innovative technology, and with quality assurance - Infrastructure for marine and fisheries meets the requirement and is produced in the country
expand domestic and international markets	- All villages have markets that facilitate fisheries production - Indonesia becomes a market leader and investment destination

Source: (MMAF 2010)

Table 6.29. Coastal management issues in Central Java Province

Aspect	**Issues**
1. Coastal governance	• Regulation of marine and fisheries at local level is still limited • Limited available funding and budgets • Utilisation of accretion land that does not follow conservation and spatial plans • Lacking of coordination for inter regional utilisation of coastal areas
2. Coastal hazards	• Coastal erosion, sedimentation, accretion, and sea water intrusion • High potential for natural disaster
3. Fisheries	• Marine fisheries resource not yet utilised optimally • Limitation on fishing gear and fleet • Limitation on supporting facilities for fish landing sites • Non-optimum management of fish pond areas • Low understanding of aquaculture practices • Marine pests that damage aquaculture
4. Coastal environment	• Mangrove and coral reef degradation • Destructive coral mining • Coastal area utilisation that is not ecologically sensitive • Rehabilitation efforts are not yet optimum
5. Social and economic factors of coastal community	• Low interaction between coastal community and financial institutions • Community institutions and organisation is still low • Market network weak so that fishers rely on middlemen • Low awareness and participation from community • Limited infrastructure for social lives in coastal areas • Skill and prosperity of coastal community is low

(DKP-Jateng 2010)

Based on above identified issues and goals, a number of strategic programs have been developed to guide Central Java Province coastal development (Table 6.30). In relation to coastal hazards, four programs are directed to address coastal erosion, sedimentation, accretion, and seawater intrusion.

Table 6.30. Target, strategy, and program for Central Java Province coastal management

Target	Strategy		Program
Sustainability of marine and coastal resources in Central Java Province	1	Development of marine and fisheries activity	• Application of silviculture fisheries aquaculture
	2	Management of vital habitat for spawning and nursery grounds	• Development of field outreach agency on coastal vital habitat conservation • Deployment of signs for vital habitat conservation and designation as conservation areas
	3	Strengthening monitoring and surveillance	• Establishment and operation of surveillance team • Provision of surveillance infrastructure
	4	Development of coastal disaster resilience and mitigation	• Education on setback areas for coastal and riverbank • Prohibiting development on setback areas by appropriate regulations • Development of hazard prone areas maps and mitigation methods • Development of hazard friendly housing for fishers settlements that are prone to coastal hazards
	5	Controlling, reduction, and prevention of marine and coastal degradation	• Establishment of coastal green belt • Coastal zoning/spatial plan development • River catchment areas management
	6	Regulation, supervision, and enforcement of coastal landuse	• Education on conservation areas
			• Enforcement on conservation regulation
		Education on importance of marine and coastal conservation	• Education on coastal sustainability
			• Assignment of special officer to work on conservation and sustainability issues
Availability of conservation areas	1	Development and optimization of special areas	• Establishment of conservation zone in Nusakambangan and Karimunjawa Island
	2	Utilization of small island for marine and fisheries activity	• Establishment of conservation zones on small island
Improvement of economic productivity and activity that derives from marine and fisheries resources	1	Optimizing and provision of supporting infrastructure for marine and fisheries economic activity	• Improvement of facilities and infrastructure • Improvement of human resources • Application of technology • Development of road network to fisheries centre and establishment of fish markets • Environmental rehabilitation for fish processing areas and fishers settlements
	2	Development of tourism potency and implementation of its planned program	• Development of tourism at potential sites and improvement of service quality of existing site • Development of new attraction • Improvement of tourism cooperation with investor
	3	Pest and disease management for aquaculture	• Assessment of aquaculture disease • Introduction of appropriate new insecticides • Training of aquaculture practitioners
	4	Improvement of capture fishing activity	• Assistance on fishing fleet and gear
	5	Improvement of skill and understanding of fishers and fish farmers	• Training, socialization, and outreach of marine and fisheries activity

Target	Strategy		Program
	6	Optimizing available land for fish pond and salt farming	• Rehabilitation of waste land • Rehabilitation irrigation channel
	7	Implementation of gas pipeline and cellular optics by considering ecological and existing policy	• Establishment of pipeline gas and cellular optic Formulation of detailed design for development • Opening new investment for business opportunities
	8	Improvement and development of energy capacity	• Development of feasibility study of energy development • Development of environmental impact assessment • Development of energy resources and opening new investment opportunity
Increasing economic contribution from coastal resources	1	Implementation of integrated marine based development to support marine and fisheries demand	• Implementation of marine based development at designated locations
	2	Utilization of oil and gas and mineral resources at coastal areas	• Feasibility study of oil, gas, and mineral development • Development of environmental impact assessment • Development of new investment opportunities • Opening new shipping routes
	3	Optimizing marine transportation	• Opening of new shipping routes • Rehabilitation of port environment • Opening new business opportunities
• Functioning of marine and coastal management institutions and regulation • Coastal community empowerment	1	Improvement of institutional performance	• Improvement of institutional performance in marine and fisheries sector
	2	Optimizing budget allocation for marine and coastal development	• Optimizing budget allocation for marine and coastal development
	3	Improvement of cooperation between district/cities in coastal management	• Improvement of cooperation between district/cities in coastal management
	4	Introduction and facilitation of coastal community to financial institution	• Facilitation of coastal community and financial institution • Socialization bank role
Improvement of community and stakeholder awareness	1	Improvement of knowledge in organization and technology transfer	Training, outreach and technology transfer to communities
	2	Improvement of social infrastructure in coastal areas	Development of social infrastructure in coastal areas
			Rehabilitation of social infrastructure in coastal areas

Source: (DKP-Jateng 2010)

Accommodation of coastal hazards mitigation in the provincial coastal strategic plan is essential for disaster management in the Central Java. This is interesting since the disaster management plan itself does not include the Agency for Marine and Fisheries as a key player in disaster management (see Table 6.26). However, the directive program in the coastal strategic plan places great emphasis on hazard management (e.g. setback development and hazardous areas mapping). It is limited or even lacking in programs for vulnerability and risk assessment.

c. Local Level

The Pekalongan coastal management strategic plan was developed in 2007 also facilitated by the Ministry of Marine Affairs and Fisheries. A number of issues have been identified for governance, social, economic, and environmental aspects (Table 6.31). Based on those issues, Pekalongan coastal management vision is to achieve integrated and sustainable coastal resources management to ensure Pekalongan coastal community prosperity, based on sustainability of the ecosystem, natural resources, and the environment.

Table 6.31. Coastal management issues in Pekalongan City

Areas	Major issue
Coastal governance	• Coastal spatial planning is lacking • Coordination among sectors and areas in coastal planning and management is weak
Environmental function	• Habitat degradation in particular mangrove • Pollution from industry and household
Coastal hazards	• Tidal inundation, erosion, saltwater intrusion, sedimentation
Economics	• Coastal sand mining • Low economic capacity of coastal community • Illegal auction fee at fish landing site
Social	• Social capital is low • Community awareness of coastal management laws and regulation is low

Source: (Pekalongan-City 2008)

To address issues and problems in coastal management for Pekalongan, the document provides detailed guidance (Table 6.32). For coastal hazard mitigation, the strategic plan still focuses on physical or infrastructure development to prevent tidal inundation, coastal erosion, and sedimentation. Approaches to reducing development or settlement along hazardous areas are not clear from spatial plan development. Assessment of community vulnerability and risks from coastal hazards is also missing.

Table 6.32. Strategic program to address Pekalongan coastal management issues

Major issue	Strategic program to address issue
Coastal spatial planning is lacking	1. Formulation coastal spatial plan that involve active participation from all sectoral agencies and community and based on scientific assessment for space and activity allocation 2. Integration of coastal spatial plan into Pekalongan city spatial plan
Coordination among sectors and areas in coastal planning and management is weak	1. Improvement of coordination. 2. Improve coordination of fishery businesses and marine and coastal tourism
Habitat degradation in particular mangroves	1. Improvement of community awareness and participation in mangrove management. 2. Rehabilitation of mangrove forest 3. Refunctioning conservation zone along coastal areas
Pollution from industry and households	- Monitoring of hazardous chemical distribution - Establish commitment and awareness among stakeholders - Improvement of technical capacity to manage environmental pollution - Improvement of waste management from industry and household - Improvement of infrastructure for pollution monitoring and environmental damage - Protection of coastal community from groundwater pollution through education about risk and improvement of sanitation and drainage system. - Management of solid and liquid waste in coastal areas - Improvement of stakeholder awareness on healthy coastal environment
- Tidal inundation, erosion, saltwater intrusion, sedimentation - Coastal sand mining impacts	1. Mitigation of coastal hazards through: i) assessment of hazard and its impact to coastal landuses, ii) formulation of hazard management team, iii) build physical structures (e.g. weave breaker, tidal control gate). 2. Improve community monitoring and surveillance groups for coastal sand mining reduction 3. Improvement of sectoral and inter regional coordination to mitigate coastal hazard impacts 4. Rehabilitation of coastal damage with environmental friendly approach e.g. combination of hard structure and mangrove plantation 5. Active involvement of stakeholder in coastal damage rehabilitation planning
- Low economic capacity of coastal community - Illegal auction fee in fish landing site	1. Improvement and empowerment of coastal communities 2. Provision of supporting infrastructure for fishing activity 3. Improvement of auction system and its monitoring
- Social capital is low - Community awareness of coastal management laws and regulation is low	1. Improvement of formal and informal education for coastal communities 2. Improvement of coastal community health level 3. Outreach, socialisation, stakeholder meeting,, and community self initiative in coastal management and its regulation

Source: (Pekalongan-City 2008)

d. Plan Compatibility

The national long term and mid term development plans consider coastal disaster mitigation is an important aspect of coastal and marine resources development. The national marine and fisheries strategic plan documents consider all indicators and specific directions from the national long term plan except for indicators to reduce coastal disaster impacts (Table 6.33). Unfortunately there is no explanation in the document why this is the case. It may be that economic development is the major influence and consideration for document formulation.

According to Table 6.33, the marine and fisheries strategic plan has addressed a number of directions which are identified in the national long term development plan. However, there are a number of important issues that are not addressed that are related to coastal disaster mitigation: 1) spatial plan enforcement, 2) development that neglects sustainability, carrying capacity, and hazard prone areas, 3) the short economic perspective to exploit resources leads to environmental problems and risk from disaster, 4) degradation, pollution, and unsustainable exploitation and impact of climate change, and 5) anticipation of food, energy, and water crisis.

Table 6.33. Direction of marine and coastal resources development in the national long term and the national marine and fisheries strategic plans

Direction from the long term development plan	Direction from the national marine and fisheries strategic plan
1. infrastructure development that unifies the Indonesian island 2. improvement and strengthening of human resource which are supported by development of marine sciences and technology 3. establishment of an Indonesian jurisdiction 4. development of a marine economy integrated with optimisation of a marine resource utilisation in a sustainable way 5. reducing coastal disaster impacts and marine pollution	1. strengthen human resources and institutions 2. sustainable management of marine and fisheries resources 3. increase productivity and competitiveness 4. expand domestic and international markets

Source: (MMAF 2010)

In relation to the national mid term development plan, the marine and fisheries strategic plan document also identifies five priorities in the mid term development plan related to the marine and fisheries sector. While coastal disaster mitigation is missing from the objectives and targets for the marine and fisheries strategic plan, it is mentioned in the policy and strategy direction to support priority number 9 of the national mid term development plan (Table 6.34).

The difference in recognition of issues, objective and targets, and the directions for policy and strategies in relation to coastal disaster mitigation is considered as inconsistency or incompatibility of planning. Exclusion from objectives and targets will also weaken coastal disaster mitigation programs at the ministry level. Another inconsistency appears when the document tries to elaborate six strategies to implement five priorities of mid term development plans under pro poor, pro employment, pro growth and pro sustainability directions (Table 6.35). Capacity development and research in coastal disaster risk and management that is mentioned in the strategy

direction to support the national mid term development plan is missing. Finally, the implications of the lack of accommodation of coastal disaster mitigation in ministry objectives are reflected in key performance indicators that are from an economic point of view (Table 6.36).

Table 6.34. Compatibility of national mid term development priorities and marine and fisheries strategic plan policy and strategy direction

Priorities in national mid term development plan	Policy and strategy in marine and fisheries strategic plan
Priority 1. Bureaucracy and administration reform	• improvement of ministry performance in public service • accountability in financial management • organisation arrangement
Priority 4. Poverty reduction	• contribution to reduction of national poverty • community empowerment in particular to fishermen, aquaculture farmer, small scale or individual that work in fish processor and distributor • *minapolitan* or fish-based city development • development of marine and fisheries financial institution • improvement of business capacity and scale to be eligible for bank loan
Priority 5. Food security	• continuation of fisheries revitalisation to achieve food independence, fish product competitiveness, and improvement of income for fishermen, fish farmer, and small fishing businesses • increasing fish production, consumption , and stabilisation of fish price
Priority 9. Environment and natural disasters	• marine, coastal, and small island environment conservation and utilisation • development of capacity in disaster risk and management • development of research and human resources on climate change and coastal disaster mitigation
Priority 10. Under developed, frontline, most outer, and post conflict areas	• management and empowerment of outer small islands • development of economic alternatives based on fisheries resources

Source: planning document analysis

Table 6.35. Six strategies in marine and fisheries development for 2010 – 2014

Strategy implementation	objective
1. Development of *minapolitan* (fishery-based economic zone)	• improvement of marine and fisheries productivity, business, and product quality • improvement of fishermen, fish farmer and its related business income • develop *minapolitan* as new economic growth centre
2. Entrepreneurship	• To develop trust building among fishing business actors • To support production factors such as gasoline, nets, seeds, and markets • To create new entrepreneurs that are eligible to receive capital loans
3. Networking	• To optimise marine and fisheries development outcomes • To stimulate interaction between marine and fisheries stakeholders
4. Technology and innovation	• Ability to use technology in aquaculture, capture fisheries, processing and post harvest • To have capacity in using marine technology for exploration, exploitation, conservation, and management resources and climate change adaptation • New technologies for optimising sustainable utilisation of fisheries resources
5. Empowering	• To improve community independence • To improve community capacity to manage marine and fisheries resources • To develop partnerships between community and private and government
6. Community institution strengthening	• To strengthen existing community groups in aquaculture, capture fisheries, monitoring and surveillance, and coral reef management. • To improve community access to politic, economy, social, and cultural resources.

Source: (MMAF 2010)

Table 6.36. Key performance indicators of marine and fisheries sector 2010 – 2014

Areas	Key performance indicator
Economic function	• Contribution of fisheries into national GDP as much as 6.5 % in 2014 • Fisheries production (capture & aquaculture) reaches 22.39 million tonnes in 2014 • Economic value from fish product export as much as 5 million USD • Fish consumption reaches 38.67 kg/capita/yr in 2014 • Number of fish processing unit increase 1.1%/yr • Fishers trade value is 115 by 2014
Environmental function	• Marine conservation areas increase to 3.6 million ha by 2014 • Number of managed outer small islands is 205 • No more illegal, unreported, and unregulated fishing

Source: (MMAF 2010)

For Central Java Province and Pekalongan City, the coastal management strategic plan has more complete issues and program than those elaborated in the long term and mid term development plans. Priorities and programs in the documents are beyond what have been addressed in the development plans (long term and mid term). Both provincial and city coastal strategic plans also share similar issues that concentrate on four major themes: i) coastal governance, ii) coastal environment, iii) coastal hazards, and iv) coastal community. There is one issue that differentiates the Central Java Province and Pekalongan City coastal management strategic plan, which is fisheries development. Even though the Pekalongan Mid term Development Plan identifies development of marine and fisheries businesses, the strategic plan does not accommodate that issue in its programs. Similarly, mid term and long term development plans only incorporate fisheries development with no elaboration on coastal management issues.

6.4. Discussion

Coastal management and disaster management are strongly supported by the national long term and mid term development plans. Clear and concrete policies and commitment are provided. Moreover, doubling of support for disaster management is obtained by specific directions for coastal disaster and natural disaster mitigation separated from general disaster management directives. Requirements for integration are also explicitly mentioned both for disaster management and coastal management.

The national disaster management plan covers general issues, policies, and programs for major natural hazards in Indonesia. Even though coastal disasters are elaborated specifically in the long term development plan, there is no specific elaboration in the

disaster management plan. Moreover, as discussed in the previous chapter, accommodation of coastal hazards in the national disaster management plan and risk reduction action plan is weak. This is a failure to harness an opportunity provided by the long term development plan in coastal disaster mitigation. It also raises a question; if coastal hazards are not accommodated appropriately in disaster management plans then what other plans should, or could, fill that gap. Unfortunately, the national marine and fisheries strategic plan also does not address coastal disasters as priorities and targets.

The lack of policy and program support for coastal disaster management at the ministry level is in contrast with the expectations and requirements as stated in the Coastal Management Act. Additionally, the national disaster management plan has recognised the Ministry of Marine Affairs and Fisheries as a key stakeholder in planning and controlling mitigation activities for coastal disasters in particular to tsunami and coastal erosion. The Coastal Management Act also strongly mandates coastal disaster mitigation for all development activities on coasts and small islands where the Ministry of Marine Affairs and Fisheries takes a lead in national coordination and local facilitation.

In addition, at the provincial level, accommodation of disaster management and coastal management issues in the long term and mid term development plans is very limited. Fortunately, Central Java Province has developed a disaster management risk reduction action plan and coastal management strategic plan. Moreover, the latter document provides strong support for coastal disaster mitigation in Central Java coastal areas by prioritising coastal hazards as a major issue to be addressed in the long term (20 years) period under the coastal management strategic plan. This recognition is critical because coastal disasters are not well addressed in both the development plan and the risk reduction action plan for Central Java.

Accommodation of coastal disaster management issues or priorities in the mid term development plan is crucial because even if these issues are part of political campaigning, it is possible that changes in leaders will result in different aspirations and interests other than allocating funding for long term issues such as disaster risk reduction and habitat conservation.

Coastal hazards are also explicitly mentioned as a major issue in Pekalongan and Semarang City which is dominated by slow onset types of hazards in particular for coastal flooding and inundation. The challenge is how to advocate and incorporate slow onset coastal hazard into development planning which is considered difficult (Glavovic 2010). Impacts of those kinds of hazards will be perceived slowly and incrementally. However, compounded with environmental degradation and pollution, coastal community vulnerability, and ineffective governance, flooding and inundation will lead to a significant disaster. Interestingly, even though coastal flooding is perceived as a major hazard for both locations, existing plans do not mention or recognise climate change as a major factor that will exacerbate that problem in the future.

Generally, compatibility between coastal management policies/programs and development plans at national, provincial, and local levels is weak. Strong encouragement to achieve optimum marine and coastal resource management in the national long term development plans is not supported by detailed development programs at the local levels. The fisheries sector is the only element that is recognised by provincial and local governments in their long term and mid term development plans. There is then, a gap in understanding and awareness of marine and coastal management issues between national and local governments. Establishment of the Ministry of Marine Affairs and Fisheries in early 2000 supports that position. All of the existing local agencies in marine and fisheries previously were only responsible for fisheries production. They have not experienced and been exposed to broad marine and coastal management issues such as pollution, conservation, and coastal hazard mitigation.

Even though support for coastal disaster mitigation at the lower levels of planning documents is weak, still there is an acknowledgment of the issues in development plans and disaster management plans, and strong accommodation in provincial and local coastal management plans. Moreover, in term of vulnerability and risk reduction, many elements are inherent in other priorities such as social, economic, and environmental development that sometimes go beyond the reach of coastal and disaster management programs or agencies. Therefore, challenges and problems still remain to translate plans into appropriate programs and at the right time, and right place to tackle coastal disaster problems.

There is also a need to provide development planners, coastal managers, and disaster management authorities information on hazards and community vulnerability that will guide them in allocating activities and funding. This would benefit all coastal disaster risk reduction including increasing capacity to adapt to climate change impact. It is recognised in the literature and research on climate change impacts to environment, sectors and society, that examination of the interaction between adaptation and existing real planning programs and development is very limited (Smit, Pilifosova et al. 2001).

6.5. Conclusion

This chapter has examined how existing planning documents are interrelated, compatible, and support each other to address coastal disaster problems in Indonesia. The result showed a number of inconsistencies between documents. Furthermore, this chapter also showed that many coastal disaster risk reduction actions are part of day to day development activities. Those activities are much more significant than what coastal management plans and disaster management plans could do. In this regard, it is essential for mid term development plans to recognise coastal hazards as a priority.

Coastal management and disaster management issues that are recognised as major problems and prioritised in the long term development plans are not translated and elaborated in more detail in lower planning documents. Coastal disaster issues are almost missing from provincial and local long term development plans. That gap is filled by coastal management strategic plans that put coastal hazards as priority issues and programs. However, both coastal management strategic plans at provincial and city (local) level failed to include climate change impacts in their issues, in particular sea level rise that will threaten coastal communities and development. Previous results that showed a number of important factors to address coastal disasters are also missing from disaster management and risk reduction action plans provides strong evidence that both coastal managers and disaster managers cannot work in isolation from each other.

Considering that existing planning documents at all government levels are weak in their compatibility, the next important assessment is how those documents function toward community resilience to disasters. This assessment is presented and discussed in the next chapter.

CHAPTER 7

THE FUNCTION OF NATIONAL, PROVINCIAL, AND LOCAL DEVELOPMENT, DISASTER MANAGEMENT AND COASTAL MANAGEMENT PLANS IN ENHANCING COASTAL COMMUNITY RESILIENCE TO DISASTERS

7.1. Introduction

Results from previous chapters have shown that coastal managers and disaster managers share similar problems in addressing coastal hazard issues. Certain problems are rooted in the act itself. For example, inconsistencies and inappropriate definitions result in flaws in subsequent regulations or plans. Furthermore, existing disaster management plans still require many improvements to comply with the Disaster Management Act's mandates. In relation to coastal disaster, elaboration of coastal hazards, vulnerabilities, and risks are minimal. Implementation of the Coastal Management Act's planning mandate is very limited.

Those problems are more challenging as analysis at Chapter VI concluded that existing planning documents within the disaster management plan do not fully address coastal hazard mitigation and associated risk reduction. Some hope is obtained from evaluation of national, provincial, and local development and coastal management plans. Although the accommodation of coastal disasters in provincial disaster management plans is minimal, support from national long term and mid term development plans is strong. Similarly, coastal disaster issues are prioritised in provincial and local coastal management plans. However, the lack of support from provincial and local development plans provides further challenges because coastal management plans cannot address all aspects of risk reduction.

The challenges to compliance with acts' mandates and accommodation of coastal disaster management issues in development plans, disaster management plans, and coastal management plans requires further important evaluation. That is, it is necessary to identify how each planning document actually supports coastal community resilience to disaster. It is essential that all planning documents strengthen coastal community resilience.

This chapter examines how existing Indonesian national and local plans function to support and achieve coastal community resilience to disaster. Assessment of this functionality is based on analysis of policies and program in comparison with resilience characteristics.

7.2. Objective

The objective of this chapter is to assess if national, provincial, and local planning documents (development plan, disaster management plan, and coastal management plan) support coastal community resilience to disaster. Two basic questions are addressed:

1. How do existing planning documents on development, coastal management, and disaster management address coastal community resilience to disaster?
2. What resilience characteristics are missing from each document's program and how could those documents complement each other to achieve coastal community resilience to disasters?

7.3. Planning Documents for Analysis

In national and provincial level three types of documents are evaluated: i) national/provincial development plans (long term and mid term), ii) national/provincial coastal management, and iii) national/provincial disaster management plans. At local government level two types of documents are examined: i) Semarang and Pekalongan City development plan (long term and mid term), and ii) Pekalongan City coastal management plan.

7.4. The Function of Planning Documents to Achieve Community Resilient

While many definitions of resilience have been suggested, three characteristics can be identified (UN/ISDR 2002; US-IOTWS 2007): i) ability to absorb disturbance, ii) ability to maintain existence, and iii) ability to recover and return to functioning after receiving a shock.

7.4.1. Resilience Characteristics

Resilience is a term that has been defined in a broad and complex description that covers individual, community, environment, and governance aspects. UN/ISDR (2004) described resilience as the ability of a community or system to resist or change to reach

and maintain its structure or function. In relation to disaster, resilient community means it has the ability to organise itself to increase capacity and reduce the risk from disasters by learning from past event. It implies that works on disaster risk reduction need to emphasis resilience alongside vulnerability reduction (Manyena 2006) Therefore, resilience has many elements and factors to be capable of achievement.

McEntire et.al (2002) describe many different aspects to achieve a resilient community that cover disaster-resistant community, disaster-resilient communities, sustainable development and sustainable hazards mitigation, and vulnerable development. McEntire et.al also underlined that resilience is a process and not an outcome. This understanding is important to avoid the tendency to apply traditional efforts in disaster management that focus on reactive measures. In more detail, resilience needs to be achieved through five thematic areas (HFA, 2005): 1) governance, 2) risk assessment, 3) knowledge and education, 4) risk management and vulnerability reduction and 5) disaster preparedness.

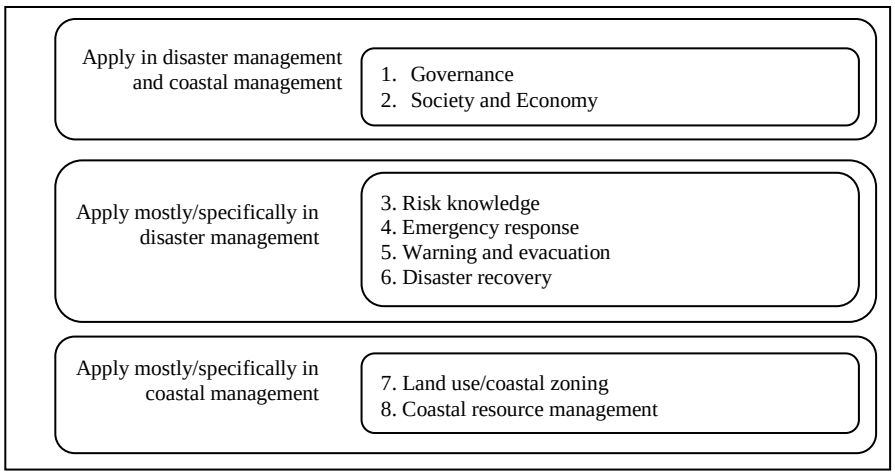
Several models have been developed to achieve resilience that cover social, financial, and environmental aspects which include: community resilience model by the Centre for Community Enterprise (CED 2000), community-based disaster risk management by Asian Disaster Preparedness Centre (ADPC 2004), sustainable coastal livelihood project (IMM 2006), building resilience through coastal vegetation (Kathiresan and Rajendran 2005), integrated coastal management (ICM) as an approach of building coastal resilience (White 2006), microfinance instruments to achieve resilience (Miamidian, Arnold et al. 2005), eight core elements to design and develop disaster resilient community (Henestra, Kovacs et al. 2004), and characteristics of disaster resilient communities (Twigg 2009).

In relation to coastal disaster, specific efforts to assess and develop coastal community resilience have been undertaken through the US Indian Ocean Tsunami Warning System Program. Based on a series of workshops and discussions, eight elements are proposed as targets for coastal community resilience to disasters (Table 7.1). These elements range from governance, socio-economic factors, land used, to disaster recovery issues and apply differently in disaster management and coastal management fields (Figure 7.1).

Table 7.1. Eight elements of coastal community resilience

Element	Desired outcome/benchmark
1. Governance	• Availability of leadership, legal framework, and institutions • Community involvement with government
2. Society and Economy	• Communities participation • Diverse and environmentally sustainable livelihoods
3. Coastal Resource Management	• Active management of coastal resources • Sustaining environmental services • Protecting coastal livelihoods • Reducing risks from coastal hazard
4. Land Use and Structural Design	• Effective land use and structural design • Complementing with environmental, economic, and community goals and reduce risks from hazards
5. Risk Knowledge	• Leadership and community members are aware of hazards • Coastal disaster risk based decision making
6. Warning and Evacuation	• Community is capable of receiving notifications and act properly • Warning at-risk populations
7. Emergency Response	• Mechanisms and networks are established and maintained • Addressing emergency needs at the community level
8. Disaster Recovery	• Plans are in place prior to hazard events that accelerate recovery • Engaging communities in the recovery process, and • Minimizing negative environmental, social, and economic impacts

Source: (US-IOTWS 2007)



Source: document analysis

Figure 7.1. Resilience elements' position in disaster management and coastal management

Among existing aforementioned models and approaches to achieve community resilience, the one that is developed by IOTWS was used in the analysis of Indonesian disaster management and coastal management. This is based on considerations that the model: i) has been developed specifically to address coastal community and environments, ii) provides detailed elements that need to be assessed in both disaster management and coastal management aspects, iii) has been piloted in several Indian Ocean countries that have similar social, economy, and political context, and iv) has

been used as model of coastal community resilience training and assessment in Indonesia.

7.4.2. Policies and Programs to Achieve Resilience Characteristics

All of the eight elements to achieve coastal community resilience are compiled from existing policies and programs from development plans, coastal management plans, and disaster management plans. Analysis on the status and level of policy and program is undertaken to ensure that planning documents are available in advance, to accelerate the recovery process is included in governance. Similarly, benchmarking for engaging communities in the recovery processes occurs where public participation and involvement are part of improving governance and within the implementation strategy for disaster management. As both rehabilitation and reconstruction will be regulated under government regulation (as mandated by the Disaster Management Act, 2007) further elaboration would be regulated by a separate document.

a. Governance Element

The governance element is applicable to both coastal management and disaster management. It focuses on providing the environment to enable coastal community resilience. Existing national policies and programs accommodate the governance element in development plans, coastal management plans, and disaster management plans, (Table 7.2).

The long term development plan provides a strong foundation for community participation in development through democratization. Improvement of marine and coastal resources management is prioritised, which is not only important to coastal resource management, but also for governance. Improvement of governance, generally in all government businesses and specifically for coastal areas and disaster management, is addressed by the Mid Term Development plan, the Coastal Management Plan, and the Disaster Management Plan. Moreover, community based disaster management is highlighted as a prioritised policy for disaster management. In addition, provincial and local planning documents are also supportive to improved governance.

The provincial Long Term Development Plan, however, has less detailed direction than that found at the national level. For example, there is no direction for benchmarking community involvement. The provincial Mid Term Development Plan does provide specific direction for achieving a disaster management strategy that is planned, coordinated, and integrated. Similar directions are also highlighted in the provincial Disaster Risk Reduction Plan and Coastal Management Plan.

b. Society and Economy

Society and economy are important elements to increase community resilience. The national level, long term development plan and coastal management plan, are in a strong position to support development of coastal community social and economic livelihood (Table 7.3). In addition, the Mid Term Development Plan gives general direction for achieving inclusive economic growth, poverty reduction, and food security. As would be expected, the Disaster Management Plan does not specifically cover that issue in its policies and programs.

At provincial level, the Mid Term Development Plan provides detailed support for delivery of national policy directions, in particular to strengthen community participation in development processes. Specific direction for empowering coastal communities and accommodation of local wisdom in disaster prevention is also addressed. Moreover, the notion of a disaster awareness culture is given specific attention along with coastal community awareness of resource management. There is, however, little direction in relation to providing diverse and environmentally sustainable livelihoods.

Similarly, the provincial Coastal Management Plan emphases strengthening social and economic factors and the capacity of coastal communities to: i) access financial resources, and ii) increase economic productivity. That policy aligns with the national policy for marine and fisheries development which prioritises marine and coastal resource competitiveness, productivity, innovation, and financial feasibility. In contrast, both national and provincial disaster management plans do not address any livelihood issues in their policies and programs. However, improvement of community awareness and participation is supported.

Table 7.2. National, provincial, and local policy/program to address the governance element

		Governance element/benchmark					
		Availability of leadership, legal framework, and institutions			Community involvement with government		
Planning document policy/program	**Document/Level**	National	Provincial	Local	National	Provincial	Local
	The long term development plan	- Indonesia that is democratic, just, and lawful - Environmentally based policy development - Multi sector, integrated, and comprehensive utilisation of marine and coastal resource	- Improvement of public participation and service quality	Pekalongan City: ▪ Improvement of city planning quality, performance, and public service • Semarang City: ▪ Improvement of public service, quality of bureaucracy, human resources ▪ Provision of law and regulations and enforcement	- Indonesia that is democratic, just, and lawful		Pekalongan City: i. Improvement of law enforcement and community participation Semarang City: ii. Improvement of public rights, awareness and participation iii. Strengthening community institutions and participation
	The mid term development plan	- Improvement of bureaucracy performance and government administration	- Implementation of disaster management that is planned, coordinated, and integrated - To strengthen government administration and its capacity, competency, and professionalism - Development of planning for hazard prone areas	Semarang City: ▪ realization of clean governance that is supported by appropriate infrastructure	- Imply in improvement of bureaucracy performance		
	The coastal management plan	- Strengthening human resources and institution in marine and fisheries sector	- Functioning of marine and coastal management institution and its regulation	Pekalongan City: ▪ Improvement of sectoral coordination ▪ Improvement of sectoral and inter regional coordination to mitigate coastal hazard impacts	- Coastal community is part of human resources target	- Coastal community empowerment	Pekalongan City: - Improvement of community awareness and participation in coastal habitat rehabilitation - Improve community monitoring and surveillance group for coastal management
	The disaster management plan	- Strengthening disaster management regulation framework - Integration of risk reduction program into development plan	- Strengthening institution and its capacity - Commitment development and strengthening		- Community based disaster management	- Implementation of participation planning	

Source: planning document analysis

Table 7.3. National and provincial policy/program to address society and economy element

		Society and economy element/benchmark					
		Communities participation			Diverse and environmentally sustainable livelihoods		
Planning document policy/program	**Level**	National	Provincial	Local	National	Provincial	Local
	Longterm development plan	- Indonesia that is democratic, just, and lawful	- Reduction of community with social problems and poverty	Pekalongan City: - Improvement of law enforcement and community participation Semarang City: - Prevention, management, and reduction of social problems by empowering community, poor group, children, and women	- Indonesian community that is prosperous and welfare - Minimising conflict and maintaining coastal resources sustainability	- Availability of basic need and food security - Improvement of fisheries production in sustainable way to increase fishermen economy	Pekalongan city: - Agriculture is directed to achieve food security - Pekalongan City as centre for fisheries. - Community empowerment, improvement of investment and financial institution Semarang City: - Developing city economic structure, distributing economic activity - Improvement of labour quality, investment, and economic infrastructure
	Mid term development plan	- Maintaining inclusive economic growth, reducing poverty, equal access to economy	- To improve democracy and human rights - To improve human resources quality in all aspects - Coastal community empowerment and participation - Improvement of local wisdom and community in disaster prevention	Semarang City: - Expansion and equal access to education and health in particular to poor community	- Poverty reduction - Maintaining food security	- To develop local economy network	
	Coastal management plan	- Poverty reduction in coastal areas - Empowerment of coastal communities and fishermen	- Improvement of coastal community and stakeholder awareness	Pekalongan City: - Active involvement of stakeholders in coastal damage rehabilitation planning - Outreach, socialisation, stakeholder meeting,, and community self initiative in coastal management and its regulation	- Development of marine and fisheries financial institution - Increase coastal and small island productivity and competitiveness - Development of fishing-based area with bankable activity - Development of marine and fisheries production centres - Development of marine and fisheries infrastructure	- Facilitation of coastal community to access to financial resources - Improvement of economic productivity and activity from marine and fisheries - Increasing economic contribution from coastal resources	Pekalongan City: - Improvement and empowerment of coastal community
	Disaster management plan	Improvement of participation and capacity	- Development of disaster awareness culture				

Source: planning documents analysis

At the local level, Pekalongan City and Semarang City provide more detailed programs. Improvement of economic activity and empowerment of community are prioritised. The Pekalongan Long Term Development Plan addresses fisheries development specifically while the Coastal Management Plan targets empowerment of coastal communities.

c. Coastal Resources Management

Existing national, provincial, and local plans address this element differently (Table 7.4.). The National Long Term and Mid term Development Plan provide general and specific policy direction for coastal resource management. In general, control of pollution and environmental degradation is highlighted. The Mid term Development Plan emphases integrated marine and land development and conservation. Policy to address coastal resource management is strong in national coastal management plans in particular regarding: i) coastal environmental management, and ii) fisheries and economic development of coastal and small islands.

However, in relation to coastal disasters, there is no specific direction stipulated by the document. Conversely, the Disaster Management Plan has no policy or program for coastal resources management. This is considered appropriate since coastal resource management is very specific and should be addressed only in a general manner under the environmental management theme in the Disaster Management Plan. This shows how important is the Coastal Management Plan to fill detailed policies and programs.

At provincial level, the Long Term Development Plan provides similar support for resource management both for general natural resources and coastal resources. Rehabilitation of habitat and prevention of destructive resource uses are highlighted to protect coastal community livelihoods. Strong support is given by the Coastal Management Plan where specific coastal disaster resilience and mitigation policy is addressed. Additionally, protection of coastal habitats from degradation is also prioritised. At the local level, the Pekalongan Coastal Management Plan provides detailed programs to address coastal resource management. Rehabilitation and conservation of coastal habitats are prioritised. Moreover, coastal hazards mitigation is addressed specifically through hazard assessment, team building, and physical construction. Similarly, Semarang City also has specific programs to address coastal inundation and its impacts under the development program.

Table 7.4. National and provincial policy/program to address coastal resources management element

		Coastal resources management element/benchmark								
		Active management of coastal resources and sustaining environmental services			**Protecting coastal livelihoods**			**Reducing risks from coastal hazard**		
	Level	National	Provincial	Local	National	Provincial	Local	National	Provincial	Local
Planning document policy/program	Long term development plan	- Indonesia that is advance as archipelagic country - Management of diverse natural resources	- improvement of natural resources quality - application of development system that is in accordance with ecosystem balance - improvement of sustainable development perspectives	Pekalongan City: - Sustainable development, pollution management, environmental degradation management Semarang City: - Natural resources management	- Development of marine resources	- Rehabilitation of coastal ecosystem and prohibition of destructive fisheries - environmental conservation that is reflected in preservation of environmental function, carrying capacity, and recovery to support social & economic development	Pekalongan City: - Strengthening fisheries development - Empowering fishing communities	- Controlling pollution & environment-al degradation	- Controlling pollution and environmental degradation	None
	Mid term development plan	- Controlling environmental degradation - For Java Sea: ✓ Integrated land and sea development ✓ Maintain and conserve marine environment and its law enforcement	- To optimise natural resources utilisation - Rehabilitation, restocking, and conservation of natural resources	Semarang City: - Ensuring sustainability of development	None	None	None	None	- Controlling pollution and environmental degradation	Semarang City: - Management of coastal inundation and flooding - Rehabilitation of degraded coastal areas and critical land and pollution management
	Coastal management plan	- Optimum and sustainable utilisation of marine and fisheries resources - Marine and coastal habitat and species conservation	- Designation of conservation areas - Socialization on importance of marine and coastal conservation	Pekalongan City: - Rehabilitation and conservation of coastal habitats - Refunctioning conservation zone along coastal areas - Improvement of stakeholder awareness on healthy coastal environment	- Development of small island to be highly economic island - Elimination of IUU fishing and destructive marine and fisheries resources uses	- Management of vital habitats for fisheries	None	None	- Development of coastal disaster resilience and mitigation - Controlling, reduction, and prevention of marine and coastal degradation	Pekalongan City: - Improvement of formal and informal education for coastal community - Improvement of coastal community health level - Mitigation of coastal hazards through: i)

		Coastal resources management element/benchmark								
		Active management of coastal resources and sustaining environmental services			**Protecting coastal livelihoods**			**Reducing risks from coastal hazard**		
										assessment of hazard and its impact to coastal land uses, ii) formulation of hazard management team, iii) build physical structure e.g. weave breaker, tidal control gate
	Disaster management plan		- Conservation and protection of natural resources - Rehabilitation and restocking	None	None	None	None	None	- Pollution and environmental degradation control	None

Source: planning documents analysis

d. Land Use and Structural Design

Land use planning and structural design are important tools to prevent disaster by limiting social and economic uses of hazard prone areas and ensuring man-made structures are capable of withstanding hazard forces. Integrated coastal management also provides a double-side of planning where land allocation is undertaken in consideration with environmental capacity (Hamza 2000). Land use also has been considered as one of the strategic tools to reduce disaster risk such as in flood management (Burby and French 1981), to create disaster resilient communities (Burby 2000), prevent people from living in hazardous areas (Shook 1997), and to reduce impacts from earthquakes (EMI 2006).

In the Coastal Management Plan, land used is accommodated by the coastal zoning plan that has a 20 year period, similar to the spatial plan. Coastal zoning is not only effective for allocating compatible activities to a location and separate incompatible uses, but also to avoid any development being located in hazard prone areas in the future. At the national level, there is no specific direction to address this element in long term or mid term development plans (Table 7.5). Generally, this element is accommodated in the spatial planning policy. In regard to coastal areas, coastal management provides specific arrangements in the form of coastal zoning plans and setback areas. However, both arrangements are in reality applied at the provincial and local levels. In contrast, provincial long term and mid term development plans address land use and structural design in some detail. Development of regional spatial plans, enforcement, and improvement of accessibility are prioritised. Moreover, specific programs to improve infrastructure in hazard prone areas and protection of coastal areas and flooding control are given. Those programs are supported by provincial coastal management plans by: i) coastal zoning development, ii) prohibiting development in setback areas, iii) establishment of green belts, and iv) construction of housing that can withstand hazards for coastal communities.

e. Risk Knowledge

Risk knowledge is important because in the end it is the community that will decide if the risk is acceptable for them or not and respond to it accordingly (Schwab, Eschelbach et al. 2007). The National Long Term Development Plan accommodates this element by

prioritising education about vulnerability, and disaster mapping. No specific direction is given by the National Mid Term Development and coastal management plan. The National Disaster Management Plan addresses this element by mandating disaster management plans and risk reduction action plans at all government levels. Complete assessment of risk knowledge accommodation is shown in Table 7.6.

In contrast, provincial planning has more detailed and supportive programs to strengthen risk knowledge. Community awareness and attitudes to natural resources management and risk reduction is prioritised by the provincial Long Term Development Plan. Detailed actions for hazard mapping, spatial planning, and mitigation are provided by the Mid Term Development Plan. Moreover, the provincial Disaster Management Plan also has a number of important programs that cover disaster mapping, public education, and assessment of existing resources and capacity. At the local level, Pekalongan City The Long Term Development Plan has strong programs to address knowledge about risk of disaster. Improvement of awareness, attitudes, and behaviour of the community are prioritised and supported by public education and application of technology. Improvement of community awareness to disaster is also supported by the Coastal Management Plan through public education about coastal pollution and improvement of sanitation and drainage systems.

f. Warning and Evacuation

Warning and evacuation are not well elaborated in national and provincial planning documents (Table 7.7). However, development of an early warning system is prioritised by the Long Term and Mid term Development Plans. The Long Term Development Plan gives specific directions to establishing a coastal early warning system, in particular to anticipate tsunamis. Unfortunately, the Coastal Management Plan does not provide any direction for the development of a coastal early warning system. Direction is given to an increased private role in enhancing warning delivery to the community at risk and it is accommodated by the National Disaster Management Plan.

Table 7.5. National and provincial policy/program to address land use and structural design element

		Land use and structural design element/benchmark					
		Effective land use and structural design			Complementing with environmental, economic, and community goals and reduce risks from hazards		
Planning document policy/program	**Document/Level**	National	Provincial	Local	National	Provincial	Local
	Long term development plan	- Spatial planning	- Regional spatial plan and its enforcement - Improvement of accessibility and mobility	Pekalongan City: - Land use planning, integrated regional development, Land administration and efficient management Semarang City: - To achieve effective spatial plan - Management of drainage to anticipate flooding and tidal inundation	- Improvement of natural resources management - Regional planning that is aware and responsive to natural hazards	None	None
	Mid term development plan	- Integrated spatial planning	- To implement provincial spatial plan - Improvement of flooding and coastal protection - Improvement of infrastructure in disaster prone areas	None	None	None	None
	Coastal management plan	- Coastal areas zoning plan - Coastal setback areas establishment	- Regulation, supervision, and enforcement of coastal land use (zoning) - Prohibiting development on setback areas by appropriate regulations - Coastal zoning/spatial plan development	Pekalongan City: - Mitigation of coastal hazards through assessment of hazard and its impact to coastal land uses, - Building physical structure e.g. weave breaker, tidal control gate to manage coastal hazards - Rehabilitation of coastal damage with environmental friendly approach e.g. combination of hard structure and mangrove	None	- Development of hazard friendly housing for fishing settlements prone to coastal hazard - Establishment of coastal green belt	
	Disaster management plan	- Prevention and mitigation program	- Spatial plan utilization and controlling - Coastal protection and flooding control		None	None	None

Source: document analysis

Table 7.6. National and provincial policy/program to address risk knowledge element

		Land use and structural design element/benchmark					
		Leadership and community members are aware of hazards			Coastal disaster risk based decision making		
Planning document policy/program	**Document/Level**	National	Provincial	Local	National	Provincial	Local
	Longterm development plan	- Natural disaster mitigation - Socialization and dissemination of disaster vulnerability - Socialization and information dissemination on vulnerability	- improvement of community awareness and attitude in natural resource management and natural disaster impact reduction	Pekalongan City: - Improvement of community awareness, attitude, and behaviour to manage environment and natural resources and disaster impact reduction - Reduction of disaster risk through socialization, community institutions, application of technology, and disaster management system	- Identification and mapping of disaster prone areas - Identification and mapping of disaster prone areas	None	Semarang City: - Addressing impact from coastal erosion and flooding
	Mid term development plan	None	- To reduce disaster risk by spatial plan, research, and technology - Identification of geological hazard prone areas	None	None	- Development of natural and geological hazard mitigation	None
	Coastal management plan	None	None	Pekalongan City: - Protection of coastal community from severe impacts of groundwater pollution through socialisation of risk and improvement of sanitation and drainage system	None	- Development of hazard prone area map and its mitigation	None
	Disaster management plan	- Development of disaster management plan and risk reduction action plan in national, provincial, and local level - Risk reduction for special need group	- Identification and monitoring of risk - hazard prone areas, community potency, and vulnerability mapping - local wisdom identification - Socialization of disaster potency to all stakeholders	None	None	- government capacity assessment, - evaluation of available resources for disaster management	None

Source: planning document analysis

Table 7.7. National, provincial, and local policy/program to address warning and evacuation

		Warning and evacuation element/benchmark					
		Community is capable of receiving notifications and act properly			Warning at-risk populations		
Planning document policy/program	**Level**	National	Provincial	Local	National	Provincial	Local
	Long term development plan	- Development of capacity and application of early warning system	None	None	- Development of coastal disaster and early warning system	None	None
	Mid term development plan	- Establishment of early warning system	- Development of search and rescue program	None	None	None	None
	Coastal management plan		- Education about setback areas for coastal and riverbank	None	None	None	None
	Disaster management plan	- Enhancement of private role in disaster management	- Development of disaster warning technology - Development of information technology that allows fast and accurate access to disaster management	None	- Early warning development program	None	None

Source: planning documents analysis

At the provincial level, the Long Term development Plan gives no direction on the development of a warning system. The development of a search and rescue program is addressed by the Mid Term Development Plan. That program is accompanied by development of technology to allow for a fast and accurate warning system under the provincial Disaster Risk Reduction Plan. The Coastal Management Plan provides support indirectly through education about coastal setback areas that give communities better understanding of hazard prone areas and allow them to respond accordingly.

g. Emergency Response

Direction for emergency response is minimal not only at the national level but also at provincial and local levels (Table 7.8). At the national level, development of a task force that can react promptly to disaster is prioritised. Improvement of capacity and capability to anticipate disasters and to support preparedness is addressed by the national and provincial mid term development plans. However, no further direction or program is elaborated.

h. Disaster Recovery

Similar to the emergency response element, the direction for disaster recovery is minimal (Table 7.9). It is only the provincial Disaster Risk Reduction Plan that provides direction to anticipate post disaster impacts and recovery from health, infrastructure, social problems, and children's points of view. However, a preparedness and recovery plan is mandated by the Disaster Management Act. It may be that no specific direction is given because it is expected it will be accommodated in a separate regulation.

Table 7.8. National and provincial policy/program to address emergency response

		Emergency response element/benchmark					
		Mechanisms and networks are established and maintained			Addressing emergency needs at the community level		
Planning document policy/program	**Level**	National	Provincial	Local	National	Provincial	Local
	Longterm development plan (RPJP)	None	None		None	None	None
	Mid term development plan (RPJP)	Improvement of capacity to overcome disaster	None	None	None	Improvement of capacity and capability of community preparedness to disaster	None
	Coastal management plan (ICM)		None	None	None		None
	Disaster management plan (DM)	Establishment of quick response task force	None	None	Disaster preparedness program	Improvement of education and training	None

Source: planning documents analysis

Table 7.9. National and provincial policy/program to address disaster recovery element

		Disaster recovery element/benchmark								
		Plans are in place prior to hazard events			Engaging communities in the recovery process			Minimizing environmental and socio economic impacts		
Planning document policy/program	**Level**	National	Provincial	Local	National	Provincial	Local	National	Provincial	Local
	Long term development plan (RPJP)	None	None	None	None	None	None	None	None	None
	Mid term development plan (RPJM)	None	None	None	None	None	None	None	None	None
	Coastal management plan (ICM)	None	None	None	None	None	None	None	None	None
	Disaster management plan (DM)	None	None	None	None	None	None	None	- Disease prevention - Rehabilitation and maintenance of infrastructure - Social services and rehabilitation - Protection of children wealth	None

Source: planning documents analysis

7.4.3. Fragmentation of Programs to Achieve Resilience

To know how existing planning documents address resilience, all related programs available in the long term development plan, midterm development plan, disaster management plan, and coastal management plan were evaluated. The results show there is fragmentation in these planning documents (Figure 7.2). The Long Term Development Plan (RPJPN) supports six elements of coastal community resilience including governance, society and economy, coastal resources management, land use, risk knowledge, and warning and evacuation. The Mid Term Development Plan (RPJMN) has fewer programs but still covers society and economy, natural resources management, warning and evacuation, and emergency response. This support from both plans is considered very strong and significant for coastal disaster management.

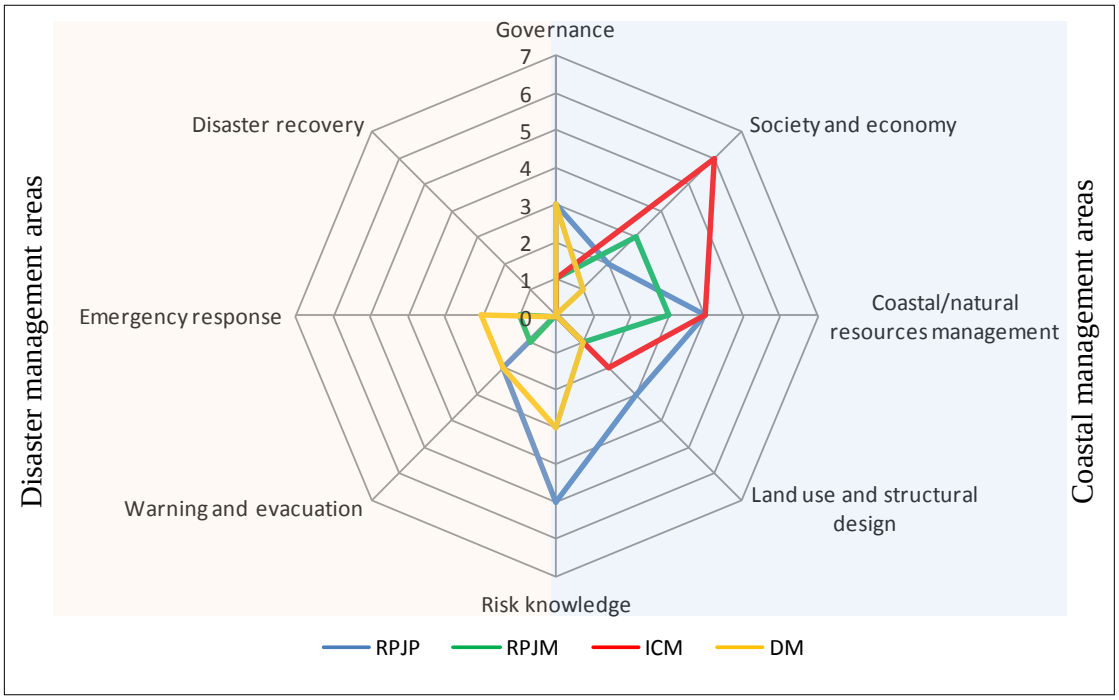


Figure 7.2. Number of programs accommodated in each national planning document

As can be expected, coastal management (ICM) and disaster management (DM) plans have strong support only for their area of concern and create gaps on both sides. The Coastal Management Plan has significant programs for coastal society and economy and coastal resources management. Two programs are also directed for land use in the form of coastal zoning. Meanwhile, the Disaster Management Plan mainly covers programs on risk knowledge, warning and evacuation, and emergency response. It is clear that

none of the coastal management or disaster management programs could cover all of the eight resilience elements. Additionally, support from the long term and mid term development plans could be beneficial only if: i) both coastal management and disaster management work together to fill the gaps and limitations of each field and ii) both fields provide direction and guidance on coastal hazards and the distribution of community vulnerability to be tackled by the long term and mid term development plans.

Similar analysis was undertaken at the provincial level (Figure 7.3). The Long Term Development Plan provides basic support to governance and risk knowledge elements. Significant support is given to society and economy and natural resources management. The Mid Term Development Plan covers more elements that include warning and evacuation and emergency response. Strong support is allocated for other elements such as governance, society and economy, resources management and land use and structural design.

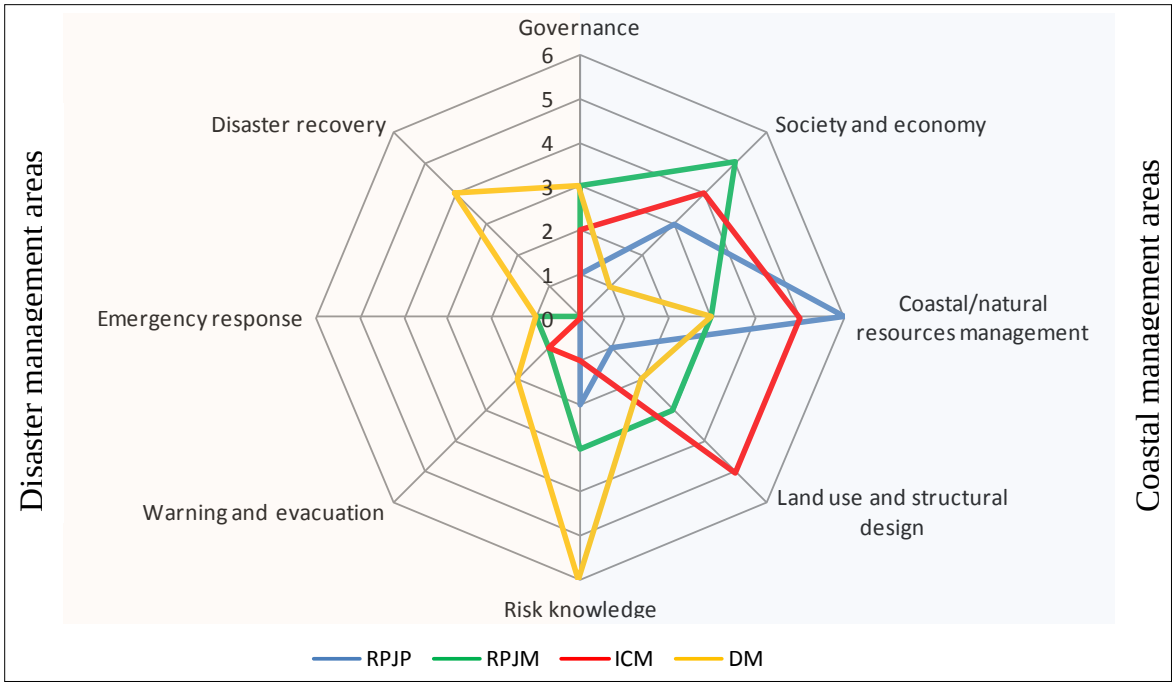


Figure 7.3. Number of programs accommodated in each provincial planning document

Even though programs on natural resource management are significant, the Central Java Province provides less detailed programs for specific coastal management and disaster

management in its long term development plan. The Long Term Development Plan addresses disaster management only on specific issues such as improvement of disaster awareness but does not mention the coastal management program. However, coastal resource management could be part of a general direction for natural resource management.

Conversely, the Mid Term Development Plan provides a more detailed program for disaster management. Four out of eight elements, governance, society and economy, resource management, and land use and structural design, are addressed. The activities include awareness development, implementation of spatial plans and technology to reduce disaster, development of infrastructure to protect coastlines and control flooding, and improvement of capacity and capability of preparedness. The coastal resource management program is not discussed in particular but more generally in term of natural resource management as in the long term development plan. Specific programs on coastal resources management and coastal community development are accommodated by the provincial Coastal Management Plan. Improvement of coastal social and economic development is accompanied by management and conservation of marine and coastal resources.

The Provincial Coastal Management Plan allocates significant programs for governance, coastal community social and economic development, coastal resource management, and coastal area zoning or spatial plan, and structural design. Interestingly, it also addresses risk knowledge and warning and evacuation for coastal disasters which are missing from the national marine and fisheries strategic plan. The Central Java Provincial risk reduction plan clearly addresses disaster management aspects and also considers natural resource management as an essential program. Governance, risk knowledge, and disaster recovery have a significant number of programs. As discussed previously, disaster risk reduction action in Central Java is allocated along sectoral tasks and responsibility under provincial government authority.

7.5. Discussion

Findings in this chapter showed that eight resilience elements are over arching areas and cannot be addressed only by a disaster management or a coastal management program or even a development plan. Therefore, integration, coordination, and communication

between all planning documents at national, provincial, and local levels are essential to achieving coastal community resilience. Considering the detailed elements of coastal community resilience suggests that there is no single powerful agency or approach that could address all of those eight characteristics. Even coastal management that is dedicated to achieve integrated and sustainable coastal development could not cover areas such as warnings and evacuation and emergency response. Those two things are addressed under a disaster management approach or agency.

The need for collaboration between development planning, coastal management planning and disaster management planning is apparent at the governance level where the planning processes takes place. As part of governance, planning documents should have characteristics that will lead to a resilient community (Table 7.10). However, in practice, as shown in this chapter, none of the existing planning documents have all of the desired characteristics. General guidance is provided by the long term and mid term development plans. For implementation, disaster management and coastal management plans translate those provisions into practical actions that are integrated with other sectors, different levels of government, and in a participatory way. Both disaster management and coastal management require development plans to ensure that their programs are supported by day to day development activities.

Table 7.10. Planning characteristic to achieve community resilience

Desired outcome/benchmark
1. commit on political and policy that include planning and priority
2. provide legal and regulatory system
3. integrate with development planning, and emergency response and recovery
4. provide institutional arrangement and allocation of responsibility
5. support partnership and community participation
6. program is monitored transparently and participatory
7. collaborate with sectors and different government level
8. support community action both technically and financially

Source (US-IOTWS 2007; Twigg 2009)

Both coastal managers and disaster managers need to collaborate on day to day development activities to address elements that are beyond their particular area of governance, society and economy, and land use and structural design. Community sustainability is then a paramount target to be achieved by all actors, plans, and programs. More importantly, disaster risk reduction is not a single action from a single

actor, it comprises multiple actions, processes, and inputs by many actors (Twigg 2009). Integrating disaster management plans or mitigation programs within existing coastal management and development plans provides at least two advantages (Schwab, Eschelbach et al. 2007): i) treat disaster management or risk reduction as part of daily government activity, and ii) incorporate disaster management into the routine decision making of development.

Complementarity and compatibility of programs are also required between different levels of government. For example, the provincial disaster risk reduction plan provides programs on spatial plan enforcement which can be directed to address coastal protection and flooding in relation to coastal disaster. Consistent with that direction, Semarang City also prioritises coastal inundation and flooding as a major city hazard. Stronger efforts are given when coastal management plans also include inundation hazards in their programs. This can be seen in Pekalongan City where, interestingly, complete and detailed elaboration of coastal hazards, in particular flooding and erosion, is provided. That accommodation is crucial in the absence of a disaster management agency and associated planning in Pekalongan City.

In terms of implementation, the disaster management plan provides strong governance for all type of disasters including coastal disasters. Specific programs on preparedness, early warning, emergency response, and post disaster recovery are allocated. In terms of coastal disaster, general arrangements for disaster management within the period of pre, during, and after disaster are provided by the plan. Particular detail is provided for coastal management. The marine and fisheries strategic plan provides detailed programs which prioritise social and economic development of marine and fisheries resources. Because coastal communities are socially and economically weak, those priorities are essential to reduce vulnerability to coastal disasters. However, there are negative consequences where the plan does not fully reflect what has been mandated by the Coastal Management Act, especially for coastal disaster mitigation. In this case, the provincial and local coastal strategic plans are more advanced by allocating coastal disaster as a main priority.

The functionality analysis method used in this chapter has been very useful to show how the different planning documents support coastal community resilience elements. It also

shows that there is a fragmentation of programs where no single planning document could cover all elements. For example, Figures 7.2 and 7.3 show that the coastal management plan has strong policies and programs for non disaster elements and in particular for coastal community social and economic and resource management. Meanwhile, the disaster management plan addresses significant policies and programs for disaster management elements and less coverage for non disaster elements. Those differences encourage both sides to work together and take benefit from each other. It is apparent for the Central Java Province, where the coastal management plan is supportive of coastal disaster management, to fill the gaps found in provincial and local disaster management plans. However, a number of considerations still need to be taken when applying this analytical approach: 1) the table and graph only show the number of policies or programs without considering the substance or content, 2) in relation to coastal disaster, the number of policies or programs is obtained only from the coastal management plan that addresses coastal areas or community specifically, while in reality support can also be obtained from other documents although this is more in general activities.

Understanding that no single agency and plan can address all characteristics of coastal community resilience to disaster provides a strong argument for integrated coastal and disaster management. In addition, because there is no superior agency for coastal disaster management, the situation is favourable for integration. No agency need be afraid of losing its authority or mandate by that integration, which is very often perceived as threatening by government agencies. Integration will only increase the impacts of policies and programs, and strengthen collaboration among stakeholders in reducing risk from coastal disasters.

7.6. Conclusion

Examination of existing documents shows that coastal management and disaster management are treated as strategic policies and programs for national planning as: 1) a specific program in coastal disaster early warning system is defined, 2) natural disaster mitigation and disaster prone area mapping is programmed, 3) marine and coastal resources management and sustainability as key factors for community resilience are highlighted and prioritised, and 4) an integrated and multi sector approach in coastal

management is recognised and supported which is important for implementation of Indonesian integrated coastal management.

However, there are certain elements of resilience which are not addressed well: i) warnings and evacuation, ii) emergency response, and iii) disaster recovery. Limitations are found both in national and provincial plans. It may be a consequence of: i) difference of time line between formulation of planning documents and enactment of the Disaster Management Act, ii) specific regulations on rehabilitation and recovery not yet enacted, and iii) awareness of disaster management issues not yet fully developed.

The resilience elements or characteristic are spread in both disaster management and coastal management areas. Fragmentation of existing programs is apparent and implies no single document could address all resilience characteristics. Each document has its own strengths and weaknesses. The coastal management plan supports coastal resource management elements and the disaster management plan provides significant support for emergency response, early warning, and preparedness. This information provides guidance for integration such as what element will be integrated and when to do the integration.

A number of questions still remain: 1) how and in which part of the formulation process the integration could be carried out and 2) when and in which element of the process document integration could be carried out. Without clear direction on implementing integration, many agencies will conduct business as usual and consider that integration will slow down and create problems for document formulation.

The next requirement is how to implement integration into the real planning process. A practical framework is required to facilitate that integration. That framework is proposed and discussed in the next chapter.

CHAPTER 8

INTEGRATION FRAMEWORK FOR DISASTER MANAGEMENT AND COASTAL MANAGEMENT PLANNING

8.1. Introduction

In the preceding chapters, disaster management and coastal management have been examined on the basis of conceptual approaches, legal arrangements, and practical planning, in the Indonesian context. Results from conceptual analysis of integration (Chapter III) concluded that conceptually, disaster management and coastal management could use their own attributes to work together to reduce coastal community vulnerability and disaster risk. Mitigation and recovery phases are two stages where ICM input provides most benefit using its strategic and operational plan documents. Conversely, ICM benefits from hazard, vulnerability, and risk assessment provided by the disaster management program in allocating sectoral activities, land uses, coastal community strengthening, and resource management.

Examination of the legal context (Chapter IV) showed a number of arrangements in the Indonesian Disaster Management and the Coastal Management Acts that potentially create challenges and problems for implementation, but at the same time also encourage integration. That is clearly shown in relation to coastal disasters. The acts' scope and mandates influence each other. For example, problems in geographic jurisdiction for the Coastal Management Act could be addressed by the Disaster Management Act that has a broader jurisdiction. Benefits need to be exploited as both acts have many similarities in areas of risk reduction and community empowerment. Integration of acts' mandates and activities will not only streamline the acts' implementation but also reduce the existing burdens on local government to conduct planning.

According to the acts' planning requirements, integration could be executed through planning documents of both disaster management and coastal management. Pre disaster event planning is the most suitable phase where integration with coastal management activities would create optimum impacts to reduce coastal disaster losses. Pre disaster event planning could be undertaken using all four hierarchical documents in the Coastal Management Act and the Disaster Management Plan and the Risk Reduction Action Plan for the Disaster Management Act.

Further analysis in Chapter V examined existing planning documents compliance with the acts' mandates. It was shown that existing disaster management plan documents do not fully comply with the act's arrangement. In relation to coastal disasters, the conclusion was: i) several essential elements for addressing coastal disasters are missing from the Disaster Management and Risk Reduction Action Plan, and ii) the Coastal Management Plan could and should fill the missing elements using coastal disaster mitigation obligations mandated by the Coastal Management Act. These findings require that both coastal managers and disaster managers consult each other and interact actively during plan development.

Those conclusions are supported by examination of the compatibility of existing plans (Chapter VI) in identifying, prioritising, and allocating actions to address coastal disaster issues in Indonesia. The results showed that existing gaps are not only found in the act's compliance but also in planning documents' policies and programs. There are a number of inconsistencies between planning documents. Coastal management and disaster management issues in the National Long Term Development Plan are not translated and elaborated in lower level planning documents, and in some cases are missing. The Coastal Management Strategic Plan fills the gaps by allocating coastal hazards as priority issues and programs. These findings further support the importance of integrated planning between coastal management and disaster management.

Finally, the need for integration is supported by the findings of Chapter VII where, from a functionality point of view, it is shown that no single document could address all characteristics of coastal community resilience. Although disaster management and coastal management plans have their strengths and weaknesses, certain elements of resilience are elaborated minimally in planning documents both at the national and provincial planning levels. Minimum response and fragmentation of programs are the most apparent problem. Without integration, coastal community resilience is difficult or impossible to achieve.

This chapter develops an integrated framework for disaster management and coastal management based on findings and conclusions from previous chapters on conceptual, legal, and planning issues. Elaboration on how that framework can be used, its benefits, and problems are presented and discussed.

8.2. Proposed Framework

The proposed integration framework between disaster management and coastal management brings together and organises three levels at which integration occurs: i) conceptual, ii) legal arrangements, and iii) planning arrangements. At the conceptual level, the framework guides any new approaches between the two fields that still need to be developed and how they could be linked and matched to increase the integration. The framework at the legal level would aid government in developing and implementing regulations of the acts, in the form of government regulation, presidential decree, or ministerial decree. The framework guides which arrangements and mandates of the acts need synchronized regulations to increase effectiveness and avoid any contradictions. The framework at the planning level guides coastal managers and disaster managers to collaborate and integrate planning documents, content, and processes to accelerate coastal disaster risk reduction programs.

At the conceptual level, integration is undertaken in three different steps (Figure 8.1). Firstly, it is on conceptual elements. There are three elements for integration in coastal management policy, function, and system which have a strong correlation with two main elements of disaster management mitigation and recovery. Therefore, integration between these two approaches is best applied within these elements.

Secondly, it is on conceptual planning. The integration is undertaken using strategic and operational plan types. In coastal management, the strategic plan type accommodates: i) issue identification and ii) program preparation. For disaster management, the strategic plan type is represented by the disaster management plan. For operational plan type, the integration is undertaken between the preparedness plan, emergency plan, and recovery plan and ICM implementation, formal adoption, and monitoring and evaluation. Thirdly, conceptual activities that are integrated include all ICM applications, where coastal disaster protection is one of those activities, hazard analysis, vulnerability analysis, and risk analysis for disaster management

The framework for integration of the Disaster Management and Coastal Management Acts' mandates and arrangements is presented in Figure 8.2. The Coastal Management Act mandates six types of integration to be undertaken for coastal development and planning. These six types of integration can occur in the two major phases of disaster

management, as regulated under the Disaster Management Act: i) pre disaster event, and ii) post disaster event. Six integration requirements under the Coastal Management Act supports these two stages by optimising available resources at all levels of government, stakeholders, and environments.

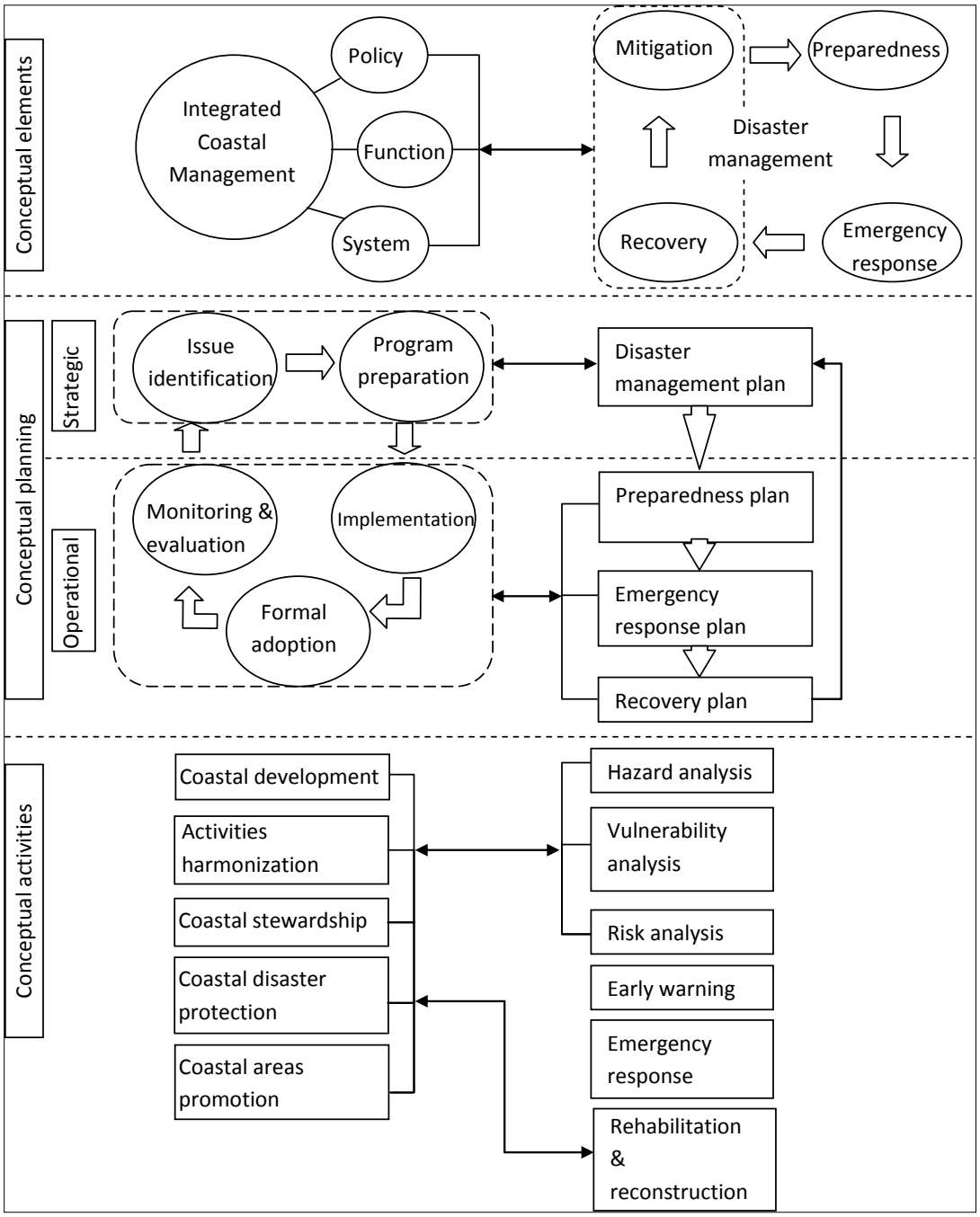


Figure 8.1. Integration framework between disaster management and coastal management conceptual elements, planning, and approaches.

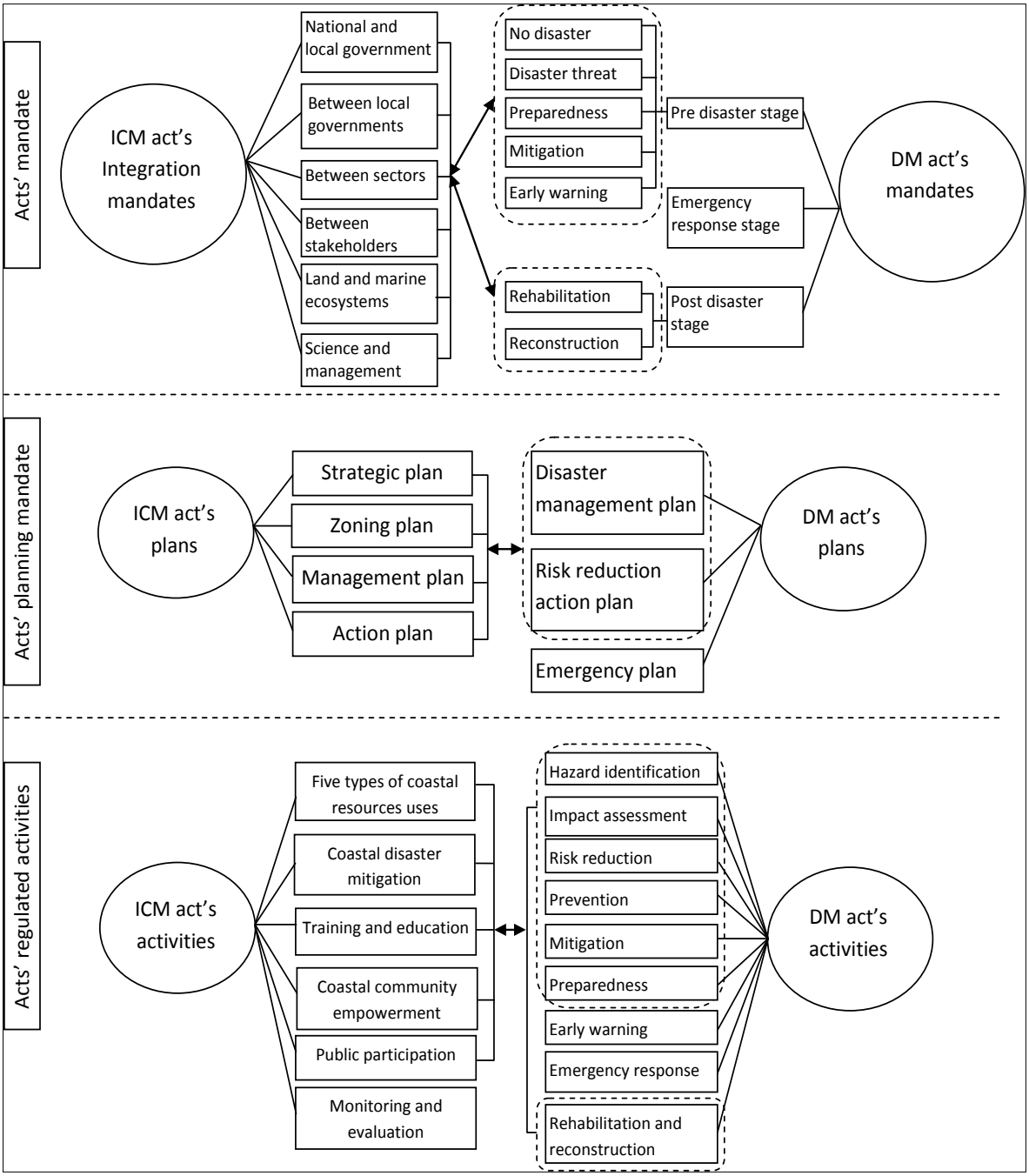


Figure 8.2. Integration framework between the Disaster Management and the Coastal Management Acts' mandates, plans, and activities.

The acts' directives on coastal management and disaster management are then translated into planning arrangements. Under the acts' mandates, the disaster management plan and risk reduction action plans could be integrated with all four coastal management hierarchical plans. The strategic plan would support the long term program, the zoning plan serve to avoid development in hazardous areas, the management plan provides

coordination and consultation mechanisms, and the action plan supports on ground activities to reduce the risks (Table 8.1).

Table 8.1. Interconnection and integration between coastal management and disaster management plan

Document type/temporal scale		Coastal management act			
		Strategic plan (20 yr)	**Zoning plan (20 yr)**	**Management plan (5 yr)**	**Action plan (1-3 yr)**
Disaster management act	**Disaster management plan (5 yr)**	• Data and information sharing • Disaster risk is one of strategic/priority issues for coastal management • Strategic plan provides policy and program commitment for long term	• Hazard prone areas are identified and located in the zoning map • Limited permit to be issued in the zone • Spatial regulation is arranged e.g. setback areas is designated and located in the map	Inform management plan on resource and coordination requirements for disaster management	Inform key actions that are important to be allocated in action plan to support disaster management
	Risk reduction action plan (3 yr)	Activities that need long term commitment are secured because the issue is aligned in the strategic plan	Coastal zoning and setback areas will provide protection from coastal hazards in long term	• Ensure coastal resource utilisation is not exceeding carrying capacity and lead to disaster • Training for coastal managers in coastal disaster field	• Support actions that address coastal community and environmental vulnerability • Ensure other support program from sectors in coastal areas
	Emergency plan (during the event)	Indirectly, inform strategic plan on main activities during emergency response	Indirectly	• coordination during the emergency response is accommodated in management plan • Available resources in coastal management agency are identified for emergency response	Indirectly, provide activities that could support emergency response

Integration of planning documents also directs and guides the implementation of a number of activities that are regulated by the acts. All five types of coastal resource uses regulated by the act, coastal disaster mitigation, training and education, coastal community empowerment, and public participation are integrated with hazard identification, impact assessment, risk reduction, disaster prevention, mitigation, preparedness, and rehabilitation and reconstruction that are obligations under the Disaster Management Act (Figure 8.3 and Table 8.2). Integration can be achieved when

the coastal managers and disaster managers implement their activities. There are many potential benefits since these activities influence each other directly or indirectly.

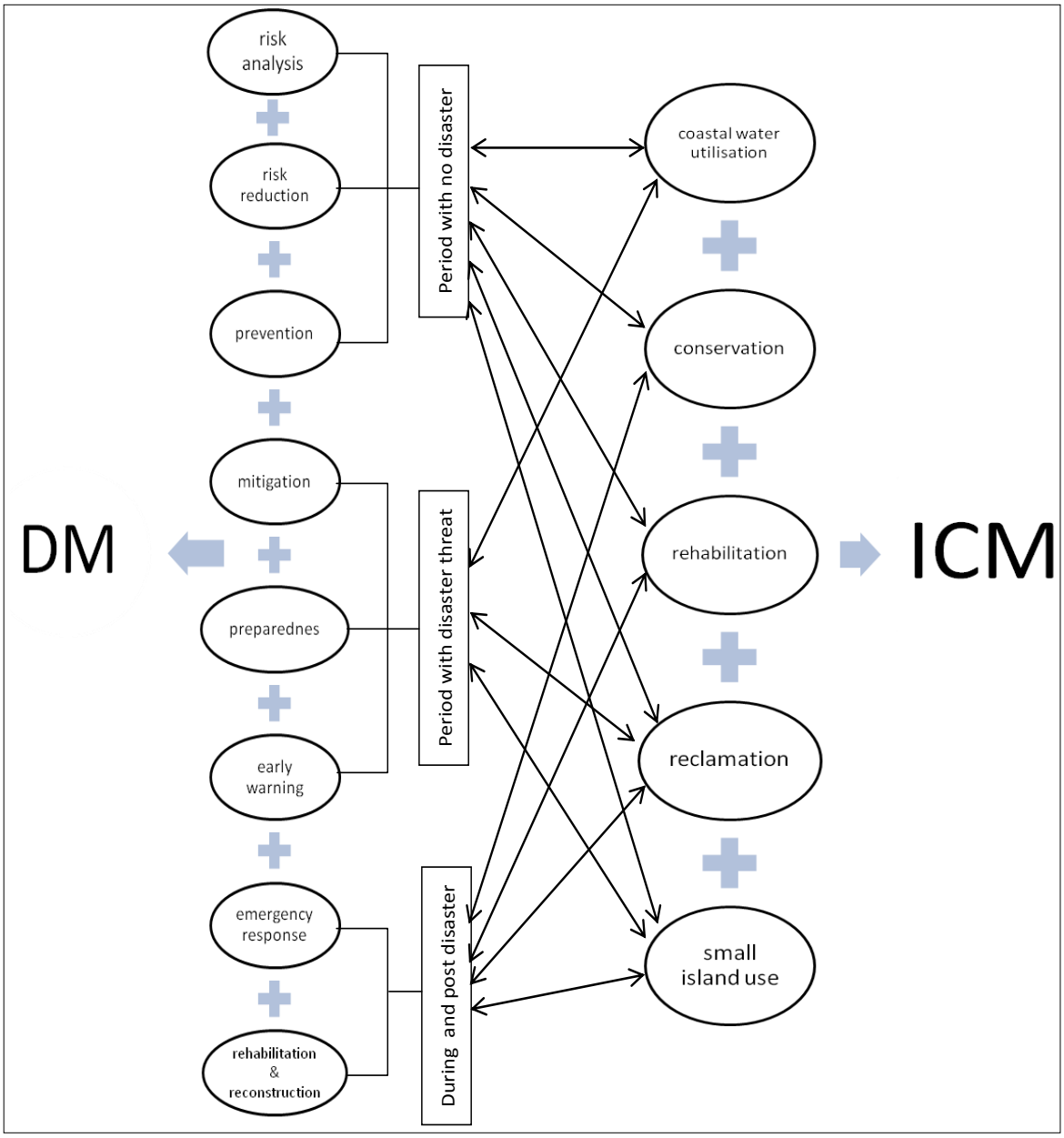


Figure 8.3. Interaction between disaster management activities and the five types of coastal area utilization as regulated by the acts.

Table 8.2. Complementary activities between coastal management and disaster management

Major activity		Coastal management act				
		Coastal water utilisation	**Small islands utilisation**	**Conservation**	**Rehabilitation**	**Reclamation**
Disaster Management Act	**Hazard, vulnerability, and risk analysis**	Direct, positive e.g. hazard prone areas to be avoided from economic investment	Direct, positive e.g. hazardous coastal and small islands from coastal hazards	Direct, positive e.g. designation of setback areas, conservation areas to maintain community resilience	Direct, positive e.g. coastal habitat at hazard prone areas is prioritised for rehabilitation program	Direct, positive e.g. hazard prone areas to be considered for reclamation project
	Risk reduction action	Direct, positive e.g. investment has to increase and diversify coastal community income	Direct, positive e.g. investment has to increase and diversify coastal community income	Direct, positive e.g. conservation increase and maintain coastal environment and community resilience	Direct, positive e.g. habitat rehabilitation to maintain environmental and community resilience	Direct, positive e.g. reclamation has to increase protection from coastal hazard such as tidal flooding and coastal erosion
	Prevention	Direct, positive e.g. any un sustainable exploitation and exceeds carrying capacity should be prohibited, no permit is issued in hazard prone areas	Direct, positive e.g. any exploitation that is not sustainable and exceeds carrying capacity should be prohibited	Direct, positive e.g. habitats that are essential for coastal community wellbeing need to be managed and protected	Direct, positive e.g. degraded habitats that essential for coastal community wellbeing need to be rehabilitated	Direct, positive e.g. reclamation project has to minimise the impacts to surrounding areas, no project is permitted in hazard prone areas
	Mitigation	Direct, positive e.g. any activities need to comply with coastal zoning and spatial plan	Direct, positive e.g. any activities need to comply with coastal zoning and spatial plan	Indirect, positive e.g. protected habitat could be used for education and awareness	Indirect, positive e.g. rehabilitated habitat for example mangrove, coral reef, and sand dune could be used for education and awareness	Direct, positive e.g. any reclamation project needs to comply with coastal zoning, spatial plan, and building standards
	Preparedness	Indirect	Indirect	Indirect	Indirect	Indirect
	Early warning	Direct positive e.g. reduce investment loss from coastal hazard	Direct positive e.g. reduce investment loss from coastal hazard	None	None	Direct positive e.g. reduce investment loss from coastal hazards
	Emergency response	None	None	None	None	None
	Rehabilitation and reconstruction	Direct, positive e.g. providing economic recovery	Direct, positive e.g. providing economic recovery	Direct, positive e.g. support environmental recovery and conserve critical habitat for future events	Direct, positive e.g. support habitat and environmental rehabilitation	Direct positive, e.g. degraded important coastal segment could be reclaimed

Note: activities are based on act's arrangement e.g. mitigation is limited to three activities that are mandated by the Disaster Management Act (implementation of spatial plan, regulation on development, infrastructure, and building, and education, outreach, and training).

Integrated planning in the real planning process is guided by the framework that is presented in Figure 8.4. It is undertaken using all planning types, contents, and the process of public participation.

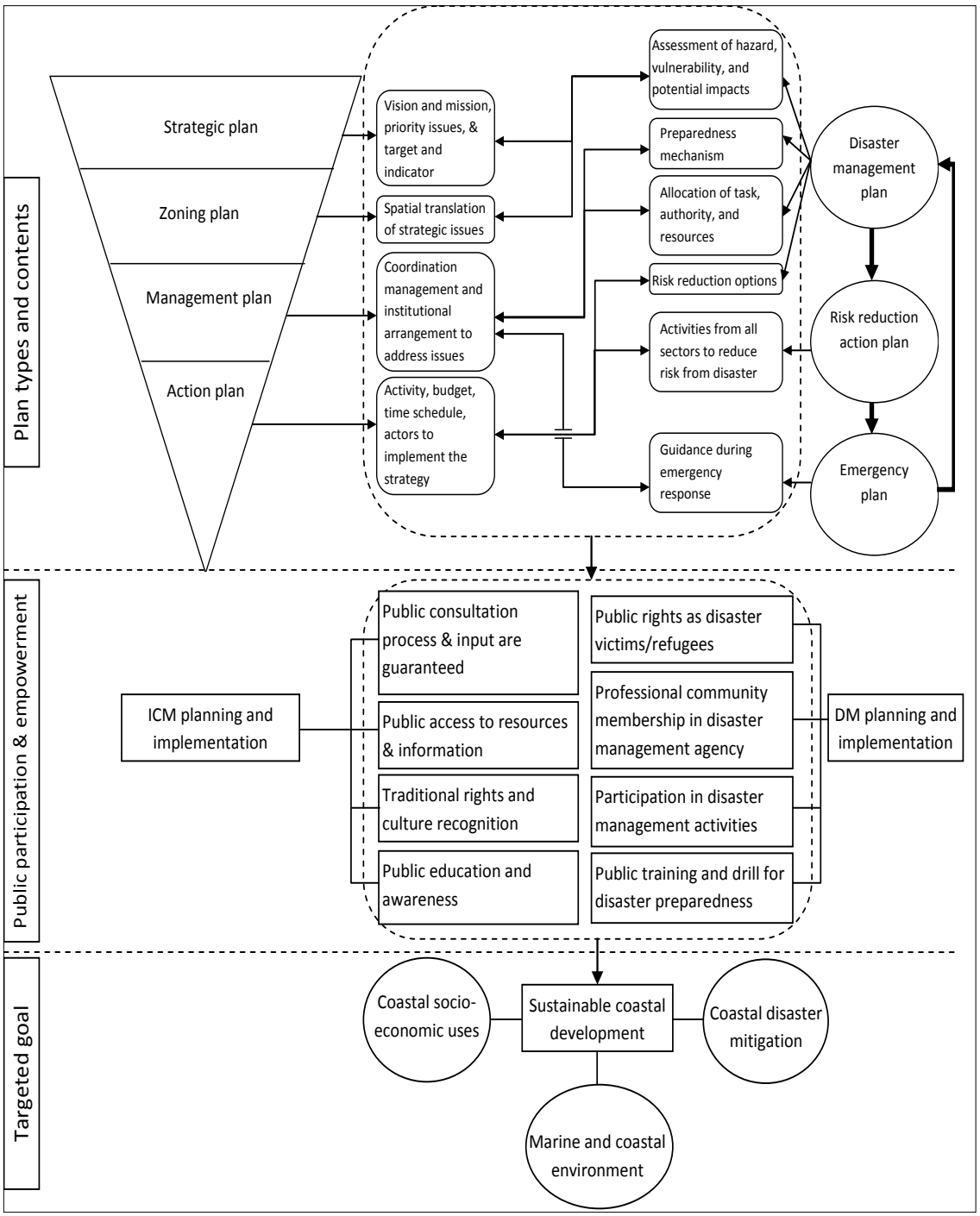
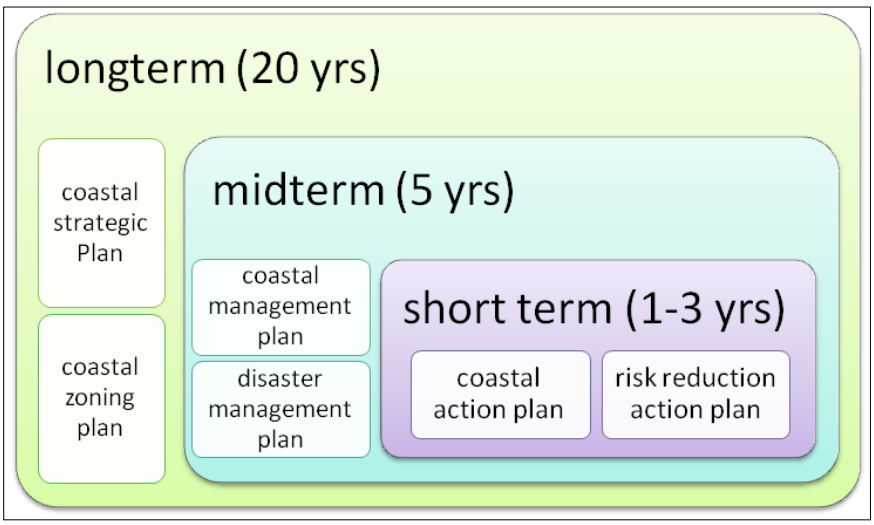


Figure 8.4. Integration framework for disaster management and coastal management planning

It would be best if the disaster management plan was already available for the development of ICM. This is important because integration will need to begin with analysis of potential hazard, vulnerable elements and risk distribution. The coastal management strategic plan considers coastal hazards as a priority issue that need to be addressed by all stakeholders. This priority is translated into spatial policy in the form of coastal zoning by applying coastal setbacks and hazard prone areas that need specific management tools e.g. permits and building standards. Disaster management provides support by obliging all development to follow the building standard. Coordination, management, and resource allocation during a disaster event are incorporated into the coastal management plan document. Finally, the risk reduction plan obtains the most benefit from implementation of the coastal management action plan when the coastal hazard is already prioritised in the strategic plan.

However, there is a potential problem from time spectrum point of view, because the planning timeframe for both acts is different (Figure 8.5). Coastal management plans, in particular the strategic plan and the zoning plan provide long term security for risk reduction commitment in spite of any changes in local leadership that take place every 5 years. However, a long term proactive approach is not really suitable to cope with disaster events especially sudden and catastrophic types (Kay 2006). In this regard, the emergency and rehabilitation reconstruction plan could provide guidance for coastal management after the disaster event.



Source: (Indonesia-CZMA 2007; Indonesia-DMA 2007)

Figure 8.5. Time frame difference in coastal management and disaster management plan

From the public role point of view, both acts have different articulation in accommodating and involving public participation (Table 8.3). The framework guides how integration of the public participation and consultation process are conducted. For example, awareness of coastal hazards is part of the coastal management plans consultation, and to be discussed along with information on coastal hazards, public rights, and preparedness. There is no need to conduct separate public consultations to discuss coastal disaster.

Table 8.3. Arrangements for community roles and participation

	Planning process	**Access to resource**	**Empowerment**
Disaster management	• Professional community participation in the disaster management structure • Participate in health assistance	• Receive any resources as rights for victims and refugees • Compensation for construction failure	• Training and education in disaster management • Community resilience program
Coastal management	• Comment and input to coastal management plans • Access data and information and research results on coastal management programs • Indigenous practice and rights are recognised in the plans • Propose conservation area to protect their culture and livelihood • Monitor and control coastal management activities • Community inputs are guaranteed to be accommodated in the plan	• Objection to any programs that limit their access to resources • Get compensation for loss of access • Conduct class action to obtain access • Public access to beaches • Social and cultural interest is a priority in zoning plans	• Partnership between communities, private sector, universities, and governments in coastal management • Incentives and encouragement for any activities that benefit coastal communities and the environment • To grow and improve community capacity and awareness of coastal management programs

Source: (Indonesia-CZMA 2007; Indonesia-DMA 2007)

Input and comment from public consultation are incorporated in both coastal management and disaster management plans. The guarantee that the input will be accommodated is obligated under the Coastal Management Act, and is essential to avoid any suspicion that the consultation is merely a way to bypass the plans. Both training and education programs within coastal management and disaster management could be synchronised to improve coastal community understanding about disaster, and the role of the coastal environment in protecting them from hazards, and their rights and responsibilities.

Finally, integration between planning types and content and public participation processes leads to achievement of the ultimate goal which is the sustainable development of coastal areas. Three essential elements are addressed by the framework: i) socio-economic development, ii) marine and coastal environmental development, and

iii) coastal disaster mitigation. In this context, integration plays an important role by reducing disaster risks in three overarching programs: 1) environmental protection, 2) socio-economic empowerment and 3) coastal disaster mitigation.

A number of factors such as environmental integrity and social and economic capacity need long-term processes to be achieved and maintained. Natural protection will not only ensure sustainability of coastal environments to support livelihoods but also provide protection from hazards themselves by reducing and absorbing hazard intensity. Social empowerment aims to increase the community's participation and access to information, resources and government services that are essential to cope and recover from disaster. Economic development strengthens a community's economic ability to cope with disaster. To achieve those conditions, ICM will facilitate stakeholder consultation, multi sectoral coordination, integration of science and management, and consistency of programs from local, provincial and national levels. Most of those factors are missing from, or weak in the Disaster Management Act arrangements.

8.3. Discussion

The framework that is developed in this chapter shows how the Coastal Management Act activities can support disaster resilience. Implementation of coastal management ensures the sustainability of coastal resources that are essential for community social, economic, and cultural life. In addition, the integration framework also shows that disaster management contributes to the ICM program through: i) identifying hazard areas and risk distribution that are important for coastal zoning, permits and licences for new development assessments, ii) assisting conservation and rehabilitation planning based on coastal hazard analysis could be used as a key parameter in conservation planning, iii) information on risk assessment could be used as a management issue for coastal policies and programs.

These findings are in line with existing conceptual ideas where ICM supports coastal disaster mitigation through: i) maintaining the integrity of the natural system that should reduce the risk from natural hazards because healthy coastal ecosystems are fundamental to coastal communities' well being and protection from coastal hazards (UNEP 2005), ii) integrating social, economic and environmental interests that will maximise and sustain the benefit of coastal resources for the community (Cicin-Sain

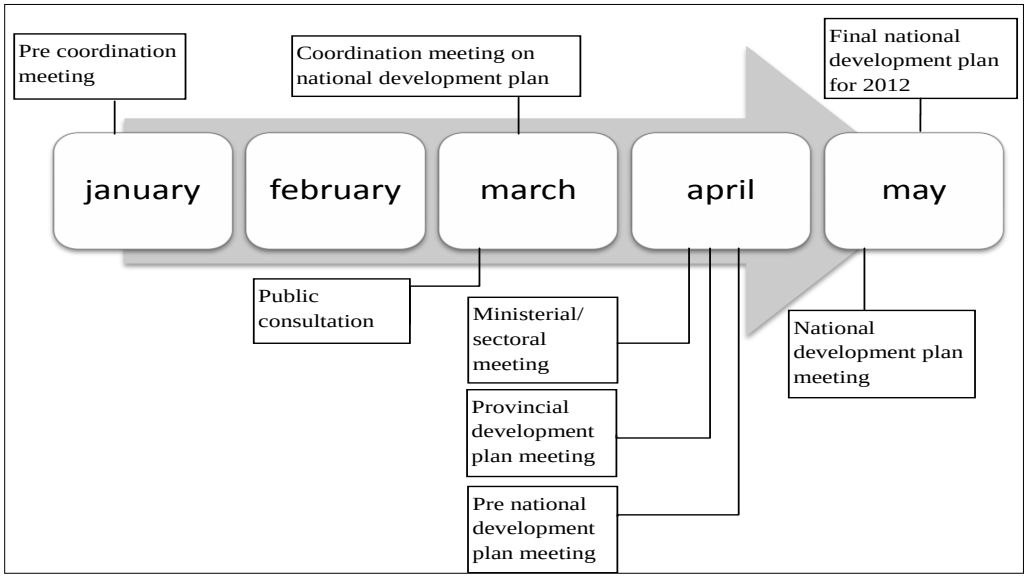
1993), iii) reducing coastal environmental degradation and community poverty that is vulnerable to coastal disaster (Olsen and Christie 2000), iv) a stakeholder forum in the early stage of ICM program development could be used in public consultation and awareness campaigns for coastal hazards (Cicin-sain and Knecht 1998).

In terms of public participation, the integrated framework provides a way for disaster managers to collaborate with coastal managers to their benefit, and overcome the limited public participation and empowerment of the Disaster Management Act. The findings of Chapter IV showed that public roles are regulated by the disaster management and coastal management acts, but the Coastal Management Act provides for more public recognition and involvement. The arrangements in the Coastal Management Act are strong, and benefit disaster management activities in particular with regard to: i) community participation, access to resources, and social and cultural recognition, ii) involvement in coastal management planning, and iii) assurance their input is accommodated in the plans.

The Disaster Management Act provides complete and detailed support for communities during and after an event whereas that arrangement is lacking in the Coastal Management Act. This results in coastal managers relying on disaster managers to address emergency response during coastal disaster events. Rehabilitation and reconstruction, where community is given an important role, are neglected in the Coastal Management Act regulation area. However, the obligation to build a better and stronger community before the next disaster is supported by coastal management programs. The community needs to use both arrangements to increase their resilience from disasters.

Even though the framework is potentially very useful and robust for facilitating the integration of disaster management and coastal management, a number of limitations still need to be anticipated. First, disaster management and coastal management planning will follow the national system and process of planning (Figure 8.6). As the Disaster Management Plan is currently influenced by periods with or without disaster threat and disaster event, the planning processes need to be adjusted to align with existing national processes. Similarly, specific requirements for public consultation and legislation for coastal hierarchical plans also influence time requirements and planning

processes. The framework focuses on the substance, content, type of plan, and regulated activities but does not incorporate the complexity of the time frames of planning.



Sources: (Bappenas 2011)

Figure 8.6. Time frame for national development plan discussion and coordination

Second, the framework is ideally used for locations where both disaster management and coastal management planning are implemented. Disaster management agencies are not mandatory for district/city government, therefore it is likely that many locations will only conduct a coastal management plan but not a disaster management plan. Moreover, if a disaster management agency is not established in a location, then the coastal manager needs to consult with different agencies and needs different approaches to accommodate different plans. Thus adjustment of the framework is needed.

It is therefore important to test the framework using real institutional arrangements, development plans, coastal management plans, and disaster issues in local government. Testing of the framework provides an opportunity to examine framework's strengths and weakness, and to address the practical problem of integration. Using real planning practice at local government level also provides an example of how integration could be conducted by the agency for marine and fisheries and the local disaster management agency.

8.4. Conclusion

The framework for integration between disaster management and coastal management has been developed using conceptual approaches, acts' mandates and arrangements, and planning practice. The framework guides the adoption of disaster management information strategically and politically in the strategic plan, spatially in the zoning plan, institutionally and coordinating in the management plan, and practically in action plans. Simultaneously, with other hazard types, coastal hazards will be accommodated in disaster management plans with specific programs and policies to mitigate coastal disaster risks, inform communities, increase preparedness and develop early warning systems.

The framework still has limitations, in particular how to integrate with the real time frame of the planning process and the fact that not all local governments have established disaster management planning. Customization and modification of the framework to adjust to real disaster management and coastal management issues and institutional arrangements at the local level are needed to optimise the framework's applicability. Therefore, testing the framework at the local level to address coastal hazards issues is essential to examine its practicality, benefits, and problems in implementing the framework. This test will be presented and discussed in the next chapter using coastal hazards issues for Pekalongan City, Semarang City, and Central Java province, Indonesia.

CHAPTER 9

ASSESSMENT OF COASTAL HAZARDS AND COMMUNITY VULNERABILITY IN CENTRAL JAVA, SEMARANG CITY, AND PEKALONGAN CITY

9.1. Introduction

Previous chapters have addressed the background and need for integration between disaster management and coastal management to address coastal disasters. Results from reviews of conceptual approaches and Indonesian legislation have also been used to develop an integration framework (Chapter 8). As discussed in Chapter VIII, integration is encouraged from the accommodation of coastal hazards as a coastal management issue, which should then be translated into strategic and operational plans. How the framework works in a real situation, however, remains in question. Therefore, this chapter assesses coastal hazard and community vulnerability, and then Chapter X examines the existing responses from local planning documents and how the integration framework can be applied to address the problems.

This chapter assesses coastal inundation and community vulnerability at Pekalongan and Semarang City, Central Java Province Indonesia. The selection of coastal inundation as a case study for coastal management and disaster management planning is based on the fact that: i) chronic hazards get less attention from governments and communities than do catastrophic ones, and ii) coastal inundation has been a chronic problem for many communities and will be exacerbated by local conditions such as land subsidence and climate change impacts in the future. It is particularly important because sea level rise will be compounded by associated climate change hazards such as extreme waves and storms, affecting coastal communities, and disturbing social, economic, and environmental aspects. Semarang and Pekalongan are both located in low lying coastal areas and are very vulnerable to coastal inundation and flooding. As they are also centres for administrative and economic activities, the impact will disrupt public services and the local economy.

Several studies have previously been conducted to assess the potential impacts of climate change, in particular tidal inundation, in Semarang (Kobayashi 2004; Anggraini 2007; Marfai and King 2008). These studies all described negative impacts of tidal

inundation to local land uses, infrastructure and community. However, no research has yet assessed hazard threats, community vulnerability and planning response from the local government together. Moreover, the challenge of how to integrate existing planning responses from coastal management and disaster management authorities in order to increase the effectiveness of the programs has not yet been addressed.

A GIS was used to map the distribution of potential inundation and vulnerable populations. Overlaying techniques were applied to examine hazard and vulnerability distribution and their spatial distribution. How the information from that assessment can be used to allocate appropriate action programs is presented and discussed.

9.2. Objective

The objective of this chapter is to apply the integration framework between disaster management and coastal management to address coastal inundation problems at Pekalongan and Semarang City, Central Java Province. The specific aim is to assess and map hazard, vulnerability, and potential impacts of coastal inundation at a provincial/regional level and at the local level.

9.3. Case Study Area

The study areas are along the North Coast of the Central Java Province for regional assessment and Semarang City and and Pekalongan City for more detailed assessment.

9.3.1. Central Java Province

Central Java Province is located in the centre of Java Island between West Java and East Java Provinces (Figure 9.1). Administratively it has 35 districts and as of 2000 (the last census) had 31.2 million population which was the third most populated province in Indonesia (BPS 2009). During the last three decades the population growth has averaged 1.2%/yr and it is predicted that the population will reach 33.2 million by 2025 (SI-BPS 2009). The population and development activities along the north coast have placed significant pressures on coastal environments, with habitat degradation, pollution and over- fishing occurring in many locations. Mangroves and coral reefs (important habitat for fisheries, coastal protection, and sediment stabilization) have been removed or degraded, with only small amounts remaining in some coastal areas (Figure 9.2).

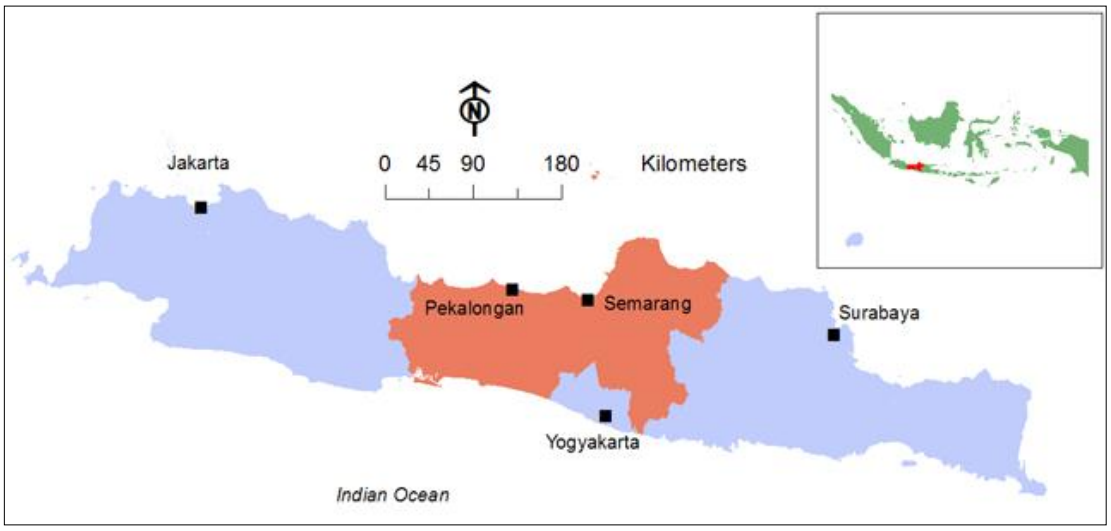
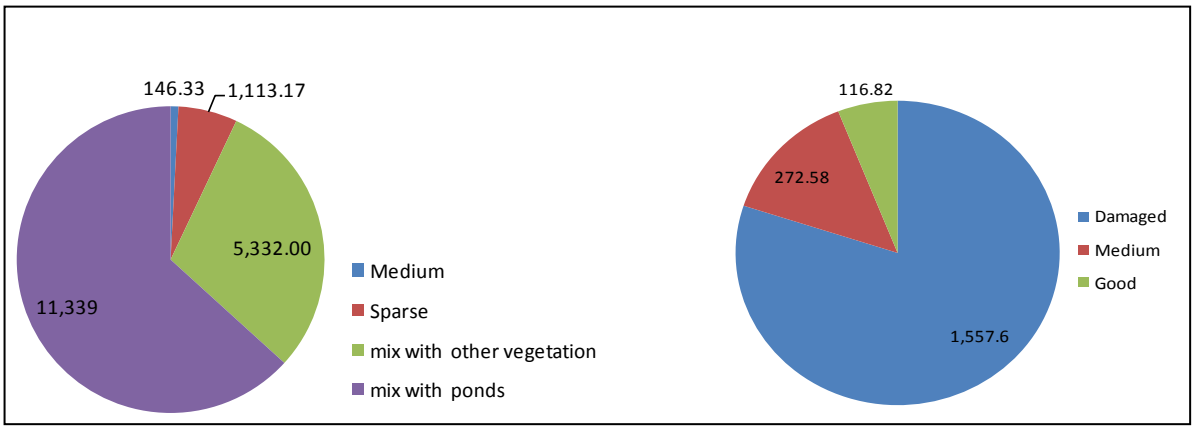


Figure 9.1. Central Java Province

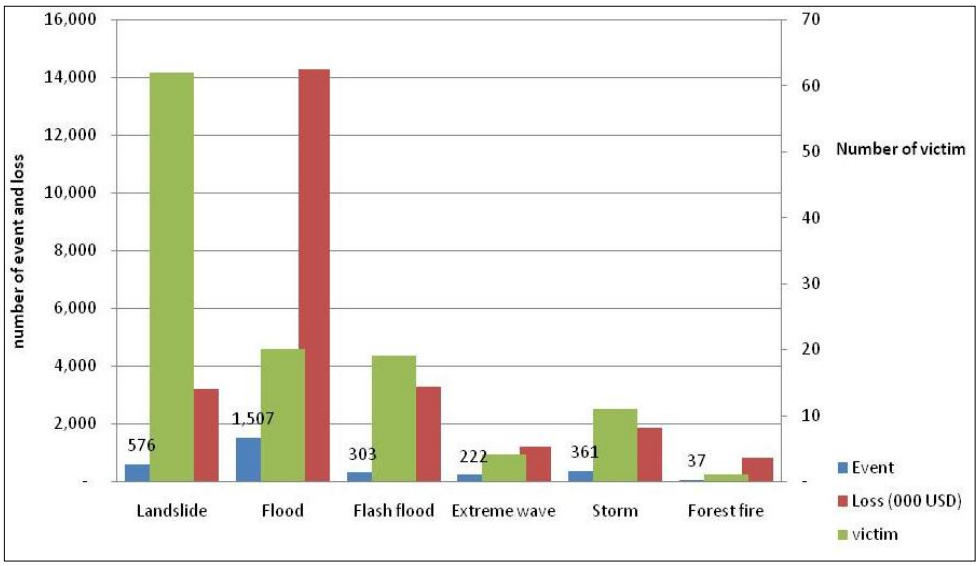


Source: (BPDAS-PemaliJratun 2006) Source: (DKP-Jateng 2009)

Figure 9.2. The condition of mangrove (left) and coral reef (right) at Central Java

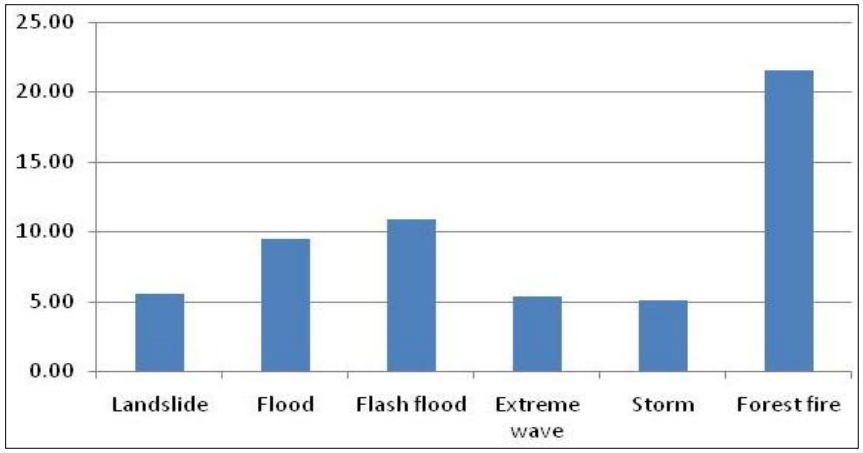
Fisheries are one of the most important sectors for coastal districts along the north coast. The dominant activities are aquaculture and capture fisheries, with the Brebes, Pati, and Demak districts containing almost 70% of total fish and shrimp ponds in the region. (BPDAS-PemaliJratun 2006). For capture fisheries, there are 65 fish auctions to facilitate landing and trading of fishing boats in the north coast of Central Java. At the same time, these locations are also vulnerable to coastal erosion caused by their coastal sediment type, such as at Pati, where 70% of its coastal areas are vulnerable to erosion (BPDAS-PemaliJratun 2006). Any changes in the coastal environment, such as sea level rise that will increase coastal erosion, will affect those areas significantly.

Natural hazards in Central Java Province are dominated by landslides, flooding, flash flooding, extreme waves, storms, and forest fire (Figure 9.3). Each hazard has different characteristics in term of fatalities and other losses. The natural hazard is also characterised by a different loss per event, which leads to different attitudes to each hazard type (Figure 9.4). This characteristic makes extreme waves and storms equally as important as other types of hazard, even though there are fewer events than floods and flash floods. Forest fires cause the largest financial loss per event because most forest in Java is used for wood production e.g. teak forest.



Source: (BPS 2008)

Figure 9.3. Natural hazard events at Central Java Province from 2005 – 2008 (y axis – number of victims)



Source: (BPS 2008), value in thousand US$

Figure 9.4. Natural hazard loss per event in Central Java Province from 2005 – 2008

9.3.2. Semarang City

Semarang City covers 37,361 ha and contains 16 subdistricts with a population of 1.5 million. Four subdistricts lie in coastal areas, namely North Semarang, Genuk, Tugu, and West Semarang. Tugu has the highest number of coastal villages and also the largest area. Most of the land use is urban settlement, particularly in the central part of the city toward the coastal areas with cultivated land in the southern part of the city (Figure 9.5). Along coastal areas, land use is mostly shrimp and fish ponds and built environments e.g. settlement, industrial areas, and commercial activities.

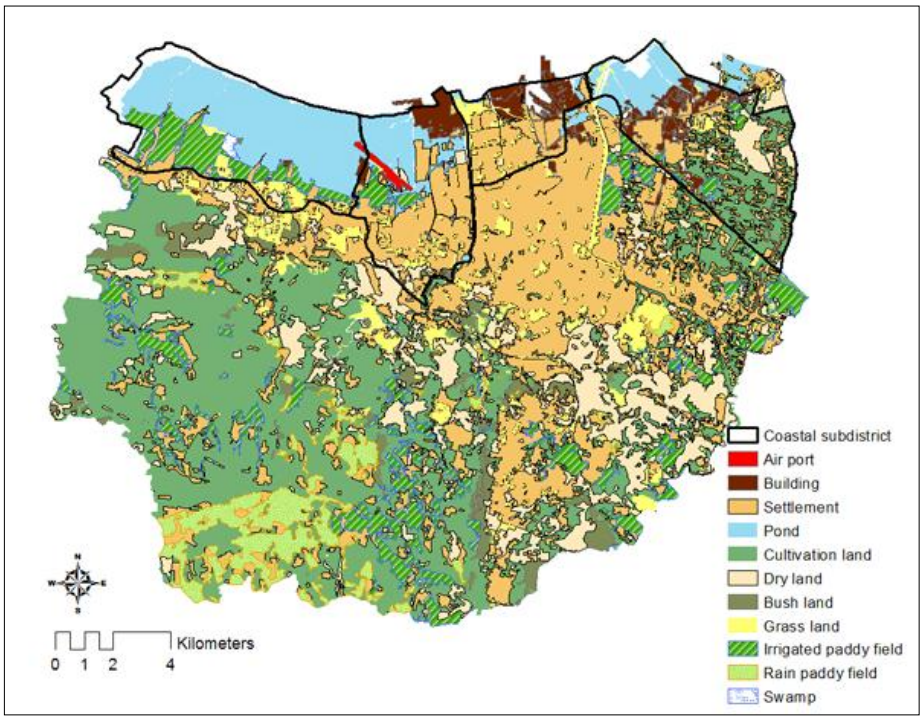


Figure 9.5. Semarang City land uses (settlement, is equivalent to 'urban' in the text)

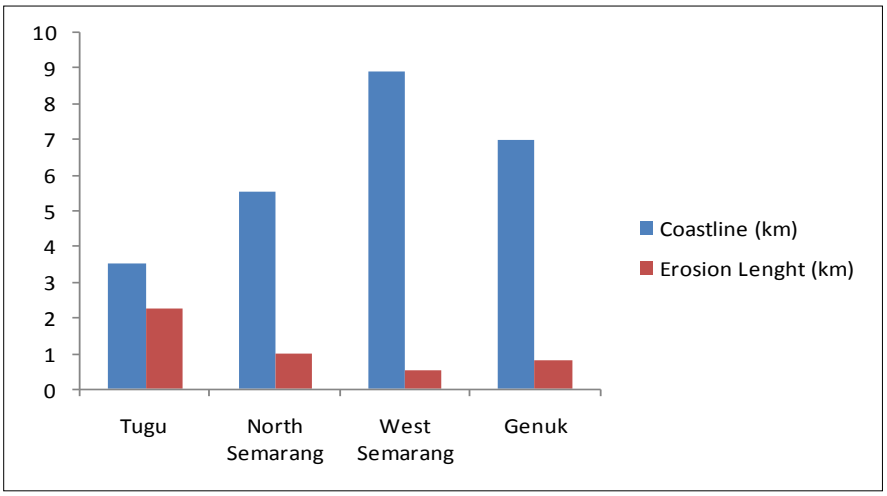
In common with most of the north coast of Java, mangroves in good condition are very limited in extent, comprising only 4 ha (DKP-Semarang 2009). Satellite image analysis revealed that 42 ha of mangrove disappeared between 2003 and 2007 (DKP-Jateng 2008). Many mangrove areas have been converted to industrial areas, urban area, seaport development, and airport extensions.

Semarang coastal zones are characterised by low lying areas with elevation of 0 – 0.75 m above mean sea level/MSL (point between the mean high tide and the mean low tide). The land slope is 0 – 2^{o}, resulting in much of the coastal area being dominated by wetland. Semarang also has been experiencing land subsidence for many years, due to

the alluvial geology, ground water usage, and buildings (DKP-Jateng 2008). Land subsidence has the effect of exacerbating the tidal inundation that has been a problem for Semarang City for many years (Figure 9.6). The topographic characteristics of Semarang also cause many coastal parts of the area to sustain coastal erosion, with 44.5 km of the 22.7 km coastline having been eroded (Figure 9.7). The erosion problems are largely caused by existing intensive development of Semarang coastal areas, especially reclamation and mangrove conversion to human uses.

Source: Semarang City Development and Planning Agency (2011)

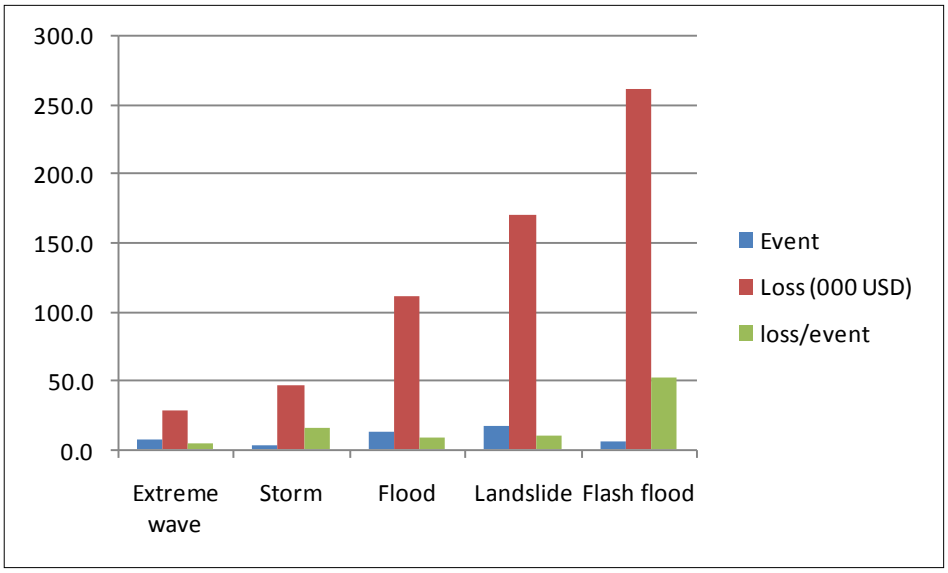
Figure 9.6. Areas of the city that are vulnerable to flooding.



Source: (DKP-Semarang 2009)

Figure 9.7. Lengths of coastline affected by erosion in Semarang City.

Natural hazards in Semarang City from 2005 – 2008 were dominated by landslide, storm, flooding, extreme wave and flash flooding (BPS 2008), while within coastal subdistricts, flooding and landslides are the most common events (Figure 9.8). Topographic conditions, drainage problems, and river mouth sedimentation are major factors that contribute to the severity of tidal flooding.



Source: (BPS 2008)

Figure 9.8. Natural hazard events at Semarang City

9.3.3. Pekalongan City

Pekalongan City is located between 6°50'42" – 6°55'44" South and 109°37'55" – 109°42'19" East, also on the north coast of Central Java (Figure 9.9). It encompasses low lying, coastal areas with general ground elevation less than 1 m from mean sea level (Pekalongan-City 2008). Pekalongan City has four subdistricts, and a total population of 277,610. West Pekalongan is the most populated subdistrict followed by North Pekalongan, East Pekalongan and South Pekalongan. North Pekalongan is the only coastal subdistrict with ten villages.

The city covers an area of 4,500 hectares with major land uses consisting of residential, fish ponds and irrigated fields, with little mangrove habitat remaining (Figure 9.10). The major land uses of the coastal areas are residential, agriculture, aquaculture, and fisheries activities e.g. fishing port. The coastal area of Pekalongan City is open and

exposed to the open sea, and is dominated by sandy sediment along its 6 km of coastline. There are virtually no mangroves ecosystems remaining along the Pekalongan coastline, as most of the coastal areas have been used for human purposes. A sparse distribution of mangrove can be found mixed with other vegetation and mainly in fish pond areas with total areas of 13 ha (BPDAS-PemaliJratun 2006).

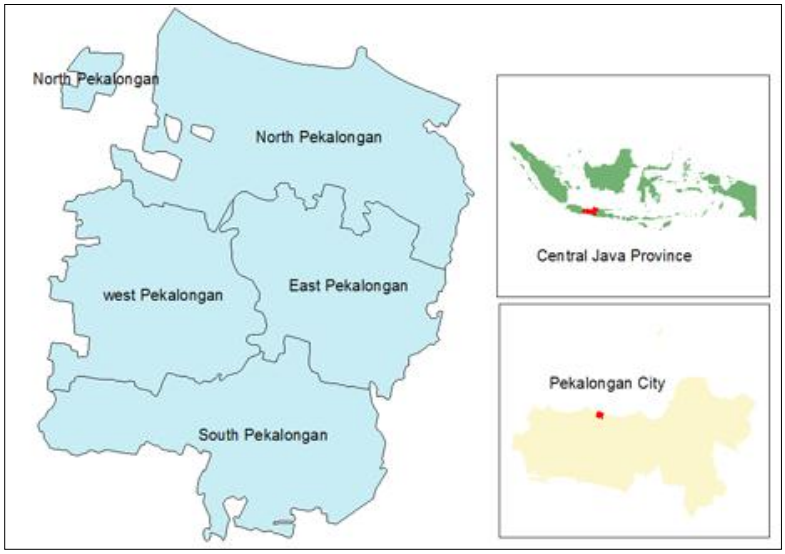


Figure 9.9. Pekalongan City location

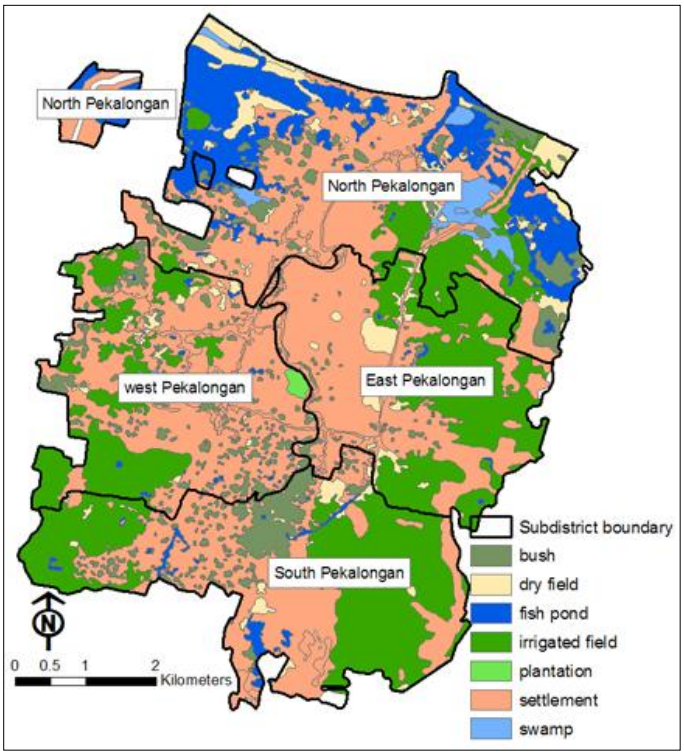
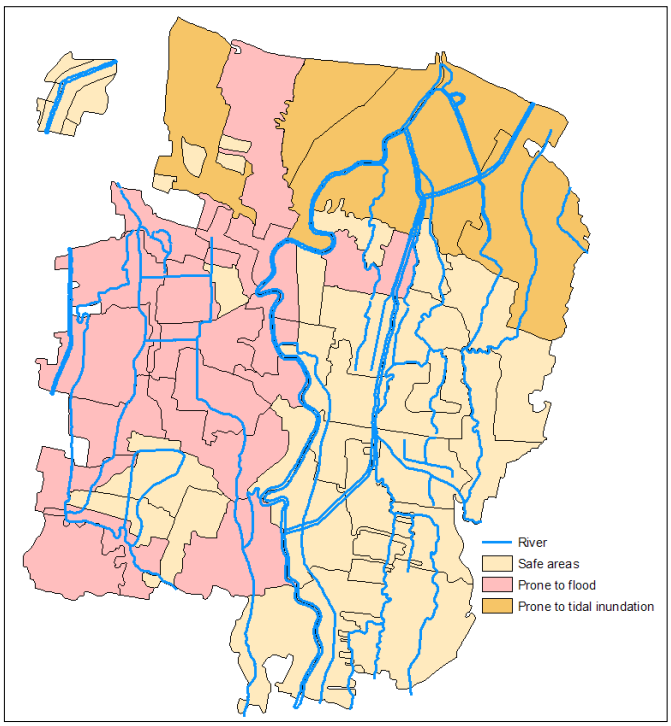


Figure 9.10. Pekalongan City land uses

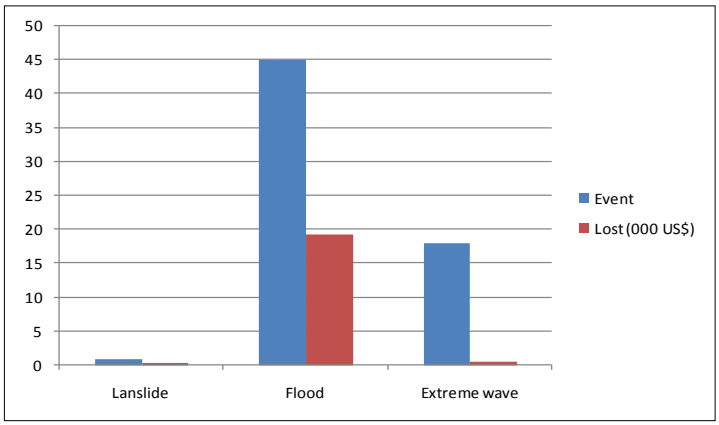
Fisheries, including aquaculture and capture fisheries forms one of the most important economic sectors in Pekalongan City, and contributes over 70% of agriculture gross domestic products in 2002 (BPS-Pekalongan 2005). A major fishing port has been built and created supplementary economic activities in surrounding areas such as boat workshops and a fish processing industry. Aquaculture activity mainly focuses on milk fish and shrimp which are concentrated in the North Pekalongan Subdistrict (total area of 162.3 ha). The fish pond areas have increased in extent by approximately 24% since 2001 (BPS-Pekalongan 2005), mainly from conversion of agriculture areas to fish ponds after the areas were inundated by tidal flooding.

Pekalongan is prone to hydrological-related natural hazards such as flooding from rain, river or tidal inundation and extreme waves. Most of the areas in Pekalongan City especially in the coastal zone and south west of the city are vulnerable to flood and tidal inundation (Figure 9.11). The two major rivers that flow through Pekalongan also increase the flooding risk to the city. There were 45 flood events and 18 extreme wave events from 2005 to 2008 (Figure 9.12).



Source: Pekalongan City spatial plan (2009)

Figure 9.11. Areas vulnerable to existing flood and tidal inundation



Source: (BPS 2008)

Figure 9.12. Natural hazard events and losses in Pekalongan City

9.4. Methodology

Analysis was carried out in two phases to show how the integration can be started from either the hazard perspective or the vulnerability perspective. The first phase was a scoping assessment of the coastal management and disaster management context. The second phase included the calculation of social vulnerability and mapping its distribution using GIS analysis. The delineation and modelling of projected inundation for Semarang City and Pekalongan City was then conducted, together with the team from the Diponegoro University, Semarang.

9.4.1. Scoping of Coastal Management and Coastal Hazard

In this study, the area encompassed by the Coastal Management Act was used to define coastal areas. Within this boundary, information on demography, social and economic indicators, coastal habitats and coastal management issues were identified. For the coastal hazard analysis, areas that are prone to coastal inundation and climate change associated hazards were then identified (Figure 9.13).

At the broad, provincial level, low elevation areas (less than 10 m) were delineated using elevation data from hydrological data and maps based on the Shuttle Radar Topography Mission (SRTM) (USGSHydroSHEDS 2008). SRTM data has approximately 90 m horizontal resolution, and assessment of its application in tropical areas shows that it has better accuracy that previous global digital elevation data such as GTOPO30 (Jarvis, Rubiano et al. 2004). It also has been widely used in many

applications in ecosystem management and disaster management (Zandbergen 2008).Vertical accuracy is specified as 16 m but also can reach from 4 – 7.5 m (Gorokhovich and Voustianiouk 2006). Therefore, SRTM data was only applied for regional/provincial scale assessment as high resolution elevation data for locations is lacking or very expensive.

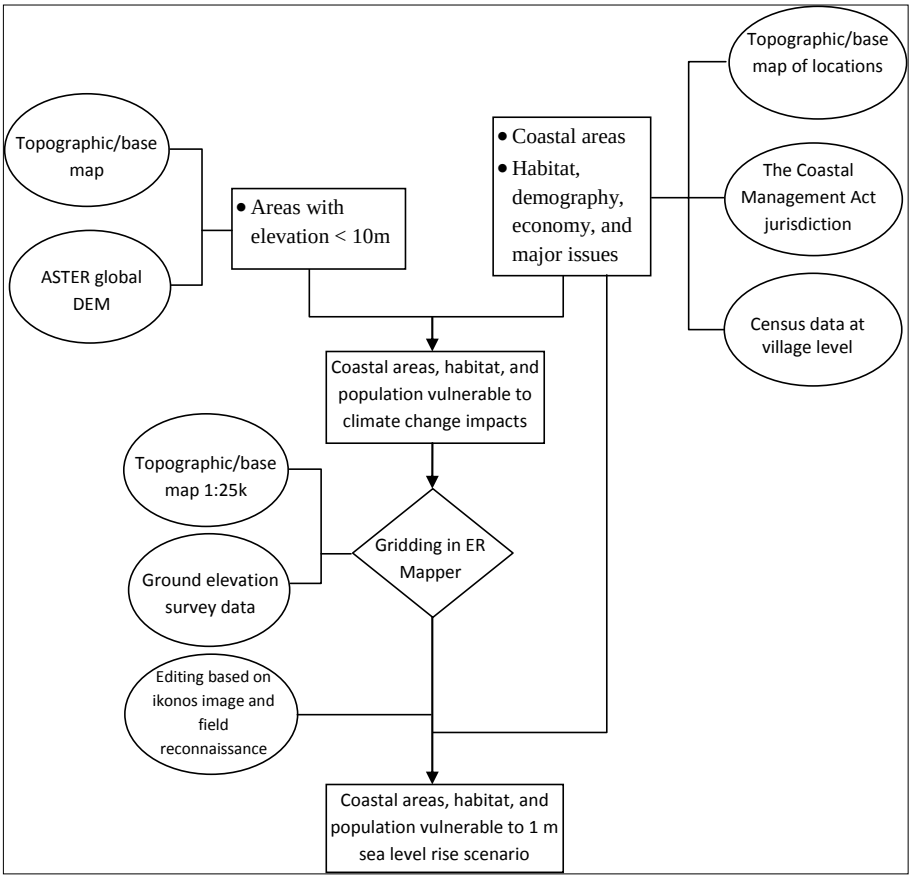


Figure 9.13. Flow chart of scoping of coastal management and coastal hazard context

Using the coastal area boundary as identified at the provincial/regional level, demographic, social and economic data, as well as coastal management issues were compiled at the city level. Topographic basemaps at 1:25k scale, combined with height point references were used for elevation contouring (Kobayashi 2004). An additional topographic survey from the local public works agency and the Ministry of Marine Affairs and Fisheries (2009) were used to improve the elevation model. Elevation of less than or equal to 1 m was then delineated using the ER Mapper gridding wizard, with minimum curvature under tension technique, to produce a gridded raster surface

from random point data with smooth output (ERDAS 2008). The result was then verified using a field survey.

The coastal management areas that are vulnerable from coastal hazards were determined at the regional and city levels by overlaying the low-lying areas with the coastal boundaries. Existing populations, land uses, and infrastructure were identified to reveal their risk from coastal inundation.

The 1m sea level rise scenario was chosen according to the IPCC prediction (2007) that global sea level rise is predicted at 88 cm by the year 2100. The sea level rise rate per year in Indonesia is actually considered to be higher that the IPCC's global estimate. Measurements from seven different locations in Indonesia suggest a current sea level rise of more than 1 mm/yr, while Semarang has the highest rate of 9 mm/yr, partially due to land subsidence (MoE 2007). There is no available sea level rise scenario at a finer scale for the study areas. Therefore, a 1 m sea level rise scenario is assumed to affect all coastal segments in this study similarly, using the same method applied by Marfai and King (2008). Simplification of sea level rise is also suggested by SURVAS (2000).

9.4.2. Social Vulnerability Calculation and Mapping

Social vulnerability assessment was undertaken based on the village potential (PODES) census data (BPS 2008), and information derived from this census data served as proxy to assess social vulnerability (Clark, Moser et al. 1998; Cutter, Mitchell et al. 2000; Wu, Yarnal et al. 2002). For calculation purposes, all quantitative information was separated from qualitative data, and spatial and statistical analyses were then undertaken for this vulnerability mapping (Figure 9.14). The selection of factors was based on understanding how those variables contribute to social vulnerability (Cutter, Boruff et al. 2003; Rygel, O'Sullivan et al. 2006; Myers, Slack et al. 2008; Iglesias, Moneo et al. 2009).

Factor analysis was applied to reduce the total number of variables by assigning correlated variables into single factors and to reveal latent factors that underlined community vulnerability (Cutter, Boruff et al. 2003; Holand, Lujala et al. 2009; Shlens

2009), using SPSS v.18 software. All variables within all villages in coastal districts were initially standardised to a Z value (King and MacGregor 2000; Cutter, Boruff et al. 2003), and then these standardised values were subjected to a principal components analysis (PCA) with the varimax orthogonal and Kaiser Normalisation rotation methods (Cutter, Boruff et al. 2003; Rygel, O'Sullivan et al. 2006). The PCA reduced existing variables into a number of factors that consist of several contributing variables, and these results were then combined with other spatial data for spatial distribution analysis.

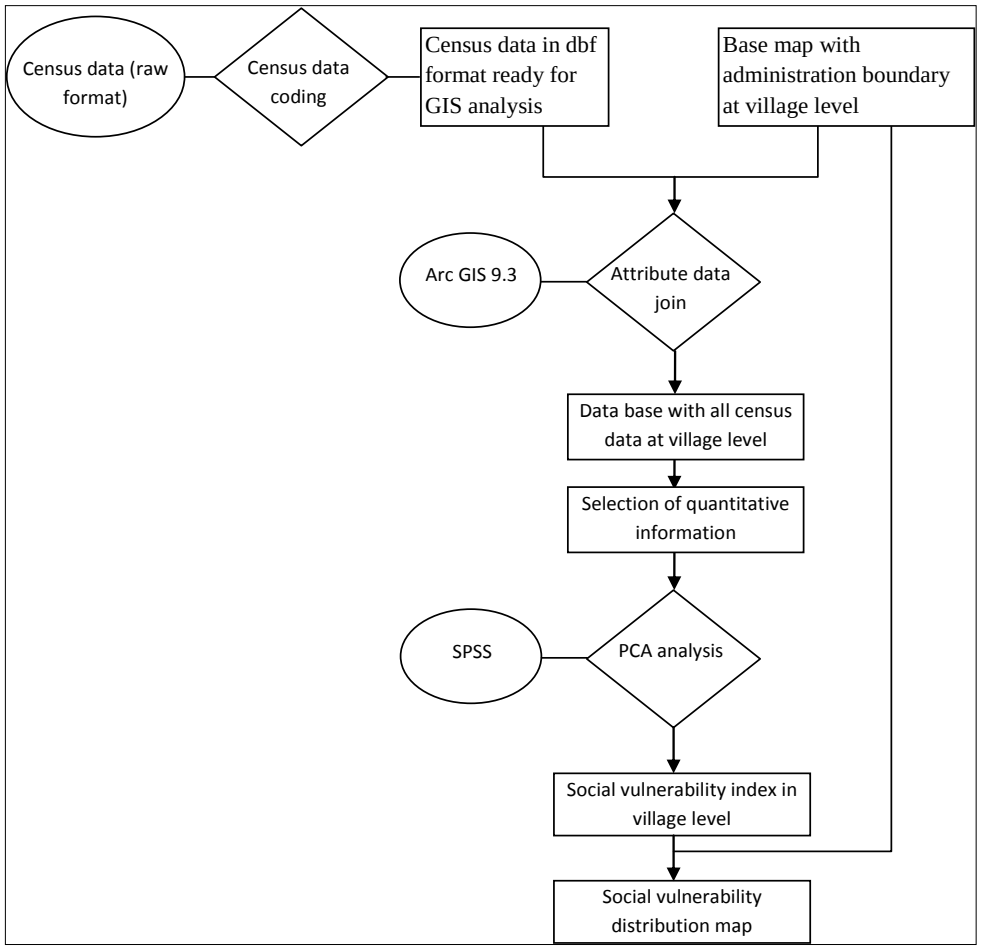


Figure 9.14. Social vulnerability calculation and presentation process

The calculation of social vulnerability was based on the SoVI (Social Vulnerability Index) (Cutter, Boruff et al. 2003) which has been applied in a number of locations in the USA and Europe (Boruff, Emrich et al. 2005; Cutter, Emrich et al. 2006; Myers, Slack et al. 2008; Holand, Lujala et al. 2009). All factor scores from the PCA process for each census location were summed. Adjustments were applied to ensure that high factor scores corresponded with high vulnerability. If a factor showed strong positive

values for a variable that decreases vulnerability then the score value was inversed. On the other hand, the absolute score value was used when a factor showed both a strong positive value and a negative value for a variable that increases vulnerability. The value was left as it is when both positive and negative values are shown but still shows a strong positive value for variables that increase vulnerability (HVRI 2008).

Factors were given identical weightings in this study, which assumes a similar contribution to overall social vulnerability (Wu, Yarnal et al. 2002; Myers, Slack et al. 2008). This method is used where there is no available information to assign different weights for each variable. Moreover, it may often be difficult to determine what scheme is appropriate for weighting, who will decide the weight, and also how the applied weight could reflect the nature of vulnerability and its importance as a variable that is a dynamic over space and time (Adger, Brooks et al. 2004).

Total vulnerability scores are displayed in GIS maps with mean ± standard deviation. Villages with scores higher than +1 standard deviation from the mean are classified as the most vulnerable locations and villages with scores lower than -1 standard deviation are classified as the least vulnerable locations. The social vulnerability distribution is then presented on the administration map, the coastal inundation scenario, and coastal areas as defined by the Act.

9.5. Results

9.5.1. Coastal Areas and Hazard Scoping

Using the criteria from the Coastal Management Act 27/2007, coastal areas along the north coast of Central Java have many different shapes from east to west depending on the shape of the coastal subdistrict boundary (Figure 9.15). It consists of 57 subdistricts, 1,076 villages, covers an area of 3,386.27 km2, has a population of 5.2 million people, and holds 39% of the total population of the coastal districts (Figure 9.16). Hydroshed data analysis shows that most of the coastal areas are low lying with small gradients and are thus vulnerable to tidal flooding and extreme waves (Figure 9.17). Only small parts of the coast in the central and eastern regions are rocky, with cliffs.

For Semarang City, the coastal areas consist of four subdistricts of varying shapes, with Tugu and North Semarang parallel to the coast and West Semarang and Genuk more

perpendicular (Figure 9.18). The population in coastal areas is also unevenly distributed, with the densest villages located in the central parts and harbor areas within West Semarang and North Semarang sub districts (Figure 9.19).

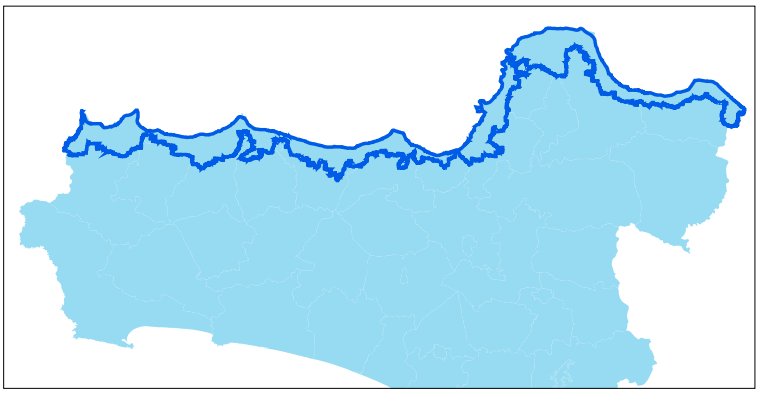


Figure 9.15. The boundary of the coastal areas subject to the Indonesian Coastal Management Act.

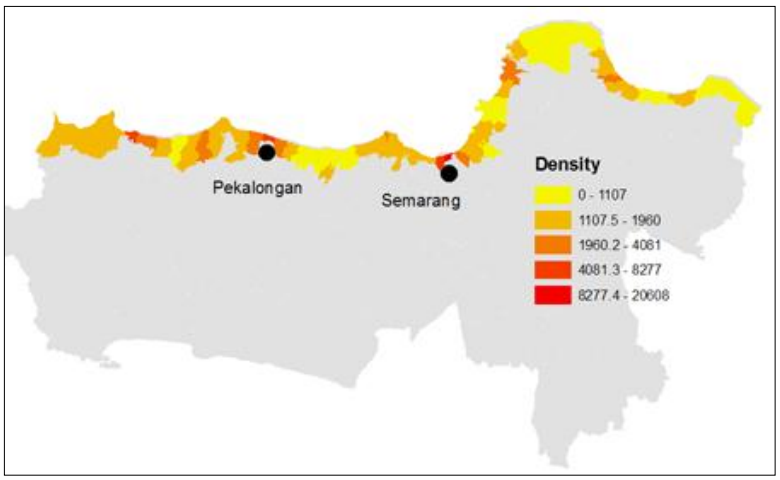
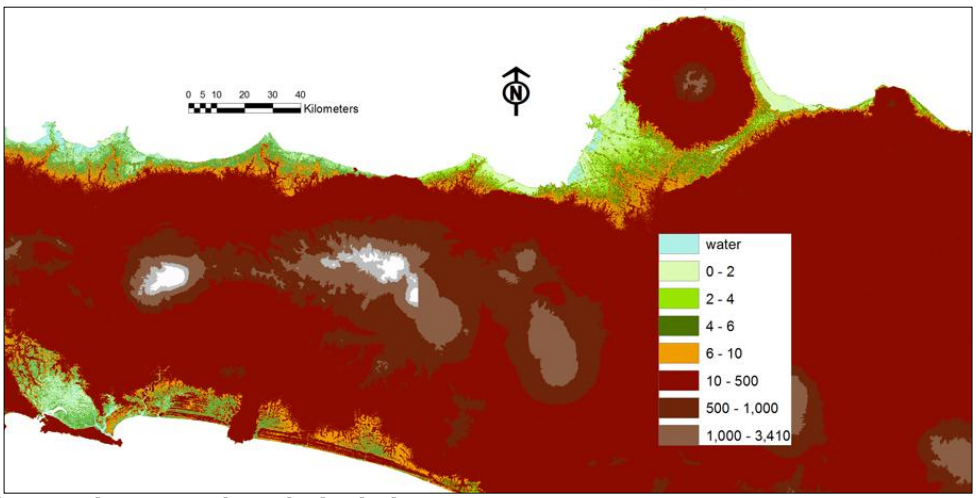


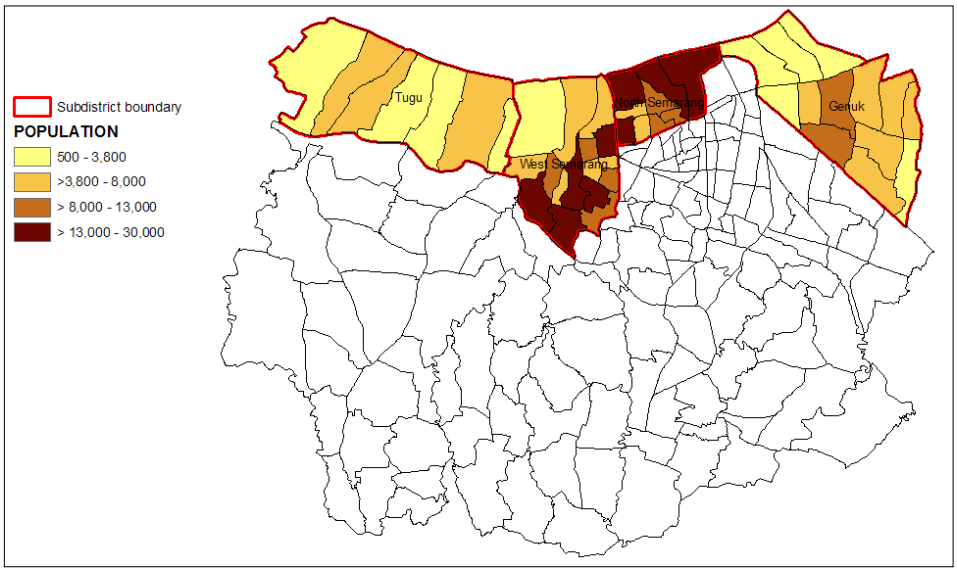
Figure 9.16. Population density (per km^2) at north coast of Central Java Province



Elevation data source: http://hydrosheds.cr.usgs.gov

Figure 9.17. Areas below 10 m (green) dominate coastal areas of Central Java Province.

Figure 9.18. Coastal areas of Semarang City



Source: GIS analysis from population data of Central Statistic Agency (2008)

Figure 9.19. Population of Semarang City coastal areas

Potential future inundation and flooding problems are likely to affect most of the coastal and city areas below 1m elevation (Figure 9.20). The impacts will be different since each subdistrict has different inundated areas. The most affected areas are four coastal subdistricts i.e. Tugu, West Semarang, North Semarang, and Genuk. Although directly affected by tidal inundation, Gayamsari and East Semarang subdistricts are not part of

coastal areas that are defined by the Coastal Management Act, such that their locations will not receive coastal management programs.

Figure 9.20. Coastal area land uses below 1 m elevation

For Pekalongan City, the coastal areas are located in the North Pekalongan Subdistrict. It consists of nine villages, of which four are not connected to the actual coast (Pabean, Dukuh, Kraton Lor, and Krapyak Kidul). In common with Semarang City, Pekalongan is also vulnerable to sea level rise, with most land uses, including residential, fish ponds and irrigated fields, will be affected (Figure 9.21).

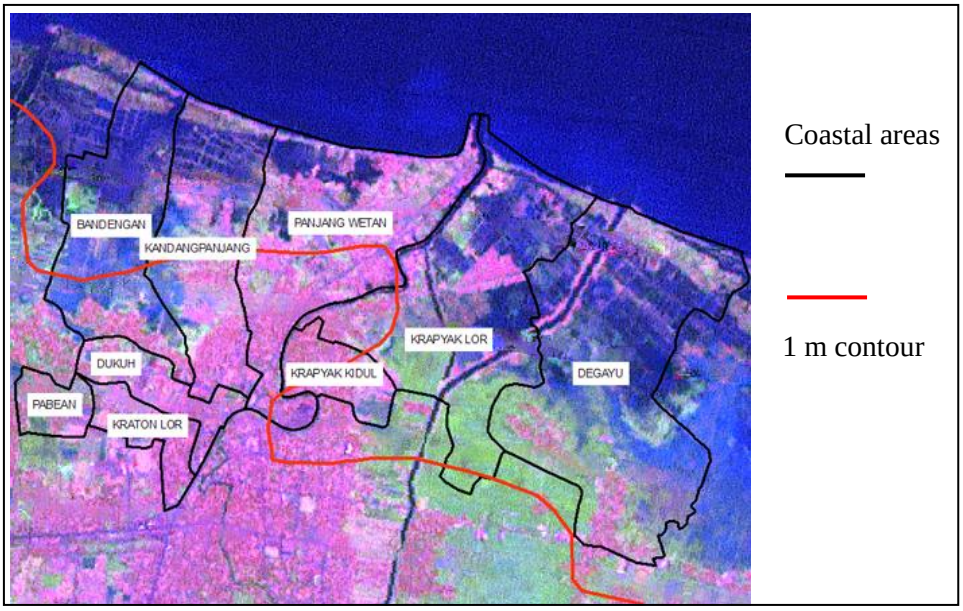


Figure 9.21. Coastal areas of Pekalongan City

9.5.2. Social Vulnerability Calculation and Mapping

a. Vulnerability Attributes

Original census data information included quantitative and qualitative variables that were categorised into 12 areas of information (Table 9.1). Extraction of quantitative variables produced 49 variables in eight categories with different contributions to social vulnerability (Table 9.2). The factor analysis with PCA then produced 14 new factors which described 62.97% of the total variance of the data. Those new 14 factors are then translated into conceptual and practical descriptions as a summary of all individual variables that make up the factors.

All variables that contained similar or correlated information were grouped into one factor. For example, information relating to population size and number of households was grouped into one factor. Each factor has a different contribution to total vulnerability with its individual variable, loading and cardinality adjustment presented in order of loading strength (Table 9.3).

Adjustment is applied to match each variable's loading with its conceptual contribution to vulnerability. For example, as the amount of village revenue's loading is positive, it is changed into negative since the lack of revenue will reduce the community vulnerability of the village. No adjustment is made for variables where the loading aligns with the vulnerability e.g. population size has a positive loading, which aligns with its effect on vulnerability (also positive).

All fourteen factors show strong relationships with existing community vulnerability both in a statistical and conceptual/logical manner. Those factors also provide a general picture of individual, community and village/place attributes that make them vulnerable to coastal hazards (Figure 9.22). More variables may further complete the picture, but data availability, as is commonly the case, makes this impossible.

Table 9.1. Original component of village potential census data

No.	Component data	Variable
1.	Village general information	- Geographic location (coastal, non coastal) - Topographic condition (plain, valley) - Ground elevation from sea level
2	Demography and human force	- Number of population - Percentage of agriculture household - Number of agriculture labour - Major income of people - People work abroad
3.	Housing and environment	- Electricity - Energy for daily need - Sanitation - Water source - Slum and river bank settlement - River uses - Pollution problem - Bush fire
4.	Disaster management	- Natural hazard events in last three years - External assistance - Mitigation program/action available - Source of mitigation program/action
5.	Education and health	- Number and location of school - Skill training provider - Illiteracy abatement program - Number and location of health facility (ranging from hospital – community health service) - Medical force availability - Disease in last three years - Mal nutrition case - Health insurance for poor people - Water source for daily consumption
6.	Social and cultural	- Majority of religion - Religious facilities - Disability - Gambling practice - Ethnicity
7.	Amusement and sport	- Distance to cinema - Distance to pub/discotheque/karaoke
8.	Transportation and communication	- Village transportation - Type of road - Access time and transportation type to subdistrict and district capital - Telephone availability - Internet availability - Post office - Television program reception - Mobile phone signal strength
9.	Land use	- Land use structure (paddy field, other agriculture, non agriculture) - Irrigated and non irrigated paddy field - Land conversion in last three years - Type of conversion
10.	Economy	- Agriculture store - Small and home scale industry - Shopping complex, distance to nearest shopping complex - Mini market - Restaurant/eatery - Kiosk - Hotel - Hostel - Cooperative - Financial credit available for community
11.	Security	- Riot event - Crime case and type in recent year - Prostitution site - Community security force
12.	Village autonomy	- Village revenue - Village financing and its source - Poverty eradication program

Table 9.2. Forty nine quantitative variables selected from original census data

Component data	Quantitative Variable		Contribution to social vulnerability
Demography and human force	1	Number of population	Increase
	2	Number of female	Increase
	3	Number of household	Increase
	4	Number of people who is working abroad as foreign workers	Reduce (by providing financial support)
	5	Number of disable people	Increase
	6	Percentage of agriculture household	Increase
	7	Number of household who is working as agriculture labour	Increase
Housing and environment	8	Number of house with electricity	Reduce (in term of their closeness to public service i.e. electricity/energy)
	9	Number of house without electricity	Increase
	10	Number of household live at riverbank	Increase
	11	Number of household live at slum areas	Increase
	12	Number of house which electricity is provided by government company	Reduce (in term of their closeness to public service i.e. electricity/energy)
	13	Number of non permanent and semi permanent house	Increase
Transportation and communication	14	Distance to post office	Increase (in term of access to social services)
	15	Number of household with fixed phone line	Reduce
Land use	16	Agriculture areas (ha)	Increase
	17	Non irrigated agriculture areas	Increase
Village autonomy	18	Amount of funding from district, provincial and national government	Reduce
Economy	19	Amount of village revenue	Reduce
	20	Distance to shop complex	Increase (access to economic sites)
	21	Number of home and small industry	Reduce /increase
	22	Number of economic activity in village e.g. eatery, stall, restaurant, hotel	Reduce/increase
	23	Number of cooperative	Reduce
Disaster management	24	Amount of lost (in million of IDR) from hazard events in the last three years	Increase
	25	Number of hazard events in the last three years	Increase
Education and health	26	Distance to secondary school	Increase
	27	Distance to high school	Increase
	28	Distance to hospital	Increase
	29	Distance to labor clinic	Increase
	30	Distance to health clinic	Increase
	31	Distance to community health centre	Increase
	32	Distance to additional community health centre	Increase
	33	Distance to GP practice place	Increase
	34	Distance to midwife practice place	Increase
	35	Distance to village health post	Increase
	36	Distance to village labor clinic	Increase
	37	Distance to chemist	Increase
	38	Distance to herb store	Increase
	39	Number of village labor clinic	Reduce
	40	Number of village health post	Reduce
	41	Number of community health group	Reduce
	42	Number of medical force live in village (GP, dentist)	Reduce
	43	Number of midwife live in village	Reduce
	44	Number of medical aide live in village	Reduce
	45	Number of traditional midwife live in village	Reduce
	46	Sickness from climate related disease (respiratory infection, dengue, malaria, diarrhea)	Increase
	47	Number of mal nutrition case	Increase
	48	Number of health insurance for poor family	Reduce
	49	Number of certification as poor family	Increase

Table 9.3. Fourteen factors from principal component analysis (PCA) result

Factor & its new description	Individual variables		Strongest Loading	Adjustment
1 Population structure	1 2 3 4 5 6 7 8 9 10 11	Number of population Number of females Number of households Number of community health groups Health insurance for poor families Number of non permanent houses Number of medical force Number of houses where electricity is provided by govt. company Number of houses with electricity Number of households with fixed phone line Number of economic activities	.911 .912 .917 .717 .517 .599 .937 .937 .465 .582 .616	+/no change
2 Access to major health facility	12 13 14 15 16 17 18	Distance to hospital Distance to health clinic Distance to community health centre Distance to labour clinic Distance to GP practice site Distance to herb store Distance to chemist	.732 .650 .575 .752 .699 .673 .828	+/no change
3 Socio-economic condition	19 20 21 22	Number of disabled people Number of household who is working as agriculture labour Number of house without electricity Number of traditional labor midwife	.419 .650 .568 .728	+/no change
4 Access to education and social facility	23 24 25 26	Distance to post office Distance to shop complex Distance to high school Distance to secondary school	.504 .578 .600 .808	+/no change
5 Village financial capacity	27 28	Amount of village revenue Amount of funding from district, provincial and national government	.971 .969	-/inverse
6 Presence of health professionals at the village	29 30 31	Number of midwives who live in village Number of medical aides who live in village Number of cooperatives	.573 .650 .457	-/inverse
7 Income diversity	32	Number of people working abroad as foreign workers	.726	-/inverse
8 Maternal health service	33 34	Number of village labour clinic Distance to village labour clinic	.641 -.750	-/inverse
9 Marginal groups	35 36	Number of households live at riverbank Number of households live in slum areas	.710 .701	+/no change
10 Hazard shock	37 38	Number of hazard events in the last three years Amount of loss (in million of IDR) from hazard events in the last three years	.743 .721	+/no change
11 Community health program	39 40	number of village health posts Distance to village health post	-.664 .787	No change
12 Environmental sickness	41 42	Sickness from climate related disease (respiratory infection, dengue, malaria, diarrhoea) Number of homes and small industry	.710 .568	+/no change
13 Food and nutrition problem	43 44	Number of malnutrition cases Non irrigated agriculture areas	.575 .463	+/no change
14 Access to secondary health service	45	Distance to additional community health canter	.716	+/no change

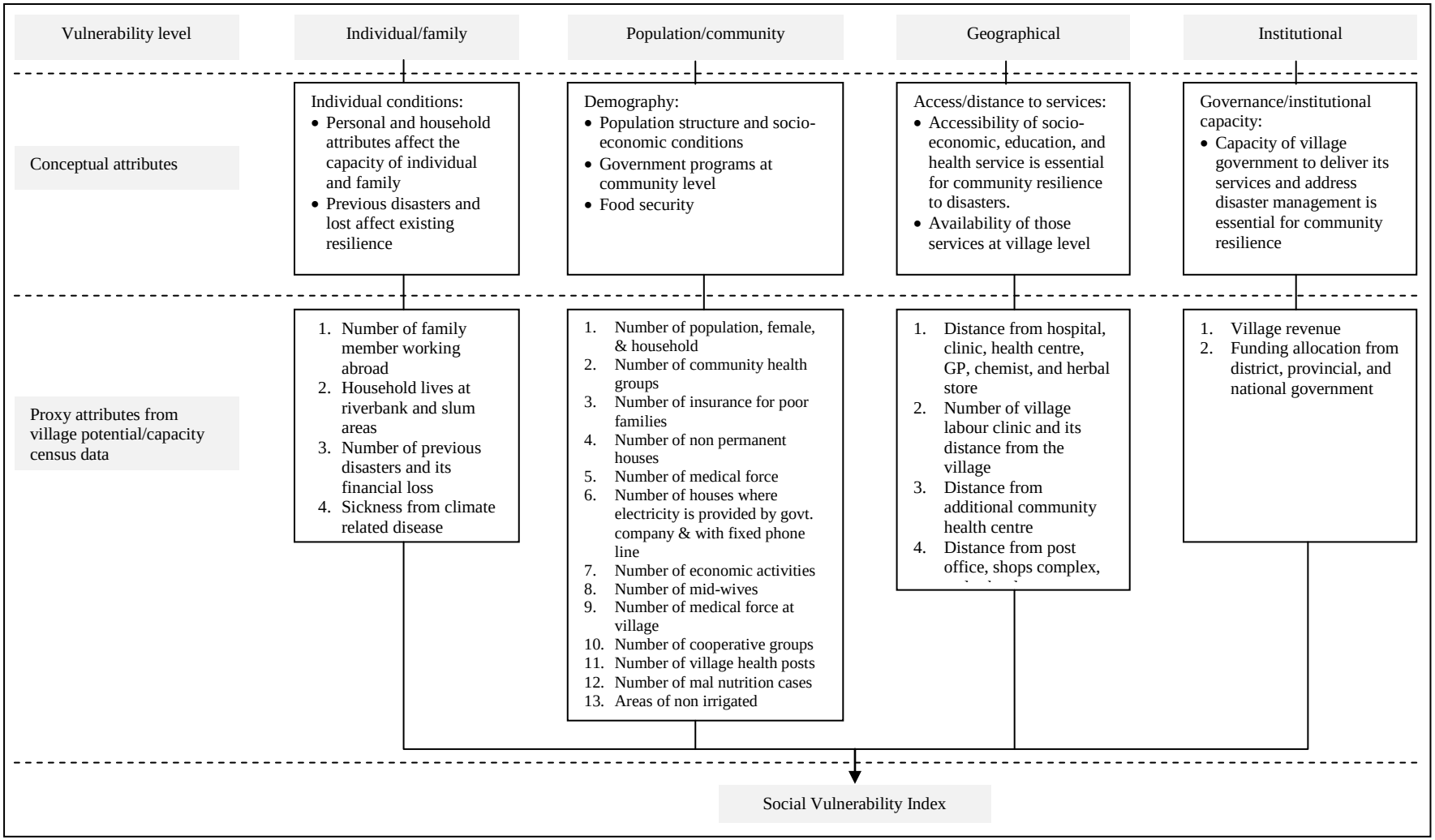


Figure 9.22. Schematic representation of individual, community, and place attribute that contribute to community vulnerability

Vulnerability attributes at the individual and family level are represented by Factors 7, 9, 10, and 12. Factor 7 represents families with a member working abroad. This is important in the Indonesian context because family members who are working abroad provide external financial support for their family. Funding from outside improves a community's resilience to natural hazards (Twigg 2009). In particular, money is sent back to Indonesia prior to Islamic festive times and events, and is used in education, health, house construction, and the daily needs of the family. This kind of support is essential to cope and recover from natural hazards.

Factor 9 represents a high number of households who live in slum areas and along river banks. Those types of settlement are very vulnerable to inundation, flooding, and illness from sanitation problems. This sanitation condition leads to health and sickness problems that are described by Factor 12. This factor relates to areas with a degree of sickness from sanitation and environmental health problems, which is a major cost to the Indonesian economy (Hutton, Rodriguez et al. 2008). Levels of Malaria, tuberculosis, pneumonia, dengue, and diarrhoeal incidents remain high in Central Java, with 13 districts categorised as 'high' for incidents for malaria, and the number of diarrhoeal and pneumonia incidents for infants remains high (Dinkes-Jateng 2006). Sickness will reduce people's productivity in the community, and will eventually influence their resilience to hazards. Factors 9 and 12 also represent poor people who could not afford to obtain sufficient health services, education facilities, insurance, and safe houses in which to live. The poor also have a little capacity to recover from hazard events which is represented by Factor 10. Loss from previous hazards and recovery processes take existing resources in the community and reduce their capacity to cope with future disasters.

Attributes at the population level are represented by Factors 1, 3, 6, 11, and 13. Factor 1 reflects villages with a high population that in consequence increases vulnerability to coastal hazards both from potential victims and loss. Factor 3 describes vulnerable populations due to high levels of agricultural labour, disabled people, little electricity, and high numbers of traditional midwifes, all of which indicate a low socio-economic capacity. Factor 6 explains the presence of GPs, dentists, midwifes, or medical aids who live in the village. Although they may work outside the village, since they live in the village their presence is important to provide medical services during emergency

situations. In the Indonesian context they are important as they also serve as motivators and educators for community health programs at the village level.

Factor 11 highlights villages which have village health posts. This is a service that is agreed among the community to be built in their areas to serve basic health services, assist in health education, and lead to healthy village programs (Depkes-RI 2007). The presence of village health posts and community access to its service will reduce the problem of poor access to major health services. The last factor highlights areas with high numbers of infant malnutrition cases and non-irrigated agricultural areas. Food scarcity is an important issue for many locations, particularly where irrigation is lacking (Carruthers, Rosegrant et al. 1997). In 2006, Central Java Province had 38 subdistricts with food security problems and 65% of them were in coastal subdistricts (Dinkes-Jateng 2006).

Finally, attributes at the village level are represented by distance from major and secondary health service (Factor 2, 14 and 8), education and social facilities (Factor 4), and village financial capacity (Factor 5). A population with poor access to health and medical services will have less capability to cope with and recover from natural hazard events. In addition, education improves community awareness of natural hazards, understanding of risk reduction programs, and provides better options for the young generation, both socially and economically. Distance from health, education, and social services also reflect the village's remoteness from administration centres in subdistricts and districts where all services are located. Consequently these locations will also have difficulty in accessing existing resources such as skills/training providers and support funding that is important before and after a disaster event. Finally, as village government is in the lowest administration structure, it is at the front line for community development. High funding capacity will increase the community capacity to cope with and recover from natural disasters.

Social vulnerability for each location was calculated as the sum or composite of all 14 factor scores that resulted from the PCA process. Consequently, each location has a different proportion from the 14 factors that make up its total vulnerability. For methodological interest, description of the different factors' influence to total vulnerability will not make users lose the information on the structure and causes of

vulnerability. It is important because one of the drawbacks and criticism of using composite scores without weighting is the difficulty in indicating the structure and causes of vulnerability (Adger, Brooks et al. 2004). The total score was displayed with base maps to display the spatial vulnerability distribution in all coastal districts. Community vulnerability distribution is displayed in five classes using standard deviation from the mean of total score value.

b. Spatial Distribution of Social Vulnerability

Generally the most vulnerable villages are distributed in all coastal districts (Figure 9.23). However, a large number of the most vulnerable villages are located in the central and south-western parts of the province, whereas eastern areas have less vulnerable villages. Along the coastal areas, very high numbers of vulnerable villages are located at Brebes, Demak, Pemalang, Semarang, Kendal, and Pekalongan.

The most vulnerable villages of Semarang City are located in almost all subdistricts (Figure 9.24), with the other villages mostly falling within -1/2 – 1/2 standard deviations of the mean. Administratively, the most vulnerable people in Semarang city are located in 12 subdistricts that consist of 35 villages (Table 9.4). There are three sub districts out of those 12 that are located in coastal areas i.e. Genuk, West Semarang, and North Semarang that cover nine villages.

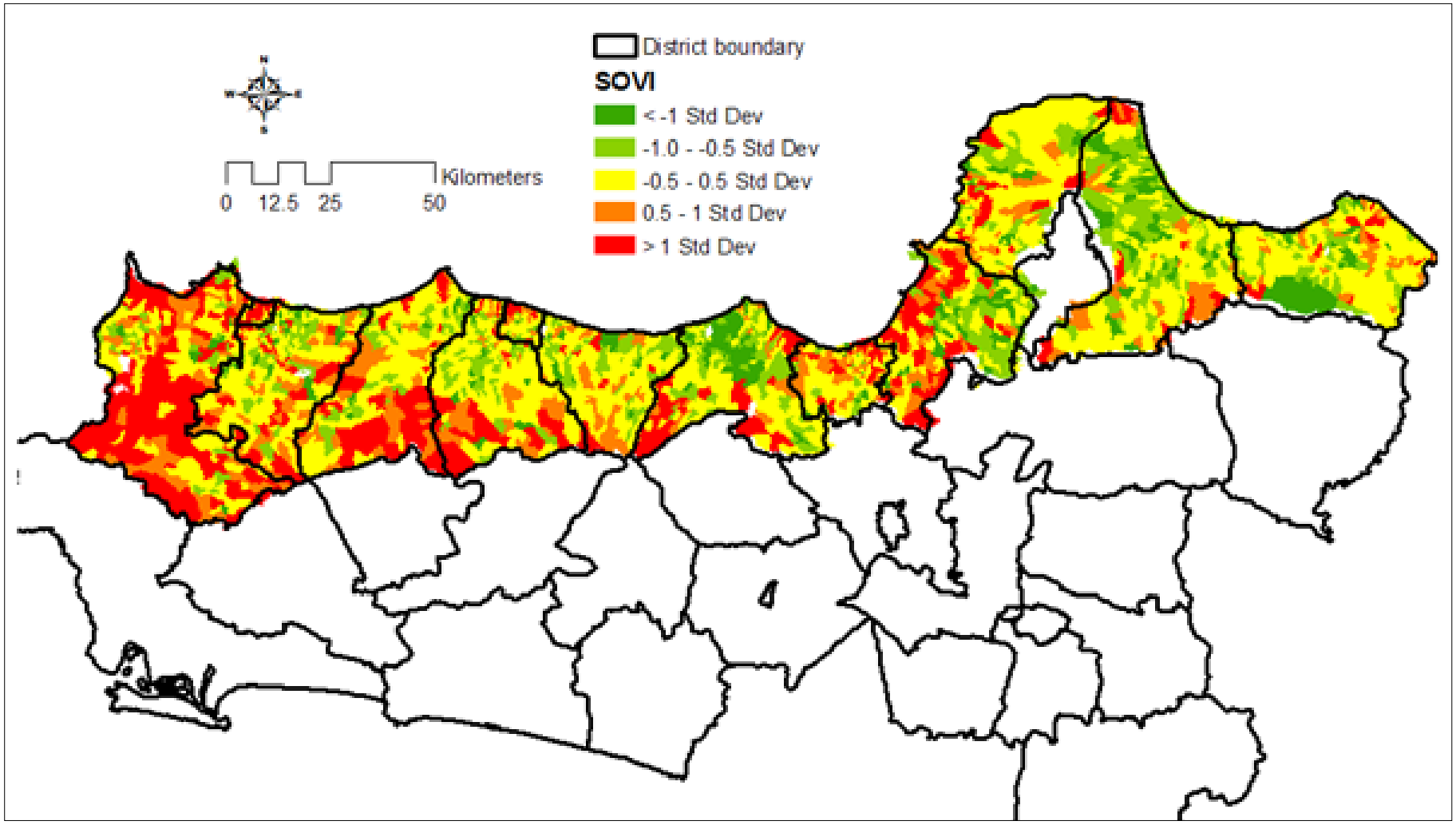


Figure 9.23. Social vulnerability distribution

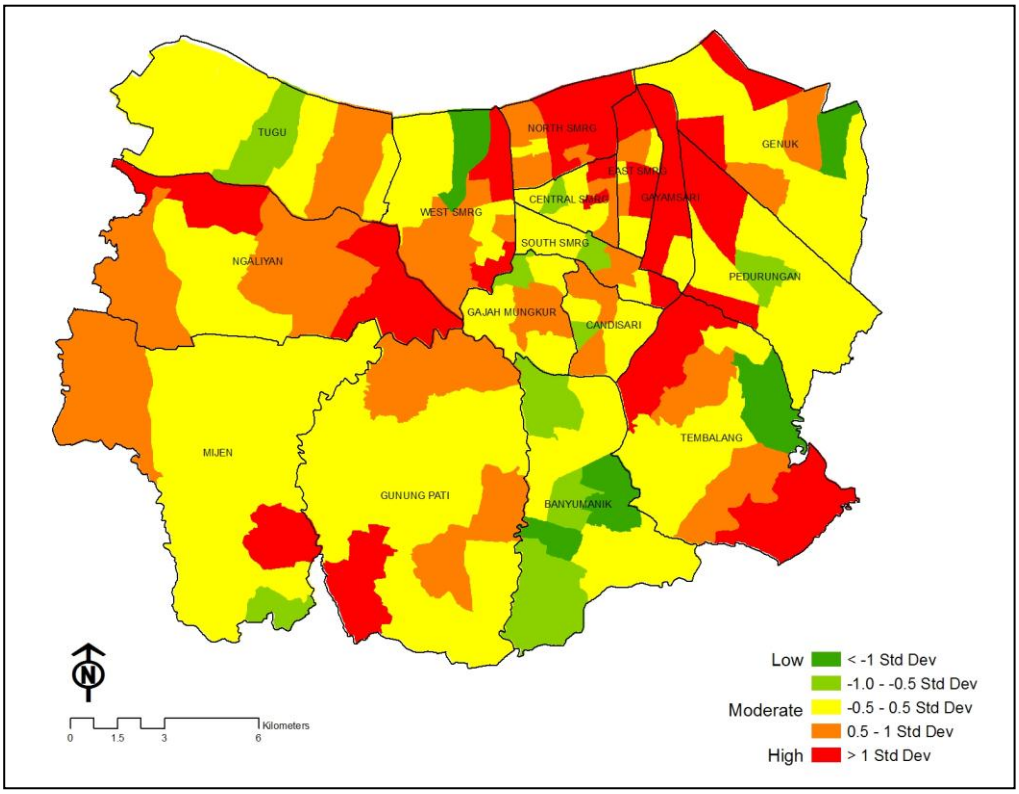


Figure 9.24. Social vulnerability of Semarang City

Table 9.4. The most vulnerable villages at Semarang City

Subdistrict	Areas	Village
1 Gayamsari	non coastal	1 Siwalan
		2 Sawah Besar
		3 Sambirejo
		4 Kaligawe
		5 Tambakrejo
		6 Pandean Lamper
2 Gunung Pati	non coastal	7 Gunungpati
3 Mijen	non coastal	8 Purwosari
4 Ngaliyan	non coastal	9 Purwoyoso
		10 Kalipancur
		11 Wonosari
		12 Bambankerep
5 Pedurungan	non coastal	13 Gemah
		14 Tlogosari Kulon
		15 Muktiharjo Kidul
6 East Semarang	non coastal	16 Rejosari
		17 Bugangan
		18 Kemijen
7 South Semarang	non coastal	19 Lamper Tengah
8 Central Semarang	non coastal	20 Purwodinatan
		21 Gabahan
		22 Kauman
9 Tembalang	non coastal	23 Jangli
		24 Sendangguwo
		25 Rowosari
		26 Tandang
10 Genuk	coastal	27 Trimulyo
		28 Muktiharjo Lor
11 West Semarang	coastal	29 Ngemplak Simongan
		30 Krobokan
		31 Tawangmas
12 North Semarang	coastal	32 Kuningan
		33 Purwosari
		34 Bandarharjo
		35 Tanjungmas

Nine out of 35 villages are located in coastal subdistricts. Major factors that contribute to their vulnerability include poverty, population structure, availability of medical force, maternal services, funding from outside the family, and village capacity (Figure 9.25). Each major factor gives different influences to each village. For example, poverty is a major problem for Tanjung Mas, a medium problem for Tawang Mas, Trimulyo, and Purwosari, and a small problem for Krobokan.

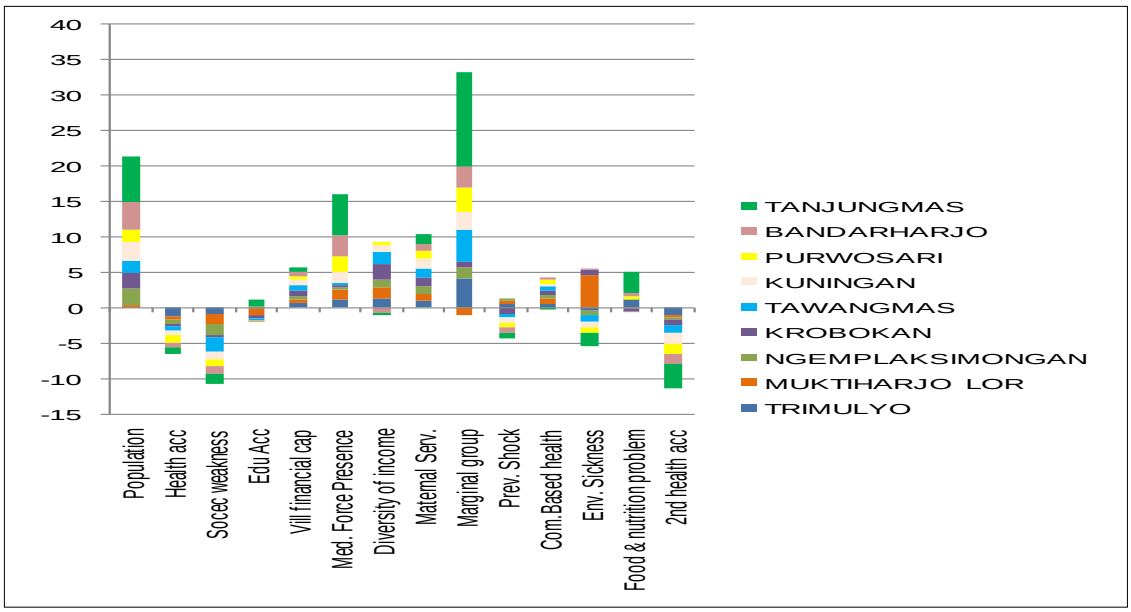


Figure 9.25. SoVI attribute at nine villages of coastal subdistricts

Distribution of community vulnerability for Pekalongan City is mostly centred in coastal areas i.e. Degayu, Kandang Panjang, Bandengan and Pasir Sari (Figure 9.26). Among the most vulnerable villages, Kandang Panjang has the highest population number followed by Pasir Sari, Degayu, and Bandengan. Other villages in coastal areas fall into the class of 0.5 – 1 standard deviation from mean of the total factor score. The least vulnerable villages are located in the central part of the city which is close to administration, health, social, economic, and public services.

Important information comes not only from vulnerability spatial distribution but also from its individual factor that composes total vulnerability. In Semarang City, each individual factor, from 14 vulnerability factors, influences the total SoVi score differently for each village (Figure 9.27). The SoVI score of Tanjung Mas village, for example, is largely driven by the marginal population, availability of maternal services,

and population structure. On the other hand, at Tlogosari, Muktiharjo Kidul, Wonosari, Kalipancur, and Purwoyoso, marginal population is not a problem. In these cases, population structure and limited funding to cope with natural hazards and risk reduction program are more significant than poverty.

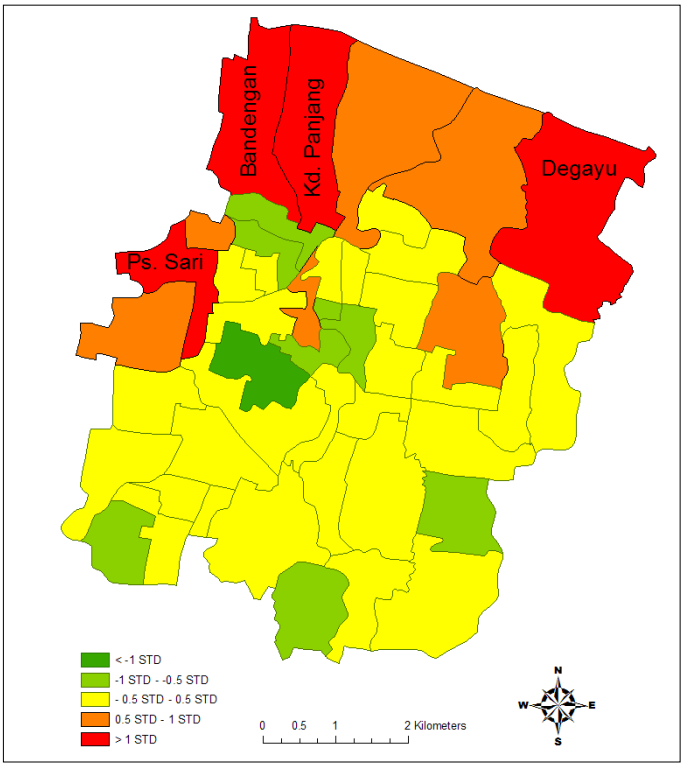


Figure 9.26. Social vulnerability at Pekalongan City

That condition is also found in Pekalongan City's vulnerability distribution. Similar to Semarang City, a number of factors act differently among its villages. Underlining factors that contribute to their vulnerability vary within all fourteen factors (Figure 9.28). Generally, factor 1 (population), 5 (village financial capacity), 6 (presence of health professionals), and 9 (marginal groups) contribute similarly to the vulnerability of all villages. The presence of marginal groups is a common problem shared by all villages with a significant vulnerability score. Similarly, but a different effect, factors 2 and 14 (access to major and secondary health services) increase the capacity of village communities in mitigating coastal hazard impacts. Meanwhile, factor 4 (access to education and social services), factor 7 (income diversity), and factor 11 (community health programs) affect villages' vulnerability in different ways.

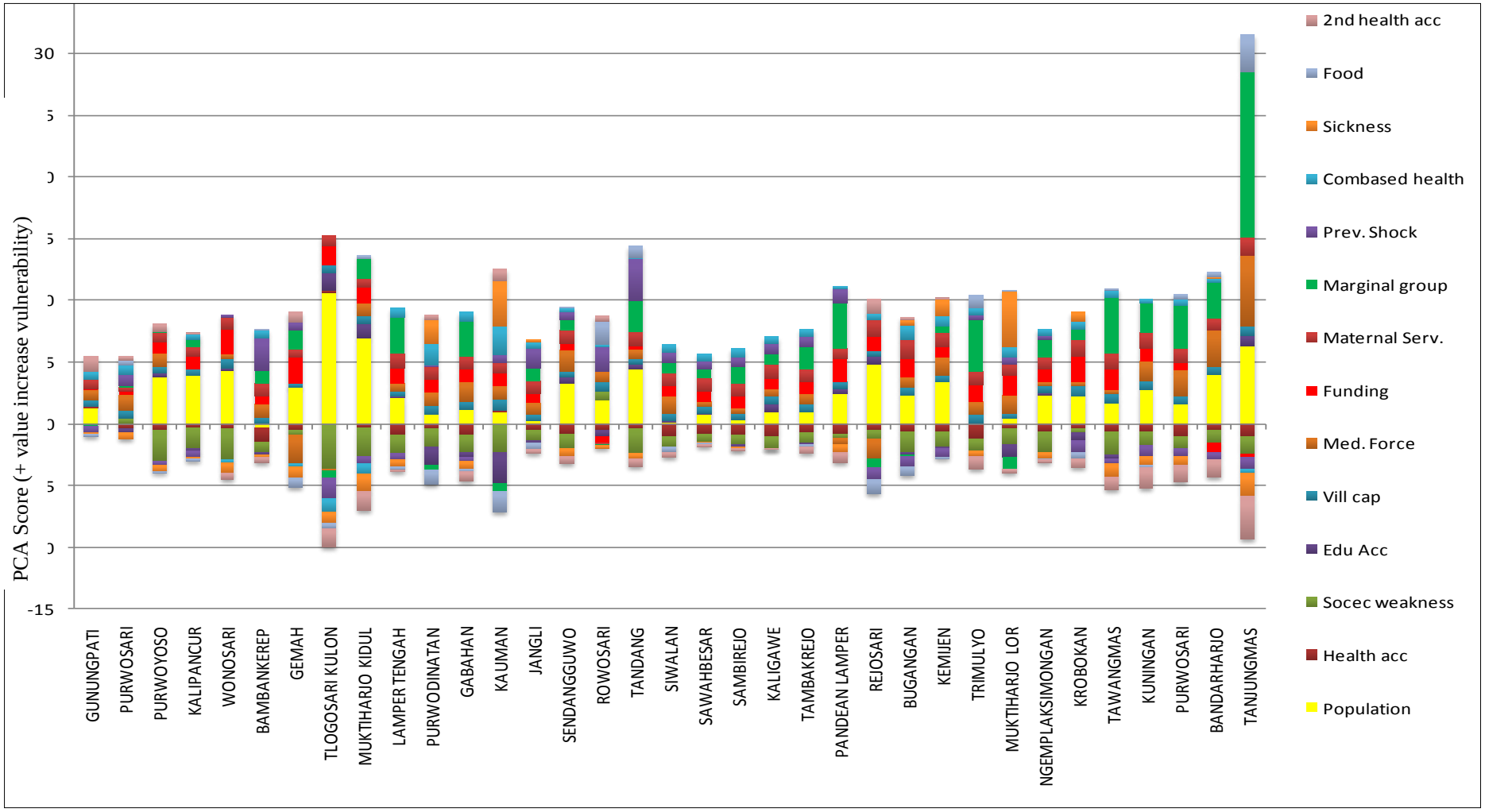


Figure 9.27. Vulnerability attribute and its influence to total SoVI of Semarang City

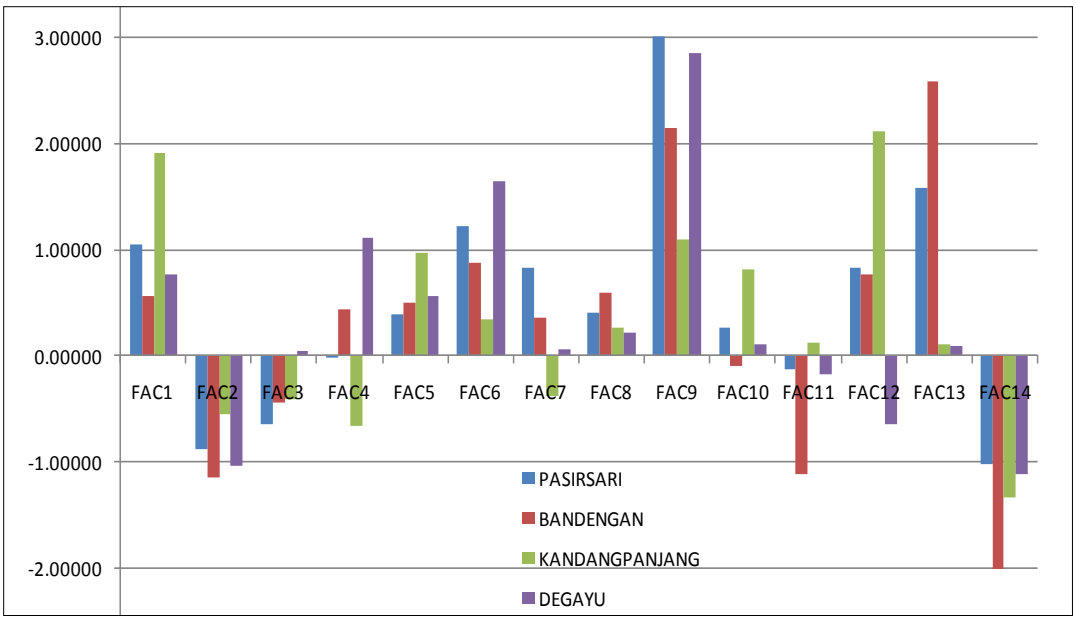


Figure 9.28. Factors' contribution to total vulnerability at Pekalongan villages

Each factor provides important information for local authorities to define mitigation appropriate programs. For example, at Kandang Panjang, factor 4 (access to education and social facility) is not a problem but it is for Degayu. Without looking at the map, one could deduce that Kandang Panjang is relatively closer to the city administrative centre than Degayu. However, Kandang Panjang has a higher residual shock from previous natural hazards than do other villages (factor 10). That also partially explains why Kandang Panjang receives more funding than other villages (factor 7). Meanwhile, Degayu has fewer problems in sickness from sanitation and environmental health than other villages (factor 12).

Community vulnerability is mainly influenced by the population structure particularly the size of the population. However, interesting results were found when detailed examination was undertaken. Districts with a higher number of vulnerable villages are not necessarily also higher in the size of the vulnerable population (Figure 9.29). Semarang City and Tegal District have almost the same number of vulnerable villages but the vulnerable population in Semarang City is almost double. Similarly, Jepara and Kendal have almost the same sized vulnerable population but the number of villages is almost double in Kendal. That kind of information is important to determine risk reduction programs for provincial government. The allocation of funds and programs should not only be based on the number of vulnerable villages but also the total number

of the vulnerable population. Routine monitoring also can be carried out to see how the vulnerability distribution is changed after a certain period of the development program.

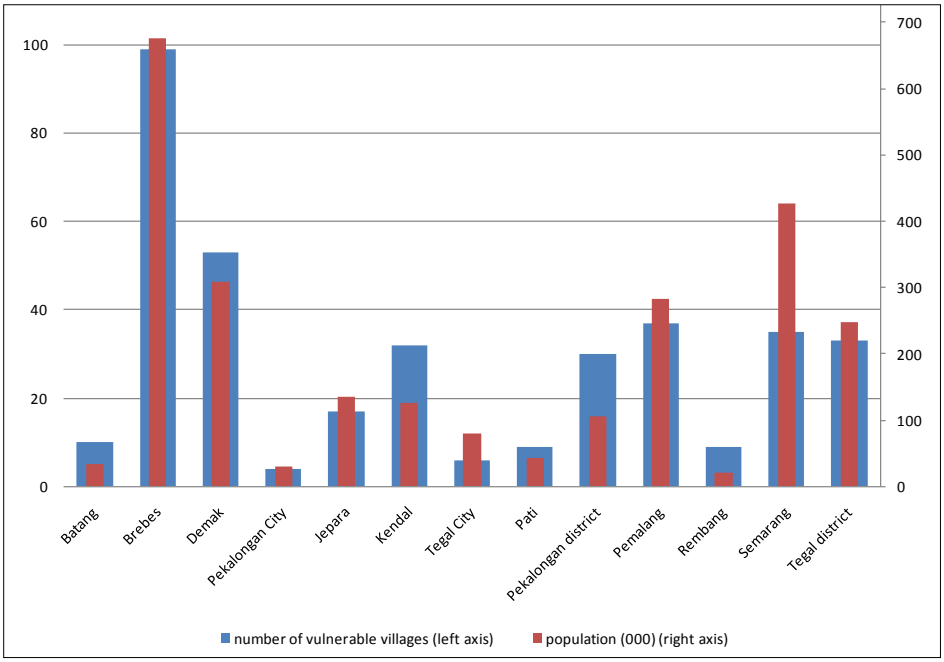


Figure 9.29. The number of vulnerable village and population in each district

9.5.3. Sea Level Rise Intersection with Social Vulnerability

In Semarang City, there are 43 villages in seven subdistricts that are located within areas less than 1 m and vulnerable to sea level rise inundation (Table 9.5 and Figure 9.30). Those 43 villages have different SoVI score where 9 of them are the most vulnerable villages. Those nine villages are Trimulyo, Muktiharjo Lor, Ngemplak Simongan, Krobokan, Tawang Mas, Kuningan, Purwosari, Bandarharjo, and Tanjung Mas. These villages also represent a quarter of the total number of the most vulnerable villages at Semarang City.

Table 9.5. Areas that are threatened by inundation from sea level rise at Semarang City

SUBDISTRICT	VILLAGE		SOVI
Gayamsari	1	KALIGAWE	4.85938
	2	SAWAHBESAR	3.74125
	3	TAMBAKREJO	5.25291
Genuk	4	BANJARDOWO	2.48890
	5	GEBANGSARI	0.06865
	6	GENUKSARI	1.63044
	7	MUKTIHARJO LOR	6.84057
	8	TERBOYO KULON	0.74678
	9	TERBOYO WETAN	0.77161
	10	TRIMULYO	6.76873
West Semarang	11	GISIKDRONO	2.93335
	12	KALIBANTENG KULON	1.92353
	13	KARANG AYU	2.77004
	14	KROBOKAN	5.43170
	15	TAMBAK HARJO	0.86216
	16	TAWANGMAS	5.45272
	17	TAWANGSARI	-3.64089
Central Semarang	18	BANGUNHARJO	0.24212
	19	KAUMAN	5.35767
	20	PANDANSARI	-0.37293
	21	PURWODINATAN	3.95864
East Semarang	22	BUGANGAN	4.46862
	23	KEBONAGUNG	1.28644
	24	KEMIJEN	7.37677
	25	MLATIBARU	2.09033
	26	MLATIHARJO	1.63225
	27	REJOMULYO	3.09599
North Semarang	28	BANDARHARJO	7.94252
	29	BULU LOR	2.83313
	30	DADAPSARI	2.49838
	31	KUNINGAN	4.89986
	32	PANGGUNG KIDUL	0.91621
	33	PANGGUNG LOR	3.13622
	34	PLOMBOKAN	2.12646
	35	PURWOSARI	5.75281
	36	TANJUNGMAS	22.20812
Tugu	37	JERAKAH	0.18246
	38	KARANGANYAR	-0.09602
	39	MANGKANG KULON	-1.57368
	40	MANGKANG WETAN	0.66527
	41	MANGUNHARJO	0.53723
	42	RANDU GARUT	-2.12773
	43	TUGUREJO	3.21751

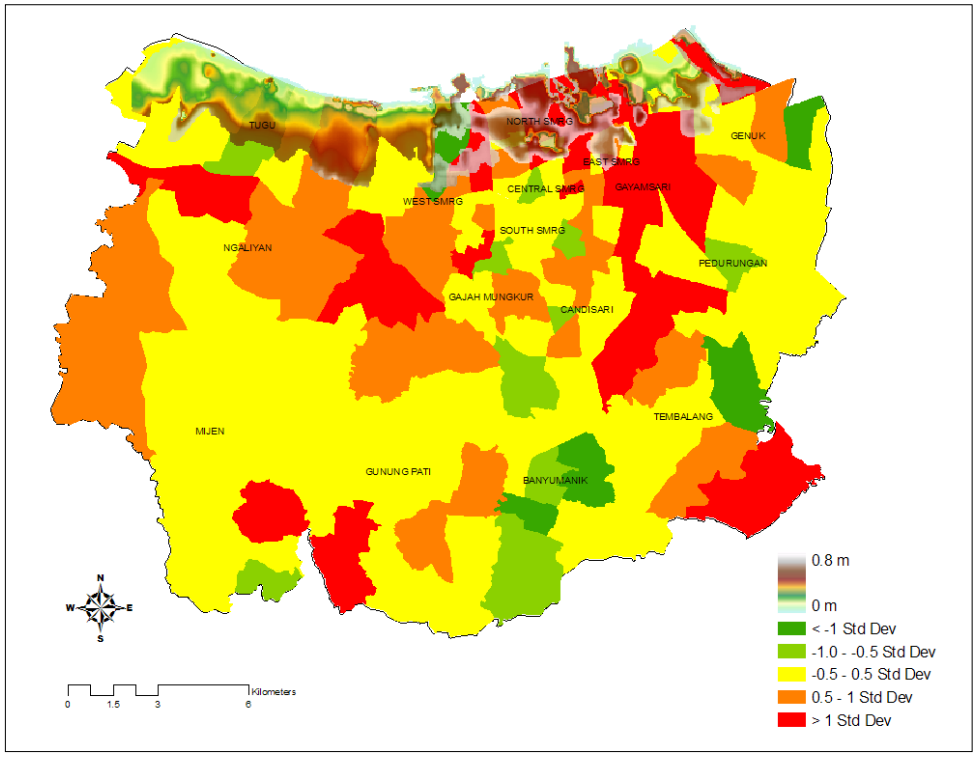


Figure 9.30. Inundated villages due to 1 m sea level rise and its SoVI

High vulnerability factors when combined with projected sea level rise inundation will have a significant impact on communities that already suffer from existing inundation problems. Many poor family houses will disappear as they could not cope with the rise in water levels. For some families that have the capacity to retrofit their houses, into more storeys, the problem could be remedied. Findings during the field observation showed many houses have been submerged due to the increasing size of their surrounding houses (Figure 9.31).

Source: field observation at Semarang

Figure 9.31. Inundation problem at North Semarang sub district

In Pekalongan City, almost all vulnerable people would be exposed to a sea level rise of 1 m (Figure 9.32). Their high vulnerability transforms into a high risk of impact from natural hazards in particular SLR. Their low capacity in village government, population structure, less availability of medical personnel and maternal health services in the villages, and a large marginal group decreases their capacity to cope with climate change impacts in coastal areas in particular from tidal inundation, flooding, sanitation problems, and environmental diseases. Bandengan village is one of many coastal villages at Pekalongan that is lack of good drainage system. During the rainy season, many locations are flooded by water which retain for days that create stinky and smelly environment. The situation is exacerbated with the practice of community that use backyard as water discharge area. During inundation time, the water that has stayed for days mix with seawater and create pools that can be potential breeding ground for mosquitoes (Figure 9.33).

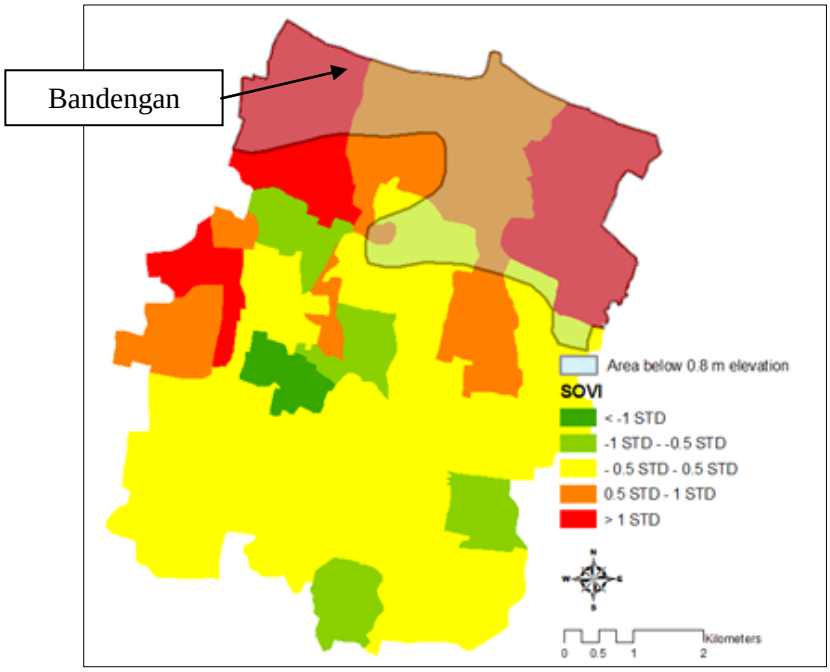


Figure 9.32. Sea level rise inundation projection of vulnerable communities

Source: field observation at Pekalongan

Figure 9.33. Sanitation problems caused by tidal inundation at Bandengan village

9.5.4. Spatial Mismatch between Coastal Boundary Delineation and Coastal Inundation and Community Vulnerability

An important result from the method that has been applied in this research is overlaying the low lying areas from a regional view with the coastal delineation that is defined by the Coastal Management Act (Figure 9.34). The general situation in Central Java is also the case for Semarang and Pekalongan. The coastal area boundary excludes certain locations that are low lying areas (Figure 9.35).

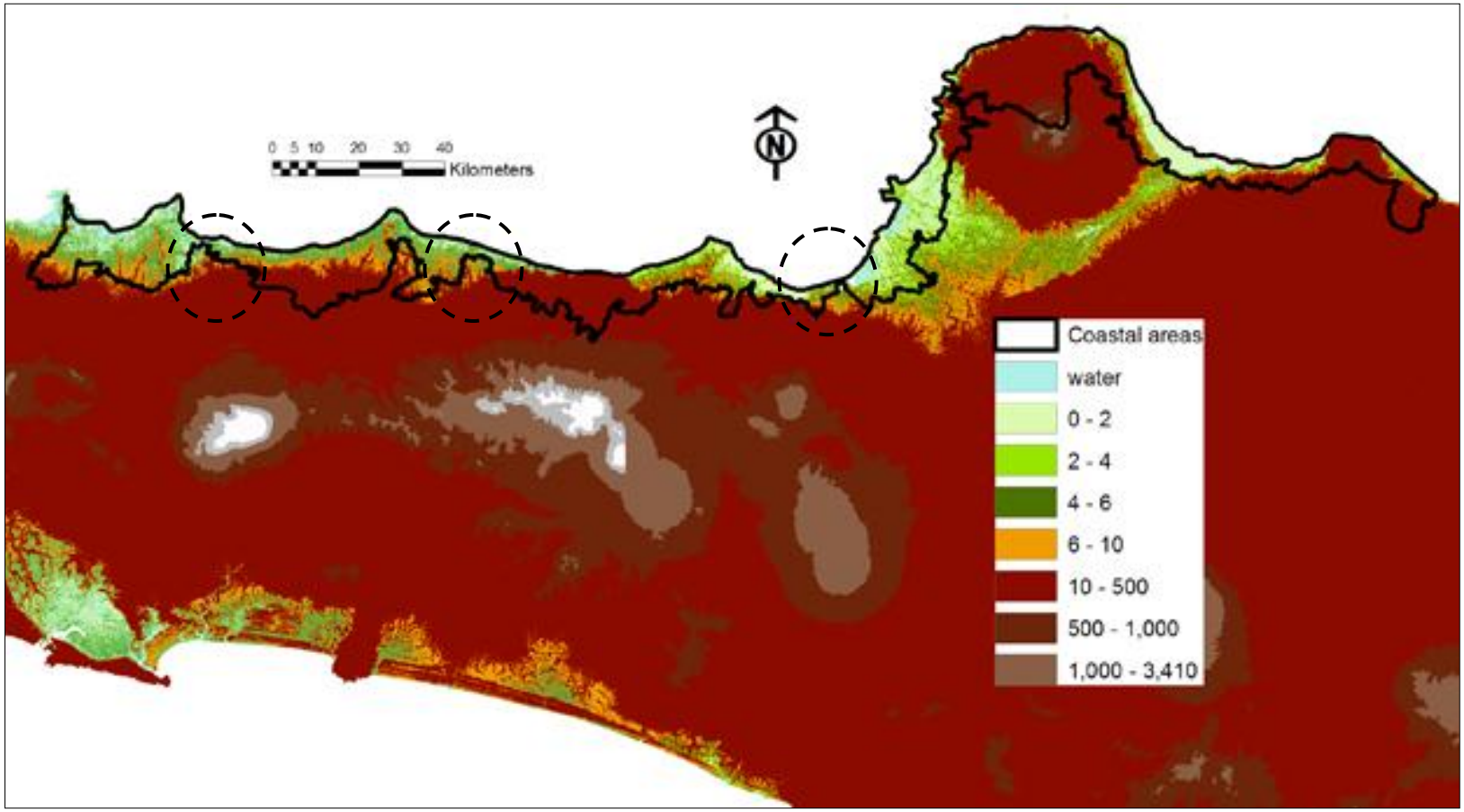


Figure 9.34. Spatial gap between coastal boundary and hazard prone areas

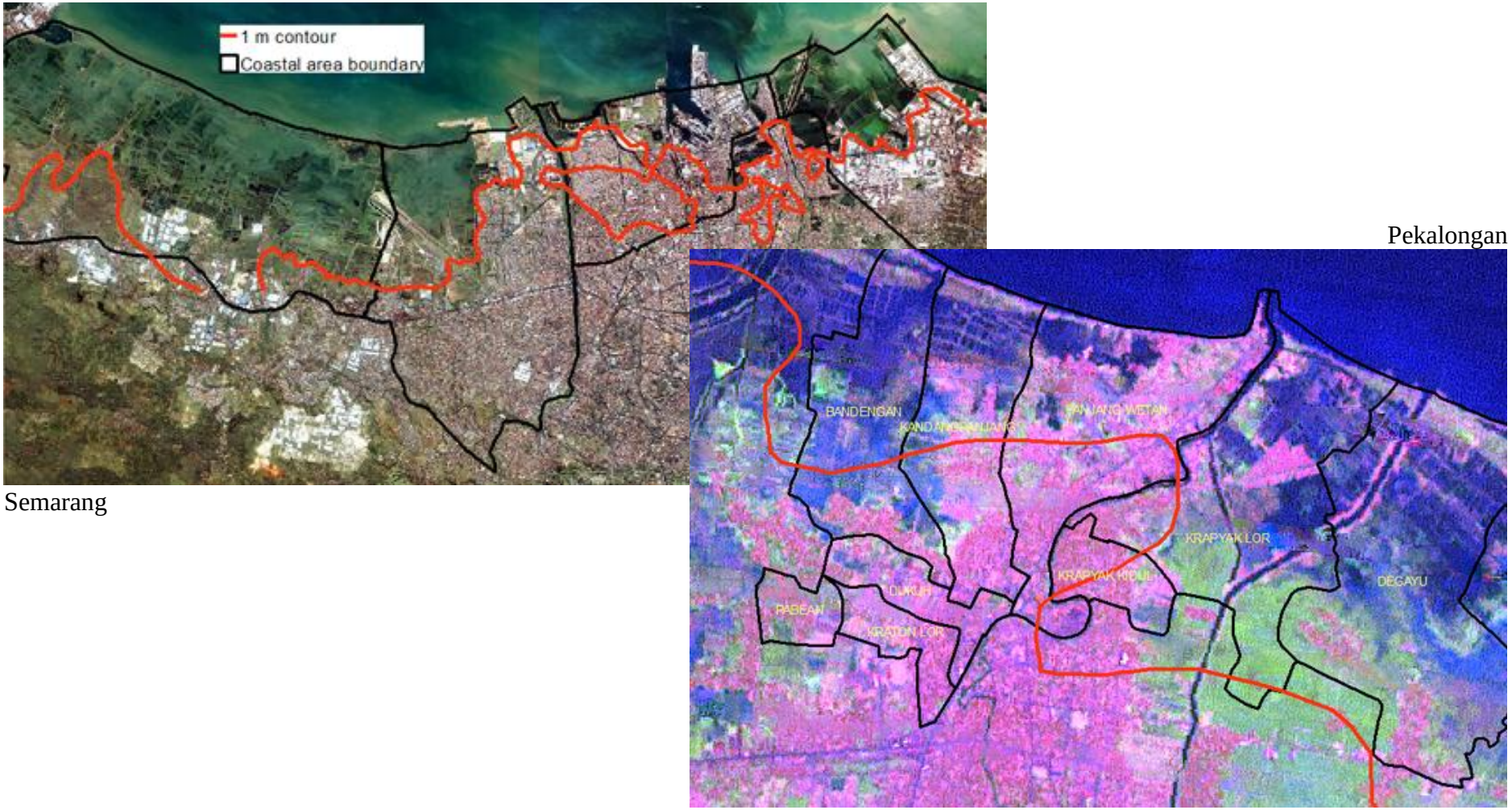


Figure 9.35. Mismatch between coastal areas (black) and inundated prone areas (red)

The spatial mismatch/gap caused by the coastal area delineation is not only between hazard prone areas and coastal boundary but is also the case for vulnerability distribution (Figure 9.36). Many vulnerable villages are potentially excluded from community socio-economic activities and funding that is allocated under coastal management programs. It is not because they are not vulnerable or not affected by coastal hazards, but because they are not located in the coastal area boundary.

9.6. Discussion

The objective of this chapter was to examine coastal inundation and community vulnerability in Central Java, Semarang, and Pekalongan City. The assessment also aimed to show how the integration between disaster management and coastal management can be initiated using the results from hazard and vulnerability assessments. To achieve that objective, coastal inundation has been mapped using digital elevation data and community vulnerability was assessed using variables from the village potential census data.

Digital elevation data were obtained from HydroSHED where according to its quality assessment, the data are suitable for hydrological assessment, but one needs to be aware of errors from conditions such as varying vegetation cover (USGSHydroSHEDS 2008). Considering the accuracy, the data were only applied for regional level assessment. At the city level, elevation data from basemap at 1:25k scale was combined with the topographic survey. Cost is also one of the considerations that need to be taken when using high resolution of elevation data (NOAA 2009). The use of more general but less detailed information such as from Hydroshed/SRTM data is still appropriate since the availability of high resolution elevation data is more difficult to obtain (Kuhn, Tuladhar et al. 2011).

This research shows that the SRTM data is useful to locate regional low lying areas that are prone to coastal natural hazards. The distributions of these areas are also clearly shown to be not in line with the administrative boundary of coastal areas. The general presentation of areas that are below 10 m from sea level, is important to examine potential inundated and affected areas by sea level rise and associated climate change hazards.

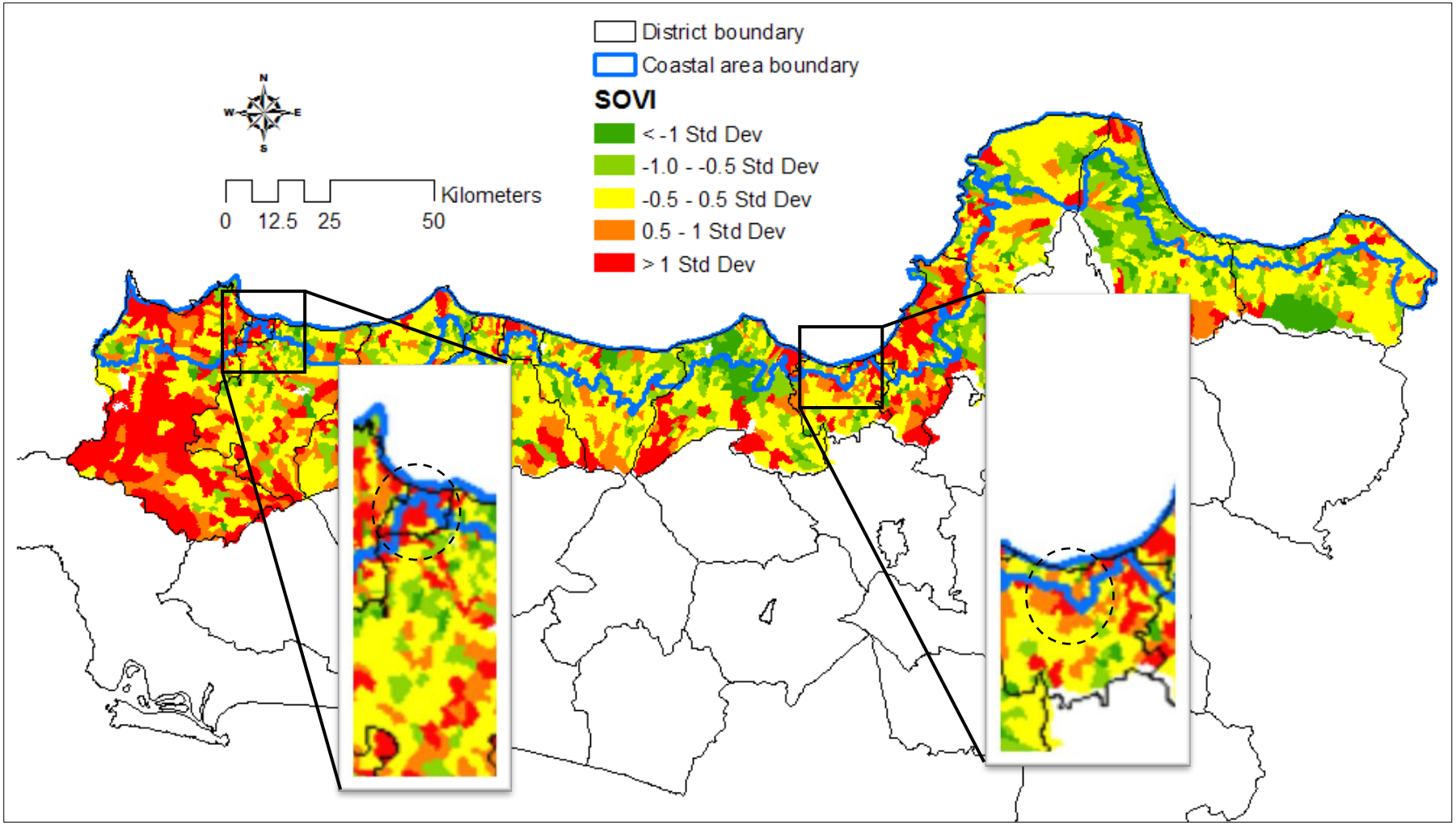


Figure 9.36. Spatial mismatch between coastal areas and community vulnerability

The village potential census data was shown to be appropriate for community vulnerability assessment in Indonesia. It contains individual, population, and place attributes that can be used as proxy to represent vulnerability factors. Availability of all variables is important since conceptually vulnerability is shaped by the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UN/IDSR 2002). The data are available in all Indonesian districts as part of the statistical product. Importantly, it is collected regularly every two years which is essential for time series assessment because the nature of vulnerability is very dynamic by time (Thomalla, Downing et al. 2006; Cutter and Finch 2008). Regular data collection is also important to minimise data lost due to time passage that changes the data as a consequence of mobility, migration and social change (King 2001). Time is also a limitation to socio economic indicators because they can change very much in a short period (McLaughlin, J.McKenna et al. 2002).

This chapter showed that GIS analysis was very useful to undertake spatial analysis and present the hazard and vulnerability results. Understanding hazard and community vulnerability is an obligation for local government in implementing the Disaster Management Act 24/2007. It is also an aspect that needs to be assessed within hazard analysis (UN/ISDR 2002) and is at the core of the mitigation program (Cutter, Mitchell et al. 2000; Alcantara-Ayala 2002). More importantly, the GIS analysis provides information on hazard and vulnerability distribution, coastal area delineation, and potential mismatch between those two boundaries. The potential mismatch between hazard and vulnerability distribution and the coastal area boundary has been identified within Chapter 4.

Spatial analysis results showed that integration is unavoidable because the boundary of inundated zones is often located beyond the coastal areas defined by the Coastal Management Act 27/2007. It is shown both at the provincial and local levels and supports the argument of this research that there is a spatial consequence of using subdistrict boundaries to delineate coastal areas. This consequence has severe impacts for coastal hazards with geographically dependent impacts e.g. tidal inundation, sea level rise, and tsunami. At the provincial level, vulnerable villages in districts that have a thin subdistrict boundary such as Tegal, Pekalongan, Semarang, Kendal, and Pati are

potentially excluded from any coastal management activities. At Semarang, there are two subdistricts (East Semarang and Gayamsari) that are affected by existing inundation and future sea level rise but are located beyond the coastal area boundary. Similarly, four villages at East Pekalongan subdistrict that are affected by inundation will not receive any direct benefits from Pekalongan coastal management programs.

The result of vulnerability assessment showed that the vulnerability attributes are rooted within many different aspects such as social, economic, environmental, and governance. Information on individual factors that contribute to village vulnerability can direct more focus and appropriate mitigation actions to specifically target that factor. Moreover, vulnerability assessment is also fundamental to make disaster planning and mitigation activities effective and sensible (Clark 1998). The result also provides important information for both disaster managers and coastal managers about the inequality of coastal inundation impact within coastal communities. Inundation mostly affects low lying villages and the impacts are influenced by community social, economic, and place attributes that differ from one village to another. That inequality is potentially exacerbated by the coastal management program that excludes certain vulnerable villages and communities from its intervention.

The results from this case study are also useful to improve existing social vulnerability index developed by Cutter, S. L., B. J. Boruff, et al. (2003) particularly in three aspects; firstly, the contextualization of vulnerability variable is important before applying the SoVI. In the Indonesian case it is reflected in the importance of foreign workers and the absence of racial problem (white and non white). Secondly, overlying the SoVI with other policies such as delineation of coastal areas gives deeper understanding of how vulnerability will be exacerbated or minimised by existing policies. Thirdly, the case study gives a practical application on how to use the vulnerability assessment result to guide the development planning and budget allocation.

In relation to coastal management issues, the characteristic of coastal hazards on the north coast of Central Java is influenced by its coastal geomorphology and habitat. The inundation impacts are severe because of sediment type which is mostly sandy and muddy that makes it vulnerable to erosion. The problem from inundation is also exacerbated by coastal management issues such as habitat degradation. Mangroves are

only found in small parts of the coastal areas with their removal associated with erosion problems. The rate of coastal habitat degradation is alarming. The Semarang coastal manager stated that 42 ha of mangrove disappeared between 2003 and 2007 (DKP-Jateng 2008). Mangroves have been shown to be essential in protecting coastal areas from erosion (Mazda, Magi et al. 2002; Thampanya, Vermaat et al. 2006). Semarang has also been experiencing land subsidence for many years. The geology of the land that is dominated by alluvial deposits, such that existing uses of ground water, and buildings are factors that contribute to land subsidence (DKP-Jateng 2008).

In the case of Pekalongan City, coastal inundation has been compounded by existing coastal management problems such as erosion and pollution. Coastal habitats cannot provide protection as there is barely any mangrove ecosystem left along the Pekalongan coastal areas. As a consequence, salt water intrusion has been increasing due to tidal inundation and has made many agriculture areas unsuitable for paddy fields. Villages such as Degayu suffer salt water intrusion into their agricultural areas (Pekalongan-City 2008). Flooding from tidal activity is also a chronic problem especially for Kandang Panjang village which is always affected by tidal flooding. As Degayu is also a location for the city dump site, tidal flooding will create more problems in the future for community health. Other coastal villages that are vulnerable to tidal flooding are Panjang Wetan, Panjang Baru, and Krapyak Lor.

9.7. Conclusion

The coastal inundation and community vulnerability of Central Java Province, Semarang City and Pekalongan City have been presented using GIS analysis. The hazards are influenced by topographic conditions of coastal areas that are mostly narrow strips located in low lying areas. Prediction of a 1m rise in sea level will increase the number of inundated villages and affect the majority of the cities along the north coast. Clear examples have been shown at Semarang and Pekalongan City. The inundation affects the city's infrastructure, facilities, and settlements. The condition is worsened by the degradation of coastal habitats such as mangroves and coral reefs that naturally can reduce the impact of inundation.

The community vulnerability has been developed using the village potential census data. Fourteen factors were constructed from individual, family, population, and village

attributes to indicate total social and economic vulnerability. Consequently, each village has a different composition of vulnerability factors that give valuable information for decision makers to allocate mitigation programs. Vulnerability factors fall into different facets of elements including social, economic, and environmental issues. This gives an understanding of how community vulnerability needs to be addressed by disaster and coastal management. Spatially, the most vulnerable villages are distributed fairly evenly through all areas of the province with some geographic patterns. In the coastal areas, the most vulnerable villages are located in most of the districts.

Both coastal inundation and community vulnerability distribution are not entirely located within the boundary of coastal areas as defined by the Coastal Management Act. As a consequence, many villages on the north coast of Central Java could be excluded from the coastal management program. This spatial consequence further supports the integration need between disaster management and coastal management.

How existing planning documents at provincial and local level specifically respond to the inundation and vulnerability problem is presented and discussed in the next chapter. Solutions from the integration and its applications are also elaborated.

CHAPTER 10

APPLICATION OF INTEGRATION FRAMEWORK TO ADDRESS COASTAL HAZARD AND COMMUNITY VULNERABILITY

10.1. Introduction

The need for Integration between disaster management and coastal management has been discussed in the preceding chapters. Conceptually and theoretically integration is feasible and it is essential within the legal and planning contexts due to the many similarities, differences, and gaps between legislation and planning documents. As a result, an integration framework has been developed using elements from conceptual, legal, and planning aspects.

How that integration framework is implemented is addressed in Chapters IX and X. The framework is initiated by conducting hazard and vulnerability assessment. As a result, empirical evidence has been presented and discussed in Chapter IX where coastal hazard and community vulnerability assessments illustrate the need for integration. This is because of: i) spatial mismatch between hazard and community vulnerability distribution and coastal delineation, ii) vulnerability attributes are multi-dimensional and cannot be addressed by only one single sector, and iii) there is a strong relationship between coastal hazard impacts and coastal environmental problems.

Results from the hazard and vulnerability assessment need to be translated and accommodated within disaster management and coastal management strategic and operational plans. However, existing planning documents were not responsive to existing general coastal hazards (presented and discussed in Chapters V – VII). This chapter presents and discusses the response from local government on coastal inundation and community vulnerability in more specific detail. How the integration framework can assist local authorities in addressing the issues and encourage integration between disaster management and coastal management to address coastal inundation and community vulnerability is also elaborated.

10.2. Assessment of Existing Planning Documents

Having an understanding of existing coastal inundation, social vulnerability, and coastal management areas gives local government a sound basis for reducing coastal inundation

and sea level rise risk through policy and development. To validate this assumption, a number of local government documents were evaluated: i) the coastal management plans, ii) the disaster management plans, iii) the spatial plans, and iv) the development plans. The examination also uses the results from Chapter 6 and 7 on planning document compatibility and functionality assessment.

a. Coastal Management Plan

The coastal management plans of Central Java and Pekalongan City were evaluated to examine whether existing coastal management plans are encouraged to achieve sustainable development in relation to risk from coastal disasters (Duxbury and Dickinson 2007). Detailed evaluation was then conducted to examine how the plan addresses coastal social vulnerability and inundation problems by looking at its: i) goals and objectives, ii) components of the program in relation to social, economic, and environmental objectives, iii) accommodation of existing coastal hazards and community vulnerability.

b. Disaster Management Plan

The disaster management plans were evaluated against a set of protocols to assess their quality on basic issues of disasters, goals, and policy (Berke, Roenigk et al. 1996; Deyle and Smith 1998; Srivastava and Laurian 2006). Detailed assessment was also carried out to evaluate the Central Java disaster risk reduction action plan in its: i) responsiveness to existing coastal inundation and social vulnerability, and ii) allocated policy and programs to address identified coastal inundation and social vulnerability issues.

c. City Spatial Plan

The existing spatial plans were evaluated against sea level rise scenarios and vulnerable areas based on ground elevation, with the goal to assess whether the spatial plan could reduce the potential risk from coastal hazards in future (Burby and Dalton 1994; Burby 1999). Detailed analysis was carried out on: i) the spatial plan response to existing coastal inundation problems and ii) the potential risk of future planned development and land uses against sea level rise scenarios.

d. Development Plan

The local development plans consist of goals, strategies, and programs of development that will be achieved within a certain period. It includes all sectors and agencies, programs, and budgets. The goal is to examine whether the plan is responsive to existing coastal hazards, social vulnerability, and coastal management issues. In this case, according to document availability, the Semarang City's budget allocation for 2010 is examined and for Pekalongan it is the budget for fiscal year 2009.

10.3. Application of the Integration Framework

Existing information from planning documents on coastal hazards, social vulnerability, and response were used to develop a hypothetical integration plan between coastal management and disaster management. The hypothetical plan was developed by applying an integration framework to the existing planning document content. The benefits, advantages, and problems in the integration are addressed and discussed.

10.4. Result

10.4.1. Response of Coastal Management Plans

The responses from coastal management plan could be grouped into two elements: i) policy and program response, and ii) spatial response in the form of coastal zonation plans.

a. Provincial Level

Specific programs to address coastal hazard issues have been allocated in the Central Java coastal strategic plan (Table 10.1). Although coastal inundation has been identified, the strategic plan document does not provide information on: i) low lying coastal areas that are vulnerable to inundation and sea level rise impacts, ii) coastal areas boundary where the coastal management plans are implemented, and iii) surveys to be conducted or data collected when the inundation or sea level rise impacts are beyond the existing coastal boundary. This kind of information needs to be incorporated into hazard prone areas and mitigation mapping which are already programmed. The information from hazard analysis assists the coastal manager in Central Java Province to conduct detailed surveys and analysis by using it as reference.

Table 10.1. Policy and program response from the Central Java coastal strategic plan

Central Java Coastal Strategic Plan			
Component	**Fact and figure**	**Strategy/Policy**	**Program**
Bio physic : • Coastal erosion • Coastal accretion • Seawater intrusion	- 5 - 6 thousand hectares are eroded within 115 km of coastline - Pemalang District suffer the most erosion problem - Accretion of 705.5 m2 within 117.85 km of coastline - Pati and Brebes Districts have greatest accretion problem - Have been a chronic problem for coastal areas in Central Java	- Development of coastal disaster resilience and mitigation	1. Socialization on setback areas for coasts and riverbank 2. Prohibiting development on setback areas by appropriate regulations 3. Development of hazard prone area map and its mitigation methods 4. Development of hazard friendly housing for fishermen settlement that prone to coastal hazard
Coastal ecosystem : • Mangrove degradation • Coral reef degradation Sea grass degradation	- Total areas of mangrove in Central Java Province is 4,023 ha - Coral reefs in Central Java mostly are in damaged condition - The biggest cover is 200 ha located in Karimun Jawa Marine National Park - Only found in Jepara/Karimun Jawa Marine National Park	- Controlling, reduction, and prevention of marine and coastal degradation	1. Establishment of coastal green belt 2. Coastal zoning/spatial plan development
Social and economic condition of coastal community: • Number of coastal aquaculture and fishermen are decreasing	- Number of fishermen was 177,000 in 2008 - Income/capita of fishermen was around 500 US$ in 2008	- Optimizing and provision of supporting infrastructure for marine and fisheries economic activity - Improvement of capture fishing activity - Improvement of skill and understanding of fishermen and fish farmer - Coastal community empowerment	1. Improvement of facilities and infrastructure 2. Improvement of human resources 3. Application of technology 4. Development of road network to fisheries centre and establishment of fish market 5. Environmental rehabilitation for fish processing areas and fishermen settlement 6. Development of new tourism sites and attractions 7. Assistance to fishermen on fishing gear/equipment 8. Training and outreach to coastal community 9. Rehabilitation and development of coastal social infrastructure

Source: (Renstra-PWP-Jateng 2009)

More deficiencies are found in the community vulnerability information. The strategic plan establishes the policy to improve economic productivity and social infrastructure but no analysis is provided on underlying factors that contribute to existing coastal communities' vulnerability. Consequently, the programs that are going to be conducted are mostly to improve fisheries production. Overlaying the vulnerability map with existing coastal habitats degradation problems provides better understanding of socio economic impacts to mangroves and coral reefs in the region. Rehabilitation and conservation efforts could be integrated with community training, income generating activities, and social awareness to support its success.

b. Semarang City

No examination of Semarang City coastal management plan could be carried out since the city has not developed any documents.

c. Pekalongan City

Policies and programs of the Pekalongan coastal management strategic plan to address potential problems from coastal inundation are shown in Table 10.2. The strategic plan identified tidal inundation and erosion as major coastal hazards for Pekalongan City but provided no information on its distribution and sea level rise impacts in the future.

Table 10.2. Policy and program response to coastal inundation and community vulnerability

Pekalongan City Coastal Strategic Plan			
Component	**Fact and figure**	**Strategy/Policy**	**Program**
Coastal hazard: • Tidal inundation • Erosion	- Panjang wetan beach suffers the most inundation - Cause many paddy fields become unsuitable for cultivation. Mostly found in Degayu village.	- Mitigation of coastal hazards	1. Hazard assessment and its impacts 2. Establishment of hazard management team 3. Build physical structure 4. Coastal rehabilitation
Coastal ecosystem: • Mangrove degradation • Coastal pollution from fabric industry	- The amount is decreasing caused by conversion to shrimp ponds - Loss of mangrove cause severe erosion problem and exacerbate pollution	Mangrove rehabilitation and pollution management	1. Awareness and capacity improvement in pollution management 2. Mangrove rehabilitation 3. Conservation areas establishment 4. Awareness campaign 5. Waste and pollution management
Social and economic condition of coastal community: • Low economic capacity of coastal communities • Human resource quality is low	- Number of population working in fisheries sector is 50% for North Pekalongan Subdistrict in 2005.	- Improvement and empowerment of coastal communities	1. Improvement and empowerment of coastal community 2. Provision of supporting infrastructure for fishing activity 3. Improvement of formal and informal education for coastal community 4. Improvement of coastal community health level 5. Outreach, socialisation, stakeholder meeting,, and community self initiative

Source: (Pekalongan-City 2008)

Hazards and their impact assessment are programmed and the information from this chapter could be used as a reference. Similar assessments could optimise the resources and be focused on detailed information for certain locations e.g. the most vulnerable villages or priority locations for coastal development. Similarly with the case of Central Java Province, there are villages that are vulnerable to coastal inundation but located outside the coastal area boundary.

Coastal habitat rehabilitation and pollution management are programmed to address coastal environment degradation that not only affects coastal fisheries but also coastal communities' health. Combining those programs with information that those areas are also home to vulnerable communities and are prone to projected sea level rise and inundation makes the program more accountable to decision makers, the local parliament and public. This shows that vulnerability assessment is useful for the overarching objectives of coastal management. For example, Pekalongan coastal community empowerment program is focused on fisheries economic activity and social development. Improvement of health conditions and outreach are also allocated in the plan. Using information from the vulnerability analysis result, the city authority could decide that the low capacity of coastal village government, availability of medical personnel in the village, and poverty/poor families are among the major factors that contribute to Pekalongan City coastal communities' vulnerability. This information is essential for coastal managers to develop sound empowerment programs that not only target the right location but also the major factors of vulnerability.

Pekalongan City has also drafted a coastal zonation plan. The plan responds to existing coastal hazard problems as shown in Table 10.3. Both erosion and tidal inundation have been anticipated in the coastal zonation. However, most of the spatial responses are related to mitigating the impacts. Consequently, further developments are still planned and allocated along the coastal areas (Figure 10.1). No direction or anticipation of projected sea level rise is provided by the coastal zonation plan. It is considered that the flood storage and coastal protection will eliminate the threats from coastal hazards (DPPK_Pekalongan 2010).

Table 10.3. Response of the Pekalongan City coastal zonation plan to coastal hazard problems

Coastal hazard	Allocated zone	Zones objective	location
Erosion	1. Conservation areas	- for mangrove protection - reduce erosion - pollution trap	- refer to existing conservation allocation under the Pekalongan City spatial plan - North coast of the city along setback areas and estuarine
	2. Setback areas	- to rehabilitate degraded coastal area - to protect areas that serve as protection from erosion	- Along the coast from Bandengan to Kandang Panjang and Degayu
Inundation/tidal flood	a. Polder areas	To serve as water storage during flood and tidal inundation	Bandengan and Degayu village

Source: (DPPK_Pekalongan 2010)

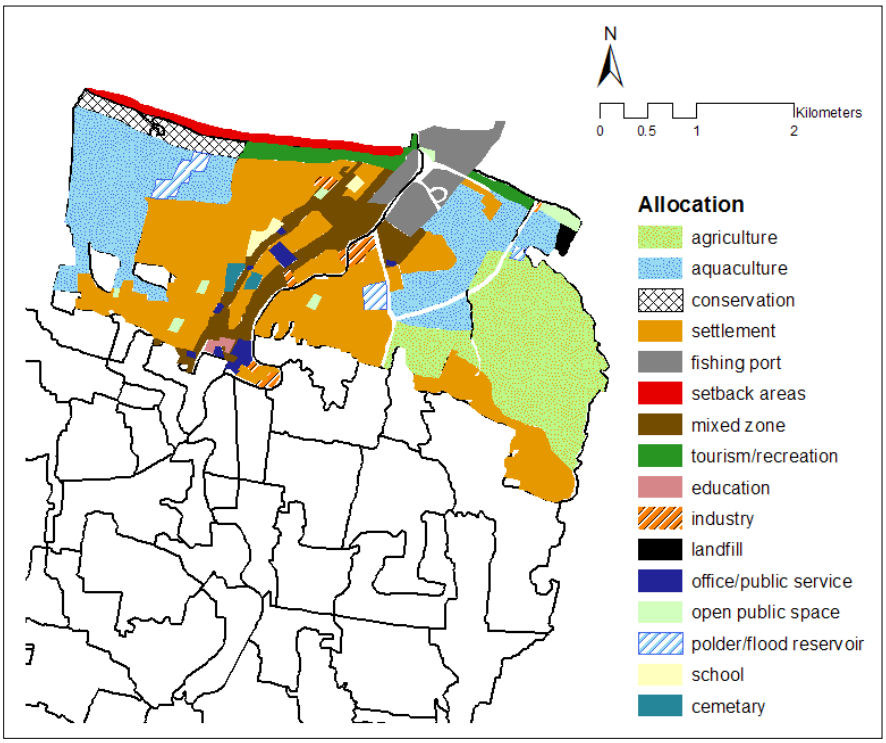


Figure 10.1. Coastal areas zonation plan of Pekalongan City

10.4.2. Response of Disaster Management Plans

The central Java Province has not established a disaster management plan and the only related document is the provincial disaster risk reduction action plan. The examination of the plan's compatibility in addressing costal disaster (Chapter VI) showed that the Central Java risk reduction action plan does not address coastal disaster in specific. However coastal protection is programmed under the civil work intervention. Sea level rise and coastal inundation are not discussed. Comparison between coastal inundation and seal level rise assessment conducted in this chapter and the Central Java Province risk reduction action plan is presented in Table 10.4.

Hazard mapping and disaster risk monitoring are programmed but the result is not known. More critically, the plan only directs the general hazard and disaster mapping and no allocation is made for coastal inundation hazards and sea level rise. It is then the responsibility of each sector to conduct specific actions to do the disaster mapping and identification and monitoring. This hazard and vulnerability analysis contributes to the implementation of policy and program of the risk reduction action plan.

Table 10.4. Comparison of the Central Java risk reduction action plan and hazard and vulnerability analysis result

Central Java risk reduction action plan		Hazard and vulnerability analysis
Policy	**Program**	
Disaster mapping	• Mapping of hazard prone areas • Mapping of community vulnerability • Assessment of government capacity, available resources, and local wisdom	- Coastal inundation affect low lying coastal areas in Central Java Province - The condition is predicted more severe in the future due to sea level rise impact
Identification and monitoring of disaster risk	Assessment, inventory, identification, and monitoring of disaster risk	- Most of coastal areas are vulnerable to erosion due to the degradation of mangrove ecosystem - Sea level rise will increase the erosion rate and severity - A lot of vulnerable villages are located in coastal areas of the province

Source: planning document analysis

10.4.3. Response of Local Spatial Plans

As coastal inundation and sea level rise threats have a geographic distribution, an appropriate response from spatial planning is essential. Spatial plans could prevent or regulate any development and social economic activities within hazard prone areas (Sutanta, Rajabifard et al. 2009; Tudes and Yilmaz 2009; Greiving 2006).

a. Central Java Province

The provincial spatial plan of 2003 – 2018 addresses the potential threat from natural hazards by establishing protected areas which include areas that are prone to natural disaster (Perda-RTRW 2003). The spatial plan identified flood, landslide, volcanic eruption, toxic gas, earthquake, and tsunamis as the major natural hazards in Central Java Province. Locations that are categorised as vulnerable to tsunamis include northern coast areas (Pemalang, Pekalongan, Kendal, Pati) and southern coastal areas (Cilacap). The spatial plan does not mention problems and locations that are vulnerable to coastal inundation and sea level rise.

The disaster prone areas, which are presented in the spatial plan, are actually only hazard prone areas as it is mainly based on the hazard threat and does not consider community vulnerability. The coastal setback areas are allocated as onsite protection areas and located in 17 coastal districts both on the south coast and north coast (Table 10.5). It means that coastal setback areas are allocated to all coastal districts in the province. No specific prioritising is given, even though according to the elevation

distribution (see Figure 9.17) there are many locations within low lying areas as well as many at high elevations. Response to spatial aspects of the Central Java coastal management plans could not be examined since the province has not developed its coastal zoning plan.

Table 10.5. Identified locations for coastal setback areas in Central Java Province

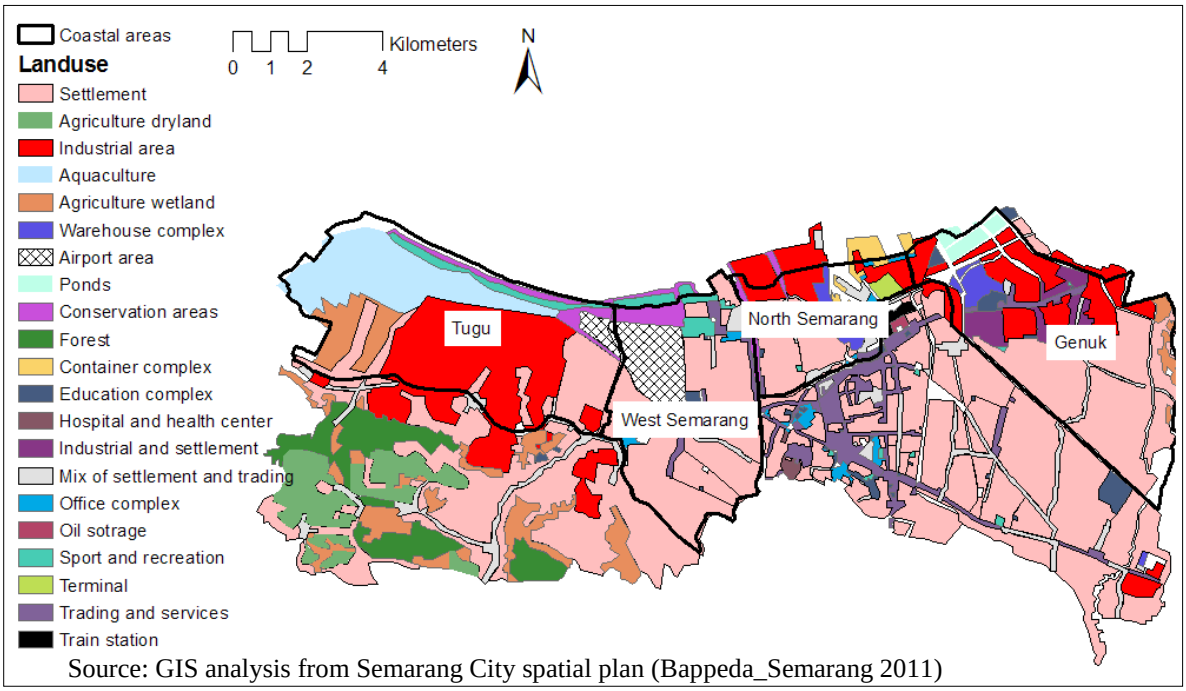
Coastal areas location	
North coast	South coast
1. Rembang 2. Pati 3. Jepara 4. Demak 5. Kendal 6. Batang 7. Pekalongan 8. Pemalang 9. Tegal 10. Brebes 11. Semarang City 12. Pekalongan City 13. Tegal City	1. Cilacap 2. Kebumen 3. Purworejo 4. Wonogiri

Source: (Perda-RTRW 2003)

b. Semarang City

The existing spatial plan for Semarang City (2000 – 2010) shows that significant development had been planned in northern parts of the city which basically are vulnerable to flooding and inundation. This spatial plan is under revision to meet the the new requirements under the Spatial Plan Act No. 26/2007. However, the new legalised spatial plan for 2010 – 2030 was not yet available during the field work data collection.

Five major developments planned were aquaculture, industrial complex, settlements, warehouses, and airport complex (Figure 10.2). Detailed allocation of areas within coastal subdistricts is presented in Table 10.6. For coastal protection, coastal setback areas are determined as 100 ms from the highest water mark for natural coasts and 50ms for reclamation areas (Setda_Semarang 2008). Conservation areas are allocated along the coastal zones of West Semarang and Tugu subdistrict. As all coastal segments at North Semarang and Genuk subdistricts are occupied by industrial areas and related activities, no coastal conservation zones are provided.



Source: GIS analysis from Semarang City spatial plan (Bappeda_Semarang 2011)

Figure 10.2. Spatial plan for Semarang City

Table 10.6. Spatial plan for Semarang City coastal subdistrict

Coastal areas subdistrict		
Tugu (as city development at western part)	West Semarang and North Semarang (as centre for transportation, recreation, trade and service, office and industry)	Genuk (as supporting areas for the city)
1. Industry and warehouse 2. City settlement 3. Trade and service 4. Conservation 5. Aquaculture 6. Recreation 7. Transportation 8. Agriculture	1. Transportation centre 2. Settlement 3. Recreation 4. Industry 5. Warehouse 6. Offices 7. Green and open space 8. Flood reservoir	Industry Transportation centre Aquaculture

Source: (Setda_Semarang 2008)

Inundation and floods are recognised as problems for the city development. It was only anticipated by development of better drainage system (Table 10.7). No other adaptation or specific regulation is proposed to reduce the impact of inundation. Attention is also only given to drainage construction to anticipate floods from rain and river, with no elaboration on the threat from sea level rise in the future. As all coastal subdistricts serve as vital areas for city growth and development, inability to adapt to the inundation problem, particularly from sea level rise, will jeopardise the city's future.

Table 10.7. Coastal subdistrict inundation problem and its response from spatial plan

	City development zone		
	Tugu	West Semarang and North Semarang	Genuk
Problem	- Flood from river and tidal inundation - Pollution problem from industry to aquaculture - Land competition between aquaculture and industry	- Flood and inundation caused by low elevation where West Semarang are majority 0 – 15 m above sea level and North Semarang 0 – 4 m. - Two big rives flow through these areas - Inundated areas at West Semarang are Tambakharjo, Tawangsari, Tawangmas, Karangayu, Slaman mloyo, Kalibanteng Kulon (0.5 – 1.2 m) - Inundated areas at North Semarang are Panggung Lor, Panggung Kidul, Bulu Lor, Kuningan, Dadapsari, Tanjungmas (0.3 – 0.6 m). - Seawater intrusion where at West Semarang it reaches 3.5 km landward	- Flood and inundation caused by less open space and reducing drainage capacity to contain rain water - Pollution problem from industry to aquaculture - Pollution from industry to nearby settlement
Proposed solution	- As development of the areas are still limited and majority are aquaculture the inundation problem is still not threatening - As the areas also grow and become city development areas tidal inundation needs to be anticipated - Conservation zones	- Settlement development needs to consider the drainage plan to minimise inundation - Limit new settlement development at coastal areas - Greenbelt along coastal and river bank areas	- Improve drainage capacity

Source: (Setda_Semarang 2008)

c. Pekalongan City

During the research fieldwork, the revised spatial plan for Pekalongan City was still under a process of finalisation and enactment by the local parliament. Based on the draft city spatial plan, the city areas are divided into two development zones (Table 10.8). The coastal areas i.e. North Pekalongan subdistrict is prioritised for marine and fisheries activity, tourism, and home industry areas. Settlement and commercial areas also dominate the north part of the city although this area is vulnerable to projected inundation (Figure 10.3).

Table 10.8. Pekalongan City development zones based on its spatial plan

City development zone	
Development zone I	Development zone II
1. West Pekalongan 2. South Pekalongan Development direction: - Administration centre - Home industry - Agriculture - Trade and service	1. East Pekalongan 2. North Pekalongan Development direction: - Marine and fisheries - Tourism - Home industry - Trade, service, and transportation

Source: (RTRW_Pekalongan 2009)

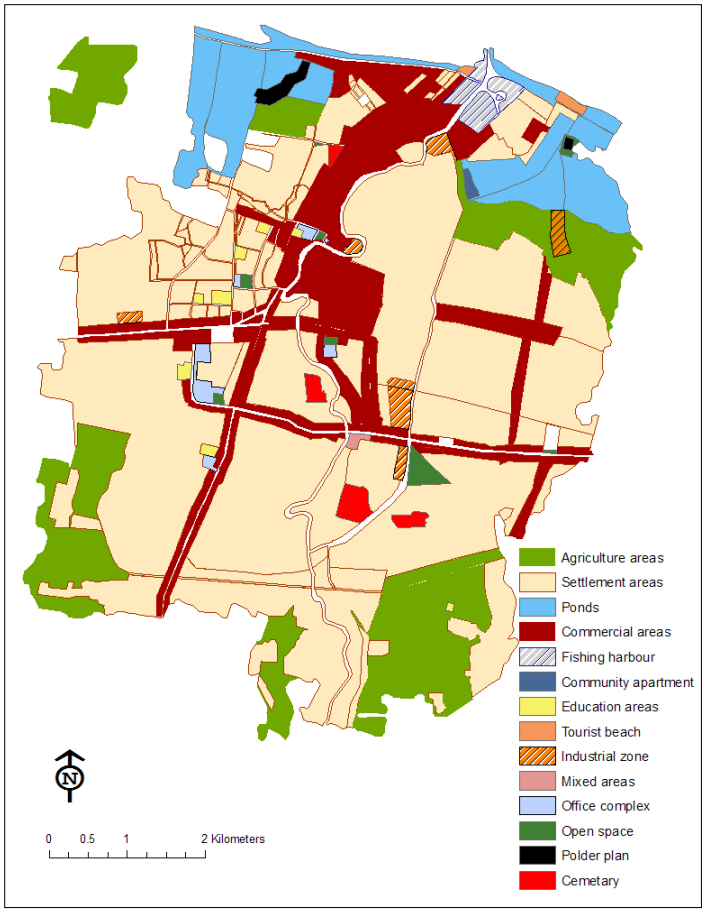


Figure 10.3. Pekalongan City spatial plan 2009 – 2029

Identified major natural hazards were flood and inundation caused by tidal activity and rainfall. The vulnerable areas for this natural hazard are located in all Pekalongan subdistricts (Table 10.9). Directions that are given include: i) protection from development of built areas, and ii) mitigation and rehabilitation of infrastructure once a disaster happens (p. 13, RTRW_Pekalongan 2009).

Table 10.9. Areas that are vulnerable to inundation and flood hazards

Subdistrict	Villages
North Pekalongan (9 villages)	• Krapyak Kidul, Krapyak Lor, Kangdang Panjang, Pajang Wetan, Panjang Baru, Kraton Lor, Kelurahan Dukuh, Pabean and Bandengan
West Pekalongan (11 villages)	• Kraton Kidul, Kergon, Sapuro, Kebulen, Kramat Sari, Bendan, Podosugih, Medono, Tirto, Tegalrejo and Pasir Sari
East Pekalongan (12 villages)	• Poncol, Noyontaan, Sugih Waras, Sampangan, Kauman, Kaputran, Landung Sari, Klego, Garner, Degayu, Dekoro and Sokorejo
South Pekalongan (6 villages)	• Kradenan, Buaran, Jenggot, Kuripan Lor, Yosorejo, and Banyu Urip Ageng

Source: Pekalongan City spatial plan (RTRW_Pekalongan 2009)

Pekalongan City spatial plan allocates two protection zones to address natural hazards: i) onsite protection area, and ii) natural disaster protection area. Coastal setback is part

of onsite protection. The criteria is 100 m from highest water landward and is located at Bandengan, Kandang Panjang, Panjang Wetan, Krapyak Lor and Degayu of North Pekalongan Subdistrict (RTRW_Pekalongan 2009). Similar to Semarang City, the spatial plan mainly considers that drainage development will solve the problem from inundation and flood by: i) development and rehabilitation drainage systems, ii) establish polders as flood storage particularly for areas with low elevation.

10.4.4. Response of Local Development Plans

a. Response to Coastal Inundation Hazard

The mid term development plan of the Central Java Province does not address specific disasters and only elaborates a general mitigation program for natural and disasters (Table 10.10). Coastal erosion and flooding are perceived as a result of failure of flood and coastal protection structures. No attention is given to sea level rise that will exacerbate existing erosion and flooding. Coastal inundation and sea level rise even are not identified under marine and fisheries issues that only cover issues of: i) community capacity to manage marine, coastal, and fisheries resources, ii) law enforcement and surveillance problems, iii) declining fish capture, iv) improvement of aquaculture infrastructure, v) improvement of fish processing, and vi) coastal habitat degradation.

Table 10.10. Areas that are vulnerable to inundation and flood hazards

Disaster issues	Target	Development sector
Geological disaster threat	• Landslide prone areas map • Volcanic prone areas map • Earthquake and tsunami prone areas map • Evacuation zone and relocation map for landslide hazard • Establishment of warning system	• Energy and mineral resources office
Coastal erosion and flooding	• Maintenance and rehabilitation of flood and costal protection structure • Community participation in establishment and maintenance of flood and coastal protection	• Public work office

Source: (Bappeda-Jateng 2008)

How the direction from mid term development plan is translated in annual development plans is provided in Table 10.11. As expected, coastal hazards that were addressed by the 2010 program are flood and erosion. As no mandate and direction are given to marine and fisheries agency to address coastal hazards, the programs were also missing

for 2010 and probably for the future also. Global warming anticipation is highlighted but not a specific elaboration or statement on sea level rise potential impacts.

Table 10.11. Implementation of disaster risk reduction for 2010 at Central Java

Sector	Target
Public works	• Rehabilitation of road and bridge that are damaged by disaster event • Flood management and coastal protection
Housing	• Rehabilitation of damaged house caused by disaster event • Settlement design and development of early warning for areas that are prone to landslide
Spatial plan	• Development of seawater intrusion map • Socialization and monitoring of geological disaster mitigation and landslide
Local Planning	• Improvement the quality of development plan at hazard prone areas
Transportation	• Improvement of search and rescue activity during disaster event
Environment	• Improvement of community and government apparatus in environment and disaster management • Improvement of data and information of natural resources, hazard prone areas, and environmental quality • Mitigation, adaptation, and prevention of damages caused by disaster and global warming • Rehabilitation of eroded coastal areas
Social	• Improvement of disaster victim psychology management • Improvement of prevention, preparedness, and risk reduction efforts • Improvement of rescue and evacuation of disaster victims • Improvement of emergency response activities
Forestry	• Land rehabilitation at hazard prone areas
Energy and mineral	• Availability of data and maps of tectonic and geological hazard prone areas

Source: (Bappeda-Jateng 2008)

Implementation of coastal hazard and disaster mitigation at Semarang City is guided by the mid term development plan that addresses coastal inundation and flooding under the environmental management priority (presented at Table 6.19, Chapter 6). Accordingly, in 2010 the city allocated risk reduction as part of: i) environmental management, ii) disaster preparedness under public service, and iii) disaster early prevention and victim management under infrastructure development program (Bappeda_Semarang 2009).

Flood and tidal inundation were identified as major hazards for the city (Table 10.12). However, the impacts and intervention were focused on an infrastructure point of view, as directed by the city spatial plan. No assessments or programs were directed to address impacts to vulnerable communities. The projection impacts of sea level rise are also missing from the document. Interviews with Semarang Marine and Fisheries Agency and Diponegoro University indicate that significant investment is going to be carried out to develop coastal reclamation and seawall to eliminate the tidal inundation problem.

Table 10.12. Flood and tidal inundation problem at Semarang City

Affected area	Impact of flood and tidal inundation	Activity for 2010
City infrastructure	• Road damage • Decreasing of infrastructure lifetime and function	• Drainage and flood management • Reducing inundation time by 5% • Improvement of flood and inundation management
City areas	• Inundated areas tend to increase	

(Bappeda_Semarang 2009)

The response from Pekalongan City development plan to coastal disaster is minimal. The marine and fisheries agency only covers programs on economic activities of the fisheries industry. Issues of inundation and flooding are lacking and indirectly addressed under the environmental management program i.e. to manage coastal pollution and degradation (p. 71-72, Bappeda_Pekalongan 2005). Accordingly, the development programs for fiscal year 2009 did not address coastal flooding and inundation. The Pekalongan Marine and Fisheries Agency had 14 activities/projects at fiscal year 2009 none of which relate to coastal inundation and flooding hazard mitigation (Table 10.13).

Table 10.13. Activities of Pekalongan City Marine and Fisheries Agency for 2009

Issues	Activity
a. Fisheries development	1. Fisheries outreach 2. Fishermen community small scale business 3. Improvement of coastal community skills 4. Development of fishing clusters 5. Coastal community empowerment during off season for fishing 6. Fish production promotion
b. Aquaculture	7. Outreach to aquaculture farmers 8. Aquaculture intensification 9. Improvement of aquaculture facilities 10. Fish auction maintenance 11. Development of fishing boat anchor
c. Marine and coastal	12. Formulation of Pekalongan coastal management plan 13. Maritime culture/festival 14. Beach clean up

Source: (Bappeda_Pekalongan 2008)

b. Response to Community Vulnerability

In general, provincial the development plan for fiscal year 2011 matched the 14 community vulnerability factors (Figure 10.4) Similar conditions are also found for Semarang City development plan for fiscal year 2010 (Figure 10.5) and Pekalongan City development plan for fiscal year 2009 (Figure 10.6). In the program level, all 14 vulnerability factors were addressed by 22 different activities and development sectors. The program in provincial level could be detailed to address the specific issues. For example, in health sector, specific programs can be allocated to provide medical forces, maternal health services, and improvement of community health program.

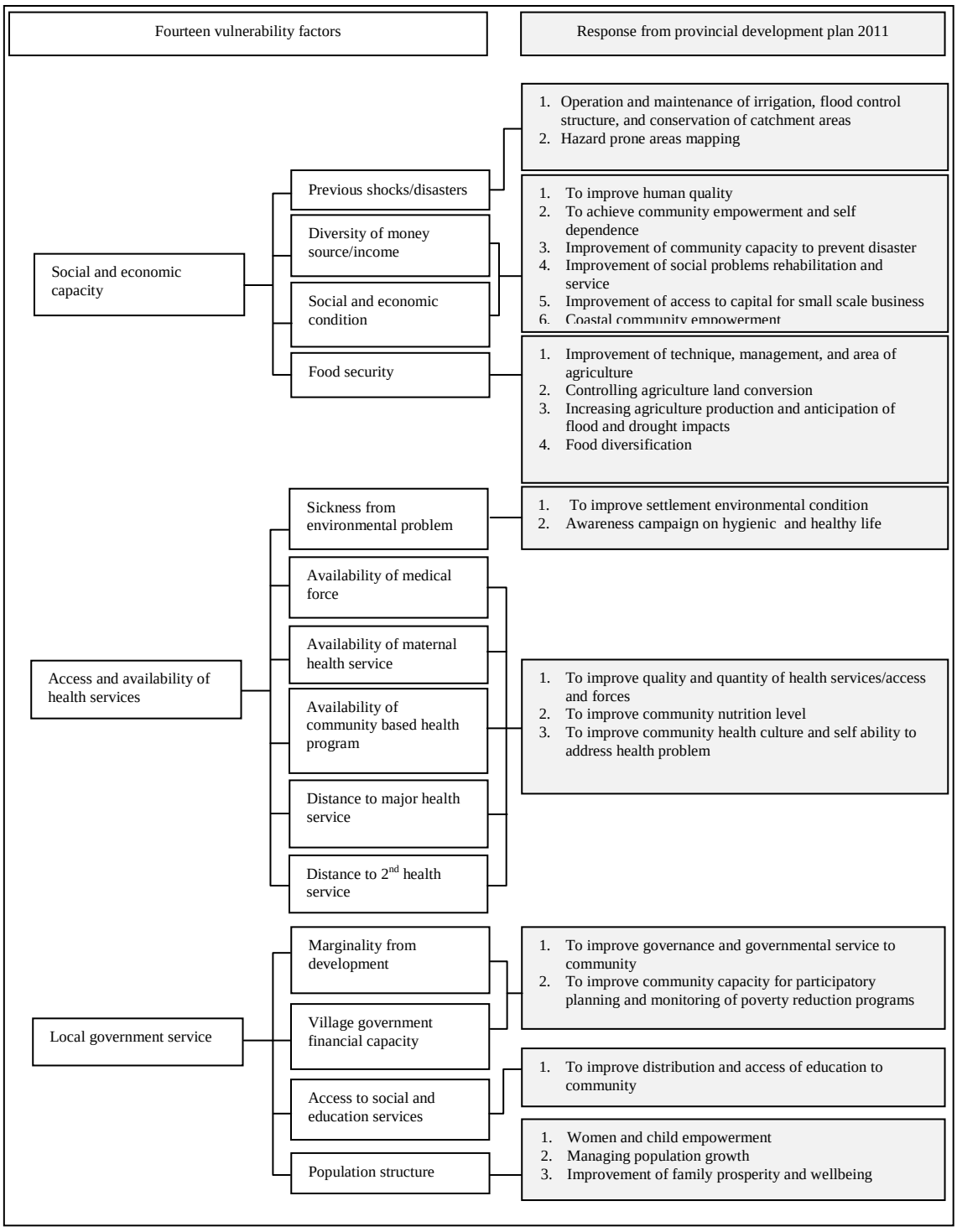


Figure 10.4. The Central Java Province Development plan for 2011 and its correlation with community vulnerability factors.

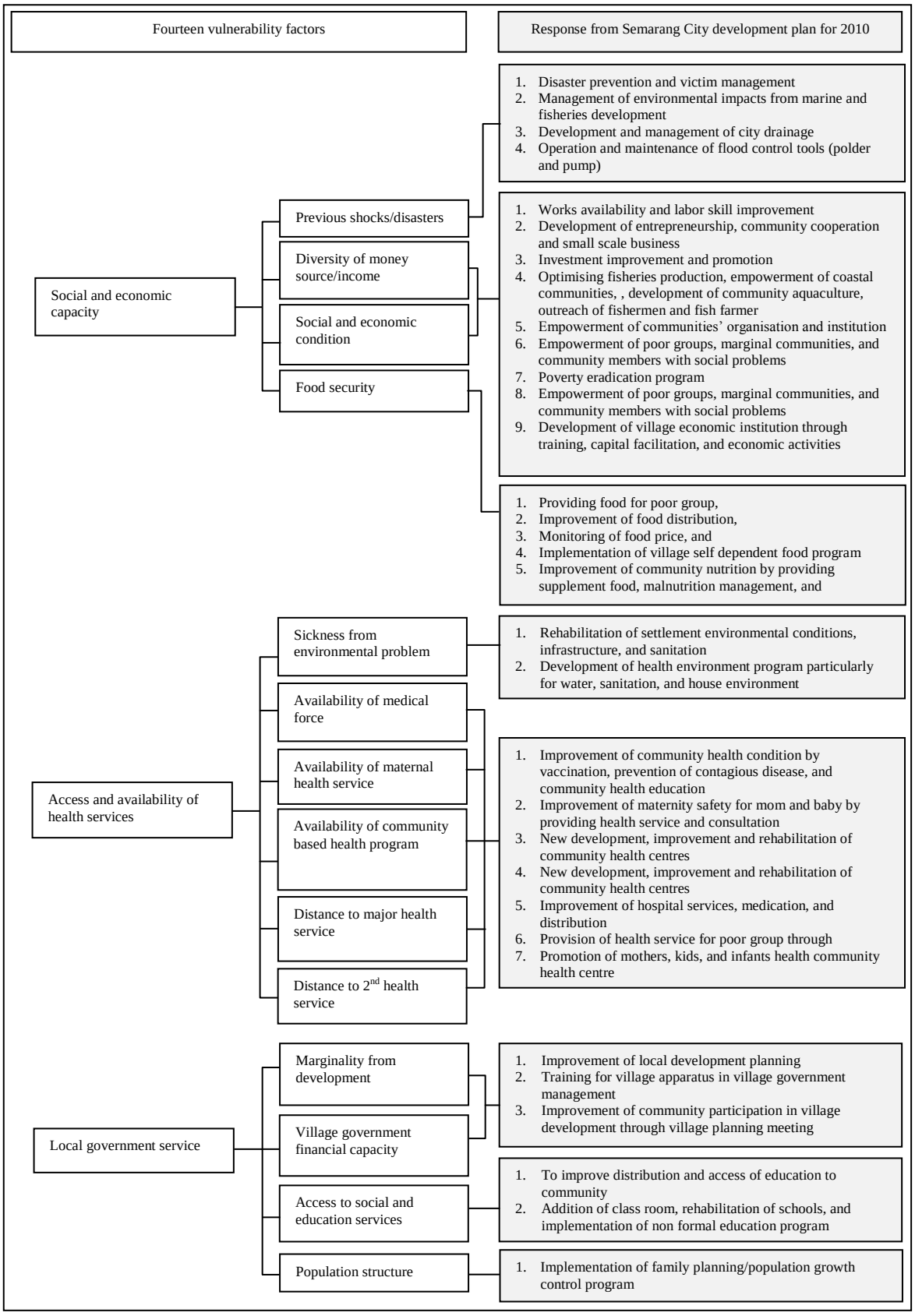


Figure 10.5. The Semarang City Development plan for 2010 and its correlation with community vulnerability factors

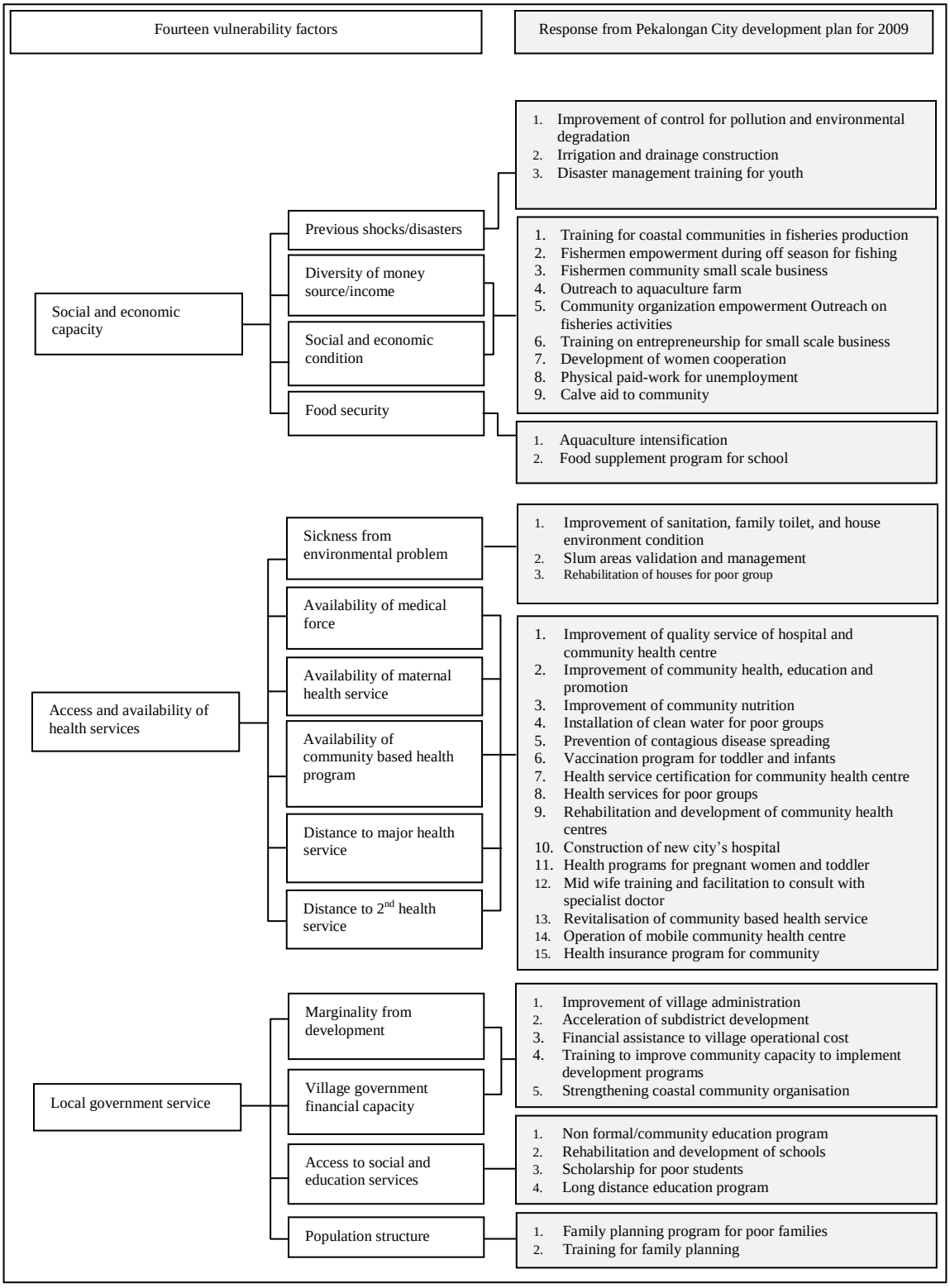
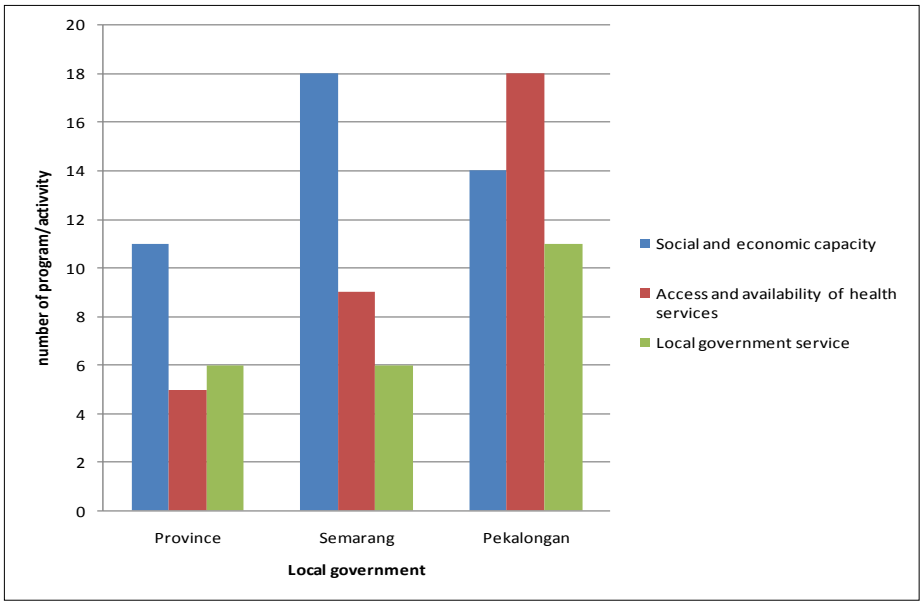


Figure 10.6. The Pekalongan City Development plan for 2009 and its correlation with community vulnerability factors.

Similarly, all development activities at Semarang City for 2010 and Pekalongan City for 2009 match with the fourteen vulnerability factors. The number of activities, however,

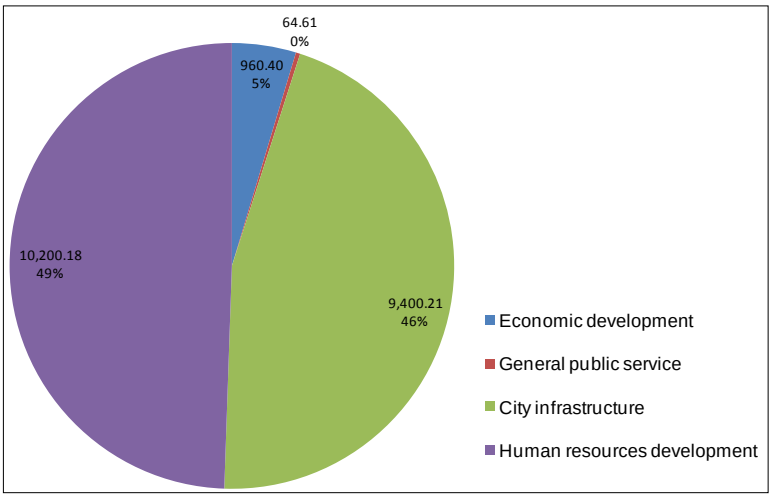
is more diverse where 33 and 43 actions were programmed at Semarang City and Pekalongan City respectively. There were also more actions allocated for each vulnerability factor (Figure 10.7). Semarang City allocated the highest number of programs within social and economic capacity area while Pekalongan City focused its program on access and availability of health services.



Source: (Bappeda-Jateng 2008; Bappeda_Pekalongan 2008; Bappeda_Semarang 2009)

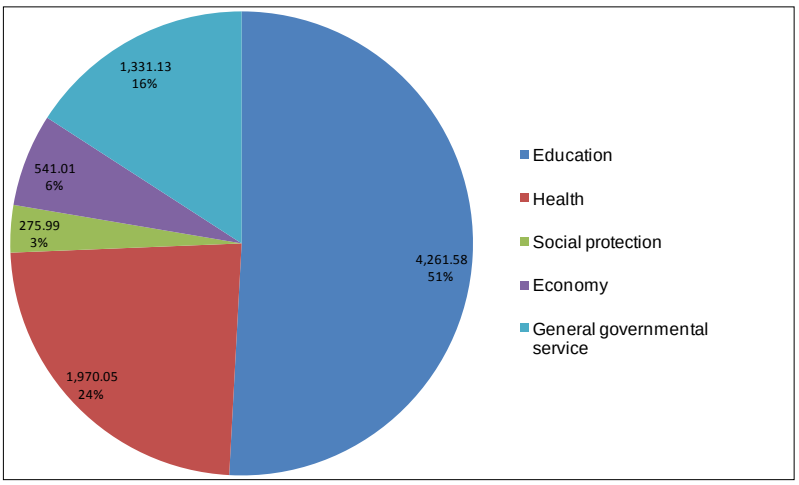
Figure 10.7. The allocation of activities to address vulnerability factors

While the programs generally match with the vulnerability factors, the funding allocation is different. Semarang City allocated much of the budget into human resource development and city infrastructure (Figure 10.8). However, almost 70% of the infrastructure allocation was for dam construction and operation of polders. Meanwhile, although the access and availability of health services has the highest number of activities at Pekalongan City, it is the education sector that gets the highest funding i.e. 51% (Figure 10.9).



Source: (Bappeda_Semarang 2009), value in 000 US$

Figure 10.8. Funding to address vulnerability factors at Semarang City



Source: (Bappeda_Pekalongan 2008), value in 000 US$

Figure 10.9. Funding to address vulnerability factors at Pekalongan City

10.4.5. Application of the Integration Framework

As no locations have a disaster management plan and coastal management plan altogether, integration is carried out by developing a hypothetical scenario.

a. Substantive and Methodological Integration

Referring to integration framework at Figure 8.4 (Chapter 8), the integration of substantial information between coastal management and disaster management to address coastal inundation is shown in Figure 10.10. How the information from disaster

management activities is integrated in the existing Central Java and Pekalongan coastal management plans is shown in Tables 10.14 and 10.15 respectively. It is clear that in addressing coastal inundation the coastal management and disaster management plans benefit from each other by completing the missing information at each side. In the case of the Central Java and Pekalongan coastal management plans, the missing information mainly related to: i) spatial distribution of coastal inundation, ii) projection of inundated areas due to sea level rise, and iii) vulnerability factors and vulnerable population.

The integration at a substantive level encourages methodological integration where coastal zonation, conservation, and rehabilitation methods are integrated with coastal inundation, community vulnerability, and risk assessment. For example, tidal inundation becomes part of zones suitability criteria for general utilization e.g. tourism and settlement. Selection and establishment of conservation areas and mangrove species for rehabilitation are also based on potential protection from tidal inundation impacts.

b. Procedural and Institutional Integration

All information from coastal management and disaster management plans are integrated through planning procedures and leading agencies that are regulated by the act (Figure 10.11). The planning process for coastal management and disaster management is carried out by the agency for marine and fisheries and disaster management agency. Consultation and communication between two agencies and teams are important to: i) share the available data and information, ii) develop a best and optimum team, and iii) synchronise work plans and available budget/resources.

Following communication between the two agencies/teams, public consultation is carried out together with training, education, and awareness campaign. This will put coastal management issues and coastal hazard problems together in each public consultation event. This is important since both coastal management and coastal hazards influence each other. Once again the integration puts together all resources from both agencies. Moreover, as the Coastal Management Act obliges the input from public consultation to be accommodated in the coastal management plans, the comment, input, and recommendations from communities to address coastal inundation problems are secured.

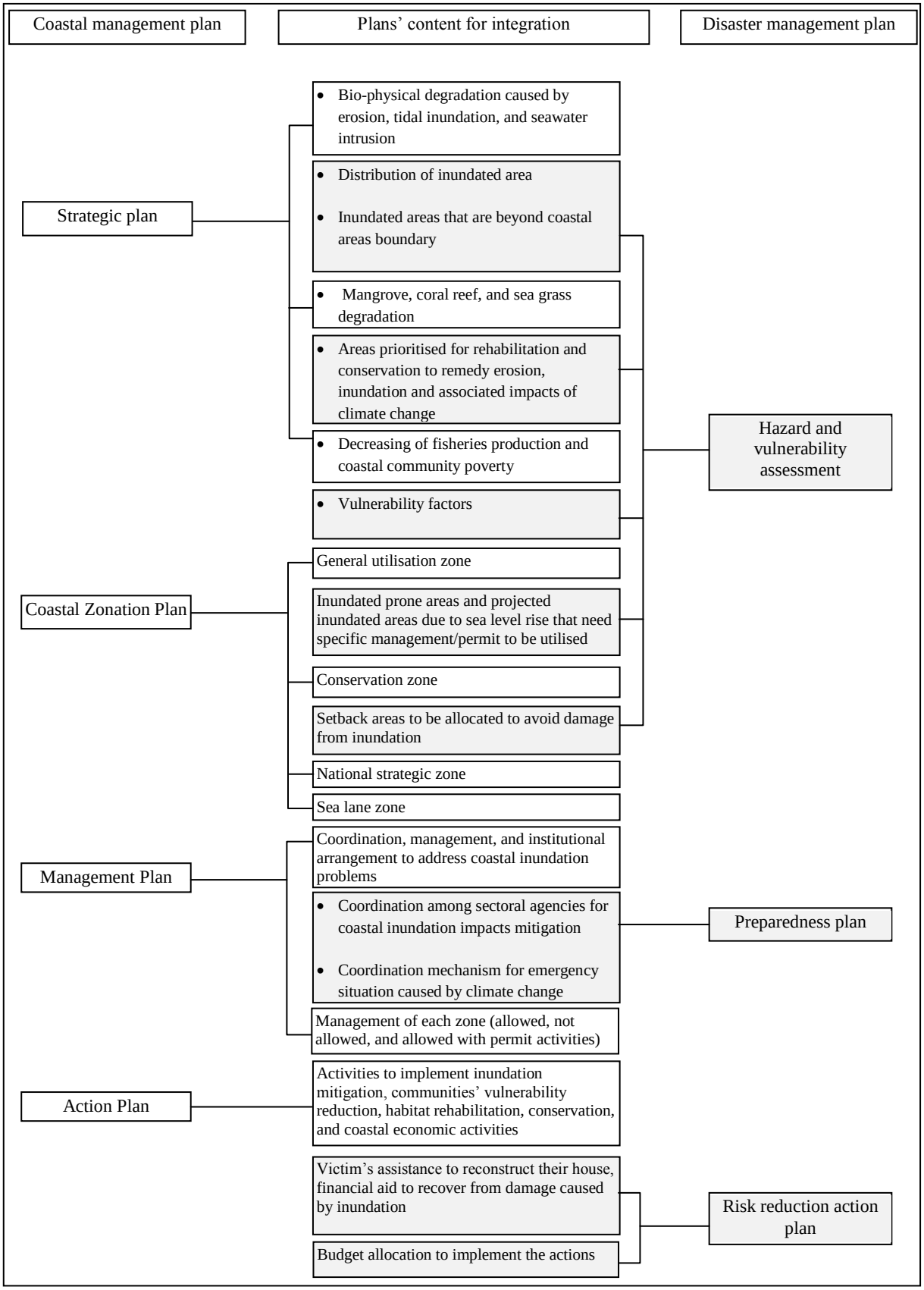


Figure 10.10. Integration of substance in coastal management and disaster management plans to address coastal inundation problems

Table 10.14. Substantive integration between the Central Java coastal management and disaster management plan

Substance of the Central Java Coastal Strategic Plan				Substance from	
Component	Problems	Program	Missing information	Hazard analysis	Vulnerability analysis
Bio physic	• Coastal erosion • Coastal accretion • Seawater intrusion	1. Socialization on setback areas for coastal and riverbank 2. Prohibiting development on setback areas by appropriate regulations 3. Development of hazard prone area map and its mitigation methods 4. Development of hazard friendly housing for fishermen settlement that prone to coastal hazard	- Spatial distribution of hazard - Hazard areas against coastal areas boundary - Projection of sea level rise and its impacts - Overlay of hazard prone areas and vulnerable population	- Coastal inundation affect low lying coastal areas in Central Java Province - The condition is predicted more severe in the future due to sea level rise impact - At some places, the affected areas are beyond the coastal areas defined by the Coastal Management Act	Many vulnerable communities are located beyond the coastal areas defined by the Act.
Coastal ecosystem	• Mangrove degradation • Coral reef degradation • Sea grass degradation	1. Establishment of coastal green belt 2. Coastal zoning/spatial plan development	- Location of degraded habitat against hazards distribution - Location of rehabilitation and socio-economic condition of surrounding population	- Most of coastal areas are vulnerable to erosion due to the degradation of mangrove ecosystem	- Almost all of vulnerable villages are located in the coastal areas which its mangrove distribution is very low
Social and economic condition of coastal community	• Number of coastal aquaculture and fishermen are decreasing	1. Improvement of facilities and infrastructure 2. Improvement of human resources 3. Application of technology 4. Development of road network to fisheries centre and establishment of fish market 5. Environmental rehabilitation for fish processing areas and fishermen settlement 6. Development of new tourism sites and attractions 7. Assistance to fishermen on fishing gear/equipment 8. Training and outreach to coastal community 9. Rehabilitation and development of coastal social infrastructure	- Socio-economic factors that contribute to community vulnerability to coastal disaster - Vulnerability map/distribution of coastal community	Coastal inundation is provide information on certain locations that should be prioritised	- Vulnerability factors give more comprehensive picture of community vulnerability and help the strategic plan in developing community social and economy empowerment - Vulnerability analysis result provides more structured intervention from individual variables, population attributes, and place/village condition

Source: planning documents analysis

Table 10.15. Substantive integration between Pekalongan coastal management and disaster management plan

Pekalongan City Coastal Strategic Plan					Result and information from	
Component	Problems	Fact and figure	Program	Missing information	Hazard analysis	Vulnerability analysis
Coastal hazard	• Tidal inundation • Erosion	- Panjang wetan beach suffer the most inundation - Cause many paddy fields become unsuitable for cultivation. Mostly found in Degayu village.	1. Hazard assessment and its impacts 2. Establishment of hazard management team 3. Build physical structure 4. Coastal rehabilitation	- Distribution of inundated areas - Projection of sea level rise inundation	- Coastal inundation affects all coastal villages in Pekalongan City - Three villages that area within inundation threat are beyond the coastal areas boundary	All of coastal villages are highly vulnerable to coastal hazards. Three coastal villages fall into the highest vulnerable groups among other villages of the city
Coastal ecosystem	• Mangrove degradation • Coastal pollution from fabric industry	- The amount is decreasing caused by conversion to shrimp ponds - Loss of mangrove cause severe erosion problem and exacerbate pollution	1. Awareness and capacity improvement in pollution management 2. Mangrove rehabilitation 3. Conservation areas establishment 4. Awareness campaign 5. Waste and pollution management	Spatial distribution of degraded coastal ecosystem and in correlation with existing erosion, inundation, and socio-economic problems	- All coastal areas that are sustaining erosion are also vulnerable to future sea level rise	- All vulnerable villages are located in the coastal areas that are degraded and polluted that increase their health and sanitation problems
Social and economic condition of coastal community	• Low economic capacity of coastal communities • Human resources quality is low	- Number of population who is working in fisheries sector is 50% for North Pekalongan Subdistrict in 2005.	1. Improvement and empowerment of coastal community 2. Provision of supporting infrastructure for fishing activity 3. Improvement of formal and informal education for coastal community 4. Improvement of coastal community health level 5. Outreach, socialisation, stakeholder meeting,, and community self initiative	- Socio-economic variables that contribute to coastal community vulnerability to coastal hazards and habitat degradation - Spatial distribution of vulnerable communities - Priority actions to address major vulnerability factors and locations of vulnerable communities	Coastal inundation and vulnerability map provide information on certain locations that should be prioritised	- Vulnerability factors give more comprehensive picture of community vulnerability and help the strategic plan in developing community social and economy empowerment - Major vulnerability factor that contribute to communities vulnerability are: a. Population structure b. Low capacity of village government c. Less availability of medical force at village level d. Poverty/poor groups - Existing capacity that reduce vulnerability are: a. access to major and secondary health service is easy b. socio economic condition is relatively good

Source: planning document analysis

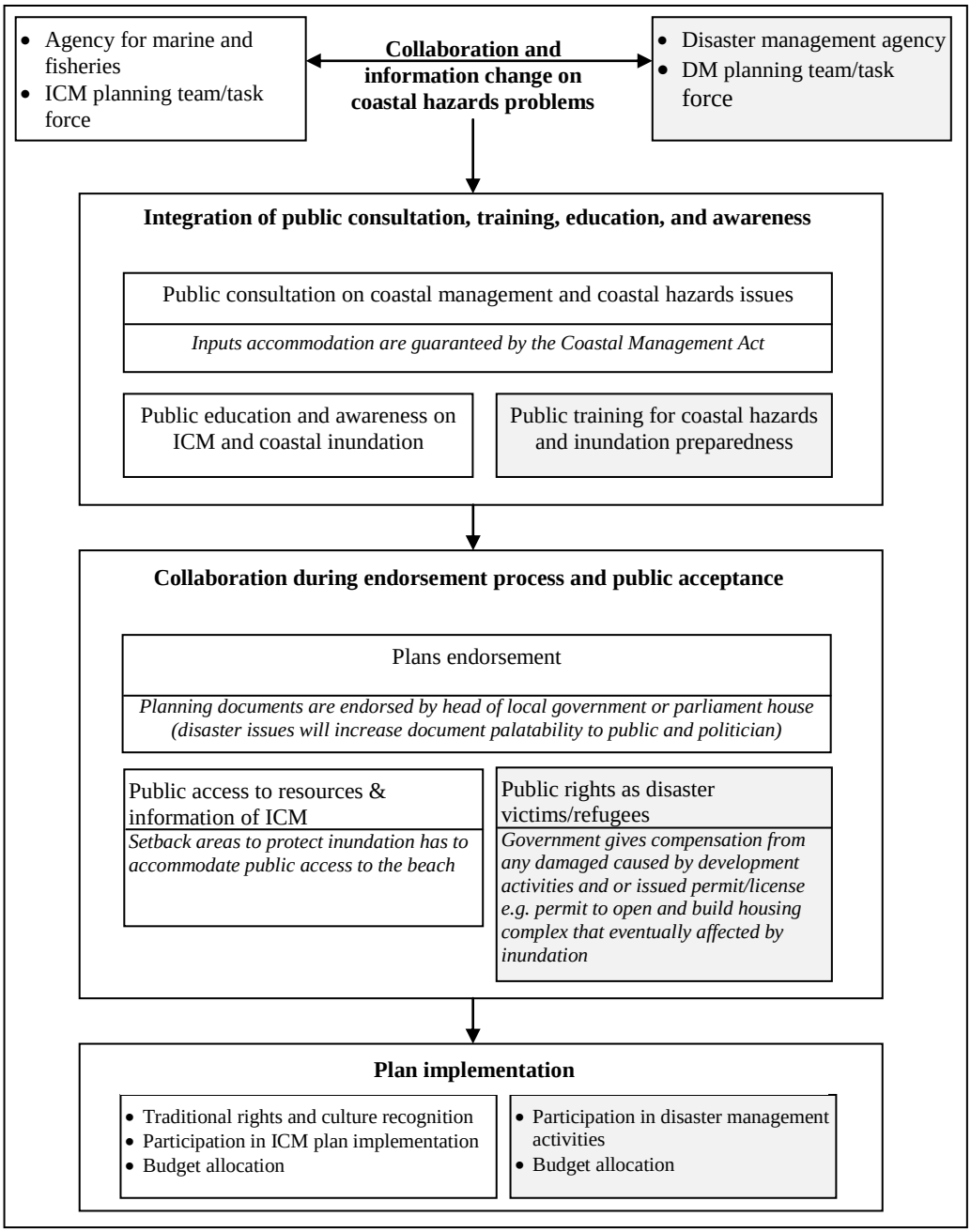


Figure 10.11. Procedural and institutional integration to address coastal hazards

As documents are already drafted, consulted, and finalised, the final stage is endorsement. The coastal management and disaster management plans need to be endorsed by the head of local government, but one of them i.e. coastal zoning plan has to be legalised by the local parliament. All of those endorsement processes require substantial time and efforts. Combining all resources from both leading agencies will ease the process and as disaster issues are easier to get attention from the community and politicians, their incorporation into coastal management plans and particularly to

zoning plan will increase their acceptability. The plan accountability is also supported by the obligation to allow public access to the beach even if there is a need to establish setback areas for inundation impact protection. Another significant support is from disaster management regulation that obliges the government to be responsible for any development activities that create a disaster at coastal areas. It could be in the form of port development, mining, or other structural construction. Compensation also potentially could be charged to local government that allocate or permit development in hazardous areas and create damage to community or private sector.

Finally, during its implementation, coastal hazards and particularly coastal inundation will be addressed by both planning documents. As presented at Figure 10.10, coastal management addresses activities related to rehabilitation, conservation, and coastal community empowerment and disaster management provides assistance and support for disaster victims.

c. Policy Integration

Aforementioned integration needs to be supported by policy from coastal management and disaster management to ensure its implementation. As presented in previous sections, existing available policies to address coastal inundation problems at Central Java, Semarang, and Pekalongan are mostly on development of physical intervention e.g. dam, polder and drainage network. To minimise the multidimensional impacts of coastal inundation, particularly for future events, a set of policies both in coastal management and disaster management are required.

Policy has to determine that all fisheries development, particularly for aquaculture, needs to adapt to higher and more frequent tidal inundation caused by sea level rise. Selection of culture methods, pond construction, and time for activity are examples of adaptations needing to be carried out. Similarly, licenses and permits to construct houses or complexes of settlements have to follow minimum floor height and specific drainage systems to minimise the inundation impacts. Importantly, all coastal development activities are required to incorporate the adaptation to climate change impacts into the environmental impact assessment document.

Referring to application of substantive, methodological, procedural, and institutional integration, policy integration to address coastal inundation problems are conducted by: i) integrating regulation to minimise the impacts e.g. zoning, setback establishment, permit and licence, ii) integration intervention policy e.g. minimise development in hazard zones, and iii) integration of program, actions, and funding.

10.5. Discussion

The application of a framework integrating coastal management and disaster management planning has been presented in this chapter to address coastal inundation and projected sea level rise impacts in the future. All possible integrations have been exercised from conceptual, substantial, methodological, procedural, institutional, and policy elements. It is shown that integration fills the missing information from each side. It concurs with the arguments that have been discussed at Chapter 8 where integration is possible and beneficial for both coastal managers and disaster managers. What kinds of benefit are potentially acquired is described.

The conceptual linkage has been shown to be one of benefit of integration. Both disaster management and coastal management concepts could be harmonised and integrated to reinforce each other in achieving coastal community resilience. The integration of substantive elements needs coastal managers and disaster managers to work together by sharing information, program, and resources. This then allows further integration in terms of institutional and procedural aspects. The collaboration between two lead agencies is essential since their mandates are not without limitation. The agency for marine affairs and fisheries is fully responsible for marine and coastal resource management, coastal disaster mitigation, and coastal community empowerment. However their mandates are limited to coastal subdistrict boundaries and mainly for pre disaster planning. As shown by the inundation and vulnerability map, the boundary could easily exclude the hazard zones and vulnerable people. Meanwhile, the disaster management agency has responsibility to conduct disaster management at pre, during, and post event, but do not directly touch areas such as coastal habitat conservation, rehabilitation, and pollution management which are important to reduce the risk from coastal disasters.

Having collaborated and worked together to address the same issues gives more understanding and reduces the reluctance to coordinate between coastal management and disaster management agencies. This will promote the integration of policy to address coastal hazard problems since many potential interventions need specific policy. None of the agencies feel that their authority is being contested. For example, to protect the beach from further erosion caused by sea level rise, habitat rehabilitation and conservation is required where the agency for marine and fisheries is responsible for issues related to permits, licences, and regulation. On the other side, the disaster management agency produces information about the distribution of inundated zones due to sea level rise. The Disaster Management Act 24/2007 mandates the government to secure these areas from any significant development to reduce potential loss. Combining the policy of coastal area conservation/rehabilitation with limitation of development in inundated prone areas will increase the effectiveness of risk reduction.

The framework is based on the assumption that both document plans and agencies for coastal management and disaster management are available at local government. However, as presented in this chapter, the reality is not as assumed. The Central Java Province has both coastal management and disaster management agencies but the disaster management plan is missing. Pekalongan city is quite advanced in coastal management plan documents, but has not established a disaster management agency and disaster management plan. Semarang city represents a location where none of the coastal management and disaster management plans are available that is a consequence of the absence of disaster management.

As local conditions of planning and institutional arrangements are diverse, the application of frameworks need to consider and adjust to: i) different time tables of plan development processes, ii) unavailability of disaster management at district/city level, iii) little allocation of programs and funding for disaster management and marine and coastal management. For example, in the case of Pekalongan City, as there is no local disaster management agency, it is difficult for the marine and fisheries agency to coordinate and communicate related information and programs to address coastal hazards. The problem is more severe at Semarang City where it is not only the local disaster management agency that is missing but also the coastal management planning

document. In this case, the integration needs more effort to implement and require a more active initiative from marine and fisheries agency.

Integration is particularly required as the existing planning and budget documents at the Central Java Province, Semarang, and Pekalongan allocated minimum programs and funding to address coastal inundation problems. The agency for marine and fisheries that is considered also responsible to address coastal inundation issues focused on fisheries and economic development only. For Semarang City, the majority of the budget is allocated for three sectors: civil work, education, and health. Allocation for marine and fisheries is only 0.33% of the total budget and for disaster management itself the allocation is only 0.23% if the budget for dam construction is excluded (Bappeda_Semarang 2009). Meanwhile, for Pekalongan City, allocation for marine and fisheries development is 1.3% and no allocation specifically for disaster management (Bappeda_Pekalongan 2008). Drainage construction had an allocation as much as US$ 403,000 or 1.3% of the total budget allocation.

Another important consideration where integration is required is because problems that are associated with coastal inundation are multi-sectoral issues which include: i) damage to houses, land uses, and structures, ii) health and sanitation problems, and iii) food security due to damage to rice fields and aquaculture failure, iv) social and cultural loss caused by the damage to community or tourism beaches. None of the coastal management programs and disaster management risk reduction action plans could address all of those issues individually. Moreover, the results from the vulnerability analysis show that all 14 vulnerability factors are part of development issues. Only a few of them could be directly addressed by coastal management and disaster management programs. For example coastal habitat rehabilitation and conservation could reduce the impacts from pollution, seawater intrusion, and declining fisheries production. These will indirectly improve communities' health and sanitation, reduce the damage to rice fields, and sustain fisheries production that is important for economic development and food source.

Understanding the above considerations makes the implementation of coastal inundation risk reduction under a broader program, such as coastal management and moreover local development crucial. Those development areas are prescribed by the

Government Regulation 38/2007 on the division of development mandates between national, provincial, and local government where none of it is explicitly labelled disaster management (Table 10.16). So since the beginning there is a basic problem to strengthen disaster management in local development programs. All risk reduction activities need to be incorporated in day to day management of sector development areas independent of the disaster label. The disaster management program should use all sectors' policies, programs, and activities to support disaster management objectives. Pre disaster event activities, where most of the risk reduction actions take place, have to be incorporated in all development areas.

Table 10.16. Type of development areas that are mandated to local government

Development mandate	Sector/area	
1. Compulsory • All local governments have to allocate the program and budget to implement the mandate • Related to basic service of the government to community	1. Education 2. Health 3. Environment 4. Civil work 5. Spatial plan 6. Development plan 7. Housing 8. Youth and sport 9. Investment 10. Small and medium business and cooperation group 11. Civil administration 12. Labour 13. Food security 14. Women empowerment and child protection	15. Family planning 16. Transportation 17. Communication 18. Land affairs 19. Nation unity and internal politic 20. Local autonomy, general governance, administration 21. Village development empowerment 22. Social affairs 23. Cultural affairs 24. Statistic 25. Archive 26. Library
2. Optional • Local government could choose to implement or not to. • Related to areas where there is potential benefit to improve community welfare based on the local condition, potential resources, and uniqueness e.g. local governments that have no coastal areas could exclude marine and fisheries from their development program	1. Marine and fisheries 2. Agriculture 3. Forestry 4. Energy and mineral resources 5. Tourism 6. Industry 7. Trade 8. Transmigration	

Source: (PP38 2007)

Securing risk reduction programs from development sectors requires strong leadership from the disaster management agency to communicate, share, and coordinate with other sector agencies. Unfortunately, during the interview with national, provincial, and local stakeholders, among the very basic problems of the disaster management agency to deliver its tasks is institutional and human resource capacity that influences its performance and confidence to negotiate and convince other parties. The challenge is

more complicated for local governments that do not establish a local disaster management agency to lead all coordination and communication with other development sectors.

To assist the disaster management agency to deal with above challenge, the hazard and vulnerability mapping are essential. Vulnerability factors serve as guidance and a key ingredient for integration of development plans into coastal inundation risk reduction. The disaster management agency uses information from hazard and vulnerability assessments to inform the city authority such that the different interplay between factors gives a better understanding in determining appropriate programs and its targeted communities. Related sectors e.g. health and environment agency benefit from that information in developing specific programs to address and underline the problems. It not only supports the achievement of their sectors but also reduces community vulnerability to coastal inundation and hazards directly. It means that instead of trying to force explicit disaster management into the development program, the disaster management agency facilitates and brings together all sectors to address vulnerability issues.

Results from this chapter also showed that the existing spatial plan at Semarang and Pekalongan still allocated significant development in coastal areas that are within hazard zones. Settlement, industrial areas, aquaculture, and transportation infrastructure are major landuses that are planned for at least the next 20 years. Even Semarang Airport will be extended and developed into a bigger airport that will cost approximately 83 million US$ (Humas_Jateng 2011). As proposed extensions are within the projection of sea level rise, this would be a very risky project if no specific adaptation in the design is applied to cope with the inundation. Similarly, Pekalongan is proposing to develop a new onshore fishing port along with the establishment of a fishing development centre project that will start at 2012 (KKP 2011).

Ongoing planned development activities within hazard zones reflect the difficulty of the city authority to deal with the need for space for city growth and the potential impacts from coastal inundation and sea level rise. There is no choice for a city to replace existing and future development due to: i) city development is significantly triggered by sea port activities, ii) there are no alternative areas for relocation of existing settlements,

industrial areas, and public service to safer areas, and iii) relocation will cost significant amounts of money as well as social problems. Consideration that the inundation problem can be eliminated by construction of drainage and polder systems also gives an incentive to carry out further development in hazard zones. For Semarang city, a major flood prevention project has been initiated by establishment of three major interventions: i) dam construction, ii) Semarang west canal normalisation, and iii) drainage system establishment. The project costs approximately 189 million US$ and is planned to finish by 2014 to ostensibly eliminate flood and inundation problems (Bappeda_Jateng 2010).

10.6. Conclusion

A conceptual integration framework has been applied to address coastal inundation problems at the Central Java Province, Semarang City and Pekalongan City. It was started by an assessment of inundation distribution (hazard zones) to show affected areas within provincial/regional level and local/city level. Distribution of vulnerable population is also assessed and presented where the inundated zones very often intersect with vulnerable population, particularly coastal communities. This creates complicated problems for coastal managers and also a chance to implement integration with disaster managers.

Integration between planning document substance, planning process, and policy were presented and discussed. From a geographical point of view the integration reduces the problems from the situation where the coastal areas boundary excludes vulnerable coastal communities and inundated zones. These happen at provincial and local levels and confirm the findings from previous chapters that there is a spatial gap between the Coastal Management and Disaster Management Acts. In program and funding interests, integration is also required between coastal management, disaster management, and local development plans.

Assessment of provincial and local responses to address coastal inundation problems showed minimum programs and funding allocations that are exacerbated by unawareness of future impacts of sea level rise. This is reflected in existing spatial plans that still direct significant development to projected inundation areas without any adaptation to sea level rise impacts. However, since the development and budget plans

do not explicitly accommodate coastal inundation in specific and or disaster management in general, the role of coastal communities' vulnerability mapping is essential. It will direct the implementation of local development plans by highlighting vulnerability factors and locations. This is also useful for disaster management agencies to address the problem from local development area structure that does not incorporate disaster management in the prescribed activities.

Beside its ability to combine available resources from coastal management and disaster management to address coastal inundation problems in an integrative way, the framework still has to adjust to the dynamic conditions of each local government. The different level of implementation of the Coastal Management Act combined with the fact that the local agency for disaster management is only optional for district/city and there is no specific timetable to do the planning process are among the challenges that need to be anticipated when the integration framework is applied.

How all findings and evidence from the case study of Indonesian legislation and the planning context integrate with existing theory and concepts in disaster management and coastal management are presented and discussed in the next chapter.

CHAPTER 11

INTEGRATED COASTAL DISASTER MANAGEMENT CHALLENGES AND OPPORTUNITIES
SYNTHESIS FROM FINDINGS ON INDONESIAN LEGAL AND PLANNING CONTEXT

11.1. Introduction

With the escalating number, frequency and impacts, of natural disasters national and global attention is also increasing. Statistics show that in 2010, 373 natural hazard events cost more than 100 billion US$ (UN/ISDR 2011). The events and impacts are predicted to be more frequent and severe in the future because of climate change (UN/ISDR 2002; HFA 2005; IPCC 2007). Integrating natural disaster and climate change impacts in management is essential because impacts from both sides significantly affect all human and natural environments (Thomalla, Downing et al. 2006). Consequently, managing natural disasters cannot be undertaken without incorporating climate change aspects. In this regards, disaster management is considered as a primary approach to reduce the risk. This consideration is in line with the concern where disaster management needs to anticipate climate change impacts as key driving forces (HFA 2005; IPCC 2009).

Coastal areas are especially affected by natural hazards related to climate change. The IPCC (2007) projected that sea level rise in coastal areas will increase existing problems of freshwater availability, flood and inundation, population migration, permanent coastal erosion, and loss of property and livelihood. The risk from disasters is high because the coastal zone is also one of the most populated and developed areas (UN-HABITAT 2008; UN 2011). Coastal disaster management will only become more difficult as climate change increases the frequency and severity of hydro-meteorological hazards such as cyclones and flood (EMDAT 2010). As these conditions only increase coastal community vulnerability, a more integrated approach between all stakeholders, and communities, within coastal areas is required. One response to the problem has been to assess coastal vulnerability (for example Harvey, Clouston et al. 1999; McLaughlin, McKenna et al. 2002; Adger, Hughes et al. 2005; Boruff, Emrich et al. 2005). However, integration is not simple in reality. Coastal disaster management has to address problems that involve many different aspects from technical and environmental

to socio-economic. Consequently, disaster management and climate change adaptation require another component, that of integrated coastal management.

Integrated coastal management becomes a central player in this context because disaster management and climate change adaptation involve both human and coastal systems to reduce community and environmental vulnerability (Adger and Kelly 1999; Kelly and Adger 2000; Adger 2003; IPCC 2007; Birkmann and von Teichman 2010). Coastal management influences resources and community capacity to cope with coastal hazards and climate change impacts. Reducing community risk to disaster and climate change impacts requires maintaining coastal community and resource integrity. Community integrity needs empowerment, education, and livelihood security while natural integrity demands activities such as habitat conservation and rehabilitation.

The integrated coastal management approach potentially can be used as a vehicle to implement coastal disaster risk reduction and climate change adaptation in coastal areas. ICM has been widely recognised as an appropriate approach to address coastal problems (Kenchington and Crawford 1993; Post and Lundin 1996; Nicholls and Klein 2005; FAO 2006). In particular sea level rise inundations, studied in 12 countries showed that integrated coastal management planning, spatial planning, and coastal management legislation are allocated as major actions in national plans (NCCSAP 2006). Coastal management itself has evolved and been strengthened by conservation interests, enriched with land use planning, and implemented within different approaches such as environmental management, resource management, engineering intervention, and urban development (Kay and Alder 2005).

The central question is how disaster management can be integrated within the integrated coastal management field to reduce community risk to coastal natural hazards and climate change impacts. That question, which is also the major question of the research, is the focus for the synthesis and discussion of this chapter. Answering that question also leads to further analysis of existing concepts and approaches in both fields. New interactions and communications between the two communities are also identified.

This chapter summarises findings and results from conceptual, legal, planning, and case study analyses at national, provincial, and local levels. The results and findings were

synthesised and concentrated to address two major challenges and questions: i) how to implement integrated approaches in coastal disaster risk reduction and climate change adaptation, and ii) how the integrated approach can be facilitated through a practical framework and implemented within the local government context. These two questions are essential in the arena of disaster management planning, climate change adaptation, and coastal management planning theory and practice (Wolensky and Wolensky 1990; Cicin-Sain 1993; Burby and Dalton 1994; Berke, Roenigk et al. 1996; Cicin-Sain, Ehler et al. 1997; Schneider 2002; Burby 2003; HFA 2005; Schipper and Pelling 2006; Birkmann and von Teichman 2010; Glavovic 2010; HFA 2011).

The proposed approach and model to address those two major questions are presented and discussed together with the respective research propositions. Implications and recommendations also discuss and examine the integration influence on existing legal and planning arrangements.

11.2. How to Implement Integrated Coastal Disaster Risk Reduction?

The compelling theoretical and conceptual need for an integrated approach in disaster management, climate change adaptation, and coastal sustainable development requires practical implementation within real development activities. Without a practical application, this idea will only remain a concept on paper and will never create a significant impact in communities. Linking planning theory into practice is crucial to apply planning concepts into general knowledge (Hillier and Healey 2009). The case study in Central Java Province, of Semarang, and Pekalongan City was designed to tackle practical problems in coastal hazard mitigation using existing theoretical approaches within the context of the Indonesian legal and planning system.

The Indonesian case study provides lessons that may be applied to other areas. How planning practitioners in Indonesia address coastal disaster issues provides an insight into how existing philosophy and science in disaster management and coastal management may be applied to solve the problem. The use of Semarang City and Pekalongan City and their planning documents in dealing with coastal inundation problems also provide a more practical perspective.

11.2.1. Framing the Integration into Research Design

The basic argument of the research is that in dealing with coastal disasters, the integration of disaster management and coastal management planning is essential, beneficial, and applicable within conceptual, legal, and planning contexts. This premise leads to further engagement with disaster management and coastal management planning theory to elicit more critical and analytical discussion and debate in finding the appropriate: i) method and approach, ii) legal arrangements, and iii) practical planning, to facilitate integration. This premise then is detailed into five propositions to be verified by the research findings that were tackled in four major tasks (Figure 11.1).

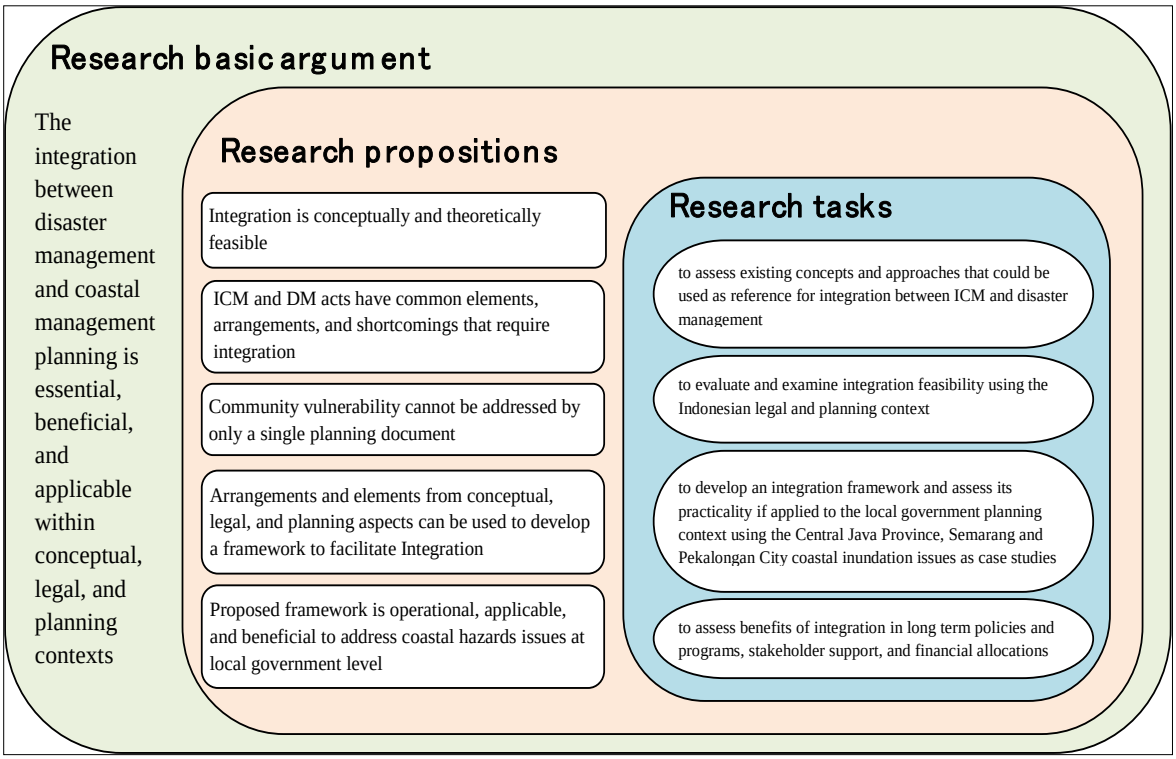


Figure 11.1. Summary of research background.

This kind of research has not been undertaken in Indonesia. In other countries, assessment of disaster management policies have been carried out by a number of scholars such as Wolensky and Wolensky (1990) who evaluated the local government response in the USA concerning disaster management obligations, Henstra and McBean (2005) who assessed the Canadian disaster management policy, and Erramilli (2008) who studied the Disaster Management Act of India. Analysis of coastal management

acts have also been undertaken, mostly on the US Coastal Zone Management Act of 1972, such as Shaffer (1977) and Kuhse (2001).

11.2.2. Integration of Theoretical Aspects

At the conceptual level, the literature review (Chapter III) showed that both disaster management and coastal management concepts and theories are related (Table 11.1.). Sustainability is the ultimate goal that both fields try to achieve. The understanding that both fields need to work together is influenced by major disaster events such as tsunamis and cyclones that devastate coastal areas and their populations. Consequently, several countries have enacted disaster management acts, for example India and Sri Lanka in 2005, Indonesia in 2007, and the Philippines in 2010, after the 2004 tsunami event. However, the awareness among coastal management scholars, that coastal disasters and coastal adaptation need to be incorporated as major issues for coastal development emerged long before these major coastal disaster events (Cicin-Sain 1993; Gordon, Reams et al. 1998; Isobe 1998).

Table 11.1. Literature review summary findings supporting integrated coastal disaster management

Proposition	Findings
Integration between disaster management and coastal management planning is conceptually and theoretically feasible (Chapter III)	- Both fields are driven by sustainability objectives - Coastal disasters have been recognised as essential issues in coastal management - Coastal management requires information on potential coastal hazards to be incorporated in management activities - Integration conceptually can be undertaken using strategic and operational plans - Disaster management is very complex in its actors and actions, and benefit from an integration approach that is applied to coastal management - Both disaster management and coastal management require similar socio-economic and environmental information to implement their concepts - Coastal management focuses on natural resource aspects and disaster management focuses on risk reduction aspects - Both planning processes apply cyclic/adaptive approaches

The effort to apply disaster management into coastal management practice was strengthened after the 2004 tsunami (Kay 2006; Sonak, Pangam et al. 2008). Further analysis showed that, conceptually, strategic and operational plans are applicable for facilitating integration since both fields are implemented through formal planning documents. However, much effort is still needed to convert that concept of integration into practice. Initial efforts have been undertaken, for example by Isobe (1998), that incorporated coastal disaster as one element in an integrated coastal management framework. Many international organizations are also calling for integration. How this

incorporation takes place in the ICM planning and implementation, however, remain unclear (Figure 11.2). This research is intended to improve existing concepts into planning and practical applications.

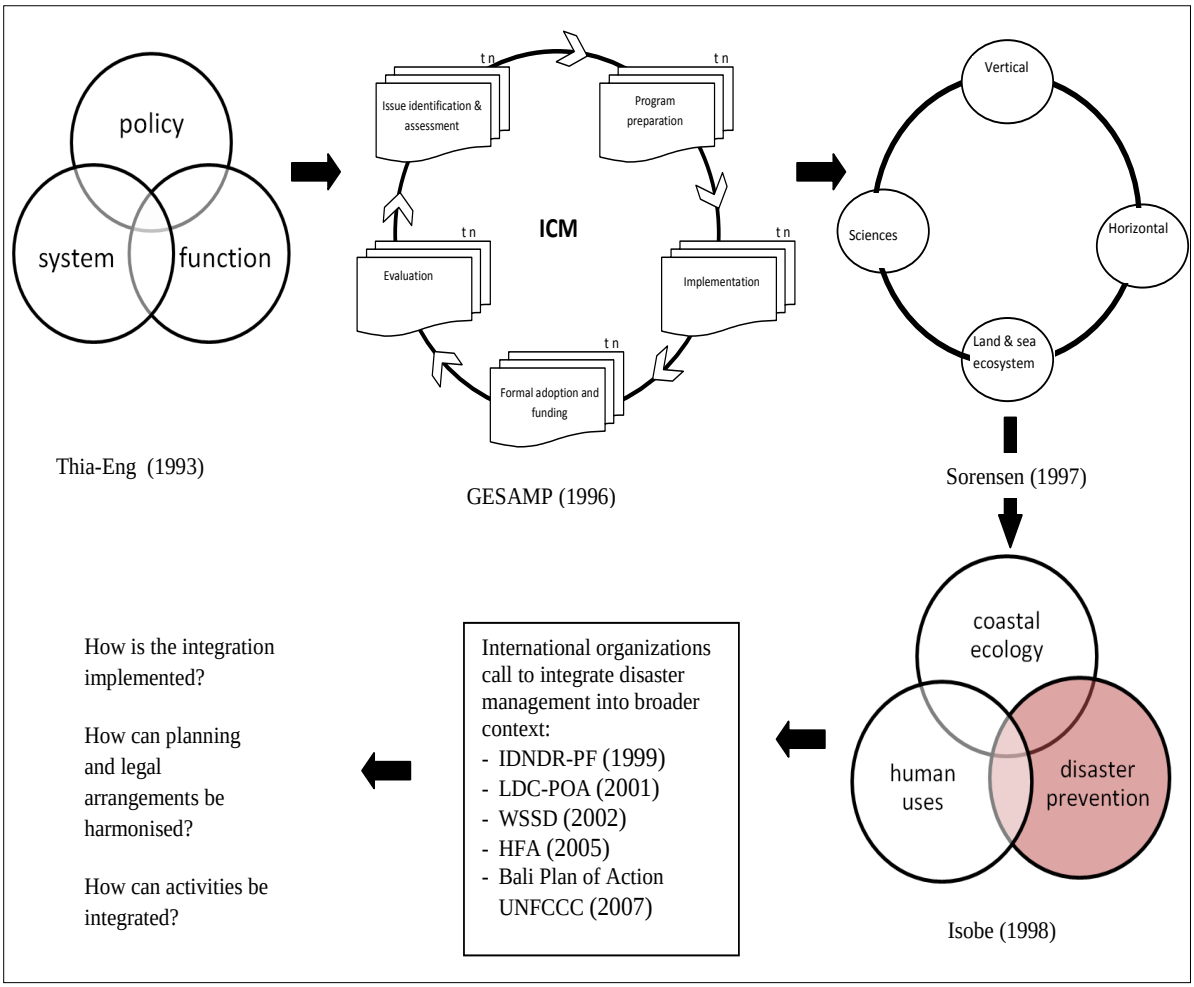


Figure 11.2. Development of ICM concept and integration of disaster management

In addition, research that specifically addresses integrated planning for coastal disaster management is limited. There tends to be more of a focus on general integrated coastal management planning, for example Clark (1992), Colt (1994), GESAMP (1996), Cicin-sain and Knecht (1998), Davis (2004), Christie (2005), and FAO (2006). Other focus on integration of disaster management and climate change adaptation such as Hori and Shaw (2011), Birkmann and von Teichman (2010), Thomalla, Downing et al. (2006) and Schipper and Pelling (2006), and integration between disaster management and sustainable development such as Rockett (2001), Twigg (2001), Schneider (2002), McEntire (2004) and Mileti and Gailus (2005). Therefore, examining the potential integration between coastal management and disaster management for coastal disaster

risk reduction is a key to reducing the future impacts of coastal hazards and climate change to coastal communities, environment, and sustainable development.

The case studies in Central Java Indonesia serve as examples and provide lessons which can inform coastal managers and disaster managers in different localities. Previous research findings of coastal inundation assessment in Semarang showed that the problems especially affect the population on the North Coast of Semarang City (Kobayashi 2004; Wibowo 2006; Marfai and King 2008). Detailed assessments also showed that Semarang coastal communities are a vulnerable population in terms of their social, economic, and village attributes (Anggraini 2007). What has been missing is the assessment of coastal community vulnerability and the existing response from local planning and how an integrated approach can be undertaken to address the problem. Exercises with real planning problems involving practising planners or government officials are beneficial because they are familiar with the practical problems, and by dealing with them in their day to day activities they have more realism and perspective about the problems (Miller and Roo 2004).

11.2.3. Integration Needs and Gaps in Legal and Planning Aspects

Legislation and planning are two important aspects for facilitating an integrated approach to coastal disaster management. It is internationally recognised as a priority to reduce disaster risk by ensuring a strong institutional basis for risk reduction (HFA 2005). As a result, legislation on disaster risk management has been established within 13 countries since the Hyogo Framework for Action was endorsed in 2005 (HFA 2011). Although this development is essential for future disaster risk reduction, problems persist because the legislation has not been integrated and harmonised with existing legislation in other sectors that influence risk reduction programs (HFA 2011).

Indonesian legislation also faces the same problem. The Disaster Management Act 24/2007 has many elements that need to be harmonised with the Coastal Management Act 27/2007. Findings on the second research proposition showed that both acts have many similarities and differences that potentially affect risk reduction policies and programs (Table 11.2). The findings showed that in the legal context, the Indonesian Coastal Management Act and the Disaster Management Act have essential similarities that require integration to avoid any redundancy in their application. In relation to

coastal disaster mitigation, the Coastal Management Act also mandates specific activities to be undertaken. In this case, two different acts regulate the same issues and two different agencies are mandated to mitigate the same potential disaster. Without integration, a number of problems can arise such as: i) contradiction or duplication of policies and programs, ii) public misunderstanding, and iii) difficulty in decision making processes. These kinds of problems need to be avoided as legal quality, certainty, cost effectiveness, and public understanding on the legislation are major elements in developing effective coastal management legislation (FAO 2006).

Table 11.2. Similarities and differences in Indonesian Disaster Management and Coastal Management Act.

Proposition	***Findings***
The Coastal Management Act and the Disaster Management Act have common elements, arrangements, and shortcomings that require integration (Chapter IV)	a. Similarities that boost integration: - apply and use existing concepts and theories of the field to develop their arrangements - mandate planning documents and processes - the Coastal Management Act also provides specific sections and articles to address disasters - The CMA obliged activities are in line with disaster mitigation activities - Both acts require integration with existing development plan documents such as local long term, mid term, and spatial plans b. Differences that require integration: - Number and types of planning documents - Public consultation process and obligation to accommodate public input is stronger in the Coastal Management Act - The Coastal Management Act mandates are limited within subdistrict boundaries - The CMA does not specifically regulate activities during emergency situations and post disaster rehabilitation and reconstruction - The DMA only provides general direction for activities to reduce the coastal disaster risk - The CMA regulates detailed and specific actions to mitigate coastal disasters within coastal management activities - The CMA has both spatial and non spatial planning documents with a long term (20 years), mid term (5 years) and short term (1 year) period while the DMA only develops non spatial types with mid term and short term periods

Source: research analysis (see Chapter IV)

As similarities require both acts to be implemented in an integral way, the existing differences also foster integration. As discussed in Chapter IV there are spatial and planning differences that characterise the Coastal Management and Disaster Management Acts. Spatially, the problem for the Coastal Management Act application comes from its coastal area definition that is based on sub district boundaries. Substantially, the coastal management plan cannot, or only minimally addresses areas such as emergency response and post disaster rehabilitation. However, the coastal management planning system requires four types of documents with wide-ranging time

frames (long term, mid term, and short term) that are very comprehensive and are not provided by the Disaster Management Plan.

Thus, in the planning system, the coastal management plans require the disaster management plan to address the plan's spatial and content problems. In reverse, the disaster management plans require support and long term policies and programs from the coastal management plans. Any effort to broaden the policy time horizon in disaster management policy is important since it has not been developed to address long term policy development but has focused on short term response and prevention (Handmer and Dovers 2007). This condition requires further improvement of planning concepts and practices within disaster management and coastal management fields.

Problems related to coastal area boundary demarcation are not only found in the Indonesian legislation context. It is an issue that has been identified for a long time among scholars in different disciplines, for example in land use control (Ausness 1973), marine protected areas (Cole-King 1995), coastal decision support systems (Fabbri 1998), and management policy (O'Hagan and Cooper 2001). Although administrative boundaries have many consequences, existing difficulties support the notion that the ecological boundary of coastal zones is not practical for planning purposes (Post and Lundin 1996; Kay and Alder 2005). Additional complexity derives from the fact that disasters also do not correspond to administrative, sector authority or legislation boundaries. If these issues are not anticipated within existing legal and planning arrangements, vulnerability and risk will increase (Handmer and Dovers 2007).

Another challenge that is important for coastal management planning is how to address and respond to existing problems while trying to mitigate or prevent future ones (Kay and Alder 2005). The challenge is increased in the context of future sea level rise impacts. Thus, climate change and coastal hazards increase the existing issues that are already complex and affect socio-economic, physical, and coastal environments and communities (Adger, Hughes et al. 2005) and sustainability of coastal development (Cicin-Sain 1993). As a response, many efforts have been made to incorporate natural disaster into broader coastal management activities such as by Agardy and Alder (2005) who linked 18 key threats to coastal ecosystems and communities, Kay and Alder (2005) included coastal hazard risk analysis as part of technical approaches to coastal

management planning, and rehabilitation of coastal livelihoods for post disaster activity (Pomeroy, Ratner et al. 2006).

In the planning context, analysis of existing planning documents in coastal management, disaster management, and development plans at national, provincial, and local level showed that no single plan can cover completely all coastal hazards and community vulnerability issues (Table 11.3). Planning document integration is crucial because coastal inundation problems, as shown in Semarang and Pekalongan City, require multidisciplinary approaches, multi-arching interventions, and multi time horizons for planning (Figure 11.3).

Table 11.3. Existing planning gaps in addressing coastal hazard and community vulnerability problems in Indonesia

Research Proposition	Findings
Coastal hazards and community vulnerability issues cannot be addressed only by the coastal management or disaster management plans and activities (Chapter V-VII)	- Existing national, provincial, and local disaster management and coastal management plans address only specific issues related to each mandated area - Fourteen community social vulnerability variables derived from village potential census data cannot be addressed by disaster management and coastal management programs alone. Moreover, most of it is included in day to day development activities under many different development sectors - Many highly vulnerable coastal communities are located beyond coastal management areas because they are not within coastal subdistricts - Disaster management plans only cover activities during and after the events such as emergency response and rehabilitation and reconstruction, most pre disaster event mitigation activities are part of the coastal management plan and the local government development plan.

Coastal inundation is generally caused by tidal systems which are then exacerbated by drainage problems and sea level rise, thereby creating subsequent problems such as seawater intrusion, environmental health, and sanitation problems. Combined with existing coastal communities' conditions, this increases their vulnerability to coastal hazards. Extreme hazard events such as storm surges and tsunamis intensify these processes. Field observations at both Pekalongan and Semarang City documented environmental conditions in coastal villages that are sustained from severe inundation (see examples at Figure 9.31 and 9.33).

Therefore, viewing coastal inundation, sea level rise, and climate change impacts within all policies and programs of disaster management, coastal management, climate change adaptation, and local development is more appropriate (Few, Osbahr et al. 2006; Prasad, Ranghieri et al. 2008). As the impacts and actions both require long term perspectives,

this approach benefits the disaster management community in particular. This is because disaster management often focuses on short term efforts, particularly at the post disaster phase, while climate change adaptation requires long term strategies (Birkmann and von Teichman 2010). As shown by Figure 11.3, a number of mitigation activities require mid term to long term periods to execute. As a result, consistency in policies, programs, and funding are crucial. In fact these considerations cannot be tackled by only the coastal manager or the disaster manager alone. They need to assist and benefit each other to reduce their limitations.

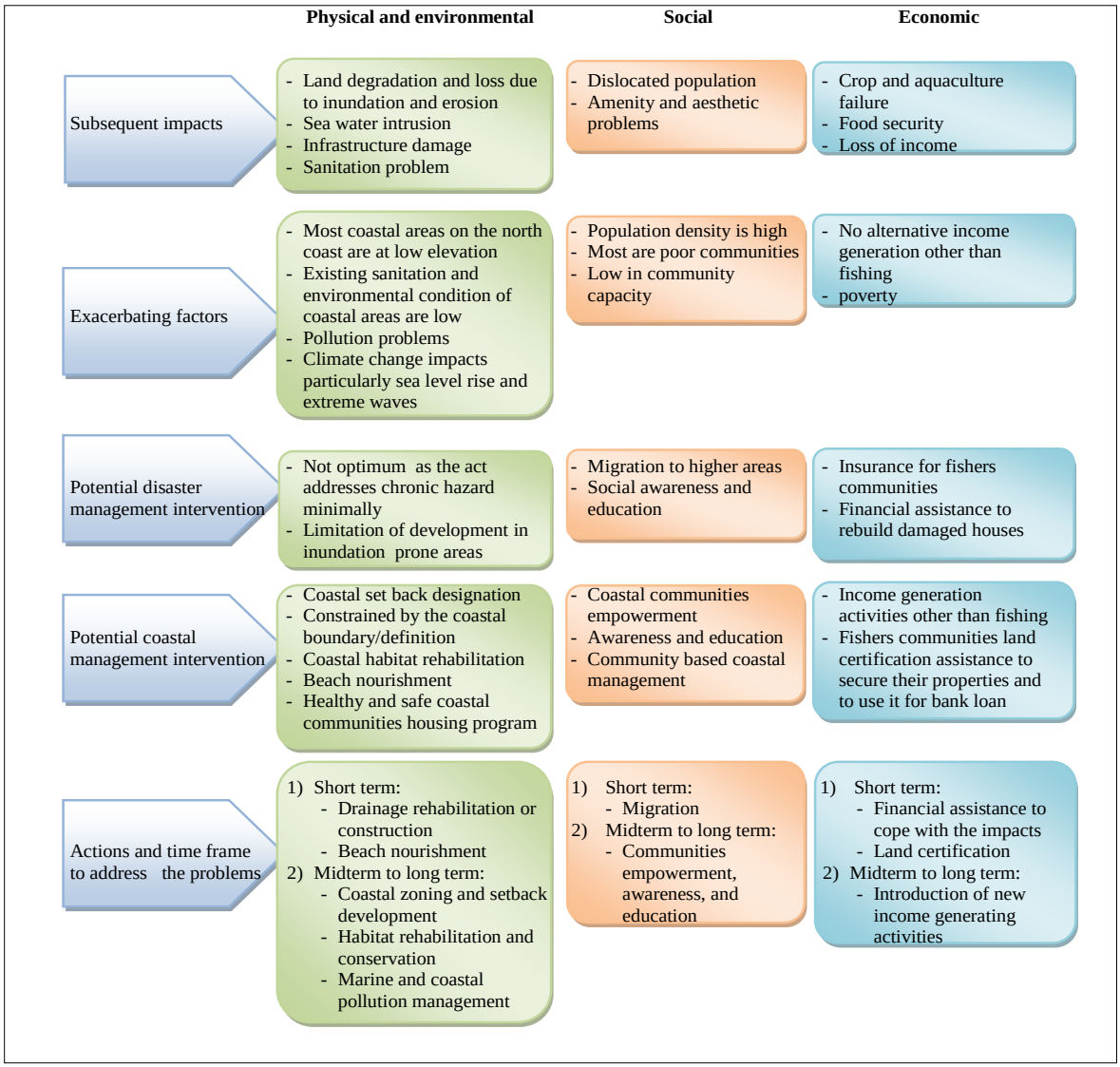


Figure 11.3. Complexity of coastal inundation impacts to coastal communities and environments that require multi-arching actions in Semarang City and Pekalongan City

This research simultaneously provides a case study for two integration needs in coastal areas: i) integrated coastal management and disaster management, and ii) integrated coastal management and climate change adaptation. The case study in Semarang City provides an example of how the integrated approach is necessary to address climate change impacts in terms of coastal inundation. Short term, mid term, and long term impacts of coastal inundation require different type of actions that are, factually, incorporated within different documents.

How this fragmentation in planning responses is addressed with a proposed integration framework is presented in the next section.

11.2.4. Integration Framework for Coastal Disaster Management

Providing compelling evidence that coastal disaster management needs integration from different acts, plans, and approaches is not enough. Integration into practical planning processes is another crucial objective. This is essential since integration with coastal management planning means that coastal disaster management engages many different actors, institutional structures, planning processes, interests, and contexts into understanding, preparing, and recovering from disaster events (Handmer and Dovers 2007). Handmer and Dovers further explained that the challenge is then how to define which institution or organization, what planning level, what socio-economic and environmental context, and what collaboration and integration can be undertaken.

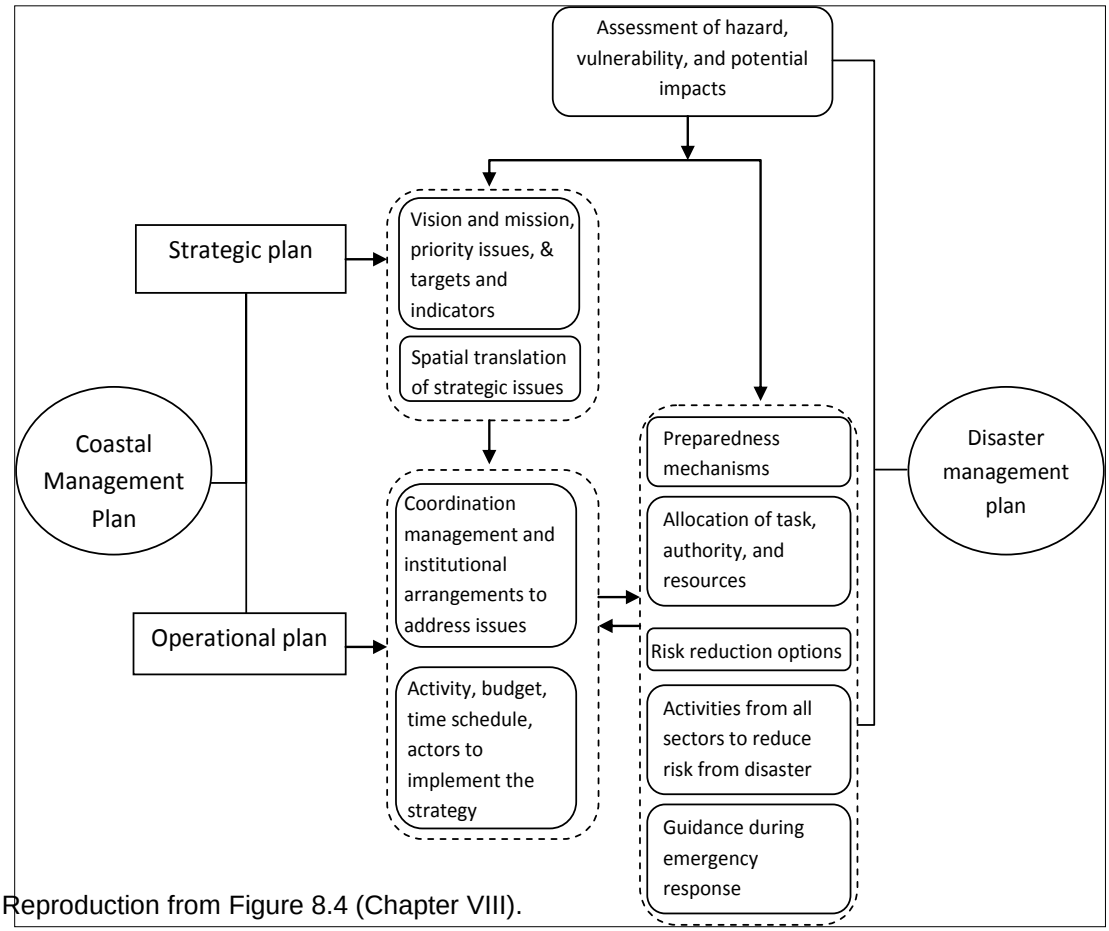
Similarly, for integrating coastal climate change adaptation into disaster management and the broader development context, key questions are still at the coordination level such as when and at what level the coordination needs to be undertaken and identifying the major actors and lead agencies who will take part (Few, Osbahr et al. 2006). Specific areas that need to be improved include: i) cooperation and coordination between actors involved and linking short and long term strategies (Schipper and Pelling 2006; Birkmann and von Teichman 2010), ii) integrating different information, approaches, practitioners, and policies to address community vulnerability (Thomalla, Downing et al. 2006).

To respond to the above challenges, available arrangements for conceptual, legal, and planning contexts have been used by this research to develop an integration framework

for coastal disaster management (Table 11.4 and Figure 11.4) (the framework has been presented and discussed at Chapter 8). The proposed integration framework and its case study showed and answered these questions by applying the integration framework at many different levels and stages. The framework guides the consolidation and integration of the acts' mandates, planning content and procedures, policies and programs, and activities. It is applicable to all potential levels of coordination and cooperation to address coastal disasters (Table 11.5).

Table 11.4. Findings on the requirement to develop an integration framework

Proposition	Findings
Arrangement and elements from the acts can be used to develop an integration framework (Chapter VIII)	- The integration framework is developed by applying planning requirements, planning substance, and public consultation processes - The framework can facilitate integration from the conceptual context to the legal and planning context



Reproduction from Figure 8.4 (Chapter VIII).

Figure 11.4. Integration of planning type and its content between disaster management and coastal management

Table 11.5. Integration processes facilitated by the framework

Substantive	Methodological	Procedural	Institutional	Policy
Integration of disaster management issues and coastal management issues in relation to coastal disasters	Integration of hazard assessment, vulnerability assessment, and risk assessment and coastal zoning, conservation and rehabilitation approaches	• Integration of planning processes • Integration of public consultation requirements • Integration of institutional work and communication	• Integration of training and education to improve skills in coastal disasters management • Collaboration of leading agencies • Information exchange and potential intervention between different actors	• Integration of regulations in coastal disasters management • Integration of intervention policies • Integration of programs and actions • Integration of programs and funding

Source: modified from Eggenberger and Partidario (2000)

The proposed integration framework does not change the planning practice in either disaster management or coastal management but tries to strengthen and optimise its results (see Figure 8.2). This kind of function is considered advantageous for attracting other sectors to collaborate without losing their authority (Cicin-sain and Knecht 1998), which is part of the way to manage the cultural ecology of coastal decision making (Orbach 1995). According to Briassoulis (2005) policy integration objectives are to achieve an efficient and effective sustainable development by uniting different arrangements and policies resulting in a coherent planning system. In urban development, for example, the integration with environmental objectives requires comprehensiveness, diversity in alternatives, and the balancing of different objectives (Miller and Roo 2004). Therefore, the proposed framework develops a new relationship between actors, aggregates individual legal mandates of acts, and structures and combines different instruments between disaster management and coastal management to achieve different objectives in an integrated way (Table 11.6).

Table 11.6. Elements of integration required in coastal disaster management

Policy Object			
Actors	**Goals and objectives**	**Structures and procedures**	**Instruments**
• Mandate, arrangements, activities that are working and involving in coastal disaster management • Stakeholders that take part in the process of planning and implementation	• Objectives of disaster management e.g. reducing the loss from disaster • Objectives of coastal management e.g. minimising conflict in coastal resource uses and sustainable coastal development	• Lead agencies • Planning process • Institutional arrangements • Planning requirements e.g. public consultation	• Measures to address the issues such as laws, regulations, and planning documents • Intervention activities and programs

Source: modified from Briassoulis (2005)

The proposed integration framework also addresses three different goals of sustainable development in coastal areas where the means, approach, and methods to accomplish it are still limited (Miller and Roo 2004). Social, economic, and environmental objectives are all incorporated (see Figure 8.4). The steps that are taken from issue and sector identification, interactions of many different dimensions of coastal systems, and community empowerment and participation are fundamental in ICM process (Tissier and Hills 2006). Case studies of Semarang and Pekalongan City provide an example of how these three different goals are addressed. The integration framework is also useful to address coastal community vulnerability in the broader coastal disaster management context because addressing community vulnerability to climate change and related hazards requires a multidisciplinary approach that falls into at least four major fields (Thomalla, Downing et al. 2006): i) disaster management, ii) climate change adaptation, iii) environmental management, and iv) poverty reduction. The research findings showed that a fifth player is required in relation to coastal areas: that is integrated coastal management.

Those five different fields, with their respective planning and research communities, have been working in isolation from each other. With the increase in the magnitude of natural disaster and climate change impacts, a call for cooperation and communication between those fields to address a common agenda is emerging (Thomalla, Downing et al. 2006). In particular to disaster management and climate change adaptation, they furthermore provided problems and challenges that need to be addressed in future to strengthen efforts in sustainable development: i) both fields fail to reduce vulnerability, ii) both fields still work independently of each other, and iii) underlying vulnerability is not addressed by both fields.

Application of the integration framework in Semarang and Pekalongan City shows that climate change adaptation in coastal areas is best addressed by integrated coastal management that places sustainability of social, economic, and environmental objectives as its ultimate goal. The integration of coastal natural disaster management with coastal climate change adaptation means integration between disaster management and coastal management. Both cities show the difficulty of addressing or managing all aspects of risk reduction and adaptation to coastal inundation that include many different policies, instruments, environmental aspects, institutions, and communities.

Difficulty is also revealed for the time and spatial points of view. Disaster managers are in a quandary as to whether to implement a short term approach that addresses hazards in the short term with structural elements, or to address community and environmental resilience which requires long term effort (Handmer and Dovers 2007). Natural hazards concern is usually overlooked with the short term problem of providing food, clean water, and energy (Chapin 2009). This is exactly what happens in Semarang and Pekalongan City where the focus of mitigating coastal inundation and flood is on structural measures that are very tangible, publicly and politically, and can be executed in a short period of time. Structural protection also provides an incentive to continue development in hazardous areas (see Figure 10.2 and 10.3). Similar effects of providing protection in coastal areas that encourage more development in coastal hazard prone areas, are also considered as inappropriate in government policy in the USA (USCOP 2004).

The use of an integration framework to address coastal inundation problems also provides further examples and benefits in addressing chronic type hazards. More research and assessment needs to be done to address slow onset hazard planning particularly one that is going to be exacerbated by climate change (Glavovic 2010). Sea level rise and coastal inundation are major hazards that threaten all low lying coastal populations (IPCC 2007). It creates a challenge in disaster management governance beyond traditional disaster management practice (Glavovic 2010). Glavovic further proposed three aspects that can be applied; coordination of institutions and legislation, cooperation between professionals, and community cooperation.

11.3. How Integrated Coastal Disaster Management is Applied in the Local Government Context Using the Framework?

The role of local government in disaster management and coastal management is central. In relation to addressing climate related natural hazards, assessment of 13 cities around the world showed that local government is a key player in concerted measures for risk reduction (Prasad, Ranghieri et al. 2008). The central role is also influenced by the mandate that is attributed to local government to address disaster management (Berke, Roenigk et al. 1996; Burling and Hyle 1997; Deyle and Smith 1998). In this context, the local planning quality, both content and development process, is an

essential requirement for effective disaster management (Berke, Roenigk et al. 1996; Burby 2003; Ahrens and Rudolph 2006; Srivastava and Laurian 2006; King 2008).

11.3.1. The Use of the Integration Framework

In the case of Central Java Province, Semarang City, and Pekalongan City, mandates to address coastal disasters come from both the Disaster Management Act and Coastal Management Act (addressed in Chapter 4.4.2). How these local governments deliver their mandates and obligations is presented within the application of an integration framework to address real coastal inundation problems. This application also shows how the issues have been identified and responded to in the disaster management plan, coastal management plan, and local development plan. A summary of the framework application at these three locations is presented in Figure 11.5.

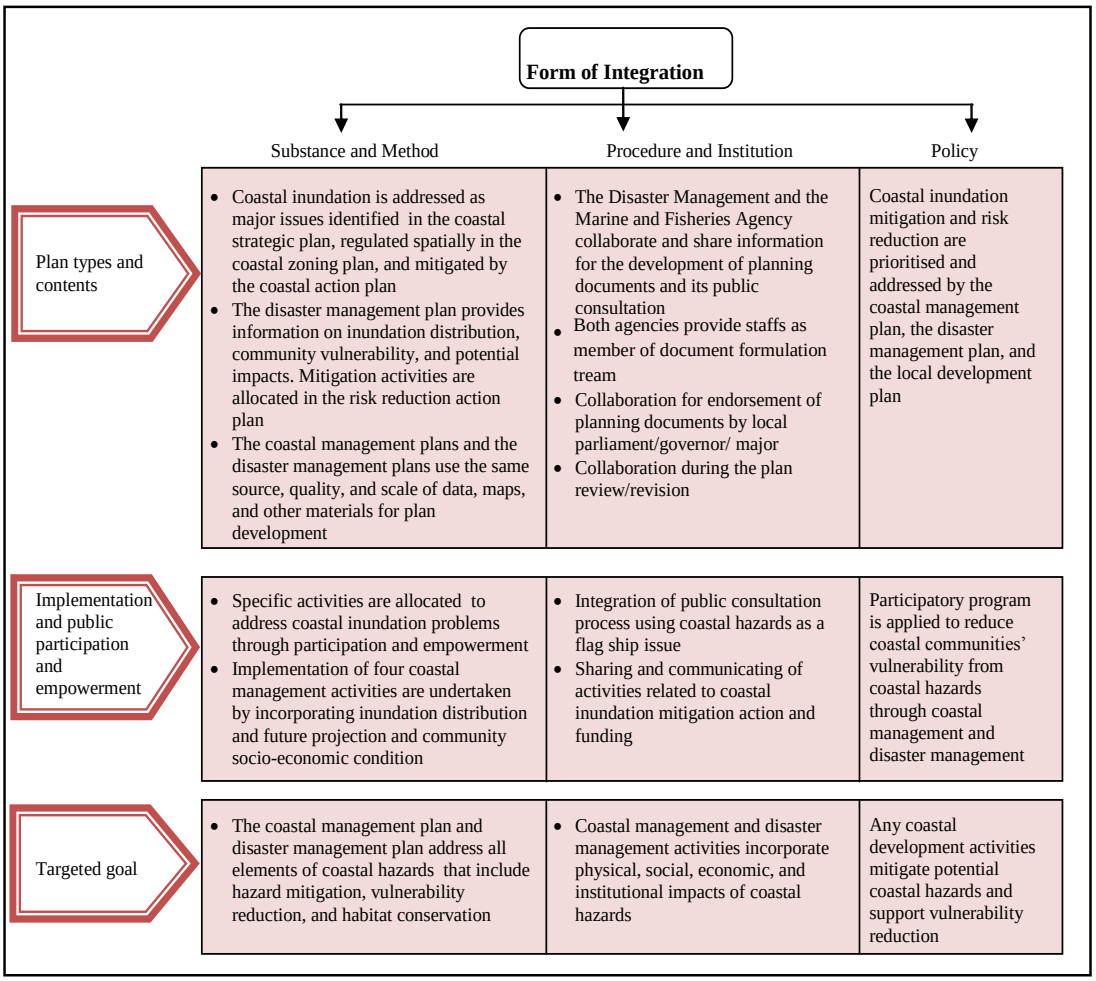


Figure 11.5. Summary of integration facilitated by the framework using coastal inundation problems in Central Java Province, Semarang, and Pekalongan City

Integration is undertaken within three major elements: i) plan type and content as regulated by the acts, ii) implementation, public participation, and empowerment, and iii) targeted goals. It was carried out in two major steps. The first step assesses coastal inundation hazards, coastal community vulnerability, and response from existing coastal management. This first step is to examine how coastal inundation problems have been treated as an important issue with appropriate planning responses. Secondly, the integration framework is applied to examine how substantive, methodological, procedural, institutional, and policy integration can be applied to achieve optimum and strong support from policies, programs, and funding.

The coastal inundation problems have been afforded different recognition by disaster managers, coastal managers, local development authorities, and spatial planners in both Semarang and Pekalongan (Table 11.7). The integration provides a means to consolidate and bring together all these available plans by framing them in coastal sustainable development (represented by targeted goal in Figure 11.5). Framing coastal inundation, and in general coastal hazards, in this sustainable development context is critical because it allows multi dimensional responses. Natural hazard problems can be framed in many different ways that will influence their manifestation in narrower or broader contexts of development activities. This approach has been encouraged by international organizations such as the UN Centre for Regional Development (1999), UN/ISDR (2004) and UNDP (2004).

Multiple problem framing is preferable to ensure that important aspects are not missed. In the case of flood problems, Handmer and Dovers (2007) suggest that to have a complete response to flood hazard, it has to be framed as a problem of: i) physical phenomena, ii) human exposure to flood, iii) community vulnerability to flood, and iv) economic consequences of flood. Each framed problem will produce different policy options and objectives. Similarly, interaction and collaboration of disaster managers and coastal managers to address coastal inundation will treat the issue as multi framing problems that require physical, social, economic, and environmental intervention. The integration framework assists both sets of managers to realise this effort.

Table 11.7. Planning problems at case study sites in addressing coastal inundation issues

	Planning document				
Identified problems	DM	CM	Spatial	LD	**Solution by the framework**
1. Coastal inundation/hazards are minimally mentioned/addressed in the plan	√			√*	• Hazard analysis is incorporated in all planning documents and serves as guidance for spatial plan, coastal zoning plan, and development permit • Coastal management rehabilitate, conserve, and protect essential coastal environment • Local development strengthen communities' social and economic conditions/vulnerabilities
2. Missing information on coastal inundation distribution	√	√	√	√	
3. Missing information on low elevation prone to inundation	√	√		√	
4. Significant developments are still planned for inundated prone areas without specific direction		√	√		
5. Missing information on coastal community vulnerability to guide development intervention	√	√	√	√	• Vulnerability analysis result is used as guidance to allocate activities and funding • Coastal habitat conservation and rehabilitation use all communities' socio-economic information and profile to improve its success
6. Information on socio-economic condition that potentially influence management program is minimal	√	√	√	√	
7. Response on inundation problem is focused on technical intervention and less or lack on adaptation	√	√	√	√	• Vulnerability analysis is used as reference for non technical/structural adaptation and implemented by all planning documents • Coastal management plan accommodate sea level rise issues and apply it in its planning documents
8. Anticipation of sea level rise impacts caused by climate change is missing	√	√	√	√	

Notes: DM (disaster management), CM (coastal management), LD (local development: long term, mid term and annual)
*: particularly for Pekalongan City

Results from hazard and vulnerability and planning document analysis in Semarang provide support for multi-framing of hazards. It was shown that inundation and floods are also a problem of exposure (to people, buildings, and city infrastructure) and vulnerability (villages have different levels of vulnerability), and environment (sanitation, clean water, coastal habitat degradation). Moreover, potential and possible adaptation in coastal zones are also not only in infrastructure, but also sand dune reinforcement, conservation of coastal vegetation for protection, and wetland rehabilitation (IPCC 2007). Framing disaster as a social issue is also seen as more appropriate than just treating it as a physical problem (Weichselgartner 2001) and encourages disaster management within sustainable community development (Schneider 2002). This approach is shown to be lacking in the case of Semarang and Pekalongan City where flooding is treated mostly as a physical phenomenon and thus, engineering intervention is prioritised. This not only affects the way the city authorities treat the inundation problem but also creates spatial problems.

This framework has proved to be very useful for these case study sites to eliminate the problem of time scale from planning responses to address coastal inundation in

particular and coastal hazards in general. Moreover, the framework provides solutions from the fact that existing funding allocations in addressing coastal hazards are minimal and institutionally disaster management is not incorporated into existing regulations that govern the compulsory and optional activities mandated by Government Regulation No. 38/2007 to local government (see Table 10.16).

Financial issues in disaster management are caused by the fact that allocating resources, particularly funding for disaster management is relatively easy during emergency response and rehabilitation reconstruction phases, but conversely, it is almost impossible to allocate financial resources during the planning process to reduce disaster risks, resulting in limited funds and competition for allocations (Schipper and Pelling 2006; Handmer and Dovers 2007). This happens in Pekalongan and Semarang where allocation for pre disaster programs is very limited. This also creates a challenge for disaster managers to use any available options in optimizing available programs and funding without labelling it as disaster mitigation. One potential solution is using vulnerability assessment which is discussed in the next section.

11.3.2. Hazard and Vulnerability Assessment as a Catalyst Tool for Integration

Complexity in legal mandates, planning arrangements and associated programs has been addressed by the integration framework. As coastal disaster and climate change adaptation become a development issue and undergo interaction with many different sectors, planning documents, agencies, policies, programs, and activities, the ability to attract as many programs as possible is essential. This relies on the result of the hazard and vulnerability assessment as it is the first and major input of the integration (see Figure 8.4 and Table 8.2).

The function of hazard and vulnerability assessment in the coastal inundation issue is to show the distribution of potential affected areas and population. This will guide the spatial planning and allocation of programmes and activities. Hazard mapping has been shown to be very useful to assist the spatial plan in addressing natural disasters (Armonia 2007; Sutanta, Rajabifard et al. 2009; Tudes and Yilmaz 2009; Greiving 2006). Conversely, the use of the vulnerability assessment as a reference for development planning is still limited. The idea is that vulnerability assessment results need to be directed to influence policy and decision making (Metzger and Schroter

2006; Patt, Schroter et al. 2009). This approach has been proposed by many scholars, such as Scira Menoni (1996), Morrow (1999), Wu, Yarnal et al. (2002), Cutter, Boruff et al. (2003), and Myers, Slack et al. (2008). These and other works are more concerned with vulnerability assessment and mapping, but there is no elaboration on how the information can be integrated and prioritised into development programs.

Prioritising hazard management among existing development plans is not simple. Hazard events are very difficult to predict, and to compare to real problems in the community such as health, education, and poverty (Handmer and Dovers 2007). Community vulnerability assessments in Central Java showed that vulnerability factors can function as a means to broaden integration not only between disaster management and coastal management but also with local development in general. As the Disaster Management Plan and Coastal Management Plan only cover issues within their areas, many are left to be handled by other development sectors such as social, education, health, and infrastructure. This condition has been anticipated in the Coastal Management and Disaster Management Acts by mandating both planning processes to be integrated with existing development plans (see Chapter 4 section 4.4.6). One apparent benefit is that coastal community vulnerability is going to be addressed by multiple sectors and not only seen as a single sector problem such as a social or poverty problem. Appropriate prioritization and programs are key factors in this context where multiple objective planning is one key for hazard mitigation planning (Schwab and Topping 2010). In the case of Semarang and Pekalongan City, the vulnerability assessment needs to be used as policy guidance rather than a product of scientific research, which is seen as more appropriate (Patt, Schroter et al. 2009).

Using hazard and vulnerability assessment to guide coastal inundation risk reduction activity also provides additional benefits because the problems are addressed within general development issues. Conducting hazard management in general aspects also has many advantages (Handmer and Dovers 2007) such as: i) support and increase the success of specific approaches, ii) increase resilience to all hazard types, iii) have multiple goals in socio-economic aspects. The last point is very relevant for developing countries where issues of socio-economic development are prominent for communities and politicians. Allocating significant amounts of resources to hazard mitigation is perceived as unnecessary amid the high poverty, unemployment, and problems of food

supply. Therefore, to put the hazard mitigation plan as an integrated plan with other planning documents and not to establish it as a stand alone plan is more appropriate (Schwab and Topping 2010).

Using vulnerability assessment as a guide also ensures that reduction actions are not only limited to poverty reduction. Community vulnerability is not the same as community poverty because it includes economic elements, but depends on how people could access resources, and protection from specific hazards (Cannon 1994). In this regard, setting poverty reduction alone to address vulnerability is not enough. This is also one of the constraints for integrating disaster risk reduction into development planning because it is assumed that the risk reduction strategy is part of the poverty reduction program (Schipper and Pelling 2006). Poverty reduction needs to be guided within broader vulnerability reduction programs. All fourteen vulnerability factors that shape coastal communities in these two cities are spread within health, socio-economic, education, and government capacity (see Table 9.3).

11.4. Challenges and Limitations to Application of the Integration Framework

11.4.1. Data and Methods

Data and information that are used in this research are categorised into spatial and non spatial types. The combination of spatial and non spatial data to show and address inequalities of disaster impacts on communities have been used widely (such as Wu, Yarnal et al. 2002; Fekete, Damm et al. 2010; Finch, Emrich et al. 2010; Romieu, Welle et al. 2010; Preston, Yuen et al. 2011). This approach is very useful in addressing coastal disasters because: i) coastal hazard impacts mostly have a spatial distribution, ii) community vulnerability is influenced by location in relation to coastal hazards that create spatial inequalities in terms of disaster impacts, iii) overlaying geographically affected areas and the distribution of vulnerable communities shows how different locations/communities have different risks to the same coastal hazards thus guiding appropriate mitigation interventions, and iv) placing information on maps significantly improves the communication and education of stakeholders. The method also shows how the spatial inequality of disaster impacts is complicated by the fact that the Coastal Management Act is applied within specific geographic boundaries.

One of the non spatial data bases is census data. This is essential for disaster management particularly for vulnerability assessment purposes. Data and information from the census have many advantages such as being open to the public, relatively cheap, and available for different time periods that make it very useful for disaster management. Many applications have been undertaken to assist disaster management using census data (Cutter, Mitchell et al. 1997; King and MacGregor 2000; Cutter, Boruff et al. 2003; Claire 2007).

This research used a specific census data called *Potensi Desa* (village potential/capacity census data) that is provided by the Indonesian Central Statistic Agency. According to Suhaimi (2011) the characteristics of village capacity census data are useful to disaster management planning because: i) data is based on a region or is geographically oriented and thus is beneficial for spatial analysis, ii) it covers information on basic elements for community welfare such as access to health services, type of food production, and the geographic condition of the areas e.g. coast, river bank, and forest, and iii) it is collected every three years which suits monitoring and evaluation needs. The last point is important for vulnerability assessment to provide an inter temporal variability of the data (Hoddinott and Quisumbing 2003).

The use of village capacity census data for disaster management in Indonesia has not been evaluated thoroughly. Limited research has been undertaken to explore how these data could assist disaster management for example Khomarudin, Strunz et al. (2010). Many more analytical applications are possible, as shown by this research. The village capacity census data is suitable for evaluating community vulnerability using the social vulnerability index (SoVI) method that was developed by Cutter et al. (2003). This is because most of the variables are conceptually related to community vulnerability. The village capacity census data, with statistics and GIS operation, can locate individuals, population, and village (place) attributes that are important for vulnerability assessments. The result is more comprehensive than the vulnerability analysis that is used in the National Disaster Management Plan (Table 11.8).

Table 11.8. Comparison between existing vulnerability analysis variable and the variables that are used in this research

Variable	The National Disaster Management Plan	This research
1. Physical environment	- proximity to hazard sources	- all villages that are within coastal hazards affected areas based on 10 m ground elevation boundary - proximity to health, education, and social services
2. Social	- population and density - labour force - health - education	- include 11 individual sub variable to show village population structure - shocks from previous natural hazard events - presence of community based health program - number of food and nutrition problems - number of sickness events caused by environmental conditions - presence of medical personnel at village - marginal groups that are represented by households living at slum and riverbank areas - social economic conditions that increase vulnerability to coastal hazards (represented by households that are working as agricultural labour and number of disabled people)
3. Economy	- local GDP - local revenue - economic growth - poverty	- village government financial capacity that contains 2 sub variables (revenue and funding from higher levels of government) - diversity of income source
Total variables	9	14 factors that cover 45 sub variables

The village capacity census data not only contains quantitative information but also qualitative ones. This information includes village characteristics (coast, non coast, and within forest), general ground elevation, major sources of income, and sanitation issues. Information on road type, availability of TV and mobile phone signals are also available to show the remoteness of village locations. The use of qualitative information to support vulnerability analysis needs to be explored to support vulnerability assessments (Capobianco, DeVriend et al. 1999) and to improve the corroboration of the method and to provide more in-depth analysis (Krishna and Shrader 1999; Hoddinott and Quisumbing 2003). One example of how these kinds of data can support the hazard and vulnerability assessment is presented in Figure 11.6.

The map shows the distribution of drinking water sources of all villages on the north coast of Central Java overlaid with the elevation less than 10 m above sea level. As many villagers get their drinking water from a well (both manual and electrically pumped), seawater intrusion, which is going to be accelerated by sea level rise and inundation, imposes a real threat for clean water sources. Eventually it increases sanitation and health problems.

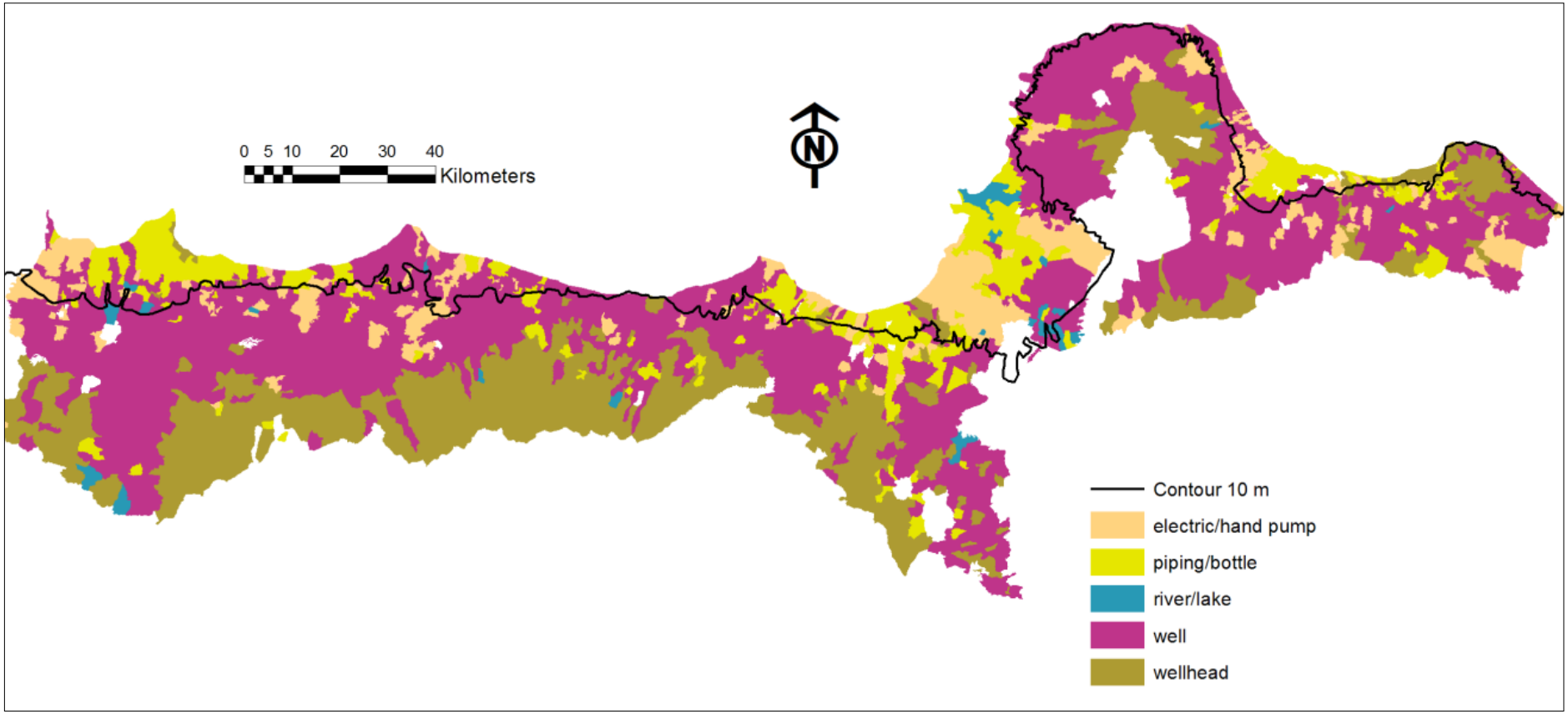


Figure 11.6. Distribution of villages' drinking water on the north coast of Central Java districts within 10 m above sea level contour

11.4.2. Application of the Method

There are a number of considerations in applying the village capacity census data for vulnerability assessment in Indonesia. Firstly, the method of SoVI calculation using village capacity census data is very time consuming because firstly it needs to modify the census raw data into a database format, and secondly there is no standard or national gazette for village names. As census data are provided by the Central Statistic Agency and the map is developed by the National Survey and Mapping Coordination Agency, any differences in the spelling of village names has to be revised. Secondly, to read and comprehend the SoVI result, we need to always refer to the SoVI's individual variables. For example, principal component analysis (PCA calculation within the statistic operation by SPSS), puts data on the number of houses at slum areas and river bank as one factor. This factor then is translated or defined as a marginal group factor. Hence, when interpreting this factor, we need to remember that it is only represented by the availability of data and the result of a principal components analysis that combines the number of houses in slum areas and river banks.

In reality marginal groups have many different attributes socio-economically that cannot only be represented by those two data types. It also means that we require more data to fully understand the status of marginal groups. Providing more data or detailed additional surveys can be undertaken later when detailed and specific assessment is required for a specific location. This kind of limitation has been a concern for many scholars. For example, Patt, Klein et al. (2005) highlighted three problems: i) representativeness of vulnerability variable to the complexity of the system, ii) validation of the interaction between different vulnerability factors, and iii) time scale difference. Other limitations are the availability of adequate data as inputs of analysis (Flax, Jackson et al. 2002).

The use of both spatial and non spatial data is not without a challenge, particularly when the method is intended to be adopted by local government staff. For example, the village capacity census data is easily accessed by all local governments, but as the data have to be analysed and processed using statistical software, it creates a difficulty because programs are not always available at local level. The general digital elevation data is also freely accessed through a website. However, the data size is very big and requires high speed internet connection to download it, which is another problem for local

conditions. Further practical problems come from ground elevation data where different scales or detail will give different results e.g. inundated areas and land uses. Additionally, detailed elevation data are very difficult and expensive to obtain. To minimise this problem, detailed elevation surveys could be undertaken for priority locations such as settlements and industrial areas.

Potential errors in digital elevation models caused by data accuracy are also an important consideration (Wang, Colby et al. 2002). Detailed uncertainties in digital elevation models for hydrological applications such as flood and inundation include (Wechsler 2007): i) error from interpolation, ii) topographic parameters, ii) scale and resolution. Simplification and exclusion of ground conditions such as roads, buildings, and embankments from the model also influences the impact of inundation assessment (Dhondia and G.S.Stelling 2002). Additionally, for climate change vulnerability and adaptation assessment, it is essential to understand technical aspects such as the appropriate scale to be used because most scenarios are on a global scale (Fekete, Damm et al. 2010).

Considering the above potential problems, the role of local universities is crucial in assisting local government. Local universities can provide technical assistance for statistical and GIS analysis, and assist in providing detailed ground elevation data. Routine monitoring can also be undertaken by universities to observe the changes on hazard intensity and distribution of community vulnerability.

11.4.3. Different Stages and Levels of Local Government Initiatives

The integration framework also faces a number of problems because progress, level, and capacity vary between local governments affecting their ability to implement the act's mandates. Similar issues were also found in the US in the implementation of the disaster management act (Godschalk, Beatley et al. 1999; Gerber 2007; Bowman and Parsons 2009), the coastal management act (Davis 2004) and future ocean management problems (USCOP 2004). It is also an issue identified by the Association of Local Government in Australia (ALGA 2006) and is one of the findings that needs improvement for disaster risk reduction initiative by countries (HFA 2011). Assessment of international initiatives on integrated coastal management also considers the strategic role of local government to successfully implement the program (Sorensen 1993).

With many different local government conditions, the institutional and procedural integration to address coastal hazard issues is more difficult. Different conditions of plan development and how the framework should be applied are presented in Table 11.9. The integration framework needs to be adjusted to anticipate the absence of planning documents either within the disaster management or coastal management plan. The challenge is even more difficult from an institutional point of view because the establishment of the disaster management agency is not compulsory for district/city governments.

Table 11.9. Framework application to suit different conditions of planning development

Progress on plan development	Framework application
1. Both plans are under the development process	- Application normally starts from issue identification, hazard and vulnerability analysis, spatial translation, public consultation, endorsement, implementation, monitoring and evaluation.
2. Only the coastal management plans are available or under the development process	- Coordination is undertaken with existing agencies that are responsible for disaster management i.e. the local disaster management agency or other agency; - Optimising available arrangement of the coastal disaster mitigation under the Coastal Management Act; - Conduct hazard and vulnerability analysis that focused on coastal areas boundary as it is part of the Coastal Management Act jurisdiction; - Incorporate available information from hazard and vulnerability assessment once it is available during the document review.
3. Only the disaster management plans are available or under the development process	- Coordination is undertaken with the marine and fisheries agency involved in the plan formulation team/task force; - Incorporate information on coastal and fisheries conditions e.g. community, critical habitats, and rehabilitation and conservation programs into plans development; - Apply information on hazard and vulnerability assessment into coastal management plans when it starts to be formulated.

11.5. Potential Implications of Research Findings

The research is based on factual problems in Indonesia to optimally implement the Coastal Management Act and Disaster Management Act in relation to coastal disaster mitigation. Therefore, the findings have implications for the legal, institutional, and policy contexts. The next sections discuss how the research findings and integration framework potentially influence legal and institutional aspects and policies of coastal disaster management.

11.5.1. Legal Aspects

The application of coastal disaster mitigation in the Coastal Management Act gives a strong legal basis for coastal stakeholders to conduct risk reduction. However, as the act itself has a number of limitations, particularly in spatial and post disaster issues, the trade off has to be undertaken without amending the act. This is possible since the Indonesian legal system allows the act to be implemented using detailed regulations in the form of government and presidential regulations. To cover the Coastal Management Act's limitations, the formulation of government/presidential regulations has to consult and be integrated with the Disaster Management Act. It will strengthen implementation of the Coastal Management Act and extend its geographical jurisdiction as one of the criteria for a holistic legal framework in coastal management (FAO 2006). Similarly, the disaster management detailed regulations have to incorporate specific information on coastal management such as oceanography, community, social and cultural life, and the role of coastal habitats in reducing the risk.

This will promote intensive communication during the regulation formulation and consultation, which is essential to reduce potential contradictions in the implementation. The interview with the Director for Marine and Coastal Affairs, Ministry of Marine Affairs and Fisheries, showed that the communications and consultations between the ministry and the National Agency for Disaster Management have been progressing very well during the formulation of the Government Regulation No. 64/2010 on Coastal and Small Island Disaster Mitigation. However, potential issues from existing limitations of the Coastal Management Act to cover hazard distribution and community vulnerability that are located beyond the coastal area boundary were not available during the process and not specifically anticipated in the regulation. It requires further effort from the ministry to minimise the impact of exclusion of many coastal villages from the mitigation program.

11.5.2. Institutional Aspects

Both acts explicitly define which institution or agency is responsible for leading the planning and implementation process of the acts' mandates and arrangements. As the district/city governments are not obliged to establish a disaster management agency, the local marine and fisheries agency will take a more strategic role in communicating and advocating coastal disaster issues at the local level in the case where the local disaster

management agency is absent. The coastal managers are then required to play a crucial role in managing and coordinating the different inputs from the various sectors to address coastal hazard problems (Tissier and Hills 2006). The implications include requirements to understand and have technical capacity to conduct coastal hazard and community vulnerability assessments. Efforts to incorporate disaster management in coastal management capacity building have been undertaken by several institutions such as US-Indian Ocean Tsunami Warning System (2007), Mangrove for the Future program (MFF 2008), and Indian Ocean region country (Jayappa 2008).

As the Marine and Fisheries Agency is still coping in trying to comprehend issues beyond the fisheries sector, this additional task gives significant challenges. Training and outreach for coastal managers is essential and critical to meet the challenge and is considered a key management issue in ICM (Cicin-Sain 1993; Crawford, Stanley Cobb et al. 1993; Lazarow 2006), and particularly for local government (Harvey 2006). Therefore, assistance and support from national government is essential through direct involvement, using its regional offices, or funding allocation to engage consultants. National government capacity and resources are also limited, so assistance needs to be prioritised for locations where the coastal hazard and community vulnerability are high and the local disaster management agency is not available.

11.5.3. Policy and Programs

As both coastal and disaster managers require all arrangements from the Disaster Management Act and the Coastal Management Act to address coastal hazards and community vulnerability, it is essential that they also apply this in their policies and programs. Coastal hazards and community vulnerability serve as the main reference points for policy and program development. Rehabilitation and conservation of marine and coastal habitats are prioritised for reducing community vulnerability and providing protection from coastal hazards. Change of planning practice and behaviour from business as usual into a new integrated approach is essential in this context (PEMSEA 2005) and not only relates to policy making technicalities but also the culture of policymaking (Orbach 1995). The interview with the former Minister of Marine and Fisheries Advisor in Public Policy also concluded that culture change in planning and policy making for coastal development is a key factor for successful implementation of integrated coastal management in Indonesia. Therefore, relying on only scientific

evidence and findings is not enough to achieve integrated coastal management (Tissier and Hills 2006).

Using hazard analysis results, all new coastal developments and investment in hazard prone areas have to be minimised. This approach is not only to reduce the potential future losses but also to anticipate the problem from allocating land uses or issuing permits in hazard prone areas. Under the Disaster Management Act and Coastal Management Act the government/agency could be sued by the community because of inappropriate decisions that exacerbate a disaster e.g. land uses allocation or permit issuance. Decision and policy accountability now have technical and legal consequences, and increases the complexity of coastal hazard planning and management (Ballinger, Potts et al. 2000).

As disaster risk reduction is complex and involves many different disciplines, the requirement for better policy and institutional settings is high. However, interaction and communication between different levels of government, sectors, and institutions that create fragmentation is a key problem to be addressed in disaster management (Few, Osbahr et al. 2006), (Handmer, Loh et al. 2007). Disaster management also requires different facets of integration such as vertical integration between government levels, horizontal coordination between sectors and between local governments, and between the stages of disaster management (Gerber 2007). That is also a key challenge in mainstreaming climate change into disaster management policy and placing it into a more holistic and multi-sectoral approach (Prasad, Ranghieri et al. 2008). Another difficulty is caused by the fact that vulnerability and resilience elements are located in daily activities of community, government sectors, and development programs and are difficult to address through disaster management when considered to be crisis management (Handmer and Dovers 2007). Effective policy approaches to address many different activities within different government levels' responsibility has been a concern for a long time and remain a concern for disaster management research (Gerber 2007). Another problem is lack of policy learning in the field of disaster management, partly because of limited availability of case studies for examination (Handmer and Dovers 2007).

providing bridging tools is essential and the integration framework that has been developed in this research plays that role. The lessons from Indonesia contribute to the gaps and the case study approach could be applied to other localities with considerations that these locations need to be in similar contexts in terms of (Handmer and Dovers 2007): i) hazard types, ii) socio-economic and cultural context, iii) political and legal system, and iv) policy instruments.

11.6. Research Contributions

The research outputs contribute to different levels of interest from local, national, and global contexts. National and local government could benefit from: i) the method of using existing elevation and census data to develop coastal hazard and community vulnerability assessments, ii) how to display and correlate the hazard and vulnerability maps with existing development plans, iii) application of the framework to optimally implement the acts' mandate using available resources, and iv) streamlining regulations to implement the acts' arrangement in relation to coastal disaster mitigation. This will provide a source for comparison with other locations in similar contexts of coastal cities in developing countries that is essential to improve the vulnerability concept and theory (Patt, Schroter et al. 2009). This is important because vulnerability assessment in the climate change context still faces many uncertainties and constraints (Patt, Klein et al. 2005).

The integration framework that is developed by this research provides a more detailed and in-depth integrated approach that is applied to coastal areas. It improves the initial framework that was developed by Isobe (1998) and the overview idea by Narcise (2005) in relation to coastal disaster mitigation, provides detailed practical implementation of the integration principles and elements that were proposed by Thia Eng (1993) and GESAMP (1996), fills the need of practical application of ICM (Pedersen, Beck et al. 2005), shows how to integrate coastal management into development planning (Vallejo 1993), and provide an example of practical linkage between disaster management and community sustainable development (Schneider 2002) particularly in coastal areas The framework and its application also illustrate and translate the use of ICM for coastal public and safety concern that is highlighted by Cicin-Sain (1993) and Kay and Alder (2005).

The application of the framework to address climate change impact in coastal areas, particularly for coastal inundation, initiates the premise that ICM potentially can be used as a means for bridging and executing coastal hazards mitigation, climate change adaptation, and sustainable development. This allows new debates and discussions about ICM theory and concepts together with existing debates which have already been discussed for integrated disaster management and climate change adaptation (Schipper and Pelling 2006; Thomalla, Downing et al. 2006; Birkmann and von Teichman 2010; Hori and Shaw 2011), disaster management and sustainable development (Berke and Conroy 2000; Rockett 2001; Twigg 2001; Dovers 2004; McEntire 2004; Mileti and Gailus 2005), environment and natural disaster management (Aalst and Burton 2002; Srinivas and Nakagawa 2008) and climate change and sustainable development (Cohen, Demeritt et al. 1998; Beg, Morlot et al. 2002; DiSano 2006; Banuri 2009).

Regionally, analysis of the legal constraints of Indonesian disaster management and coastal management acts provides a useful reference for other countries in the Indian Ocean region that also enacted disaster management acts after the 2004 tsunami. Globally, the research contributes to existing processes and efforts to reduce the risk from natural disasters which is prioritised by many regional and international initiatives where from 1994 – 2003 there were 22 initiatives related to disaster risk reductions (UN/ISDR 2004). A number of initiatives following that year include the Hyogo Framework for Action (HFA) and ASEAN Agreement on Disaster Management and Emergency Response in 2005. Priorities include strengthening and improving policy and planning in disaster risk reduction and to reduce social vulnerability to natural disaster and climate change impacts. However, the mid term review of the HFA implementation considered that an integrated approach to disaster risk reduction is still lacking along as is the integration of climate change adaptation and disaster risk reduction through an integrated plan within all level of governments (UN/ISDR 2011).

For the disaster management and coastal management fields the findings of this research provide more evidence that both disciplines are mutually interdependent when it comes to coastal disaster risk reduction. The approach of using administrative boundaries in delineating coastal areas has proved to be complicated when dealing with geographically dependent coastal hazards such as inundation and flooding. The failure of existing planning documents, in these research case study sites, to give appropriate

response to the coastal inundation problem implies the requirement to provide better methods to communicate and advocate chronic coastal hazards. Overlaying coastal hazards with existing community vulnerability to show that the hazards will exacerbate existing vulnerability can be applied. From a methodological point of view the use of multi sources of evidence, both spatial and non-spatial, that are triangulated to verify the propositions, proved effective in solving the research questions and validating the argument.

In relation to climate change adaptation, the research findings suggested that adaptation framework need to consider several aspects. Those aspects include; i) institutional settings and planning arrangements to facilitate and foster adaptation, ii) difficulty for local government to implement climate change adaptation caused by a limitation on available space (for retreat or migration) or technical and financial resources (to develop structural protection from sea level rise) and iii) effective methods to incorporate climate change adaptation into broader development activities.

This research and its framework provide more insight on how adaptation policy development needs to be undertaken by considering complexity in legal, planning, and characteristics of local governments. The integration framework in particular, is part of a trade off to reduce the complexity of climate change adaptation that can be in the form of technological, legal, and institutional aspects (Smith, Burton et al. 2000) and even further into administration, organization, regulation, education, and research (Carter, Parry et al. 1994).

CHAPTER 12
CONCLUSION AND RECOMMENDATIONS

12.1. Conclusion

The research had addressed a major question in disaster management and coastal management planning which is how to integrate disaster management and coastal management in addressing coastal hazards. The question has been shown to have implications for both fields' theories and concepts and practical applications in the form of legislation and planning requirements. It is part of the strategic goals for global risk reduction from natural disasters. Research to assess the integration between these two areas is still limited as most coastal management activities have been applied without incorporating coastal disaster mitigation elements. A similar situation is also found in the case of disaster management. The Indonesian context represents the complexity and challenge to develop integration because: i) its vulnerability to coastal disaster is very high, ii) Indonesia has enacted disaster management and coastal management legislation, and iii) there are three different levels of planning systems from national through provincial to local (district/city) to represent the complexity of the planning process.

To guide the analysis, five propositions have been developed to support the argument that an integrated approach for coastal disaster mitigation is essential, beneficial, and applicable within conceptual, legal, and planning arrangements. All propositions were successfully verified using multi sources of evidence that include content analysis of acts and planning documents, spatial analysis of coastal hazard and community vulnerability, semi structured interviews with key stakeholders, and field observations.

Analysis of conceptual, legal, planning, and practical contexts concluded that coastal disaster risk reduction is a complex and multidisciplinary action that is regulated within different legislation and policies and implemented by different levels of governments and sectors. Integration is required to avoid contradiction and optimise available resources which have been endorsed by many international organizations and conceptually proposed by many scholars. What has been lacking is the framework to facilitate the integration.

Assessment of Indonesian legislation and planning arrangements leads to the development of an integration framework between disaster management and coastal management. The framework was constructed using existing conceptual and theoretical approaches in both fields. The framework has been shown to be effective in translating the integration between disaster management and coastal management in which a concept has been proposed and encouraged but is still lacking operational arrangements. Five conceptual integrations have been successfully facilitated from substantial, methodological, procedural, institutional, and policy integration. The framework also provided a new relationship between disaster management communities and coastal management communities at conceptual, legal, planning, and implementation levels.

Results from the application of this framework at local government level concluded that coastal community vulnerability factors are multidimensional and cannot be addressed by only disaster management or coastal management policies and programs. Weaknesses of existing plans and fragmentation of programs and policies are the basic problem. GIS analysis of coastal hazard and community vulnerability corroborated the potential problems from spatial and content drawbacks identified in disaster management and coastal management legal and planning assessments. That drawback encourages integration to eliminate cultural barriers between sectoral agencies that perceive integration as a threat to their authority. The framework allows both disaster and coastal management communities to optimise their strengths and reduce their limitations without compromising their existing development in terms of theories, concepts, and applications. The framework does not eliminate each other's elements but combines and optimises them toward coastal sustainability.

Application of the framework in the local government context to address the real problem of coastal hazards shows many benefits of integration. In the legal context, integration eliminated legal constraints that were found in disaster management and coastal management legislation. Anticipating spatial boundary and program limitations were the most apparent benefits that can be achieved. In the planning time horizon, the problem of long term and short term policy in addressing coastal hazards can be minimised both in disaster management and coastal management plans. Vulnerability assessment is also proven to be effective in guiding all available development planning documents at the local level to simultaneously reduce coastal community risk to

disaster. The framework also promotes multi framing treatment of coastal hazards and vulnerability problems from socio-economic, environmental, and governance contexts.

A number of limitations were also identified for further adjustment of the framework. The limitations mostly come from the different timeframe and process of planning document formulation and the fact that not every location has both a disaster management agency and coastal management agency simultaneously. These conditions require modification of the framework application.

12.2. Recommendations

Considering the results and findings from this research it is recommended that coastal disaster management planning and its regulations should be undertaken more inclusively to integrate both disaster management and coastal management stakeholders. Particularly in the Indonesian context, communication between the Ministry of Marine Affairs and Fisheries and the National Disaster Management Agency in developing detailed regulations to implement the acts need to be strengthened. Moreover, the national government needs to increase its facilitation to local government to accelerate the fulfilment of the acts' mandates in disaster and coastal management planning. As the mandates are very complex and potentially a disincentive to implementation, optimising local universities' roles to provide technical and expertise assistance is crucial. One crucial action is developing a national gazette for village names to reduce the problem of compatibility between census data and base maps to support national vulnerability assessments.

As the interaction between disaster management and coastal management is very complex, the integration between both fields provides many new directions for future research. At the governance level, examination of post disaster rehabilitation planning in coastal areas is needed to be undertaken to see if the integrated coastal management principles are applied and to evaluate any constraints and problems. At the implementation level, the interaction between coastal habitat rehabilitation and conservation and community capacity to cope with and recover from coastal hazards still needs assessment. In particular it needs to show how the activities in coastal management can match both spatially and timely with the activities in disaster

management. For both assessments, the integration framework could be used as a reference and starting point.

Another important evaluation is on the application of detailed ground elevation data to provide more accurate inundation distribution. This research has shown that the vulnerability distribution does not match with existing spatial arrangements in the Coastal Management Act and allocation of coastal management and disaster management programs to address it are very limited. Specific attention needs to be given to assess how the program and funding location, not only total allocation, matches with the spatial distribution of coastal hazards and community vulnerability. This then can be used for monitoring and evaluation of the effectiveness of coastal disaster management by applying census data from different years to examine the vulnerability changes and associated socio-economic development in the areas.

For a spatial planning point of view, it is essential to examine future losses caused by existing development and city spatial plans that still allocate significant activities in hazardous zones. The results then can be examined with proposed mitigation actions to see the benefit and cost of the programs against potential loss. The result is important to advocate more safe and resilient coastal development in the future.

Finally, this research has fulfilled its objective to support an integrated approach in coastal disaster management. Findings and evidence from this research contribute to existing knowledge in disaster management and coastal management fields. More importantly, the integration framework and it application provide bridging tool from conceptual concept to practical application of integrated approach in coastal disaster management. Constructive implications for policy and planning arena are further impacts that are important for Indonesia and countries in the region that share similar problem in natural disaster management.

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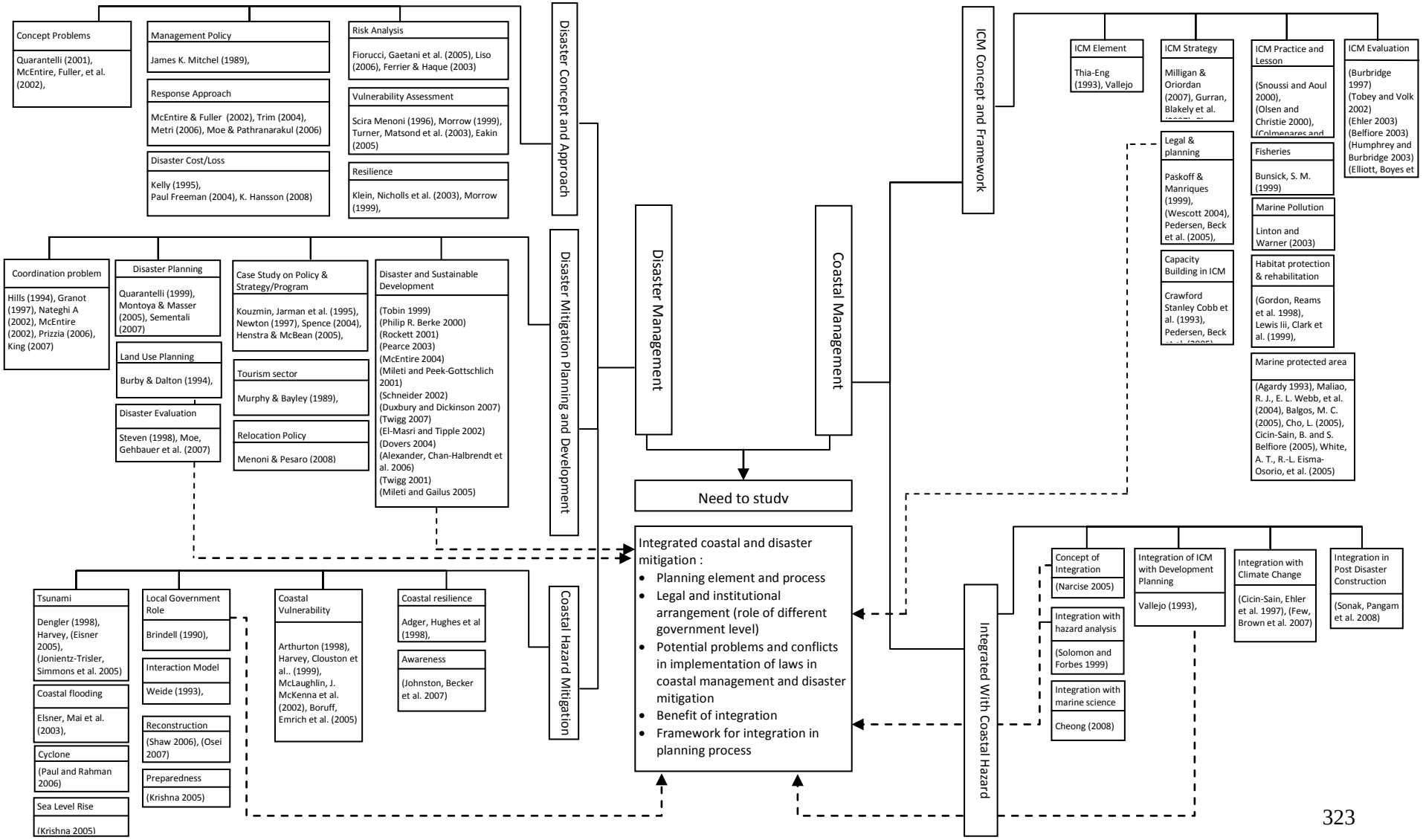
APPENDICES

Appendix 1. Literature map of existing approaches and concepts in disaster management and coastal management and the need for integration



Appendix 2. Summary of literature review and analysis on disaster management and coastal management fields.

No	Author	Addressed Problem	Purpose	Methodology	Result
A.	**CONCEPTS AND FRAMEWORK IN DISASTER MANAGEMENT**				
1.	(Mitchell, Devine et al. 1989)	Hazard-management policies	To evaluate that the a natural hazard is influenced by environmental, socio cultural, economic, and political context	Disaster impacts analysis, context analysis, and policy analysis	A contextual model of natural hazard is proposed
2.	(Kelly 1995)	Disaster response and cost efficiency	To provide a framework that is useful for general disaster response planning	Analysis of disaster response planning and in the development of cost-efficient procedures for supporting disaster response efforts	• A systematic proactive planning of response, costs projections, procurement and resource mobilization is proposed • It is generic and can be adapted to local conditions and requirements
3.	(Scira Menoni 1996)	Framework for vulnerability assessment of urban and regional.	To provide a framework to assess the urban and regional vulnerability that take into account the vulnerability of the subsystem as well as social and economic vulnerability	• Identification of important parameters to evaluate the vulnerability • Put in a framework to assess the overall regional and urban vulnerability assessment • The framework is applied in a small seismic settlement in Italy	Vulnerability assessment framework that is useful for addressing decision on disaster mitigation for planner and administrators
4.	(Morrow 1999)	Community vulnerability	To assess the community vulnerability as social and economic problems	• Analysis on USA context • Used Hurricane Andrew as an example	• Different impact of hurricane based on the social and economic condition discussed • Identification and effort to locate the distribution of vulnerable people are encouraged
5.	(Quarantelli 2001)	Disagreement concepts and dubious data in disaster studies	To discuss the problems in disaster studies especially related to terms and statistic data	• Analysis existing concepts and its problems • Analyse the statistical data and its problems	• Inadequate conceptualization in disaster is argued as factor in disaster studies problem • Not much consensus on main terms such as hazard, risk, and disaster. • More relevant concepts are urged.
6.	(McEntire, Fuller et al. 2002)	Concepts of disaster management	To provide more comprehensive paradigm as guidance for research and practice in disaster management	Review and analyse the existing concepts i.e. community-resistant, community-resilient, and sustainable development,	• New paradigm as comprehensive vulnerability management is proposed • To be used as guidance to understand and reduce disaster that improve previous concepts

No	Author	Addressed Problem	Purpose	Methodology	Result
7.	(McEntire and Fuller 2002)	Approach in disaster management	To explore key factor that contribute to disaster and response actions	• Field research • Interview • Literature review • Evaluate Peru context	• Explanation of disaster must take into account both physical and social factors • Recent disasters are argued as combination of natural, technological, and human-induced disaster
8.	(Klein, Nicholls et al. 2003)	Resilience concept in environmental management	To assess the concept of resilience to natural hazards, using weather-related hazards in coastal mega-cities as an example	• Literature review on mega-cities, coastal hazards, hazard risk reduction strategies, and resilience within environmental management • Evaluate the potential use of climate adaptation concept for resilience	• The concept of adaptive capacity is proposed to be used as umbrella for resilience • More communication between the natural hazards and the climate change communities is needed
9.	(Turner, Matsond et al. 2003)	Hazards and vulnerability of human-environment system	To evaluate and assess the application vulnerability framework for human-environment system	• Developing framework • Case study of framework in three different location	• the usefulness of the vulnerability framework through three case studies is discussed • the framework is proposed to be used in analyzing human-environment system to reduce its vulnerability
10.	(Freeman, Martin et al. 2004)	Methodology to incorporate potential future losses into current planning activity	To develop an technique to integrate probabilistic natural hazard losses into macro economic planning model	• Estimation of potential direct, stock losses by combining information on natural hazards, country's capital stock and physical vulnerability of the capital stock. • Integrate these stock loss estimates with the macroeconomic model representing the economy and its vulnerability. • Probabilistic losses to capital stock (direct losses) serve as input to a macroeconomic model, which consequently calculates the macroeconomic impacts. • The macroeconomic effects calculated comprise the indirect effects of losing and not being able to replace capital stock sufficiently or in a timely manner, as well as the effects of diverting funds to relief and reconstruction activities.	The modeling can serve as a tool for planning for the effects of natural disasters before they occur and for engaging in appropriate risk management activities

No	Author	Addressed Problem	Purpose	Methodology	Result
11.	(Trim 2004)	Holistic setting in disaster management	To provide the concept for community policing to ensure the problems of disaster are respected as shared responsibility among stakeholder	• Analysis of issues	• A holistic interpretation of disaster management is discussed • An effective and integrated approach to disaster management and planning, will improve the disaster management and allow an ideological bridge building activities
12.	(Fiorucci, Gaetani et al. 2005)	Framework for natural disaster mitigation	To define a general framework for natural disaster mitigation, specifically, for forest fire.	• Analysis of pre-operative strategy and real time risk management • Decision model is developed	• general framework for the forest fire risk management presented and discussed • further research is identified on model calibration and validation
13.	(Eakin 2005)	Rural vulnerability to climate change in context of policy and globalization	To provide the evidence of problems faced by rural community in the context of agricultural policy and globalization	• Analysis of recent changes in Mexico's agricultural policy • Ethnographic data are collected in three communities • Focus on risks posed to smallholder livelihoods by climatic variability • Livelihood strategy is explored •	• The key attributes of adaptive capacity of the smallholders are presented and discussed
14.	(Metri 2006)	Mechanism for disaster management	To develop a framework for disaster management using quality circle a bottom up approach	• Discussion and analysis on quality circle concept in disaster management	• A framework is proposed to use quality circle in disaster management • Proposed framework argued to be effective to increase the awareness and knowledge of disaster
15.	(Liso 2006)	Integrated risk management of climate change impacts	To develop cross-disciplinary strategies to meet the challenges of future climate change by using of modern risk management theory	• Review and analysis • Application in construction and built environment field	• Cross-disciplinary risk-based management strategies is argued as important step • robustness of the built environment in the light of the unknown risks of future climate change is a key condition to be achieved through reducing potential damage, precautionary approach, and building location
16.	(Moe and Pathranarakul 2006)	Integrated approach in disaster management	to develop an integrated approach for effectively managing natural disasters	• Identification of specific problems associated with tsunami disaster • A case study of the tsunami in	• the country lacked of master plan for natural disaster management • The proposed integrated

No	Author	Addressed Problem	Purpose	Methodology	Result
				Thailand	approach which includes both proactive and reactive strategies can be applied to managing natural disasters
17.	(Shaluf 2007)	Disaster types and terms	to provide graduate students, researchers, and government and independent agencies with an overview of disasters	Literature review from many sources (technical, general articles, internet web sites, and internal reports)	• Classification of disasters • Characteristic and impacts of disasters
B.	**PLANNING, INSTITUTIONAL ARRANGEMENT AND COORDINATION IN DISASTER MANAGEMENT**				
18.	(Murphy and Bayley 1989)	Natural hazard and tourism planning	To provide analysis on natural disaster planning in tourism development	• Analysis • Case study on volcano eruption	• It is suggested that tourism should give more attention to disaster planning • tourism and local needs can be accommodated during all stages of disaster planning
19.	(Hills 1994)	Concept of coordination and its application for disaster management	To provide more understanding on coordination meaning and application	• Case study at UK context • Discussion on coordination word and term • Analysis of related report in disaster management at UK	• Idea about co-ordination in the disaster response are confused • In general, emergency planning in the UK suffers from a lack of precision in some of its fundamental concepts
20.	(Burby and Dalton 1994)	Disaster mitigation and land use planning	To analyse the potential role of land use planning at local government in disaster mitigation	• Analyse 176 local governments in five states • Analyse the state mandates and its influence for the quality of the plan	• State mandate on land use plan and disaster mitigation plan importance is demonstrated • The rational consideration of community needs and policy alternative is important. • Cooperative approach to hazard mitigation policy based on landused planning is important for local adoption
21.	(Kouzmin, Jarman et al. 1995)	Disaster management policies and program	To assess the disaster management policies and program in Australia	• Analysis and synthesis from Australian context • Propose better approach in the future	• Australia were poorly if compared in any rigorous, strategic and meta-policy sense against the set of demanding criteria • The sharing of the experiential data, technical expertise and expert systems capability is important
22.	(Granot 1997)	Inter-organizational cooperation during emergency event	To review the inter-organizational and cooperation that needed for	• Assess the culture, organizations, legislation, and bureaucracy	• A better coordination and cooperation is suggested

No	Author	Addressed Problem	Purpose	Methodology	Result
			emergency operation	consideration for the process during emergency • Review number of existing finding and analyse directions for improvement	
23.	(Newton 1997)	Hazard mitigation strategy	To provide a current hazard legislation and programs in USA and Canada for future improvement in Canada context	• Conduct comparative assessment • Identify implications for mitigation policy within the framework of the Canadian IDNDR initiative • Explore the perception of mitigation	• diversity of response capabilities and readiness within the institutional organizations responsible for emergencies is demonstrated • future direction is recommended
24.	(Quarantelli 1999)	Planning and management policy in disaster impacts reduction	To provide an assessment the role of planning and management for disaster mitigation	• Analysis and synthesis	• A number of actions are proposed: - to accept the social context of disaster, - to move to all hazard mitigation approach (more generic), - to give more priority in disaster planning, and - to assess the difference and similarity of disaster and environmental problems
25.	(Nateghi-A 2000)	Disaster management organization	To evaluate existing earthquake management in Iran and propose the improvement in future	• Present existing organization • Discuss the legal aspects and issues • Analyse the weakness of the organization • Propose modification	• New organization is proposed
26.	(McEntire 2002)	Problem in coordination among many organizations during the disaster event	To examine how collaboration among organization happen in certain case study	• Fort Worth tornado is used as case study • Identification of factors that inhibit and support the coordination • Conclude with recommendation for improvement in the future	• Problems for coordination in the field are identified, include information, lack of communication, equipments, language, command control problem • Support factors for coordination include political context, preparedness measures, networking and cooperative, technology, emergency operation center
27.	(Ferrier and Haque 2003)	Planning of disaster mitigation based on the risk analysis	To provide common framework for mitigation planning for emergency	• a review of the existing literature • develop a framework	• standardized framework is proposed for managers,

No	Author	Addressed Problem	Purpose	Methodology	Result
			managers that come from different background		regardless of training or education • framework consists of the numerical ranking of the frequency of the event, multiplied by a numerical ranking of the severity or magnitude of an event • multiplied by a numerical ranking of the Social Consequence; community perception of risk level and collective action available
28.	(Spence 2004)	Policy and regulation on earthquake risk mitigation	To assess the appropriate laws and policy to be widely adopted for risk mitigation	• Analysis and synthesis	• Three type of regulation is proposed: building code, upgrading existing building, insurance.
29.	(Montoya and Masser 2005)	Urban planning for disaster risk reduction	To identify gaps in current urban planning framework and practices as well developing geographically referenced information to assist the selection of mitigation	• Analyse the existing planning and building regulation • Focus on population and general building for earthquake risk	• Analysis on existing problems are presented: horizontal expansion of city, lack of building code, need of inter-municipal cooperation, and access to census data. • Conceptual risk model is developed •
30.	(Henstra and McBean 2005)	Effort in revising policies for disaster management	To provide analysis on Canada context on integrated disaster management	• Evaluate and analysis Canada context (planning, mandate of government level, and legislation)	• Canada has not sufficiently integrated mitigation into disaster management • There are several barriers that impede progress
31.	(Prizzia 2006)	Public and sector coordination for disaster management especially for homeland security and state security	To discuss and present the application of disaster coordination among stakeholders in Hawaii that could be applied to other countries	• A case study approach that is combined with a meta-analysis and general literature review	• Hawaii case study is potential to be used as reference for Asia and Pacific region • Applicable for security related disaster (terrorism)
32.	(Sementelli 2007)	Disaster planning and response	To provide analysis on framing and defining the role of public administration theory on disaster management	• Analysis and synthesis	• Sample of different approaches in studying disaster is presented •
33.	(King 2007)	Emergency response and community recovery	Analyse the structure and effectiveness of organisations during the response and recovery processes in emergency	• Synthesis and analysis	• the problems of organizations and leadership are shown always emerge during the disaster. • It suggested that emergency

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			management		manager recognise and understand the involvement of many levels and types of organizations that will have different agenda, approach, and needs. • The complex organization involved is a feature and also crucial for the response and recovery
34.	(Hansson, Danielson et al. 2008)	Institutional system for applying cost effective and reliable technologies for disaster prevention, early warnings, and mitigation	To provide strategies for the sharing of losses from hazardous events that may aid a country or a community in efficiently using scarce prevention and mitigation resources, thus being better prepared for the effects of a disaster	• An approach to this problem was taken during a large study in Hungary, the Tisza case study, where a number of policy strategies for spreading of flood loss were formulated. • A set of parameters of particular interest were extracted from interviews with stakeholders in the region • Northern Vietnam is used as an example of a developing region • Identify important parameters and discuss their importance for flood strategy formulations	• A framework for loss spread in developing and emerging economies is proposed • The parameter set can straightforwardly be included in a simulation and decision model for policy formulation and evaluation, taking multiple stakeholders into account
35.	(Menoni and Pesaro 2008)	Relocation from hazard prone areas	To identify the criteria for relocation from areas subject to high levels of hydrogeological hazards	• Review of existing information and practice in voluntary relocation • Analysis on involuntary strategy • Develop criteria to be applied in case study	• Criteria are proposed • Application for Lombardia region, Italy is provided
C.	**HAZARD MITIGATION PLANNING AT LOCAL LEVEL**				
36.	(Berke, Roenigk et al. 1996)	Natural hazard planning in local government	To examine natural hazard elements in community plan and to provide recommendation for improvement	• Evaluate 139 community plans with focus on natural hazard elements • Assess the effect of state mandate in landuse planning for the quality of local government plan	• The state mandate improve the local government plan quality • State mandate help local government to overcome political, economic, and physical constraints to produce a plan
37.	(Burling and Hyle 1997)	National, regional, and local disaster planning response	To identify and evaluate plans for disaster preparedness and impact of administrators' experiences with disaster on current and future plans	• Comparative analysis • Interview • Evaluate with the Quarantelli's minimum requirements	• Education was addressed in the instructional curriculum, legislative mandates and a resource directory provided by the

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					governor's office
38.	(Deyle and Smith 1998)	Planning mandate in different level, states and local government	To analyze the effectiveness of the mandates that govern local planning for coastal storm hazards in Florida	• To examine the extent to which 18 Florida communities comply with state mandates about coastal storm hazards. • Test two sets of factors: the interpretation and enforcement of the mandates by the state agency charged with their administration, and local community conditions.	• the state agency has emphasized some mandate requirements over others, and not necessarily consistently over time or across different sub-units of the agency. • some local conditions may have influenced plan content in cases where the state agency did not strictly enforce the mandate. • storm hazard planning inclusion in local plans cannot be attributed solely to the content of the state's planning mandate • effectiveness of state planning mandates need be measured and interpreted
39.	(Burby 2003)	Planning at local government	To provide a better approach in planning development and its implementation in local government level	Analyse 60 local planning process in the State of Florida and Washington	Approach in planning process is proposed
40.	(Srivastava and Laurian 2006)	Natural hazard mitigation planning at local level	To evaluate the strengths and weaknesses of hazard mitigation in local comprehensive plans	• Use plan evaluation protocol for flood, wildfire and drought hazard • Evaluate 6 counties mitigation plan in Arizona	• Plan do not address equally to all three hazards • Hazard information for development of mitigation plan is shown very important
41.	(Ahrens and Rudolph 2006)	Governance in disaster management	To identify institutional failure as the root cause for underdevelopment and susceptibility to disasters	• Analysis	• Accountability, participation, predictability and transparency are identified as the key features
42.	(Khan and Rahman 2007)	Institutional arrangement for disaster management	To assess and evaluate the policy and institutional arrangement for disaster management in Bangladesh	• Analysis of current context • Assess and develop partnership framework	• partnership among the stakeholders is shown to be absent in Bangladesh context • the need for collective decision-making in planning, in resource sharing, and in implementing disaster management policies and programs is evident • a partnership framework to implement prevention, preparedness, response, and recovery phases is proposed

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43.	(Baker, Deyle et al. 2008)	The mandate of local government in US to have a comprehensive plan policies on hurricane	• To provide the assessment of the effect of post-plan growth on evacuation clearance times and public shelter demand in a subset of five counties in US. • To examine several possible explanations for why this growth occurred despite the state's planning mandate	• Using existing parcel/land data to evaluate the residential unit • Model is used to calculate evacuation time and shelter demand	• State mandate to maintain or reduce the clearance time is not in harmony with the result of evaluation and model • Current state law limit need to be improved to enhance the implementation of comprehensive plan policies in local government
44.	(King 2008)	Natural disaster and risk mitigation	To illustrate the process of local government engagement in hazard mitigation in Australia	• Overview and analyse the Australian context in natural risk management	• the weakness of many local councils' engagement with their own communities is shown • the next steps of risk management and mitigation is argued to be strengthening stakeholder and community involvement • integration of social impact assessment in disaster management is proposed
D.	**INTERNATIONAL AGENDA**				
45.	(Stanganelli 2008)	International agenda on UN-ISDR ask all countries to reduce the risk of community from disaster under the Hyogo Framework for Action 2005 - 2025	To promote an effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels	• Discusses each aspect of the Hyogo approach in relation to the Italian experience. Italy represents an interesting case because of its multiple hazard environment, and the fact that it has developed an integrated approach to risk reduction planning. • Strengths and weaknesses of the ''Italian way'' of dealing with risk are identified, and compared with the theoretical processes suggested by the framework	• A new process for dealing with risk, using the framework for guidance, is identified • factors that appear to interfere with an integrated approach to risk management are identified • Guidelines for analyzing vulnerabilities to disaster in a multi-hazard, integrated context are proposed
E.	**EVALUATION OF DISASTER MANAGEMENT PROGRAM**				
46.	(Stevens 1998)	Evaluation of awareness and preparedness at local level	To provide a analysis on the process and tools to implement the handbook	Analysis of handbook implementation and future consideration of the handbook	• Progress of awareness and preparedness program in many countries is discussed • Future improvement is proposed
47.	(Moe, Gehbauer et al. 2007)	The need to implement disaster mitigation project in effective and successful way	To evaluate the application of balance score card (BSC) approach in disaster management project	• Discussion on the application of BSC for natural disaster management projects	• Performance should be assessed for four areas (donor, target, process, and learning and

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				• Using real flood management project as case study • Five generic phase of disaster management are assessed (preparedness, early warning, emergency, rehabilitation, and recovery)	innovation) • Allow project managers to asses and evaluate the problem areas and further improvement
F.	**COASTAL MANAGEMENT CONCEPT AND FRAMEWORK**				
48.	(Thia-Eng 1993)	Element of integrated coastal management (ICM)	to discuss the essential elements and application of ICZM	• Evaluate experiences and lessons drawn from the ASEAN	• The ICM could provide a strong legal and institutional framework for sectoral development • The problems in implementation of fisheries, mangrove, and coral reef management and marine park program outside the ICM framework has been caused by the lack of ability to address legislative, interagency and other cross-sectoral conflicts
49.	(Crawford, Stanley Cobb et al. 1993)	Capacity building on ICM for developing countries	To provide an overview on URI/USAID experience and lesson learnt from ICM efforts in Sri Lanka, Thailand, and Ecuador	• Analysis and overview of the program	• Need an integrated strategy for training and institutional strengthening • Global capacity on coastal management in early stage of formation compare to other fields that have more experience and history.
50.	(Vallejo 1993)	Integrated coastal management and development planning	To examines various forms and elements for the effective integration of coastal management into national development planning	• Analysis of current situation and problems	• Model to integrate coastal management and development planning is presented • Gap that is argued to be located at the top political and planning levels • major forms and elements to be coordinated to effectively integrate CZM into national development planning are proposed and discussed
51.	(Paskoff and Manriquez 1999)	Ecosystem and legal framework for coastal manageemnt	To review the environmental condition and legal framework for coastal management initiative in Chile	• Analysis existing environment and legal context • Analyse land use for tourism is	• Better development is proposed

No	Author	Addressed Problem	Purpose	Methodology	Result
				particular	
52.	(Pedersen, Beck et al. 2005)	The need on practical approach to translate the ICM to real on the ground activities	To examine key problems of developing capacity for ICM	• Evaluation of ICM in Malaysia • Evaluation on lesson learnt from project implementation • Evaluation of political, economic, and legal context to ICM in Malaysia	• Some practical approach for capacity development is discussed
53.	(Milligan and O'riordan 2007)	National strategic frameworks, planning arrangements, and changing economic assessments in coastal areas	To assess the recent policy and regulation development in coastal governance in UK	• Highlights both physical and socioeconomic sustainability as key factors in coastal governance. • Evaluate the regulation and context in UK and Europe	• a new phase of geographical research is proposed
54.	(Gurran, Blakely et al. 2007)	governance frameworks to response the profound environmental, social, and cultural implications of rapid growth in coastal areas	To provide the analysis on how governance frameworks in coastal Australia respond to the profound environmental, social, and cultural implications of this process.	• Use non-metropolitan coastal growth settings • Identify the main environmental, social, economic, and governance issues they face. • outline the policy and legislative framework governing coastal areas in Australia and show how this framework is interpreted at the local level through an analysis of five local plans covering different coastal settings	• the drivers and implications of lifestyle driven population change for coastal policy, management, and planning is presented • The land use planning system offers an important framework for implementing coastal policy and resolving disputes about the use or conservation of coastal space
55.	(Cheong 2008)	Integration of marine science and coastal management studies	To discuss the rationale for integration of marine science with ICM and to examines the progress towards linking marine science and management.	• Analysis and synthesis • Provide some examples that promote integration	• more balanced integration by conducting research on the current practices of marine sciences in coastal management and coastal management in marine sciences is proposed.
G.	**COASTAL HAZARD MITIGATION**				
56.	(Brindell 1990)	Coastal management responsibility at local government	To evaluate the effect of new regulation in Florida that requires local governments to address, the efficient and effective allocation of uses of coastal resources.	• Synthesis and analysis • Case study at Florida State • Using upcoming new regulation as a basis for analysis	
57.	(Weide 1993)	Natural hazard and human activities in coastal areas and conflict interest between shorterm economic benefit and longterm ecological services	To provide a general system description on the coastal zone with focus on the modeling of natural system components toward the integrated coastal management	Analysis of concepts	
58.	(Arthurton 1998)	Marine related natural hazard	To provide overview and analysis on	• Analysis on existing data and	• Marine related natural hazard will

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		mitigation	marine related natural hazard and its mitigation	information of natural hazard in Asia Pacific region	increasingly impact on Asia Pacific region • Existing hazard can be exacerbated by human activities along the coastal areas • Further research is highlighted: spatial temporal prediction of hazard, vulnerability assessment, and appropriate planning and integrated management
59.	(Dengler 1998)	Tsunami mitigation program	To define, prioritize and support the coordination of the mitigation efforts of the National Program at USA	•	• Strategic plan document as guidance • Could be used as reference
60.	(Harvey, Clouston et al. 1999)	Coastal vulnerability to sea level rise	To present and evaluate the existing methodology and provide the better one that is more holistic	• Evaluate existing method that is developed by IPCC • Revise the methodology by incorporating spatial and temporal scale • Test it in three locations in South Australia	• There are significant regional variations in sea level rise response, human induced hazards and local planning • The methodology could be used as reference for other locations
61.	(Ballinger, Potts et al. 2000)	Complexity and shortcomings of current coastal hazard planning and management in UK and Wales	To make a comparison analysis between UK and Wales context with New Zealand's in coastal hazard planning and management following the constitutional reform and strengthening local government role	• comparing the regional dimension of coastal hazard planning in the two areas, • analysing the status, scope and jurisdiction of regional planning bodies and • investigating issues relating to intergovernmental and cross-sectoral links and public involvement	• New Zealand case study shows the advantage of clearly defined roles for different levels of government, with emphasis on regional decision-making and extensive community involvement. • Comparison and reference for similar regulation and arrangement for other country is possible
62.	(McLaughlin, McKenna et al. 2002)	Coastal vulnerability index for coastal disaster mitigation	To investigate the incorporation of socioeconomic variables into a GIS based coastal vulnerability index	• Socio economic index is developed • Problems and constraints are assessed • Test the index	• Problems are presented that related to temporal and spatial aspects
63.	(Elsner, Mai et al. 2003)	Coastal defense planning and hinterland management	To provide the risk analysis of coastal defense and the potential losses in case of failure using GIS analysis	• Develop the flood scenario • Quantification and spatial modeling of damage potential	• The spatial distribution of damage and the value of losses from coastal defense failure is presented
64.	(Boruff, Emrich et al. 2005)	Vulnerability of coastal to erosion hazard	To examine the vulnerability of US counties coastal to erosion	• Combine socioeconomic vulnerability index with USGS physic survey	• Socioeconomic and physical factors influence the place

No	Author	Addressed Problem	Purpose	Methodology	Result
				• Produce the erosion vulnerability index based on county area	vulnerability • Each location has different vulnerability characteristic either socioeconomic or physic • The approach has not been applied to scientist and policy maker
65.	(Adger, Hughes et al. 2005)	Coastal community resilience to disaster	To review the social ecological resilience of coastal community to coastal disaster	• Analysis	• With the increase trend in number and impacts, building resilience in coastal areas is urgent • Generating ecological knowledge and translating it into information that can be used in governance are essential
66.	(Eisner 2005)	National tsunami hazard mitigation program	To analyse US national effort in tsunami hazard mitigation through landuse planning and development practice	• Analysis of existing context • Asses how to apply seven principle of tsunami risk reduction	• Guidance on the application of seven principles is presented • Longterm commitment to risk mitigation is essential that can be achieved through land use planning and development regulation.
67.	(Jonientz-Trisler, Simmons et al. 2005)	National tsunami hazard mitigation program	To provide overview on USA national tsunami hazard mitigation program	• Review existing program in national and local level	• The program addresses three major components: hazard assessment, warning guidance, and mitigation • Mitigation activities focus on assisting federal, state, and local officials who must plan for and respond to disasters
68.	(Krishna 2005)	Coastal hazard science and preparedness	To provide overview on coastal hazard science and its preparedness	• Analysis and synthesis with reference to 2004 Indian Ocean tsunami	• Seven main issues are identified from hazard identification, modeling, and education • Science issues are identified and proposed to be implemented
69.	(Paul and Rahman 2006)	Cyclone mitigation at small island community	To examine the difference in cyclone mitigation in two small island at Bangladesh	• Comparing two communities in two small island on cyclone preparedness • Observation and questionnaire survey among 200 household	• Two communities have different awareness on cyclone hazard • The disaster management in term of shelter and relief is not same in two locations
70.	(Shaw 2006)	Post tsunami reconstruction program	to provide an overview on specific issues of tsunami reconstruction	• Analysis of features of past reconstruction process, roles of	• Reconstruction process should be linked to vulnerability reduction

No	Author	Addressed Problem	Purpose	Methodology	Result
			process	different stakeholders, and vulnerability reduction – human security context. • Evaluation of a specific program highlighting its goal, objective, scope and activities.	measures of the community
71.	(Osei 2007)	Co-ordination and policy framework for hurricane disaster preparedness and reconstruction or long-term development	to investigate Government and people of Jamaica to the Hurricane Ivan in September 2004	• Analyse the context , based on the established institutional response framework, Disaster Preparedness and Emergency Management Act (1993) and Disaster Prevention and Emergency Management Plan • interviews, attendance at press briefings, and reviews of policy documents and media reports • interpret and evaluate the policy interventions during the event of Ivan	• the mitigation and preparedness is stimulated after the major event • institutional memory that gained from several events should be preserved and used for future events • the need for disaster relief fund and strengthening of disaster committee is highlighted
72.	(Johnston, Becker et al. 2007)	To increase the hazard awareness for resident and tourist population in coastal tourism areas at Washington, USA	To evaluate staff training for emergencies, emergency management exercises, (and hazard signage within motels and hotels.	• Interview with reception staff and managers at 18 hotels and motels	• Level of understanding and awareness are low • Training and drill are only conducted by large hotels • How to improve the situation is suggested by conducting training, workshop, simulation, and employee training
H.	**INTEGRATED COASTAL AND CLIMATE CHANGE/COASTAL HAZARDS MANAGEMENT**				
73.	(Cicin-Sain, Ehler et al. 1997)	ICM for climate change adaptation	To provide a guide for coastal nations to implement or strengthen an ICM program, the management of coastal areas and the related implications of climate change	• Prepare and discuss the document on the international workshop	• A document as guidance is proposed
74.	(Solomon and Forbes 1999)	Coastal hazard, delineation of risk, and ICM practice	To provide the review of coastal hazard issues and it relevance to ICM in Pacific	• Analysis of individual issues in each of four Pacific countries • Analyse the relevance with country ICM practice	• ICM will facilitate the coordination on the donor and country recipients for the project aid • Hazard zonation should be part of ICM plan and to be used for decision making in coastal development
75.	(Narcise 2005)	ICM and disaster management	To provide overview and idea on ICM framework for coastal disaster management	Analysis and synthesis	An opportunity and ideas to integrate disaster management in ICM framework is discussed

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76.	(Few, Brown et al. 2007)	Integration of climate change adaptation into coastal management	To provide analysis on climate change adaptation in UK especially in coastal defense issues	• Examining local capacity for climate response • Qualitative research with local and regional stakeholder • Analyse the gap between adaptive capacity and generic response for climate change • Conduct case study at Christchurch Bay, UK	• In terms of temporal scale, it finds that the time horizons of coastal planning are generally too short to mandate consideration of climate change impacts. • In terms of spatial scale, it exposes a mismatch between the broad geographical scale at which strategic planning takes place in the UK and the narrower spatial scale of decision-making on coastal management interventions • the barriers to adaptation are particularly evident at the local decision-making scale in the context of political, financial, and technical constraints.
77.	(Sonak, Pangam et al. 2008)	Post disaster reconstruction by using ICM concepts	To document several issues involved in the recovery of tsunami and to recommend the application of the ICZM concept to the reconstruction efforts	• Overview on ICM context in India • Analyse the reconstruction process	• Lack of implementation of an ICZM approach in India is presented prior to tsunami • reconstruction efforts should focus on effective integration of environmental consideration in coastal zone management • coastal zone management is important for long-term solution of the tsunami disaster preparedness
I.	**ICM PRACTICE AND LESSONS**				
78.	(Agardy 1993)	Multi use planning for marine protected areas	To provide analysis and framework for multiuse planning of marine protected areas	• Review and analyse the role of marine protected areas • Review and analyse the role of tourism in supporting marine protected areas • Case study	• Multiple use planning is argued could lead to sustainability of marine and coastal resource use • Eco tourism should capable in generating income for local inhabitants that will lead to improvement of their awareness to environmental services
79.	(Gordon, Reams et al. 1998)	Implementation of coastal zone management in coastal protection projects	to investigate coastal resources protection, specifically beach and dune protection, at the state level	• Identify the differences among the coastal states in regards to state adoption and implementation of specific coastal management strategies and tools	• The presence of environmentally active citizens and support polices are identified as the most influential factor at the state level • States which possess a high level

No	Author	Addressed Problem	Purpose	Methodology	Result
				• Determine which state factors influence the level of coastal management program • Ordinary Least Squares Regression Analyses (OLS) were used to evaluate associations between political, economic social, and environmental factors and the level of development of programs	of citizen participation in environmental organizations have more developed program
80.	(Lewis Iii, Clark et al. 1999)	Coastal habitat rehabilitation with ICM approach	To provide overview and analysis of Tampa Bay habitat rehabilitation with ICM approach	• Overview and analysis of Tampa Bay problems • Rehabilitation program	• Process of ICM in habitat rehabilitation is presented • Strong local direction and committment coupled with good science and significant support from state and federal programs are essential
81.	(Bunsick 1999)	ICM and fisheries management	To provide the progress on consortium for facilitating the exchange of knowledge between the United States and Europe regarding ICM and regional fisheries management	• Overview on the consortium progress	• progress in promoting international cooperation in marine and coastal management is presented
82.	(Snoussi and Aoul 2000)	ICM practice in Africa region	To present a physical and socio-economic environmental analysis of the region and highlights the few efforts of integrated coastal zone management	• Evaluate and anlyse the existing context of ICM in African countries	• the lack of promotion of the ICZM concept and its potential benefits to decision makers is argued as constraints in ICM program at African countries • develop capacity and reinforce ICZM institutions are recommended as main issues
83.	(Olsen and Christie 2000)	Tropical coastal management practice	To provide the coastal management practice and lesson from tropic countries	• Evaluate the implementation of coastal management and its problems	• factors critical to the design of coastal management projects and programs are identified • priorities for furthering the practice of coastal management is proposed
84.	(Colmenares and Escobar 2002)	Ocean and coastal management practice	To provide regional perspective on the integrated coastal management (ICM) that exist in the Wider Caribbean Region	• Evaluation on existing policy and regulation • Analyze the trend in the future	• ICM program in the Caribbean is presented • Recommendation for improvement is proposed: start ICM with small scale activity, importance of

No	Author	Addressed Problem	Purpose	Methodology	Result
					guideline.
85.	(Linton and Warner 2003)	ICM and marine pollution	To provide analysis and framework for robust indicators that gauge the 'health' of the coast that useful for ICM program	• Analysis of biological indicators in the Caribbean are focused on coral reefs, seagrass beds and mangrove forests	• indicators is critically reviewed and the presence or absence of a relevant framework for their use in Caribbean ICM programs is discussed
86.	(Maliao, Webb et al. 2004)	Effectiveness of MPA implementation in promoting fisheries recovery	To investigated the effectiveness of enforcement in promoting the recovery of abalone stock	• Survey of abalone population in the Sagay Marine Reserve (SMR), western Philippines, • Analysis of the result	• Recruitment appeared limited • The population has been near a critical threshold, that recent climatic events may have suppressed recovery rates
87.	(Wescott 2004)	Integrated coastal management planning	To describe an approach of coastal planning in Victoria, Australia, which particularly at subnational coastal planning jurisdictions	• Evaluate Australian context • Case study at State of Victoria	• Ideas, concepts, and lesson from Victoria in coastal management planning is presented • The concept is potential to be applied in other country
88.	(Balgos 2005)	Marine protected areas and ICM program	To provide the analysis of ICM and MPA development	• Analyse the Philippine context	• A number of recommendations in addressing the problems and obstacles faced by ICM and MPA initiatives and in improving their effectiveness are presented
89.	(Cho 2005)	Marine protected areas in ICM Program	To provide analysis on ICM program on MPA implementation support	• Analysis and review on existing context at Belize	• The further challenges are presented: linkages between ICM and MPA, fostering of community participation in management, broadening of the scope of ICM to watersheds and ocean governance
90.	(Cicin-Sain and Belfiore 2005)	MPA in ICM program	To review the ecological, social and economic linkages between MPAs and the governance of broader ocean and coastal areas	• sets forth guiding principles for managing MPAs within an ICM context; • reviews work conducted under the Convention on Biological Diversity on the linkages between ICM and MPAs; and • develops strategic guidance for addressing these linkages	• diverse communities involved in marine protected areas is essential, • the need of coastal and ocean management, and watershed management to collaborate in national-level ocean and coastal planning is presented
91.	(White, Eisma-Osorio et al. 2005)	Marine protected areas and ICM program	To describe in relation to the evolution of integrated coastal management (ICM) in the Philippines	• Overview and analysis of MPA development and ICM program in the Philippine	• the need for integrating of MPAs within ICM through broad area planning and implementation is presented

No	Author	Addressed Problem	Purpose	Methodology	Result
92.	(Patlis 2005)	Law and legal context of integrated coastal management in Indonesia	To provide analysis on the role of law in promoting ICM in Indonesia	• Overview of law and legal context in Indonesia • Evaluate existing coastal resources management program	• Sustainability of ICM program can still be achieved by recognizing, addressing, and accommodating the legal frameworks
93.	(Ledoux, Cornell et al. 2005)	Coastal management project	To present results of an extensive consultation of key stakeholders in England and Wales on coastal realignment project	• Evaluate current condition on realignment in England and Wales • Evaluate the stakeholder participation in the process of planning	• new directions for a long-term strategic approach to river and coastal flood management are suggested
J.	**ICM EVALUATION**				
94.	(Burbridge 1997)	The need of framework to measure the success of integrated coastal management initiatives	To provide assessment framework for ICM initiative	Analyse the progress in developing ICM programmes and projects, and the success of such initiatives in meeting broader development goals	Method to assess progress in formulating and implementing ICM program
95.	(Tobey and Volk 2002)	Integrated coastal management implementation	To review the principles and operational attributes of ICM from the perspective of international donors and professionals	• Analysis and synthesis	• Several thematic areas are suggested where there are currently important needs and opportunities for ICM • The important role of donors is highlighted
96.	(Ehler 2003)	ICM implementation and its success measurement	To provide indicator of governance performance on ICM initiative	• Develop an indicator with focus on evaluation phase and the need to complement process-oriented indicators • Test the indicator on marine protected areas	• Set of indicators are proposed • Test in marine protected areas implementation provide example of using of indicator • Can be used as reference or applied to other coastal management project
97.	(Belfiore 2003)	Indicator in integrated coastal management implementation	To review the f indicators to monitor the environmental state of the coastal zone, the socioeconomic conditions of coastal communities, and the integrated coastal management (ICM) programs	• Analysis of current development	• A series of recommendation on the use of indicators are presented
98.	(Humphrey and Burbridge 2003)	Sector integration in coastal management	To provide overview and examination ICM project in Europe	• Analyse European context in ICM implementation	• Important steps that have been taken in policies and legal framework in Europe is presented • Steps to be taken at national level to enable and harmonize policy framework is suggested
99.	(Elliott, Boyes et al. 2006)	Institutional arrangement in marine management	To provide overview on UK's arrangement for marine management	• Analysis of existing arrangement and UK's context in marine and small	• Analysis is provided with the role and responsibility of important

No	Author	Addressed Problem	Purpose	Methodology	Result
				island management	sectors
K.	**DISASTER AND SUSTAINABLE DEVELOPMENT**				
100.	(Philip R. Berke 2000)	Planning for sustainable development		Sets forth a set of six principles that define and operationalise the concept of sustainable development apply the six principles to 30 planning document	• no significant differences in how extensively sustainability principles are supported between the plans that state an intention to integrate sustainable development and those that do not. In addition, • these plans do not provide balanced support of all six sustainability principles, as they support some principles significantly more than others
101.	(Rockett 2001)	Hazard and sustainable development	To present an overview on hazard and sustainable development	• Analysis and synthesis	• The disaster must be viewed more as human causes rather than natural caused
102.	(Twigg 2001)	Sustainable livelihood and vulnerability	To provide analysis and summary on recent ideas on sustainable livelihood and vulnerability to disaster	• Literature review • Analysis	• Concepts, strength and limitation on livelihood and vulnerability is presented • Link between disaster and development process is discussed
103.	(Pearce 2003)	Integration between hazard mitigation and community planning	To provide analysis and synthesis on the link between sustainable hazard mitigation and community planning	• Overview on history of disaster management planning • Review finding and progress in Australia and America • Study case at California's Portola Valley	• Current practice shows that hazard awareness is absent from local decision-making processes • Disaster management process should incorporate public participation at local level
104.	(McEntire 2004)	To link between development theory and disaster management	To explore existing development theories and analyse how the potential application and integration disaster management	• Literature review • Analysis and synthesis	• Future disaster paradigm must consider the combination of physical, technological, social and institutional variables • Vulnerability is central for development and disaster risk reduction and must be integrated on ongoing policy and program
105.	(Mileti and Peek-Gottschlich 2001)	To link between hazard mitigation and sustainable development	To provide analysis on hazard impacts to sustainable development in USA	• Synthesis and analysis in USA context based on existing data and information	• Problem on development and economic interest that are mostly short-sighted and disaster mitigation require longer-term is discussed • A direction is proposed to link

No	Author	Addressed Problem	Purpose	Methodology	Result
					hazard mitigation to sustainable development
106.	(Schneider 2002)	The conceptual approach for hazard mitigation and community planning for sustainable development	To assess the problem in implementation of hazard mitigation and community planning for sustainable development	• Assessment of problems and constraints • Evaluate the new framework	• A new framework for hazard mitigation and community planning is proposed • Initial steps are suggested
107.	(Duxbury and Dickinson 2007)	Coastal disaster and sustainable governance	To examines the current problems in coastal zone and to develop new principles for sustainability principles	• Analysis and synthesis • Review the latest major coastal disaster and its implication to coastal sustainability	• developing and implementing sustainable and adaptive coastal management is argued should be an imperative • emphasis on natural capital, improved stakeholder participation and integration amongst the various actors is emphasized
108.	(Twigg 2007)	The need of measure to monitor the success of Hyogo Framework of Action in community level	To provide guidance for all stakeholder in disaster risk reduction to measure the impact of risk reduction activities in community level		• Manual and guidance to be tested in the field
109.	(El-Masri and Tipple 2002)	Implementation of sustainable development in disaster mitigation	To examine the application of sustainable development principles to natural disaster mitigation in developing countries	• Analysis of the most pressuring issues • Evaluate the major areas for policy intervention	• A number of disaster demonstrate the need for pre disaster mitigation • changes and adjustments in human settlements planning and management is proposed to meet the mitigation of natural disaster within the context of urban sustainability • to ensure harmonious interactions between natural and human systems the adjustment and changes are proposed
110.	(Tobin 1999)	Sustainability and resilience concepts in hazard planning	To develop a framework for analysis of sustainability and resilience	• Analysis and synthesis • Develop a framework • Apply using data from Florida USA	• A framework for analysis of sustainability and resilience is proposed • A case study is presented • communities need develop comprehensive on-going planning strategies that encompass all aspects of the hazard problem, including socio-economic and political elements is argued

No	Author	Addressed Problem	Purpose	Methodology	Result
111.	(Dovers 2004)	Sustainability and disaster management	To provide analysis on sustainable development agenda and disaster management	• Analysis of the concepts • examines shared attributes of problems in sustainability and disaster management • identifies common challenges	• commons in disaster and emergency management and sustainability are presented • closer substantive, R&D and policy linkages between the two fields is recommended
112.	(Mileti and Gailus 2005)	Disaster and sustainable development	To give overview of disaster and development in the US context	• Analysis and synthesis	• losses from hazards and inability to comprehensively reduce losses of all types are the consequences of narrow and shortsighted development patterns, cultural premises, and attitudes toward the natural environment, science, and technology • link hazard mitigation to sustainable development is proposed
113.	(Alexander, Chan-Halbrendt et al. 2006)	Sustainable livelihood and disaster risk management	To analyse and apply of sustainable livelihood framework for disaster risk management on the Government of Indonesia tsunami rehabilitation and reconstruction plan	• discussion of the preliminary findings from earlier work • development and exposition of framework • interviews and secondary research	• important considerations in developing appropriate vulnerability-reducing livelihood strategies are listed
L.	**ENVIRONMENTAL AND NATURAL DISASTER MANAGEMENT**				
114.	(Berke 1999)	Intergovernmental relationship in environmental management plan	To examine the relationship between national and local government's mandate in environmental management planning	• Analysis and synthesis • examining the quality of regional policy statements and district plans in New Zealand • using criteria and statistic test to compare the result	• The Resources Management Act is difficult to translate into practice • The information dissemination and local organization capacity are important for the quality of regional and district plan
115.	(Aalst and Burton 2002)	Integration of disaster mitigation and environmental management	To examine the ways in which natural resources management and environmental degradation affect natural hazard risk	• preliminary assessment of the importance of such linkages and the extent of their incorporation into disaster mitigation strategies • analysis is based on case study in the Carribean	• the capacity of the national government is a major bottleneck for effective disaster reduction- as well as environmental management • hazard maps, local practices, knowledge and experience are important to know the linkage between environmental condition and hazard risk. • Local communities are key players

No	Author	Addressed Problem	Purpose	Methodology	Result
					to identify and address the issues and play their own more effective role in the poverty, environmental degradation, and natural hazards.
116.	(Stanturf, Goodrick et al. 2007)	Coastal forest for hurricane mitigation	To provide analysis on the effects of hurricanes on coastal forests as a study in incorporating disturbance into managed forests	• Develop a conceptual approach to incorporating disturbance into forest management • Apply the concept to a case study of Hurricane Katrina impacts on coastal forest	• A conceptual approach is proposed for coastal forest management
117.	(Mascarenhas and Jayakumar 2008)	Coastal environment function for hazard mitigation	To describe the tsunami onslaught on the coast, and the function of sand dune belts and associated forests to reduce the impacts	• Overview the existing coastal policy in India • Post tsunami survai • Analyse landform changes post tsunami	• Existing coastal policy does not contain coastal hazard policy • lack of science—policy connection and fragmented policy are major problems
118.	(Srinivas and Nakagawa 2008)	Interconnection between environmental and natural disaster	To give overview and emphasis on cyclical interrelations between environments and disasters	• studying the findings and assessments of the Indian Ocean tsunami at Indonesia, Thailand, Maldives, and Sri Lanka • focuses on findings and lessons learnt on the environmental aspects of the tsunami, • analyse implications on disaster preparedness plans	• lack of understanding of the effect of environmental degradation in a disaster is found in all case study locations • coastal zone management strategy have been taken up as a part of the environmental recovery process in all countries • lack of vulnerability and risk assessment/mapping, environmental baseline data, assessments of the local environment, risks from hazardous/toxic materials are problems that need to be addressed • disaster mitigation policy and plan should incorporate marine and coastal environmental dimension
L.	**GUIDELINES AND TOOLS FOR DISASTER/COASTAL MANAGEMENT**				
119.	(Wallace and Balogh 1985)	To improve the disaster management through DSS	To provide a conceptual framework to apply decision support systems (DSS) in disaster management.	• Analysis and synthesis	• A framework is proposed
120.	(Center 1998)	Manual for emergency management			• Term and thesaurus for comparison and reference with other document in other country

No	Author	Addressed Problem	Purpose	Methodology	Result
121.	(Dwyer, Zoppou et al. 2004)	Social vulnerability quantification guideline	To provide guideline for risk assessment based on the social vulnerability quantification		• A guideline for Australia is provide • Could be used as reference for other locations
122.	(Szlafsztein 2005)	GIS application for coastal vulnerability assessment	To support the Coastal Zone Management Program of the State of Pará through the identification, assessment and classification of the coastal zone' overall vulnerability to flood and erosion risks	• Using a Geographic Information System to create a composite vulnerability index (CVI) • The CVI includes sixteen different variables, describing both the natural and socio-economic conditions • determine the risk situation in 343 census collection areas (22 municipal districts) of the coastal zone	• presented in three maps, showing the natural vulnerability, the socio-economic vulnerability and the total • applicable tool for measurement and description of the coastal susceptibility to current and potential hazards in • provide the spatial distribution of the IPCC's adaptation strategies (protection, accommodation and retreat).
123.	(Billa and Shattri 2006)	Spatial decision support system (SDSS) for flooding hazard	To present a flood management plan for Malaysia and the importance of spatial information technology to assist the decision making at various levels of the plan	• review of Malaysia's flood disaster management plan • discuss framework of a SDSS and its role in the process of decision making	• a comprehensive disaster management program for Malaysia is proposed • highlight the role of SDSS in comprehensive plan • SDSS improve the collection and processing information • SDSS could speed up the communication between the stakeholder
124.	(Ramsay and Bell 2008)	The need of guideline for local government in climate change adaptation	To support local authorities (policy, planning, consents, building and engineering staff) in dealing with climate change challenges	• Guideline • Best practices to strengthen the integration of coastal hazards and climate change in landuse planning and permit approval	• Guideline for reference and comparison
125.	(FEMA 2008)	Guidance for the implementation of Disaster Management Act	To provide guidance for local government in implementing the Disaster Management Act		• Guidance as reference • Can be used as comparison

Appendix 3. Identified issues from semi structured interviews on disaster management and coastal management

Theme	Identified issue	Respondent
1. Planning and integrated approach challenge	• Disaster risk reduction has been put in national development plan since 2007 but the implementation is still limited • Need a kind of umbrella planning which all sector could contribute on disaster management • Implementation of spatial planning authority with local government role and responsibility • Risk reduction actions in coastal areas needs a clear hierarchal with existing laws/planning documents • Different time frame and spatial in planning documents/initiatives e.g. Spatial Plan is in 20 years and cover (mostly) on land, national action plan on disaster management is 3 years and cover all areas, disaster management plan is on 5 years and covers all areas	National planning and development
	• There is a shift now in Indonesia from respond and recovery to risk reduction • Indonesian disaster management plan is focused on risk reduction programs • Planning is key basis for risk reduction which need to be accommodated in government work plan • Difficulty in the implementation of disaster risk reduction because the activities lay on many actors • Existing laws and efforts need to be integrated and synergised	National disaster management agency
	• Previous laws not include disaster management and more on sectoral approach • For risk reduction, the coordination is still weak where each agency work in isolation from others • Need a national action plan that serve as reference and guidance for all sectors	Ministry of internal affairs
	• For coastal disaster management issues, the accommodation in the coastal management act is stronger than in spatial act. • For coastal disaster management , it requires explicit accommodation in coastal planning documents, availability of hazard, vulnerability, and risk information, and spatial coverage of coastal hazards • need a bridging regulation to make local long term and mid term are in harmony with coastal strategic plan, and funding problem that is not in balance with the obligation to develop four planning documents (no incentive for local government)	Ministry of marine affairs and fisheries
	• Coordination with other ministry particularly the ministry of home affairs is important for the act implementation because during the planning process the lead agency is the provincial/local planning agency. • Require a specific coordination regulation to implement the act planning mandates that has been formulated in form of presidential decree	Indonesian coastal management expert association
	• Disaster management plan is still missing as the disaster management agency also not yet established	West Sumatra Planning and Development Agency

Theme	Identified issue	Respondent
	• For location such as Padang City, coastal management and disaster management have been working together in mitigation issues • Harmonising different objectives for local coastal development such as: i) marine tourism, ii) services and environment, iii) marine and fisheries	Bung Hata University, Padang West Sumatra
	• Coastal mitigation plan can not cover other natural hazards threat and become problems when the disaster management plan is still absent. In the case of Padang City, the initiative from marine and fisheries agency is more advance. • More technical and detail management plan is required for district/city government • Existing action plan is still on compiling sector activities that are related to DRR	Andalas University, Padang West Sumatra
	• The content of West Sumatra disaster management plan is good but the challenges are how to make it is implemented by districts government. Also there is a change in institutional role between province and district where province is more coordination and facilitation	West Sumatra Province marine and fisheries agency
	• Challenges: i) funding, ii) standardisation of procedure for DRR, ii) inter sectoral and inter administration collaboration, iii) institutional strengthening	Disaster preparedness community (local NGO/Padang West Sumatra)
	• Existing coastal strategic plan document is not referred by sectors in Pekalongan to develop their activities. The development in coastal areas is inconsistent with existing strategic plan document • Land use and spatial plan in coastal areas will be harmonised with ICM principle because the zonation plan will be accommodated in mid term and longterm development plan • to evaluate and monitor ICM planning implementation through local development planning consultation	Pekalongan University
	• For many years, coastal habitat degradation especially mangrove ecosystem leads to coastal erosion	Pekalongan planning and development agency
	• Problems of risk reduction come also from fishermen who work in Pekalongan City areas but live in Pekalongan District • During plan development many changes in team members create problem in continuity and consistency • Each team member has to be consistent, become liaison to their agency, thinking comprehensively. • Document has to be referred for all sectoral agency program at coastal areas • City development and planning agency need to be more active and take a lead	Pekalongan marine and fisheries agency
	• The disaster management agency focus on rapid onset types hazards while for chronic hazards sectors are more appropriate to address the issues	Central Java Province Disaster Management Agency
	• Need a grand strategy for mangrove rehabilitation and conservation that can facilitate all activities in coordinated way • Mangrove committee that is composed from many stakeholders has been established to provide input and assistance in policy and programs of mangrove in Semarang city.	Semarang City marine and fisheries agency
2. Funding allocation for disaster management	• Funding allocation has been increasing and need to be implemented effectively • Budget assessment in each agency to find out funding opportunity for disaster risk reduction • Funding commitment from each agency/local government	National planning and development agency

Theme	Identified issue	Respondent
	• Disaster management plan is a multi stakeholders activities and makes people also scary because so many activities/lists that need to be funded for DRR	Andalas University, Padang West Sumatra
	• Disaster is important but it is very often over shadowed by other issues because the priority is still on poverty reduction • Existing funding assistance is only on preparation/planning and not in construction project or physical implementation. Also pre disaster funding assistance is very limited or absent	West Sumatra Province marine and fisheries agency
	• Lack of funding and existing policy to concentrate in other sector development	• Pekalongan University • Pekalongan marine and fisheries agency • Indonesian coastal management expert association
	• The commitment from local government is good but for now it is still concentrating on education (20%) and poverty reduction program	Pekalongan planning and development agency
3. Institutional and human resources	• regulation on disaster management agency structure and level is still on progress • the National Disaster Management Agency is still progressing and adjusting to coordinate with more established agencies	National planning and development agency
	• the priority is on institutional strengthening both national and local Agency for Disaster Management • challenges in regulation and institutional arrangement because disaster management agency is not mandatory for district government • capacity building on human resources such as providing of DM experts	National disaster management agency
	• Disaster awareness culture • Addressing institutional (institution, legislation, and funding) and cultural problem (government and people) • National disaster management agency is still new and struggling to deliver its role in national coordination	Ministry of internal affairs
	Coastal disaster issues got high attention usually after the event, but for Padang it should be continued because the potency and risk is very high	Bung Hata University, Padang West Sumatra
	• Padang City disaster management agency has been established but the human resources capacity is still weak and mostly supported by outside. • It is also considered not yet ready to fully implement their role and responsibility in particular for risk reduction activity. • Common interest is needed to be able to develop a common commitment and this case is exactly what happen in west Sumatra now and maybe cannot be applied to other locations because they don't feel the same fear from natural disaster	Andalas University, Padang West Sumatra
	• Mindset of integrated costal management is still only in marine and fisheries agency and other sectors are still weak	West Sumatra Province marine and fisheries agency

Theme	Identified issue	Respondent
	• Understanding and commitment from local government to disaster risk reduction is still a problem • Institutional capacity problem: i) to increase collaboration with stakeholder, ii) strengthening local disaster management agency is a common interest and issue	Disaster preparedness community (local NGO/Padang West Sumatra)
	• Facilitation and support from provincial and national government is essential to keep all agencies commitment in place • Awareness on ICM and its issues are very low in local government and community	Pekalongan University
	• Facilitation from national government/MMAF help in raising awareness and understanding on ICM importance for Pekalongan • lack of human resources that understand on ICM process, capability, and communicate ICM to stakeholder • Facilitation and support from national government is essential	Pekalongan marine and fisheries agency
	• understanding on importance of coastal areas and its management that is still low	Indonesian coastal management expert association
	• Challenge for local disaster management agency is mostly on human resources that do not have capacity in disaster management issues. • Most of them are more familiar with search and rescue and emergency activities	Central Java Province Disaster Management Agency
	• In central java, climate change adaptation in coastal areas is coordinated by three different main agencies and require integrated approach • Coastal strategic plan is under development • Nain challenges for coastal management are human resource, consistency in planning and program, and commitment	Central Java province marine and fisheries agency
4. Regulation and policy	• Policy strengthening in disaster management and climate change mitigation and adaptation • Implementation of five systems of Indonesian disaster management that consists of: i) regulation, ii) institutional arrangement, iii) planning, iv) funding.	National planning and development agency
	• Need assessment on: i) existing planning at local level on disaster response, ii) existing disaster management plan to evaluate its actions programs, iii) funding opportunities from all sectoral activity, iv) capacity of local disaster management agency in addressing risks	Ministry of internal affairs
	• main issues and utilisation of coastal areas will be addressed through spatial planning instrument • Previously Pekalongan people consider coastal and marine areas as a danger and unsuitable areas for human. However, due to space limitation the city development is directed to coastal areas/to the north side of the city • ICM law gives a clear direction on how to manage coastal areas. Zoantion plan and spatial plan will be in one regulation to optimise its implementation. Detail planning will be regulated by Regent regulation to anticipate the dynamic condition in the field	Pekalongan planning and development agency
	• To address coastal hazards, the city still has difficulty to implement setback areas • To address inundation, the city plan to build drainage and polder system • Mangrove rehabilitation also programmed to improve coastal ecosystem and create local tourism • Vertical settlement in form of apartment is encouraged	Pekalongan spatial plan division

Theme	Identified issue	Respondent
	• Settlement areas that are inundated was actually a dry zone and it just happened during last two years after the construction	
	• Semarang city is developing local regulation on coastal and fisheries management including the mitigation of coastal flooding • Following the regulation, all four hierarchal coastal management planning document will be developed • Mangrove rehabilitation and conservation will be priority for city coastal management program	Semarang City marine and fisheries agency
5. Technical element	• Data and information availability problem • Important assessment to be done: i) assessment of existing laws related to disaster management, ii) assessment of existing national plan of action, iii) coastal management strategic plan in coastal disaster mitigation, iv) spatial planning based on disaster mitigation	National planning and development agency
	• There is no standard procedure for evacuation	Padang marine and fisheries agency
	• Optimising existing data from national statistic agency to support disaster management	National disaster management agency
	• Availability of guidance for sectors program and activities	Ministry of internal affairs
	• The coastal management act provides basis for coastal disaster risk reduction through environmental rehabilitation and protection but it needs detail guidance in the field to be practical	Bung Hata University, Padang West Sumatra
	• Lack of specific actions/program to reduce the coastal inundation • Adaptation is important such as cultivation and culture cycle that is harmonised with tidal flooding cycle. • Capacity to predict and distribute the information to coastal community is also a must	Pekalongan marine and fisheries agency
6. Coastal management activity to support coastal disaster management	• A number activities under the marine and fisheries agency: i) construction of tsunami shelter from MMAF, ii) facilitation of program implementation, iii) outreach, iv) surveillance with community to reduce coral reef illegal mining and mangrove cutting, v) mangrove and coral reef rehabilitation/coral farming • Pro active in risk reduction by participating/facilitating the development of coastal disaster mitigation strategic plan • Risk reduction actions for fishermen: i) fishermen insurance program with its socialisation, ii) premium is considered as cost/spending for fishermen, iii) inventory and certification is carried out to verify existing fishermen • Local action plan on disaster mitigation: i) compilation of sectors activities, ii) city spatial plan accommodate coastal setback areas, iii) education agency conduct disaster awareness campaign and education as part of local content of school curricula, iv) marine and fisheries agency responsible for conservation and rehabilitation of coastal ecosystem, fishermen empowerment, small island management	Padang marine and fisheries agency
	• Program related to coastal environmental conservation: coastal vegetation rehabilitation/planting, coral reef conservation and rehabilitation, socialisation on environmental function and protection from tsunami/coastal hazards • Special program for fishermen: i) construction of disaster friendly house, ii) education and relocation of housing to safer location, iii) socialisation on tsunami hazard and signs, iv) pilot project on insurance for	West Sumatra Province marine and fisheries agency

Theme	Identified issue	Respondent
	fishermen	
	• the main issues in Pekalongan coastal management has been formulated in coastal strategic plan one of the issues is coastal hazard • coastal development should be driven by hazard mitigation • community needs and participation is basis for coastal management in Pekalongan • Previously before ICM law is enacted coastal management is Pekalongan was lacking and now it is very active. ICM law give a clear direction on how to manage coastal areas.	Pekalongan University
	• ICM strategic plan has accommodated tidal flooding in their issue •	Pekalongan marine and fisheries agency
7. University role	• University and other stakeholder will monitor the progress • University provide technical support for ICM implementation and planning development	Pekalongan University Diponegoro University
	• Facilitator from university is important to fill the gap	Pekalongan marine and fisheries agency