



TOWARD A DISASTER- RESILIENT ASEAN

Building the Capacity of Brunei Darussalam on Disaster Management



INSTITUTE OF POLICY STUDIES

Master in Public Policy and Management Student Research Project



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ABOUT THE PROJECT



The Master in Public Policy and Management Student Research Project (MSRP) is a core requirement of the degree programme. Students are tasked to examine relevant policy issues to gain insights into real-life policymaking processes and develop efficient teamwork. Each group consists of four students supervised by a faculty member serving as the Project Academic Advisor (PAA).

The objective of this project is to identify and evaluate the economic, socio-cultural and political contributions of Brunei Darussalam to developments in the Association of Southeast Asian Nations (ASEAN). To this end, the research project shall seek to:

1. Explain the legal, economic, political and other related parameters that define the relations between Brunei Darussalam and ASEAN, as an intergovernmental regional organization, and the other Member States as well;
2. Identify the strategic objectives of each stakeholder in terms of their economic, socio-cultural and political viabilities;
3. Explain and assess the existent synergies between each stakeholder's strategic objectives and their policy formulation and/or implementation processes; and
4. Recommend to the Brunei Government a hypothetical strategic plan or policy that will define the country's relations with other ASEAN Member States related to the three pillars of ASEAN, namely Economic, Politico-Security and Socio-Cultural, for the short, medium and long terms.

After determining their research topic, the team decided to work with a client for their project. By interacting with a client organization, the group was able to understand the steps and decisions needed in conducting a systematic and research-based policy analysis. The team worked closely with the National Disaster Management Centre (NDMC), Brunei's focal point for disaster management in ASEAN. The project also enabled the team members to develop subject matter expertise on disaster management and benefit from the many learning opportunities, through engagement with the client and other stakeholders, and collaboration by sharing knowledge and experiences.



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The members wish to express their sincerest gratitude to all those who have helped and supported them in doing the research project.

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They have been so generous with their time and have willingly guided the group every step of the way. Their advice and assistance are greatly valued and have contributed in achieving a viable, accurate, balanced and informative policy research paper.

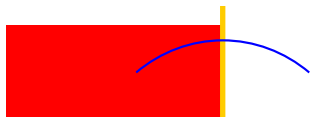
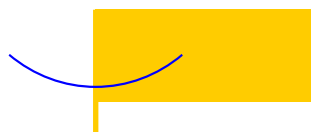


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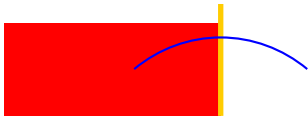
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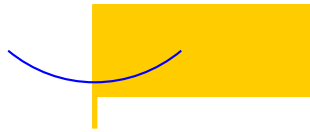
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EXECUTIVE SUMMARY



Disaster management is gaining momentum as one of the pressing issues the world is facing today for it is closely linked to climate change and the environment. Natural disasters have affected millions of the world's population and have serious repercussions on economies and governments. Notably, the effects of disasters tend to transcend national boundaries; thus, the impact of disasters cannot be effectively resolved by a country acting alone.

Brunei Darussalam, as a member of ASEAN, has been aspiring to play a more active role in the region, particularly as the country marked 30 years of joining the organization in 2014. Disaster management is an area wherein the country could significantly strengthen its participation in ASEAN. Disaster management is an important security issue; albeit a non-controversial one in keeping with ASEAN's non-interference policy. This topic has been particularly relevant to Brunei Darussalam as of late given the frequent occurrence of flooding and landslides around the country.

Indeed, ASEAN countries are greatly exposed to natural disasters. Philippines and Indonesia sit right on the Pacific Ring of Fire; with the region having hundreds of active volcanoes. Moreover, typhoon passes through the region bringing on average 30 typhoons per year, according to the Joint Typhoon Warning Center. Meanwhile, heavy monsoon rains cause flooding and land-

slides, especially in the region's low-lying areas such as the Mekong Delta and other densely-populated towns and villages. The region is also subjected to an intense hot and dry season, leading to drought and forest fires, destroying agriculture, and exposing some countries to serious haze problems in the dry months.

Hence, this project aimed to recommend policies that Brunei Darussalam can initiate to strengthen its national capacity on disaster management, as well as to contribute to regional efforts toward achieving the ASEAN Vision 2020 of having a disaster-resilient region and safer communities.

Findings from research and evaluation, in addition to consultations with the various stakeholders, led the group to recommend producing a geohazard map for Brunei Darussalam. Geohazard mapping allows the country to identify areas susceptible to geohazards and can be integrated into the early warning system to build the country's ability to manage disasters by enhancing disaster preparedness and response. The group also developed a Plan of Action, which was divided into five phases, to ensure the successful implementation of geohazard mapping, and enable Brunei Darussalam to share the benefits of an improved disaster management system to the ASEAN region as a whole.

1 | INTRODUCTION

“...menekankan pentingnya untuk mengukuhkan kemampuan di dalam pengurusan bencana. Kejadian bencana alam yang kerap dan bertambah teruk di tahun-tahun kebelakangan ini menyebabkan kemusnahan besar dan keperitan kepada ramai masyarakat di serata dunia.”

HM Sultan Haji Hassanal Bolkiah Mu'izzaddin Waddaulah
69th United Nations General Assembly, New York

Significance of the Study

Southeast Asia is a region vulnerable to both natural and manmade disasters such as storm, flood, drought, earthquake, landslide, volcanic eruption, wildfire, haze and epidemic. Disasters disrupt the functioning of a community or a society by causing widespread human, economic and environmental losses. The Indian Ocean tsunami in December 2004, which affected Indonesia and Thailand, Cyclone Nargis, which struck Myanmar in May 2008, and Typhoon Haiyan, which hit the Philippines in November 2013, left thousands dead and destroyed homes and livelihoods. Losses related to natural disasters cost the ASEAN region, on

average, more than USD 4.4 billion annually.¹ Since a disaster is usually an unforeseen and often sudden event that causes great damage, destruction and human suffering, assistance from the national or international level is necessary.

A disaster is typically seen as a function of the risk process for it results from the combination of hazards, vulnerabilities and insufficient capacity to decrease the negative consequences of risk.² Disasters are inevitable, but their worst effects can be prevented by preparation, early warning and swift decisive responses. Disaster management aims to reduce the attendant risks and to mitigate the impact of events that cannot be avoided. ASEAN

¹ World Bank, “Advancing Disaster Risk Financing and Insurance in ASEAN Member States: Framework and Options for Implementation”, Volume 1, 2012, World Bank website

² UNISDR, “Terminology”, August 30, 2007, UNISDR website,

member states recognize the importance of cooperation in addressing natural and manmade disasters. The ASEAN Political-Security Blueprint has identified disaster management and emergency response as one of the region's main non-traditional security challenges along with transnational crime and counterterrorism. Natural disasters can be classified as a non-traditional security issue for they arise out of non-military causes and are transnational in scope. These kinds of security threats require multilateral cooperation because national efforts are often inadequate and the effects are not confined to one state.³ Disasters pose threats to development in the region by disrupting production and flows of goods and services, worsening the balance of payments and government budgets, derailing economic growth, income distribution, and poverty reduction, as well as causing adverse effects to political stability, social structures and the environment.⁴ With the onset of climate change, the frequency and intensity of severe weather-related hazards are expected to increase over the next decades.

Hence, governments and communities have to prepare for such events. Disaster management is considered a proactive approach to avoid or reduce human and material loss. Government agencies play a critical role during times of disaster for they have the resources and manpower needed in

disaster relief operations and mitigation. The national government has the responsibility to reduce risk, mitigate effects of, prepare for, respond to and recover from disasters. Therefore, disaster management is a public policy issue.

The government of Brunei Darussalam has initiated efforts to enhance the nation's capacity for disaster preparedness and response. In recent years, the country has been hit by floods and landslides. To address this problem, the National Disaster Management Centre (NDMC) was established to develop strategies on building disaster-resilient communities. ASEAN, being a cornerstone of Brunei's foreign policy, is an important partner in promoting dialogue, consultation and cooperation on disaster management and emergency response. Moreover, cooperation with ASEAN exemplifies Brunei's commitment to uphold efforts on building ASEAN's capacity to deal with disasters on a regional level.

This research project aims to arrive at useful, evidence-based and effective policy recommendations on strengthening the capacity of Brunei Darussalam and ASEAN on disaster management. Capacity building can be defined as "the process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions."⁵ Although the primary re-

³ Mely Caballero-Anthony, "Non-traditional security challenges, regional governance and the ASEAN Political-Security Community (APSC)", *Asia Security Initiative Policy Series*, Working Paper, September 2010

⁴ Yusuki Sawasa and Fauziah Zen, *Disaster Management in ASEAN*, ERIA Discussion Paper Series, January 2014, p. 3

⁵ UNISDR website

sponsibility to respond to disasters and implement programs to reduce disaster risk rests on individual Member States, addressing natural and manmade disasters requires a regional approach for such events affect the ASEAN Community as a whole. In 2006, ASEAN Member States signed the Agreement on Disaster Management and Emergency Response (AADMER), a legally binding framework, which seeks to increase both national and regional capacities on disaster management. The Strategic National Action Plan (SNAP) 2012-2025 of the Brunei Government on Disaster Management also identified capacity building as one its priorities. Thus, building the capacity of Brunei and ASEAN is an important policy area that has to be examined. It is hoped that through this research the Brunei Government can implement concrete and actionable policies and programmes which can contribute to the realization of ASEAN's goal of having a disaster-resilient region and safer communities.

Objectives

The objectives of the research project are the following:

- To review current policies and programmes of the Brunei Government and ASEAN on disaster management ;
- To recommend policies that will strengthen the capacity of Brunei Darussalam and ASEAN on disaster management; and

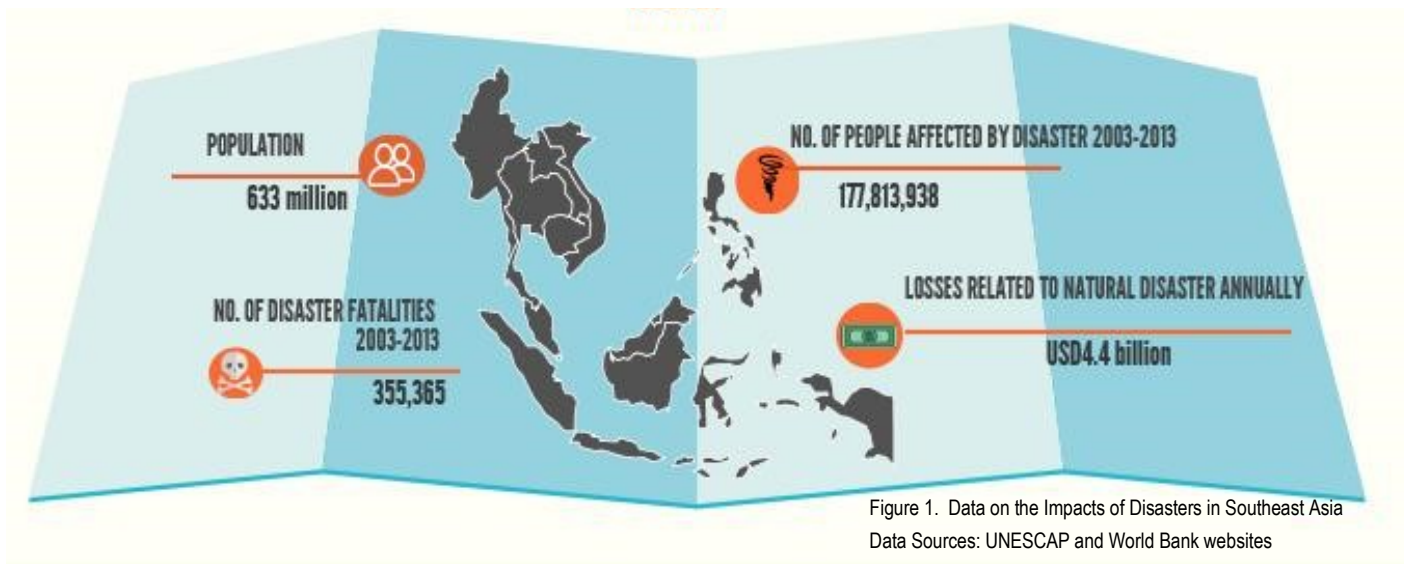
- To propose a Plan of Action for the policy recommendation to the NDMC

Rationale

The AADMER is a regional framework for cooperation, coordination, technical assistance and resource mobilization in all aspects of disaster management. It embodies ASEAN's commitment to attain the vision of disaster-resilient nations and safe communities.

The AADMER Work Programme was developed to achieve concrete actions and initiatives from 2010-2015. It was designed to support the national agenda and complement the capacities of ASEAN Member States in the different aspects of disaster management. The ASEAN Committee on Disaster Management (ACDM), the body responsible for policy oversight and supervision of the implementation process, approved the Work Programme in 2010.

This research study intends to identify policy options that Brunei can implement as a national initiative in line with the country's goals and priorities and ASEAN's as well. In designing the policies, the study takes into consideration ASEAN's vision, AADMER's respective components and related building blocks, the challenges in AADMER implementation, and Brunei's own plans and priorities in terms of disaster management.



2 | POLICY REVIEW

Disaster Management in ASEAN

Since 2000, close to 200 million people in the region have been adversely affected by natural disasters, and over 300,000 of them died as a result of these catastrophic events. In terms of economic cost, ASEAN countries have incurred losses of a staggering USD 92 billion, between 2000 and 2014, due to natural disasters.⁶ To put things into perspective, a person living in Southeast Asia is 11 times more likely to be affected by natural disaster than a person living in North America, and almost 18 times more likely to be affected than a person living in Europe.⁷

Not only is Southeast Asia prone to disasters,

there are other aggravating factors that further weaken the region's ability to cope with the negative impacts of disasters. With the onset of climate change, the intensity and frequency of natural disasters in the region are expected to increase. The region is home to more than 633 million people, many of which are living in vulnerable areas. Majority of ASEAN Member States are still considered as developing countries, and because of resource constraints disaster management ranks low in the priorities of Member Governments. Moreover, rapid urbanization brought about the growth of slums in cities which are already densely populated. These poor people are the ones most seriously affected when a disaster

⁶ Natural Disasters Indicators in Southeast Asia region (2000 – 2014), ESCAP Online Statistical Database , UNESCAP website

⁷ Ibid.

strikes. Member States are also dealing with governance issues, which result in weak planning and implementation challenges.

The United Nations International Strategy for Disaster Reduction (UNISDR) defines disaster risk management as "the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster."⁸ This process aims to avoid or reduce the negative effects of hazards through prevention, mitigation and preparedness. In 2005, members of the UN adopted the Hyogo Framework for Action (HFA), which set an overarching goal to achieve substantive reduction of disaster losses by 2015 by building communities resilient to disasters. It underscored the importance of promoting disaster risk reduction efforts on the local, national and international levels.

Under the HFA, regional organizations are responsible for the following:

- (1) promoting regional programs for disaster risk reduction;
- (2) undertaking and publishing regional and sub-regional baseline assessments;
- (3) coordinating reviews on progress toward

Box 1. Hyogo Framework for Action: Priorities

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation. Governments are enjoined to develop or modify policies, laws, and organizational arrangements, as well as plans, programs, and projects, to integrate disaster risk reduction. They must also allocate sufficient resources to support and maintain them.
2. Identify, assess and monitor disaster risks, and enhance early warning. Early warning is widely accepted as a crucial component of disaster risk reduction. When effective early warning systems provide information about a hazard to a vulnerable population, and plans are in place to take action, thousands of lives can be saved.
3. Use knowledge, innovation, and education to build a culture of safety and resilience at all levels. Disasters can be reduced substantially if people are well informed about measures they can take to reduce vulnerability, and if they are motivated to act.
4. Reduce the underlying risk factors. Countries can build resilience to disasters by investing in simple, well-known measures to reduce risk and vulnerability.
5. Strengthen disaster preparedness for effective response at all levels. Being prepared, including conducting risk assessments, before investing in development at all levels of society will enable people to become more resilient to natural hazards.

Source: UNISDR website

implementing the Hyogo Framework in the region;

- (4) establishing regional collaborative centers;
- (5) supporting the development of regional early warning mechanisms.⁹

⁸ UNISDR website

⁹ UNISDR, "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disaster", January 2005, UNISDR website

The disaster management process can be divided into different phases:

- (1) Prevention and preparedness is done before disasters occur to minimize the possible impact of disasters (i.e. setting up early warning systems, emergency training, creating plans, imposing safety regulations and evacuation measures).
- (2) Response involves coordinated multi-agency response to reduce the impacts of disasters (i.e. search and rescue, relocation, providing relief such as food, water, temporary shelters, medical care).
- (3) Recovery is about helping the affected community to return to normal.¹⁰

Disaster management is considered a proactive approach for it avoids or reduces human and material loss. Part of ASEAN's 2020 vision is to have dis-

aster-resilient nations and safer communities; thus, it came up with mechanisms to facilitate regional cooperation on disaster management. In 2006, Member States signed the AADMER, which aims to provide effective mechanisms to achieve substantial decrease in disaster losses, and to jointly respond to disaster emergencies through concerted national efforts and intensified regional and international cooperation. The agreement defines disaster management as a range of activities, prior to, during and after the disasters, designed to provide a framework for helping communities to avoid, minimize and recover from the impact of disasters. The AADMER is a legally-binding regional framework for cooperation, coordination, technical assistance, and resource mobilization in all aspects of disaster management. It affirms ASEAN's commitment to the HFA for ASEAN member states are cognizant of the need to develop



¹⁰ Corina Wayfield, 'The Disaster Management Cycle', Global Development Research Center website

Box 2. AADMER General Objectives (Article 4)

In pursuing the objective of this Agreement, the Parties shall:

- a. cooperate in developing and implementing measures to reduce disaster losses including identification of disaster risk, development of monitoring, assessment and early warning systems, standby arrangements for disaster relief and emergency response, exchange of information and technology, and the provision of mutual assistance;
- b. immediately respond to a disaster occurring within their territory. When the said disaster is likely to cause possible impacts on other Member States, respond promptly to a request for relevant information sought by a Member State or States that are or may be affected by such disasters, with a view to minimizing the consequences;
- c. promptly respond to a request for assistance from an affected Party; and
- d. take legislative, administrative and other measures as necessary to implement their obligations under this Agreement.

Source: ASEAN website

coordinated regional approaches to prepare for disasters and ensure swift response in situations that require international assistance. The AADMER requires members to cooperate in developing and implementing measures to reduce disaster losses; immediately respond to disasters occurring within their territory; promptly respond to a request for assistance from an affected country; and take legislative, administrative and other measures to implement provisions under the agreement.

The AADMER has two different levels of commitment: one, to build regional capacity focused

on supporting Member States in preparedness and response capacities, coupled with a regional system of rules to expedite collaboration during disasters; and two, to assist governments in improving their disaster risk management systems through all stages of the disaster management process.¹¹ Moreover, the agreement intends to accomplish concrete actions in the strategic components of (1) risk assessment, early warning and monitoring; (2) prevention and mitigation; (3) preparedness and response; and (4) recovery.¹² Member states came up with the AADMER Work Programme for 2010-2015 to serve as a roadmap in effectively translating the goals of AADMER into flagship projects based on the four components of disaster management.

Several bodies are involved in implementing, monitoring and evaluating the AADMER Work Programme. The representatives of the national disaster management agencies of Member States comprise the ACDM. Established in 2003, its function is to provide a link between national and regional institutions, and manage and implement regional activities. It also does policy oversight and supervision of the Work Programme. The ACDM has four Working Groups which correspond to the strategic components of the AADMER. Member States agree to be lead shepherds of projects and are tasked to coordinate the activities of the members of the Working Group. The Chair of the ACDM provides leadership and guidance to fulfill the goals of

¹¹ Daniel Petz, "Strengthening Regional and National Capacity for Disaster Risk Management: The Case of ASEAN", Brookings-LSE Project on Internal Displacement, November 2014, p. 14

¹² AHA Centre, "AADMER Work Programme 2010-2015", AHA Centre website

the AADMER. The Chair is primarily tasked to initiate and direct the execution of activities in the Work Programme. It is also the task of the ACDM to collaborate with Dialogue Partners, international and multilateral agencies, non-government organizations and the private sector to advance the objectives of the AADMER.

The ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre) was established to facilitate cooperation and coordination among ASEAN Member States and with relevant United Nations agencies and other international organizations. The AHA Centre performs operational coordination and technical functions under the AADMER, and it operates on a 24/7 basis.

The ASEAN Secretariat provides policy coordination support, conducts monitoring and evaluation of the AADMER, and serves as the custodian of the AADMER Fund. In addition, the ASEAN Secretariat assists the ASEAN Secretary-General in fulfilling his duties as the ASEAN Humanitarian Assistance Coordinator in times of a major disaster or emergency. The ASEAN Disaster Monitoring and Response System (DMRS), which provides the emergency operations center using streams of hazard data from all over ASEAN, is located in the AHA Centre. In its 2013

Annual Report, the AHA Centre reported a budget of almost USD 5.8 million, most of which came from Dialogue Partners. Each ASEAN Member State has to contribute USD 30,000 annually for operational expenses. Members can also give voluntary contributions to the AADMER fund.¹³ In implementing AADMER, ASEAN collaborates with its Dialogue Partners¹⁴ and formed the AADMER Partnership Group¹⁵, a consortium of seven civil society organizations, for it acknowledges the significance of establishing a wide network of cooperation in addressing the issue.

A comprehensive systems approach is applied in studying disaster risk management. A systems perspective entails developing and implementing efforts that complement the varying aspects of the cycle. It is also important to note that to achieve a comprehensive and integrated approach all stakeholders have to be involved. In the case of ASEAN, cooperation covers from the community level to the inter-governmental level and promotes multi-sectoral coordination. Disasters pose enormous challenges especially for developing nations. Thus, regional organizations like ASEAN are working to increase the capacity of Member States to cope with disasters in the short run and invest in measures on disaster prevention and mitigation in the long run. However, the challenges in effectively

¹³ Daniel Petz, "Strengthening Regional and National Capacity for Disaster Risk Management: The Case of ASEAN"

¹⁴ Australia, Canada, China, European Union, India, Japan, New Zealand, Republic of Korea, Russia and United States

¹⁵ Led by Oxfam Great Britain as the current chair, it includes the following members: ChildFund International, HelpAge International, Mercy Malaysia, Plan International, Save the Children, and World Vision.

translating policies into strategies and activities remain.

Brunei's Initiatives on Disaster Management

Although Brunei is one of the least hazard-prone countries in Southeast Asia, it had its share of disasters over the years. Based on the records of emergency calls received by the Fire and Rescue Department since 2006, NDMC acknowledges that the occurrence of hazards have been increasing. In addition to floods and landslides, other hazardous events such as strong winds, haze, fire and outbreak of diseases have been reported as of late. NDMC has also recognizes the possibility that natural disasters such as drought, beach erosion, tsunamis and earthquake, and industrial hazards like explosions, pollution and oil spills are likely to happen.

At the beginning of 2015, many areas suffered from severe flooding after days of torrential rains. Floods were reported in 13 sub-districts of Brunei-Muara, Tutong and Temburong. The abnormal amount of rainfall recorded and high tide of 2.4 meters from 2:00 to 4:00 am caused the flooding in the three districts.¹⁷

In 2014, some 44 cases of landslides have been recorded by the Brunei-Muara District Disaster Management Committee. The worst-affected areas in the district were Kg Telanai, Kg

Lambak Kiri, Kg Perpindahan Lambak Kanan, Sg Tilog, Kg Kapok Kanan and Kg Mentiri. In Tutong District, landslides were reported in a number of villages: Kg Piasan Lamunin, Kg Kebia, Kg Pengkalan Mau, Kg Luagan Timbaran, Kg Pengkalan Tangsi, Kg Birau, Kg Sinaut and Kg Bukit Panggal. Flooding was also reported in several areas around the country. Radio Televisyen Brunei gathered reports that Mukim Lamunin, Mukim Rambai, Mukim Tanjong Maya and Mukim Ukong were among the areas worst hit by floods in Tutong District; as well as Kg Sungai Mau, Jalan Bukit Puan, Kg Singap and Kg Laid Lakang, Jalan Setia Diraja, Jalan Jaya Negara, Jalan Puteri Brunei, Jalan Panglima, Jalan Singa Menteri and Jalan Sungai Pandai in Belait District and Mukim Bokok in Temburong District.¹⁶

As a signatory to AADMER, Brunei is expected to comply with the objectives of the agreement. One way for the Brunei Government to operationalize the AADMER objectives is by strengthening the capacity of NDMC for it is the country's focal point for disaster management in ASEAN. NDMC is part of the country's National Disaster Council.

The Disaster Management Order of 2006 mandated the establishment of a National Disaster Council. The Council was assigned the following functions:

¹⁶ Rafidah Hamit, "Floods and 44 Landslides", 23 January 2014, Brunei Times website

¹⁷ Ak Mohd Khairuddin Pg Harun and Izzati, "Floods Reported in 13 Sub-districts Across Brunei", 26 January 2015, Brunei Times website

- (1) to develop a strategic policy framework for disaster management for Brunei Darussalam;
- (2) to ensure that an effective disaster management system is developed and implemented;
- (3) to ensure that regional and international arrangement concerning matters relating to effective disaster management are established and maintained;
- (4) to identify resources that may be used for disaster operations;
- (5) to provide reports and make recommendations to His Majesty the Sultan and Yang Di-Pertuan about matters relating to disaster management and disaster operations;
- (6) to prepare the National Disaster Management Plan;
- (7) to exercise or perform any other function conferred or imposed to the Council under this Order or under any other written law;
- (8) to decide on the assistance to be provided to any country or territory relating to disaster operations; and
- (9) to decide on the assistance offered by any country or territory, organisational or individual.

The Order also provided legal basis for the establishment of NDMC in August 2006. NDMC reports to the National Disaster Council, and is under the administrative purview of the Ministry of Home Affairs. Under the Order, NDMC was given the following functions:

- (1) to help the Council exercise or perform its functions;

Figure 3. Façade of NDMC Building
Source: NDMC



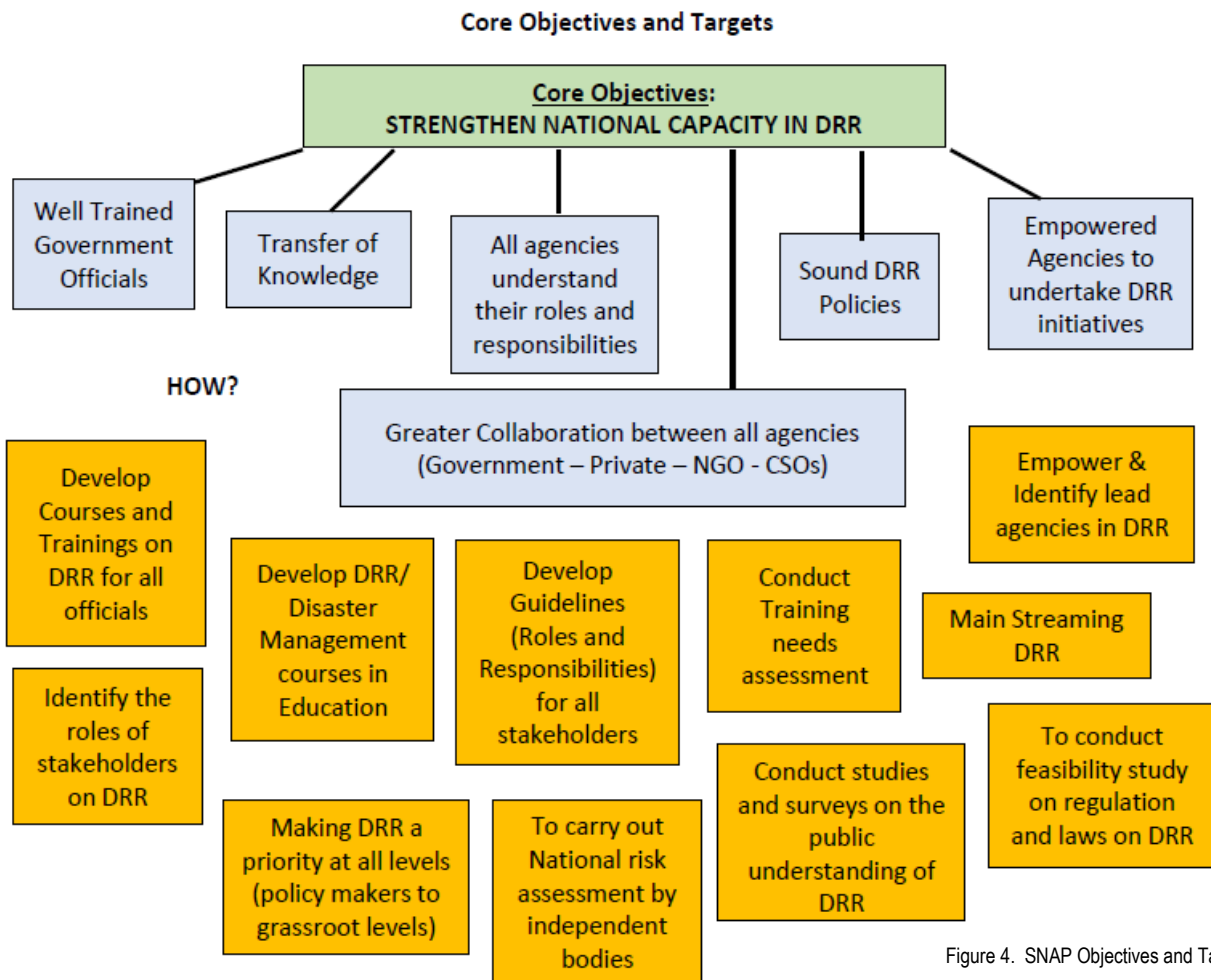


Figure 4. SNAP Objectives and Targets
Source: NDMC

- (2) to advise and make recommendations to the Council about matters relating to disaster management referred by the Council to the Centre; and
- (3) to exercise or perform such other functions as the Council may determine.

The NDMC has formulated the SNAP for Disaster Risk Reduction 2012-2025, which serves as comprehensive and cohesive plan of action aimed at building the capacity of both government and non-government institutions in promoting disaster

risk reduction. The SNAP is in line with the objectives of the AADMER and the five priority areas of the HFA. Similarly, NDMC came up with the National Standard Operating Procedures (NaSOP) for Response that outlines the agreed procedures that must be followed by all agencies involved in a disaster operation. The SNAP was developed in partnership with the UNISDR to assess the needs of the country in the field of disaster management. However, it is still awaiting endorsement from the different government agencies. Some of the issues identified in the SNAP are the following:

- (1) Inadequacies in hazard data and vulnerability information;
- (2) Multi-stakeholder coordination;
- (3) Level of emergency preparedness of the population;
- (4) Weak early warning system; and
- (5) Integration of disaster risk reduction concerns in social, environmental, physical and land use planning.

Given these issues, NDMC planned to direct its resources to meet four priorities, which are:

- (1) to enhance disaster risk reduction mechanisms by ensuring that policies are implemented in accordance with the objectives of AADMER and HFA;
- (2) to build multi-sectoral disaster management capacity through strong cooperation and coordination among different stakeholders;
- (3) to increase community awareness and preparedness by promoting an understanding of the disaster management concept at the community level; and
- (4) to upgrade the competencies of NDMC staff.

NDMC has initiated a few programs to operationalize the SNAP. One of which is the Community-Based Disaster Risk Management programme which was launched in March 2010. It is part of NDMC's efforts to increase the readiness and preparedness of the communities for disasters by identifying hazards and reducing risks associated with them. The objective is to create disaster-resilient communities in Brunei since it is at the district level where disaster impacts are felt the most. Under this programme, NDMC conducts public awareness exercises, early warning and risk assessment, and safety checks of houses and buildings. NDMC has also put together modules used in the National Service programme and training for trainers programme primarily focused on teachers. Moreover, it conducts training activities for the different government agencies on radio communications technology, emergency rapid assistance team training in cooperation with Singapore, table-top workshops, and simulation exercises pursuant to the NaSOP. It also made efforts to introduce the US-based Incident Command System (ICS) into the country's disaster response system. This two-year training was carried out by US Forest Service as part of the ASEAN-ICS Pilot Country Project since 2010.

In 2014, NDMC partnered with the CAE-Brunei Multi-Purpose Training Centre (CAE-Brunei MPTC),

a joint venture between a Canadian firm and the Brunei Government to launch a world-class training centre by delivering a range of training solutions to different sectors such as defence, aviation, emergency and crisis management, healthcare and energy, among others. CAE-Brunei MPTC has established an Emergency and Crisis Management Cen-

tre of Excellence that will provide relevant local authorities such as the Ministry of Home Affairs and NDMC with comprehensive training activities to enable the Government to better plan and prepare for emergencies. Using simulation-based training, the Centre is offering emergency and crisis management training programs to improve the

Box. 3 Brunei Darussalam's Disaster Management Strategy

NATIONAL DRIVERS

- Brunei Vision 2035
- Disaster Management Order
- National Disaster Council
- National Disaster Management Centre
- Strategic National Action Plan (SNAP) for Disaster Risk Reduction 2012-2025
- National Standard Operating Procedures for Response

INTERNATIONAL DRIVERS

- ASEAN Agreement on Disaster Management and Emergency Response
- Hyogo Framework for Action
- ASEAN Committee on Disaster Management
- ASEAN Secretariat
- ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management
- ASEAN Dialogue Partners
- AADMER Partnership Group
- International Relief Agencies
- Regional Research and Training Centres

Source: NDMC

Government's coordination, response and operational decision making given a range of emergency scenarios. It also plans to offer emergency and crisis management training to ASEAN.

On the international level, NDMC is working closely with the AHA Centre in Jakarta. NDMC's own Disaster Command Centre is linked with the AHA Centre to facilitate cooperation and coordination among ASEAN Member States, and relevant UN agencies and international organizations engaged in disaster response and giving early warning. NDMC is also engaged with other regional research and training centres such as the Asian Disaster Reduction Centre, the Asian Disaster Preparedness Reduction Centre, the Pacific Tsunami Warning Center and Pacific Disaster Centre. To improve interoperability, NDMC attends the ASEAN Regional Disaster Response Exercises (ARDEX), a biennial event, focused on increasing the region's capacity in responding to disasters; as well as the Disaster Response Exercises (DIREX) under the ASEAN Regional Forum. It also participates in the Human Assistance and Disaster Response (HADR) Exercises as part of the ASEAN Defence Minister's Meeting Plus Eight (ADMM+8) initiative.

Through all these efforts, NDMC hopes to build the country's disaster management capacity in the short, medium and long term.

3 | METHODOLOGY

Research Design

The study was conceived mainly as a qualitative research that employed case studies, contextual analysis and interviews as the research methods. Case studies were done to benchmark the proposed policy options with the initiatives of other countries. For the policy review, conducting a contextual analysis of relevant policies and programmes helped in linking the concepts and objectives with the realities of policy implementation. Semi-structured interviews with experts and stakeholders were helpful in determining the feasibility of policy options and the challenges related to implementation. This research project has also examined ways to expand or modify current policies for it was deemed important to take note of the projects that key political actors are actively proposing or seriously considering.

In evaluating the three policy options, a Criteria-Alternatives Matrix (CAM) was used. The outcomes of the each policy option were assessed using a set of criteria and were presented in the matrix. The CAM was useful in evaluating and prioritizing a list of options. Set of evaluative criteria was developed, and a relative weight was as-

signed to each criterion. All the options were ranked according to how well each met the criterion. Each option was multiplied by the weight, and the option with the highest ranking was selected for further examination.

The main institutional partner of this project is the NDMC. Understanding the mandate, organizational framework, strategies and priorities of NDMC is important for it functions as Brunei's national focal point for Disaster Management in ASEAN. The NDMC is the lead coordinating agency of the Disaster Management Council, which includes other government agencies.

Study Framework

The purpose of the policy review is to analyze current policies and programmes that deal with disaster management and emergency response at the national and regional levels. From the policy review and consultation with stakeholders and experts, the study was able to find out the challenges and priorities in building ASEAN and Brunei's capacity on disaster management. These factors were carefully considered in coming up with policy options that will meet the immediate

and long term outcomes. The outcomes must fulfill two objectives: (1) to build Brunei's capacity on disaster management; and (2) to contribute to regional collaboration on disaster preparedness, response, recovery and mitigation.

Below is a logic model to explain how the proposed policy options are understood to contribute to the accomplishment of intended outcomes and impacts. It provides a visual representation of the development of the research project by

showing the relationship of inputs and activities with the expected results. The model specifies the inputs or resources needed; activities, which are the tactical actions to fulfill the strategy; outputs are the indicators that activities generate; outcomes are determined by changes in awareness, knowledge, skill or behavior; while impact reflects the changes over time.

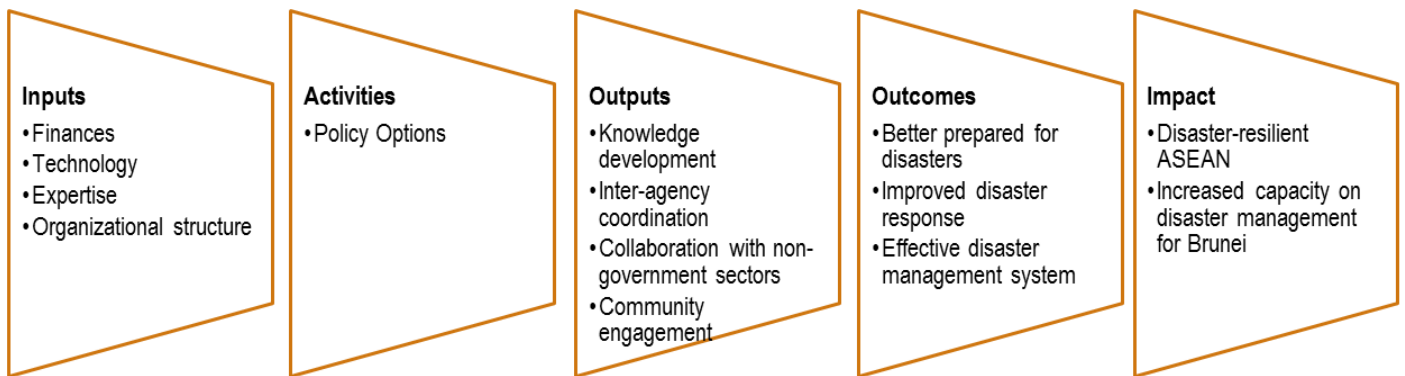


Figure 5. Logic Model

4 | POLICY ANALYSIS



From the policy review and consultations with various stakeholders at the nation and regional levels on the disaster management process, three policy options have been identified: (1) producing a geohazard map for Brunei Darussalam, (2) putting in place an Incident Command System, and (3) establishing an ASEAN Think Tank on disaster management.

Geohazard Map

Through geohazard mapping, areas which are susceptible or vulnerable to various geohazards are determined. Information gathered from surveying and assessing certain areas can increase

awareness on the types of hazards present in the community. Geographic Information System (GIS) helps in identifying disaster points; GIS combines geospatial input, hardware and software that can analyze data to produce information. The use of satellite data and GIS enabled large-scale mapping, 3D analysis, updating of existing maps and project planning. In recent years, GIS has been applied in disaster management to forecast and reduce the risks of geohazards.¹⁸ These maps can also be integrated into a country's early warning system to provide stakeholders with valuable information in implementing programs and activities to reduce risk and mitigate the impacts of

¹⁸ Elmira Shamshiry et.al. 2001. "Disaster Management Base on Geoinformatics." Institute of Electrical and Electronics Engineers. p. 30

natural or manmade disasters. Moreover, maps can be utilized for development and land use planning in terms of large-scale infrastructure investments.

CASE STUDY: THE PHILIPPINES

The Department of Environment and Natural Resources (DENR) of the Philippine government started its program on geohazard mapping and assessment in 2004. It is an on-going priority of the DENR, which is being implemented by the Mines and Geosciences Bureau (MGB). The components of the program are the following: (1) rapid assessment survey to generate geohazard maps that will indicate which areas are prone to natural hazards; (2) printing and reproduction of maps, manuals and information materials for public dissemination; and (3) conduct of seminars and workshops for local government officials and public school teachers to increase their awareness and preparedness on various natural hazards, as well as teach them on the proper use of the geohazard maps.

Direct beneficiaries of the project are segments of the population living in vulnerable areas, the local government units, various government agencies, non-government organizations and institutions engaged in land use planning and classification, environmental regulation and protection, and

Box. 4. Uses of GIS in Disaster Management

Pre-Disaster

- Hazard mapping, Risk and Vulnerability Assessment, Preparedness Plans, Early Warning and Monitoring, Risk Modelling, Forecasting

During Disasters

- Public Warning Systems, Emergency Operations, Search and Rescue, Evacuation Planning, Relief Operations

Post-Disaster

- Damage Assessment, Setting up of Temporary Shelters, Processing and Granting Land Claims, Identification of Reconstruction Sites

Source: UN-SPIDER

disaster management and mitigation. Also to benefit are public and private schools, businesses engaged in infrastructure and resources development, general utility companies such as water districts, construction companies engaged in public works and energy producers.

The DENR allocated some PhP 354 million for the creation of a detailed geohazard mapping in various disaster prone areas in the country as part of the agency's efforts to enhance the preparedness of local government units and the implementation of various mitigation measures against natural disasters.¹⁹ The Philippine government has al-

¹⁹ Jonathan Mayuga, "Bigger geohazard maps of Yolanda-hit areas now available", 10 November 2014, Business Mirror website

so received foreign assistance for this program. The Japan International Cooperation Agency (JICA) gave PhP 4 million worth of new geohazard mapping materials to the Philippines which included 20 units of Global Positioning System (GPS) equipment, 30 digital cameras, 20 binoculars, a large format plotter 42-inch printer capable of printing large-size maps, a 4x4 vehicle, about 12,000 information and educational posters on geohazards, 1,500 frames of aerial photographs, scanners, laptops and projectors.²⁰ In addition, the United Nations Development Program (UNDP) extended a PhP 2.24 million grant for geohazard mapping for it recognized the program's substantial impact on the country's disaster management goals by reducing, if not eliminating, the possible loss of lives and properties caused by the interplay of natural calamities and existing geohazards.²¹

The program has accomplished a number of noteworthy outputs. It has identified the top 10 provinces which are highly susceptible to landslides, and another list of top 10 provinces highly susceptible to flooding. Some 1,634 municipalities and cities have undergone geohazard assessment and mapping that led to the creation of maps in 1:50,000 scale. A total of 75,000 map sheets were distributed to all local government units with corresponding training and capacity building in interpreting the maps. In 2011, the DENR decided to

update the maps of 218 municipalities by making them more detailed using a scale of 1:10,000. The interactive maps are also accessible and downloadable from three government websites.

BENEFITS TO BRUNEI

Those who will benefit from having geohazard maps are the general population, especially those living and working in vulnerable areas. Geohazard maps can accurately pinpoint these areas and provide salient information needed in planning and improving measures on disaster preparedness, response and recovery. It can assist government in infrastructure and development planning.

Geohazard maps of Brunei are barely available. A national mapping system using GIS can be useful for land administration, and risk and vulnerability mapping for disaster mitigation and preparedness. There is a need to integrate risk and vulnerability mapping with the national base maps to produce multi-hazard risk maps complete with comprehensive risk assessment. Geohazard maps are an integral part of a country's early warning system for these will strengthen Brunei's commitment toward implementing the HFA. The NDMC, in its SNAP, identified inadequacies in hazard data and vulnerability information and integration of disaster risk reduction concerns in social, environmen-

²⁰ Beverly Natividad, "JICA donates P4 million worth of geohazard mapping tools", 5 April 2006, BusinessWorld website

²¹ BusinessWorld, "UNDP funds mapping project," 25 March 2005, BusinessWorld website.

tal, physical and land-use planning as issues that have to be addressed. Thus, conducting geohazard mapping and assessment will enable NDMC and the Brunei Government to build capacity on disaster management.

CHALLENGES

The geohazard maps are expected to be costly; for example Philippine government had to spend around PhP300 million or almost BND10 million. However, taking into account of the country total land area compared to the Philippines the costs is expected to be lower for Brunei. After identifying geohazard areas, some people living in areas vulnerable to flooding and landslides may be compelled to leave and find safer places to reside. This can be a difficult and costly process, and some people may resist from moving from their homes because of traditional and sentimental values. The geohazard mapping project is an inter-agency effort. The agency responsible for producing and maintaining maps, which is the Survey Department under the Ministry of Development, would need to work with agencies such as the Meteorological Section of the Department of Civil Aviation, Public Works Department and Town and Country Planning, etc. The project may be slowed down because of bureaucratic and coordination problems.

BENEFITS TO ASEAN

As for ASEAN, the geohazard maps will allow Brunei to feed accurate data and information to AHA Centre which can be used in conducting regional-level analysis. With Brunei's know how it can support other ASEAN Member States considering to implement geohazard mapping in terms of knowledge sharing and technology transfer. Of the 10 ASEAN Members, only the Philippines, Thailand and Indonesia have geohazard maps. Brunei can also hold trainings and workshops on geohazard mapping in cooperation with other ASEAN members.

Incident Command System

An ICS is a management framework designed to integrate personnel, equipment, procedures, facilities and communications during complex events such as in a catastrophic disaster, enabling various agencies to come together for a more effective response operations within a common organizational structure. Using this structure, first-responders and other trained personnel can be assigned to positions with clear responsibilities regardless of their agency or jurisdiction on a standard planning process to broadly communicate incident objectives and ensure that responders' collective actions meet those objectives through a unified response. ICS also enables inte-



Figure 6. Incident Command Structure of the US Department of Labor
Source: OSHA website

gration not only across institutions or domestic agencies, but also across state, region, and/or national boundaries.

CASE STUDY: UNITED STATES

The concept of ICS was developed in the United States more than thirty years ago, in the aftermath of a devastating wildfire in California. Although all of the responding agencies cooperated to the best of their ability, numerous problems with communication and coordination hampered their effectiveness. As a result, the Congress mandated that the U.S. Forest Service design a system that would "make a quantum jump in the capabilities of Southern California wild land fire protec-

tion agencies to effectively coordinate inter-agency action and to allocate suppression resources in dynamic, multiple-fire situations."²²

ICS is structured into five essential functions: Command, Operations, Planning, Logistics, and Finance and Administration.²³ The Command function is basically enabling all responsible agencies to manage a unified command and establish a single command structure. The Command function consist of:

- An Incident Commander who provides overall leadership for incident response, and delegate authority to others;

²²Federal Emergency Management Agency, NIMS and the Incident Command System, 23 November 2004, FEMA website

²³ Idaho State University, Incident Command System, ISU website

- A Public Information Officer who disseminates information and media relations;
- A Liaison Officer who assist the Incident Commander by serving as a contact point for agency representatives who are helping to support the operation; and
- A Safety Officer who provides advices to the Incident Commander on issues regarding incident safety.
- Information Technology and Communications for Radio Dispatch, Notifications, and Network communications.

The Planning Section is responsible for planning ongoing operations, and supervising situation status and damage assessment. The functions of this section include collecting, evaluating, processing, and disseminating information; developing action plan, in coordination with the other sections, maintaining information on the current and forecast situations and on the status of resources, and conducting documentation. The task of the Logistic Section is to support the Operations Section. The Section is in charge of all resources from off-site locations and provides facilities, services, personnel, equipment and materials, including food and transportation. The Finance and Administrative Coordinator is responsible for all accounting and financial aspect of the disaster operations and any other administrative requirement, which covers accounting, insurance and procurement.

Supervised by a Coordinator, the Operations Section responsible for coordinating all operations in support of the emergency response and implementation of the action plans. This function may include the following branches:

- Public Safety which includes Traffic control, access control, and evacuation;
- Health and Safety such as Hazmat Response, Fire Safety, Building Coordinators, Chemical/ Biological/ Radiological experts or specialist;
- Search and Rescue to locate trapped and injured person, and moved injured person to medical triage;
- Medical such the Paramedics, Coordinate Medical Transportation, Psychological Trauma Response;

BENEFITS TO BRUNEI

The ICS provides a single management system for multi-jurisdictional incidents. By having an ICS in place, Brunei can meet the needs of incidents of any kind and size (e.g. wildfires, landslides, flooding, disease outbreak, and even urban disas-

ters). It allows personnel from various agency to meld rapidly together into a common management structure, and enables Incident Commanders to make decisions by establishing a single command structure. ICS ensures that sufficient logistical and administrative support are available given that multiple logistics are usually required in response to an incident. It is designed to be interdisciplinary and most importantly organizationally flexible, which means that ICS is not a permanent organizational structure and is only activated in times of emergency. Moreover, the ICS is also cost-effective for it avoids duplication of efforts.

Before ICS, the following weaknesses in incident management were identified:

- Multiple Incident Commanders, too many 'heads' leading the operations causing confusion and clashes of operating procedures;
- Different emergency response organizational structure;
- Lack of reliable incident information;
- Inadequate and incompatible communications;
- No mechanism for coordinated planning among agencies;

- Unclear lines of authority;
- Agencies using different terminologies; and
- Unclear or unspecified incident objectives.

In an effort to address the weaknesses in incident management, NDMC conducted research and workshops in collaboration with the US Forestry Department in 2009. At present, the major framework of the NaSOP in Brunei Darussalam is based on the ICS -- from the collaboration, format of reporting, to the terminologies used in disaster management. All four districts use and implement terminologies such as District Disaster Management Committee (DDMC), District Emergency Operation Centre (DEOC) and Incident Command Post (ICP). The initiative to implement ICS went hand-in-hand with the NaSOP. Starting in 2011, NDMC conducted seminars, roadshow, workshop, tabletop exercise and simulation exercises in all four districts to promote the use of ICS. However, this initiative has not been fully implemented to cover all kinds of incidents, and it does not involve non-governmental organizations.

CHALLENGES

The main challenges of ICS is integration in terms of forming effective and efficient teamwork among various governmental and non-governmental entities, especially in times of large-scale disaster.

Silo mentality of the different government agencies hinders cooperation. In times of disasters, all agencies involved have to work together and should be able to take orders from the incident commander. Those in command of respective agencies prefer to use old, more familiar methods, rather than ICS.

For ICS to stick, periodic drills are necessary. Thus, sustainability is a challenge. Since emergencies do not happen every day, it is difficult to instill ICS as a standard operating procedure. More importantly, ICS is a complex system. Before Brunei can implement this system, it needs to amass experience in disaster management to develop a system that can effectively address disasters. The country needs to clearly define the command and control system, lines of coordination and supporting roles of actors involved in disaster management. Since ICS is an evolving system, there are no quick solutions available. Evaluation is required to ensure that operations reach the desired level of efficiency and effectiveness. It requires hard work, compromise and commitment to go beyond one's jurisdiction to make ICS work. There should be regular inter-agency trainings, simulation exercises and drills. Thus, a combination of strong political will and administrative machinery are critical.

BENEFITS TO ASEAN

If Brunei can successfully put in place ICS, it can take the lead in conducting joint simulation exercises with countries in the region that also uses ICS. Currently, only Thailand and the Philippines have been training their respective respond team to follow the ICS structure. The AHA center in Jakarta also tries to implement ICS as part of its disaster response operations in the region. In the future, Brunei can be a 'model' country for ICS, and may contribute to ICS development in ASEAN through trainings, knowledge sharing and technology transfer. Because of the Brunei's size and population, the scale of disasters in the country are more manageable. Brunei can be the prototype for ICS that can be eventually implemented in all ASEAN countries.

Think Tank

The term 'think-tank' refers to any organization undertaking technical and scientific research to support policy-related analysis.²⁴ These institutions often act as a bridge between the academic and policymaking communities and between states and civil society, serving in the public interest as independent voices that translate applied and basic research into a language that is understandable, reliable, and accessible for policymakers and the public.²⁵

²⁴ "What is a think-tank?", TPP Map Website

Think tanks in disaster management can bridge the gap between scientific researches in natural disaster and translate it to policy recommendations that can be applied in improving disaster management capacities. Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters;²⁶ hence, it includes activities before, during and after disasters occur.²⁷ Think tanks in disaster management provides holistic approach to the disaster management process and can institutionalize capacity building efforts.

CASE STUDY: NATURAL HAZARDS CENTER

Natural Hazards Center, based in University of Colorado, has served as a national and international clearinghouse of knowledge concerning the social science and policy aspects of disasters. The Center collects and shares research and experience related to preparedness for, response to, recovery from, and mitigation of disasters, emphasizing the link between hazards mitigation and sustainability to both producers and users of research and knowledge on extreme events. The Center publishes bi-monthly newsletter, the Natu-

ral Hazards Observer, and an electronic bi-weekly newsletter, Disaster Research. It maintains a web site containing updated information on upcoming conferences and links to publications, organizations, and other internet resources for hazards research and practice. It also hosts annual invitation-only Hazards Research and Applications Workshop, among its tasks. The Center is funded by a consortium of US federal agencies (Federal Emergency Management Agency, National Science Foundation, US Geological Survey, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, US Army Corps of Engineers, the Centers for Disease Control and Prevention, and the US Forest Service) and the Public Entity Risk Institute.²⁸



Figure 7. Natural Hazards Center Logo
Source: www.colorado.edu

²⁵ Think Tanks and Policy Advice in the US, Routledge 2007 and in The Fifth Estate: The Role of Think Tanks in Domestic and Foreign Policy in the US, University of Pennsylvania Press

²⁶ International Federation of Red Cross and Red Crescent Societies (IFRC) definition

²⁷ Corina Wayfield, The Disaster Management Cycle

²⁸ Natural Hazards Center website

There are several ASEAN-based think tanks such as ASEAN Studies Centre and Institute of Southeast Asian Studies in Singapore. Under the AADMER, Singapore is working on the ASEAN Network of Disaster Management Training Institute (DMTI) initiative. Among its functions are to serve as a recognized center for excellence in disaster management training, education, and information in the ASEAN region; facilitate capacity building and sharing of knowledge and resources; and develop the pool of subject matter experts. Moreover, there are also various think tanks in other ASEAN countries, among them: Institute of Policy Studies (IPS) – Singapore, Institute of Strategic and Development Studies (ISDS) – Philippines, Centre for Strategic and International Studies (CSIS) – Indonesia and Institute of Strategic and International Studies (ISIS) – Malaysia. However, none of these think tanks focused specifically on natural disaster management.

BENEFITS TO BRUNEI

This think tank can assist NDMC in developing plans, guidelines and SOPs related to the country's disaster management efforts. It can also advise the Government on policymaking by translating evidence-based research into policy recommendations. In addition, the think tank can help develop local expertise on disaster management, and open opportunities for collaboration between the gov-

ernment and the non-government sector, particularly the academe.

CHALLENGES

Should Brunei take on this initiative, it will require strong commitment on the part of the Government for it will involve huge funding and various logistical issues. The country has to determine whether the Government is willing to fund the whole operations of the think-tank, which is like providing a public good for the region, or just the initial investments of setting it up and let the other Member States share the costs. Other logistical considerations include human resources, technical capabilities, infrastructure, etc. As the project is for the benefit of ASEAN, Brunei needs to consider the perspective of other Member States, be it in terms of support, as well as sharing of sensitive information. Moreover, Brunei has to address the issue of credibility for the country lacks experience in disaster management.

BENEFITS TO ASEAN

The think tank will be greatly beneficial toward the region's disaster management efforts. By having this think tank, ASEAN can use research to improve its disaster management capacity. This task becomes easier when there is a data and information hub, which can be housed in a think tank. At the same time, the think tank will

also institutionalize the role of research in policy-making on disaster management efforts in the region. It can also contribute to ASEAN initiatives on knowledge and skills development, and provide support to the functions of the ASEAN Secretariat and AHA Centre.

Criteria-Alternatives Matrix

The CAM was used in evaluating the policy options. The outcome of the each policy option was examined using a set of criteria and presented in a matrix. A typical CAM organizes policy options across the columns and the evaluative criteria down the rows. A scale was applied to measure how well the outcomes meet a certain criterion. Each cell represents the projected outcome of a particular policy option as assessed with reference to the evaluative criterion.

Five criteria were developed to determine which policy to recommend. The following are the criteria for evaluation:

- **Cost-effectiveness:** This criterion looks at the cost of initiating each policy option, which includes initial investment in setting up the policy, infrastructure development needed and funding for other logistical needs such as technical and human resources.

- **Ease of implementation:** This refers to the capacity of the Government to implement the policy options, in terms of organizational structure, experiences, technology capacity, expertise and skills needed.
- **Political acceptability:** It pertains to public support and credibility of the Government to carry out the policy options. In some instances, ASEAN's acquiescence for Brunei to carry out the policy option is also considered.
- **Urgency:** This criteria refers to how important the policy option at the short to medium term and whether it meets the immediate concerns of the country on disaster management.
- **Contribution to ASEAN:** In line with the project's objectives, the policy option recommended must contribute to ASEAN's goals.

Different weights were assigned to each criterion to prioritize some over the others. The study identified 'urgency' as the most important criterion, assigning it 25 percent, while 'ease of implementation', 'political acceptability' and 'contribution to ASEAN' were given 20 percent each, and 'cost-effectiveness' received 15 percent. Projected outcomes are scored using a scale of 1 to 3, with 3 being the highest. The score for each

Table 1. Criteria-Alternatives Matrix	Geohazard Map	Incident Command System	Think Tank
Cost effectiveness (15%)	2 (.15) 0.3	3 (.15) 0.45	1 (.15) 0.15
Ease of implementation (20%)	2 (.20) 0.40	3 (.20) 0.60	1 (.20) 0.20
Political acceptability (20%)	3 (.20) 0.60	1 (.20) 0.20	2 (.20) 0.40
Urgency (25%)	3 (.25) 0.75	2 (.25) 0.50	1 (.25) 0.25
Contribution to ASEAN (20%)	2 (.20) 0.40	1 (.20) 0.20	3 (.20) 0.60
Total	2.45	1.95	1.6

option was multiplied by the percentage assigned to the criteria. All the scores were added to get the total, which was used in comparing all three options. The policy option with the highest total was deemed the best one to recommend.

Results of the CAM indicated that the geohazard map is the more favorable policy option given the set of evaluative criteria. Although the ICS will require very little financial costs on the part of the government, research indicates that it will only work if there is a strong push from the top level and complimented by a commitment from the middle and lower levels of the bureaucracy. It will take years of constant interaction and collaboration among the different government agencies to institutionalize ICS. Moreover, the government would have to engage the non-government sector

and the communities to achieve a whole-of-nation approach. Of the three policy options, ICS ranks lowest on contribution to ASEAN for its benefits are more focused on Brunei.

The Think Tank option is projected to have greater contribution to ASEAN's goals; however, the outcomes can only be achieved in the medium term and considerable efforts have to be done to obtain the consensus of all ASEAN Member States before the Brunei Government can begin such an undertaking. More importantly, setting up a Think Tank will entail huge financial costs, coupled with several logistical and administrative requirements that the Government has to consider.

5 | CONCLUSION AND RECOMMENDATIONS



Figure 8. Reported Landslides in January 2014
Source: Brunei Times website

Conclusion

Geohazard mapping allows the Government to identify areas susceptible to geohazards such as floods, landslides, coastal erosion²⁹, peat fires, etc. in all the four districts. The maps can be integrated into the country's early warning system to increase awareness for better preparedness and improved disaster response. These maps can also be used in land use planning particularly for large-scale infrastructure investments and can provide stakehold-

ers with information needed to be able to mitigate the impacts of disasters. This policy recommendation is not a new one for it has been identified as a main deliverable under the Disaster Management Order of 2006 and one of the priorities in the SNAP for Disaster Risk Reduction 2012-2025. Despite the fact that the Government acknowledges its importance, geohazard maps are barely available in the country. Thus, this research project recommends geohazard mapping to be done in all the four districts.

²⁹ Information on coastal erosion, refer to <http://www.bt.com.bn/frontpage-news-national/2015/05/10/measures-contain-coastal-erosion-brunei>

The recommendation is also based on the analysis of the Government's capacity to implement the chosen policy by looking into initiatives done in the past, ongoing efforts and the available expertise, technology and human resources. It was necessary to know the Government's priorities and constraints in order to think of ways to address these issues. From the policy recommendation, a Plan of Action was developed.

Recommendations

Since 2008, more than 900 incidents of landslides have been recorded nationwide. Landslides not only cause damage to properties and areas where they occur, but also harbor an untold number of deaths and injuries. Given the severity of the problem, the Public Works Department conducted a pilot study in 2014 toward developing a national landslide hazard zoning map. A slope stability study has been carried out around residential development areas in Jalan Kota Batu and Jalan Tutong, which are known to be prone to landslides. The immediate outcomes of the study include mapping of landslide conditioning factors for the areas under review, as well as identifying landslide risks and hazards. The threshold for rainfall was also measured for it is a contributing factor to the occurrence of landslides.³⁰ The national landslide hazard zoning map will allow planners to gain a working knowledge of con-

cepts and considerations for incorporating landslide hazard assessment into the planning process, while civil engineers will be able to evaluate the appropriate mitigation measures in a timely manner.³¹ This project highlights the importance of being proactive rather than reactive in dealing with disasters. Reports indicate that the government spends an average of BND 5 million annually for slope rectification works.

The pilot study and the landslide zoning map can serve as fundamental building blocks in coming up with a national geohazard map. The government can utilize the data, findings and processes from the pilot study in doing the geohazard map. The only difference is that the geohazard map looks at various natural and manmade hazards instead of focusing on landslides only. Another initiative that can strengthen the geohazard map programme is to link it with the Climate Modeling and Weather Forecasting Project developed by the Universiti Brunei Darussalam in partnership with IBM. This project investigates the impact of climate change on flood forecasting using the "Blue Gene Supercomputer," which is the first in the ASEAN region. The joint efforts between researchers from UBD and IBM led to the creation of climate models using regional climate data, which were then incorporated into the weather models to enable flood forecasting and prediction of the impacts of climate-related events.³²

³⁰ Syazwa Souyono, "Pilot study to serve as 'first step' for landslide map", 16 January 2014, Brunei Times website

³¹ Rabiatul Kamit, "Landslide hazard map for Brunei", 16 January 2014, Brunei Times website

³² UBD-IBM Centre, Climate Modelling and Weather Forecasting, UBD-IBM Centre website

Having geohazard maps will benefit the general population, especially those living, schooling and working in vulnerable areas, and the Government, particularly the Ministry of Development, for it can make better informed decisions when investing in big infrastructure projects. Businesses also stand to benefit from this project such as the oil and gas sector, which has pipes running across peat lands and shorelines, construction companies, real estate developers, and the like. Furthermore, conducting geohazard mapping and assessment will enable NDMC and the Brunei Government to build national capacity on disaster management. Inter-agency coordination is crucial to successfully implement this policy. To produce geohazard maps with comprehensive risk assessments, agencies such as the Department of Meteorology of the Ministry of Information, Marine Department, Survey Department and Land Survey Department of the Ministry of Development, along with the NDMC, have to work together. The Government should also engage the private sector, academe and communities.

Capacity-building through geohazard mapping and assessment is also enshrined in the objectives of the AADMER. One of the strategic components of the AADMER Work Programme 2010-2015 is on risk assessment, early warning and monitoring. The Work Programme also supports activities that build

on national priorities and agenda by turning expected benefits and outcomes as leverage to produce a multiplier effect on a regional scale. Multi-hazard mapping and vulnerability assessment based on national data inputs are considered as part of an ASEAN-wide disaster risk assessment for these efforts allow for data consolidation and regional-level analysis. With geohazard maps, NDMC can feed accurate data and information to the AHA Centre. Part of the functions of AHA Centre is to receive and consolidate data pertaining to risk levels from the national focal points. On the basis of such information AHA Centre is able to conduct analyses on possible implications of disasters on a regional level. Thus, having a geohazard programme enables NDMC to contribute to the development of a disaster preparedness platform and disaster response planning on a regional level.

Plan of Action

The Plan of Action is divided into five phases, and each phase has a list of tasks to ensure the successful implementation of geohazard mapping in Brunei.

PHASE 1

Identify lead agency
Convene relevant implementing agencies
Obtain support from key Government offices
Ensure availability of funds and other inputs

It is important for the Government to identify the lead agency to take charge of the project, and bring in the relevant implementing agencies together to plan out the project. To ensure success at an early stage, strong support is required from key Government offices such as the Prime Minister's Office and the Ministry of Finance, as this will help ensure the availability of funds and other inputs such as access to important information and data.

PHASE 2

Project Proposal

Implementation Plan

After obtaining support for funding and other inputs, Phase 2 involves developing the project proposal and implementation plans.

PHASE 3

Survey areas to know which parts are prone to geo-hazards

Produce maps, manuals, and other information materials

Create a website to make the maps accessible online

Phase 3 is the implementation proper. Relevant agencies should conduct studies and survey areas to identify zones that are prone to geohazards. This will be followed by producing maps, manuals, and other information materials for dissemination, and later on create a website to make the maps accessible online.

PHASE 4

Conduct seminars and workshops for Government officials, school teachers, and community leaders

Engaging the public to increase awareness and know-how on the use of geo-hazard maps is important. Thus, it is necessary to conduct seminars and workshops for government officials, school teachers, and community leaders.

PHASE 5

Monitoring and Evaluation

The final phase is monitoring and evaluating the program to track progress and assess its effectiveness. If gaps and implementation issues are discovered, necessary actions should be done to address them.



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