The Natural Disaster Management in ASEAN Countries

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Abstract
Objectives of this study are to (1) find the impacts from natural disaster in ASEAN countries, (2) find the key success factors that affect to disaster management ability in ASEAN countries, and (3) find the model to improve disaster management ability in ASEAN countries. The information about disaster management of public sector on national level in ASEAN countries before, during, and after disaster were reviewed and analyzed.

The results found that the impacts from natural disaster in ASEAN countries were loss of life and property, injury, destruction of buildings and infrastructures, damage of agriculture and livestock, and depress of economic and social. In addition, the key success factors that affect to disaster management ability in ASEAN countries before disaster were appropriate policies, laws, and plans, disaster awareness, and education and training on disaster; during disaster were effective leadership, suitable decision, standard operating, adequate resources, good network between public sector and stakeholders, and updated data and technology; and after disaster were knowledge management, damage assessment and recovery, and long-term disaster planning.
Consequently, the model to improve disaster management ability in ASEAN countries should have six elements. First, proactive disaster management, second, allocation resources, third, empowerment the local authorities in disaster management, fourth, linkage key stakeholders, fifth, community based disaster risk management, and the last, management information system.

Keywords**:** Disaster management, disaster risk reduction, community based disaster risk management, ASEAN

1.Background

Most of disasters in the world are natural disasters, for example, flood, earthquake, volcanic eruption, tropical cyclone and tsunami (Coppola, 2007). Disasters arising from natural disasters can be divided into two groups. First, hydrometeorological disasters are related water and weather, which include extreme precipitation incident, flood, drought, windstorm, and tropical cyclone. Second, geological disasters are volcano eruption and earthquake (Pulhin, Tapia & Perez, 2010). The natural disasters are catastrophe to people and property, such as loss of life, injury, and destruction of buildings and communications (Carter, 1991). In addition, damage to infrastructures, agriculture and livestock, and depress of economic and social.

The ASEAN countries comprise 10 countries as the following, Brunei Darussalam Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Because of distinct economic, demographic, and social characteristics are unique geographic and climatic conditions. Therefore, ASEAN is considered as one of the world's most vulnerable regions (Uy & Shaw, 2010). The most of the ASEAN countries have located in vulnerable areas to disaster, for example Indonesia is one of the most disaster prone countries in the world and faces manifold dangers such as earthquake, tsunami, volcanic eruption, flood, and forest fires (ASEAN Inter Parliamentary Assembly, 2011b). Moreover, country which is far from the risk must also face with disasters, for instance Lao PDR is frequently affected by flood and drought (ASEAN Inter Parliamentary Assembly, 2013b). The ASEAN countries have different geographic areas, public policies, laws, leader, and resources. Consequently, the ASEAN countries have different of ability, strength and weakness in disaster management.

In 2015, the ASEAN countries will be established as the ASEAN community which consists of three pillars namely: first, the ASEAN political and security community, second, the ASEAN economic community and third, the ASEAN socio-cultural community (Department of Disaster Prevention and Mitigation, n.d.). The disaster management within the ASEAN countries have been mentioned in the first pillar (article B5) and the third pillar (article B7) which emphasis on the issue of preparedness, response, coordination, participation, increasing awareness and competency in disaster management. In addition, the ASEAN community has established the ASEAN Committee on Disaster Management (ACDM) to enhance cooperation in all aspects of disaster management prevention, mitigation, preparation, response and recovery through mutual collaborative activities in the ASEAN countries (Department of Disaster Prevention and Mitigation, n.d.).

Moreover, the ACDM has specified the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) which was signed by the Foreign Ministers of ASEAN in 26 July 2005, just a few months after the 2004 Indian Ocean Tsunami and entered into force on 24 December 2009. The AADMER is a regional legally-binding agreement that binds the ASEAN countries states together to promote regional cooperation and collaboration in reducing disaster losses in the ASEAN countries. Furthermore, the AADMER contains provisions on disaster risk identification, monitoring and early warning, prevention and mitigation, preparedness and response, rehabilitation, technical cooperation and research, mechanisms for coordination and simplified customs and immigration procedures. The AADMER also provides for the

establishment of the ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) to undertake operational coordination of activities under the agreement (Post Nargis Knowledge Management Portal, 2005).

Although, the ASEAN countries have instituted agreements in disaster management. However, the ASEAN countries have faced more natural disaster in terms of quantity, damage and loss as the following table.

Year	Occurrence	Deaths	Injured	Affected	Home-less	Total affected	Total damage ('000 USD)
2000	54	2,526	4,379	19,352,611	198,255	19,555,245	892,449
2001	43	1,949	730	8,323,915	161,180	8,485,825	345,041
2002	51	1,055	2,206	15,187,461	39,104	15,228,771	731,570
2003	39	1,051	517	1,826,367	102,223	1,929,107	178,663
2004	58	177,674	11,954	4,695,647	589,144	5,296,745	6,945,655
2005	37	1,733	1,506	2,670,034	18,205	2,689,745	1,012,131
2006	61	11,334	143,696	17,471,189	1,061,045	18,675,930	4,817,464
2007	57	1,835	3,317	5,352,293	127,437	5,483,047	3,639,315
2008	57	139,925	21,340	23,849,353	71,225	23,941,918	5,184,279
2009	51	3,232	5,711	20,351,866	108,745	20,466,322	4,508,307
2010	40	3,009	128,557	23,055,389	6,450	23,190,396	1,576,787
2011	66	3,717	6,959	26,537,618	13,247	26,557,824	41,798,177
2012	45	2,648	3,593	12,993,655	336,652	13,333,900	1,380,581
2013	26	431	2,605	2,434,673	26,500	2,463,778	3,206,680
Totals	**685**	**352,119**	**337,070**	**184,102,071**	**2,859,412**	**187,298,553**	**76,217,099**

Source: EM-DAT The international disaster database (2013).

Therefore, it is interesting and important to study the ability to manage natural disasters in the ASEAN countries which lead to finding the key success factors that affect to the ability to manage natural disaster in the ASEAN countries and lead to constructing the model to improve the ability to manage natural disaster in the ASEAN countries.

2.Objectives

2.1 To find the impacts from natural disaster in the ASEAN countries.
2.2 To find the key success factors that affect to the ability to manage natural disaster in the ASEAN countries.
2.3 To find the model to improve the ability to manage natural disaster in the ASEAN countries.

3.Literature Review

The author reviewed knowledge about disaster management and natural disaster management in the ASEAN countries as the following.

3.1 The definition of disaster

The definition of disaster are not yet accepted universally, because of the definition depend on the discipline using the terms (Shaluf, Admadun & Said, 2003), but in general terms, typical meaning or effects of disasters tend to be loss of life, loss of livelihood, loss of national economic, destruction of property, damage to national infrastructure and disruption to government systems, sociological and psychological after effects (Carter, 1991). In addition, it depend on the definition of each country which as a result of policy, law, organization and activity in disaster management of these countries. The trends of disasters are rapidly increasing. These changes are generally accepted as resulting from human actions and development patterns (Coppola, 2007). Therefore, related actors, for example public and private sector, community, and key stakeholder should investigate appropriate pattern for sustainable disaster management.

3.2 The disaster management

The disaster management is not the management process only after the disaster, but it is the management which needs to focus before, during, and after disaster. Hence, the definition of disaster management "is an applied science which seeks, by the systematic observation and analysis of disaster, to improve measures relating to prevention, mitigation, preparedness, emergency response and recovery" (Carter, 1991). In addition, it is process which deal with disaster since before, during and after disaster. Coppola (2007) concluded that complete disaster management has four components as the following.

1) Mitigation involves reducing or eliminating the likelihood or the consequences of a hazard, or both.
2) Preparedness involves equipping people who may be impacted by a disaster or who may be able to help those impacted with the tools to increase their chance of survival and to minimize their financial and other losses.
3) Response involves taking action to reduce or eliminate the impacts of disaster that have occurred or are currently occurring, in order to prevent further suffering, financial loss, or a combination of both.
4) Recovery involves returning victims' lives back to a normal state following the impact of disaster consequences.

Moreover, Asian Development Bank (1991 cited in Carter, 1991) established the basic format of the disaster management cycle as the following figure.

Source: Asian Development Bank (1991)

3.3 The natural disaster in the ASEAN countries

Most likely, the ASEAN countries have faced with natural disaster, as a result of they have located in an area at risk. For example, Cambodia is one of the most disaster prone country in ASEAN**,** is highly vulnerable to the impacts of natural disasters like flood, drought, and landslide (Plan UK, 2005 cited in Nguyen, Shaw & SVRK, 2010). Indonesia is one of the most disaster prone countries in the world. It faces multiple hazards for instance, earthquake, tsunami, volcanic eruption, flood, and forest fire (ASEAN Inter Parliamentary Assembly, 2011b). Lao PDR is one of the countries frequently affected by river flood and drought (ASEAN Inter Parliamentary Assembly, 2013b). Myanmar is affected from multiple natural hazards which include cyclone, flood, earthquake, tsunami, drought, and forest fire (Relief and Resettlement Department, 2009). Philippines situated along a stretch of risk prone area, near the most seismically active part of the earth, the Pacific Ring of Fire. Hence, Philippines also vulnerable to volcanic eruption and earthquake (ADPC, 2001 cited in Pulhin, Tapia & Perez, 2010). Vietnam has located in the tropical monsoon area in ASEAN, it is one of the most hazard prone area in the Asia Pacific Region (World Bank, 2011).

On the contrary, Brunei Darussalam is generally free from severe natural disasters such as earthquake, volcanic eruption and typhoon. However, it faced thunderstorm, monsoon flood, man-made disaster, and haze (ASEAN Inter Parliamentary Assembly, 2013a). Malaysia has located outside the Pacific Ring of Fire and is generally free from severe natural disasters such as earthquake, volcanic eruption and typhoon. Nonetheless, it is affected from other disasters such as flood, man-made disaster, and landslide (ASEAN Inter Parliamentary Assembly, 2011a). Singapore has located

outside the Pacific Ring of Fire, thus it is away from the ravages and destruction caused by natural phenomena for example earthquake and volcanic eruption. However, being highly urbanized, Singapore's main challenges are man-made and technology-based disaster (ASEAN Inter Parliamentary Assembly, 2013c). Thailand, there have been many disasters over the past decade, such as tsunami and flood, especially flood disaster in 2011 which appear loss of life and asset in many areas. Therefore, mostly natural disasters in the ASEAN countries are flood and storm (Pulhin, Tapia & Perez, 2010; Pereira, Tiong & Komoo, 2010).

3.4 The disaster management in the ASEAN countries

All of the ASEAN countries have established national organizations to disaster management as the following. In Brunei Darussalam, the National Disaster Management Centre (NDMC) has led initiatives to ensure all aspects of disaster management, mitigation and prevention, preparedness, and response and recovery are considered though policies, strategies and practices implemented guided by international, regional and national drivers. The NDMC's strategy is to enhance capacity in both response and preparedness with the main objective in building disaster resilience community. The NDMC has also embarked on public awareness program to increase community resilience through the community based disaster risk management (CBDRM) (ASEAN Inter Parliamentary Assembly, 2013a).

The National Committee for Disaster Management (NCDM) of Cambodia has established the actions for achieve the goals of the disaster management (ASEAN Inter Parliamentary Assembly, 2013e), review and improve the legislations, policies, and promote resources and budget allocation, improve system and mechanism of disaster management, mainstream disaster risk reduction into social-economic development and poverty elevation agenda, invest long term disaster management knowledge building and strengthen regional, international collaboration and cooperation in disaster management.

National agency for disaster management (known as Badan Nasional Penanggulangan Bencana, or BNPB) is an independent body that has the authority to coordinates and implements disaster management programs and activities in Indonesia (ASEAN Inter Parliamentary Assembly, 2011b). Indonesia has law on disaster management (Law 24/2007) that outlines the principles, division of labor, organization and implementation of the national disaster management system, including the role of international organizations. In addition, Indonesia was among the first few countries in Asia to formulate a national action plan for disaster risk reduction (World Bank, 2011). Moreover, Alexander, Halbrendt and Salim (2006), concluded that resources management in Indonesia, the sustainable vulnerability reduction for disaster risk management (DRM) of Indonesia tsunami rehabilitation and reconstruction plans are listed under the categories of resource provision. Furthermore, disaster management by people or community based has occurred in Bantul district, Indonesia. People rebuild their house by themselves after disaster. Local government has only supported basic housing needs (Kusumasari & Alam, 2012).

Lao PDR, the National Disaster Management Committee (NDMC) have responsibilities for developing policies and coordinating disaster risk management activities in the country. The disaster risk management framework developed by the

Government is appropriately structured both vertically and horizontally to identify and address the threats of hazards at the village, district, provincial, municipal and national levels of society (ASEAN Inter Parliamentary Assembly, 2013b).

The National Security Council (NSC) is the principal policy making and coordinating body for disaster management in Malaysia (Komoo, Aziz, & Lim, 2009a cited in Pereira, Tiong & Komoo, 2010). The NSC has been organizing community based disaster management programmes in collaboration with other agencies such as the Malaysian Meteorological Department (MMD), and the Department of Town and Country Planning Peninsular Malaysia, (ASEAN Inter Parliamentary Assembly, 2011a).

Moreover, Malaysia has various experiences of disaster management, for example biological, structural collapse, fires and explosions, landslides and meteorological incidents (Said & Ahmadun, 2007). Malaysia has undertaken various measures to enhance disaster prevention, mitigation, response, relief and recovery in the country such as; amendments to existing laws and acts, public awareness and education, establishment of forecasting and early warning systems, mitigation structures, national disaster relief fund; and development of standard operating procedures (Che Moin, 2006 cited in Said & Ahmadun, 2007). In addition, Billa, Shattri, Mahmud and Ghazali (2006) discovered that spatial decision support system (SDSS) in Malaysia has the role in the collection and processing of information to speed up communication between the proponents of the disaster management program.

The National Disaster Preparedness Central Committee (NDPCC) is responsible for disaster management in Myanmar. The NDPCC has established the Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) for disaster resilient. Moreover, four working groups were constituted to develop the specific components of MAPDRR, namely: 1.hazard, vulnerability and risk assessment and multi-hazard early warning systems, 2.policy, institutional arrangement and further institutional development and preparedness and response programs at national, state/division, district and township levels, 3.mainstreaming disaster risk reduction into development, and 4.community based disaster preparedness and risk reduction and public awareness, education and training (Relief and Resettlement Department, 2009).

National Disaster Coordinating Council (NDCC) is the highest policy-making and coordinating organization for disaster management in Philippines. Philippines have disaster management which covers risk reduction and preparedness before disaster, response during disaster and recovery after disaster (Pulhin, Tapia & Perez, 2010). Moreover, Pulhin et. al (2010) concluded that factors led to an effective integration of disaster risk reduction and climate change adaptation were awareness raising, enabling policies, effective leadership and cooperative, and technological and capacity building.

The Singapore Civil Defence Force (SCDF) is Singapore's leading operational authority. The SCDF is responsible for leading and coordinating the multiagency response. The emergency preparedness and disaster management activities undertaken by Singapore are based on three main principles, namely: 1) prevention, 2) readiness, and 3) awareness (ASEAN Inter Parliamentary Assembly, 2013c).

In Thailand, start from the legal framework, by enacting the Disaster Prevention and Mitigation Act 2007 or DPM Act 2007, the foundation of legal mechanism of Thailand's disaster management system. The Department of Disaster Prevention and Mitigation (DDPM) is stipulated as the core government department in handling national disaster management tasks. Afterwards, by launching the National Disaster Prevention and Mitigation Plan 2010-2014, Thailand's disaster management system was formulated by focusing on three main parts; 1) principles of disaster management, 2) disaster countermeasure procedure, and 3) security threat and countermeasure procedure in managing both natural disaster and national security issues. The severe flood situation in Bangkok and surrounding areas is consequently brought about the launch of royal decree in the creation of National Catastrophe Insurance Fund 2012 to provide risk management caused by flood, earthquake and windstorm. The fund includes the insurance and reinsurance of household, small and medium enterprises and industry sector (ASEAN Inter Parliamentary Assembly, 2013d). Moreover, the National Committee on Disaster Prevention and Mitigation (NCDPM) has been instituted and served as a policy making body on disaster management. This Committee is chaired by the Prime Minister and comprised of designated members from related Ministries and government agencies (ASEAN Inter Parliamentary Assembly, 2013d). The NCDPM has function to formulate the national disaster prevention and mitigation plan, approve the national plan before submitting to the cabinet, integrate the development of disaster prevention and mitigation system among all concerned sectors, give recommendations, consultation, and support to concerned agencies propose regulation on remuneration.

Vietnam's government approved the national strategy for natural disaster prevention, response and mitigation to 2020 which lays out Vietnam's primary disaster risk management objectives, focusing largely on water related disaster. The main objectives of the national strategy are the integration of disaster risk management into socio-economic development plans with a focus on disaster response, ensuring sustainable disaster recovery which integrates disaster risk management, planning five different regional disaster risk management strategies for the five geographical regions of the country, combining structural and non-structural measures in disaster risk management and dividing implementation responsibilities, and timing for risk reduction among a range of ministries (World Bank, 2011). Moreover, management tools were applied for disaster management in Vietnam. For example, Tu and Nitivattananon (2011) discovered that adaptation process to cope with flood risk in Ho Chi Minh city, focused on integrating vulnerability assessment with the assessment tools in order to develop as well as implement adaptation measures effectively.

Although, the ASEAN countries have national organizations and many procedures of the natural disaster management. However, disaster management in the ASEAN countries have weakness as the following; location near the most seismically active part of the earth namely: the Pacific Ring of Fire; the high population density in many of the larger cities increased the vulnerability of the population in case of large scale disasters (World Bank, 2011); deficiency in economic planning, economic forecasting, and annual budgetary planning process (Benson, 2009 cited in Pulhin, Tapia & Perez, 2010); lack a coordination among stakeholders are also among the weakness of the disaster management; lack a system of disaster risk and vulnerability indicators at national and sub-national scales (World Bank, 2011); lack a master for natural

disaster management, participation of local and international NGOs, education and knowledge for tsunami, and information management system (Moe & Pathranarakul, 2006; Lebel, Lebel & Daniel, 2010); resources (budget) constraints (World Bank 2007 cited in Nguyen, Shaw & SVRK, 2010); and limitation of professional staff and low commitment of government staff (Nguyen, Shaw & SVRK, 2010).

Therefore, first, there is a need to update the disaster management system and practice, particularly including medium and long term visioning for mitigation and reducing risks to natural disaster. Second, the need to integrate efforts on disaster risk reduction and climate change adaptation has been recently gaining greater recognition (Pulhin, Tapia & Perez, 2010). Third, the need to improve sub-regional, regional, and international coordination in the field of disaster management and disaster risk reduction, particularly in the development of early warning mechanisms and disaster preparedness to minimize the impacts of disaster (ASEAN Inter Parliamentary Assembly, 2011b). Fourth, the need capability for disaster management cycle in local government are evaluation, monitoring, dissemination, planning, exercise, training, assessment, information exchange, logistical expertise, damage assessment expertise, debris removal and disaster assistance skills (Kusumasari, Alam & Siddiqui, 2010).

Fifth, the need to improve warning information system because of management information system and network system have the role for saving people and property before and during disaster (Martin, 2007). Sixth, the need for better awareness on disaster risk reduction at the community level to encourage community prepare to mitigate disaster risks properly (Shikada, Myint, Ko Gyi, Nakagawa & Shaw, 2012).
In addition, the community based disaster risk management (CBDRM) methodology need to be continually used as a core concept in the future disaster risk reduction program which the key success recommendations as the following (Nguyen, Shaw & SVRK, 2010).

1) Ensuring community participation and government linkages, including communications with authorities and disaster management focal points.

2) Focusing projects more on sustainable livelihoods and strengthening capacity.

3) Mainstreaming disaster risk reduction into national and local development planning rather than ‘‘stand-alone’’ projects.

4) Accessing more resources and longer funding cycles to enable disaster risk reduction initiatives to be fully integrated into development plans.

5) Addressing food security issues for rural households when constructing disaster risk reduction projects at a community level.

Therefore the CBDRM is a process in which at risk communities are actively engaged in the identification, analysis, treatment, monitoring and evaluation of disaster risks in order to reduce vulnerabilities and enhance capacities (Centre for International Studies and Cooperation, n.d.).

Moreover, an integrated database management system needs to be developed, regular educational and community awareness programs are also required on disaster

prevention measures, specifically for disaster risk mitigation strategies, and need to establishment of the Ministerial Integrated Disaster Prevention and Mitigation Action Plan on disaster management with focusing on disaster management by participation of all involved agencies at provincial and ministerial, private and government sectors, and foundation and NGOs.

4.Methodology

The related information with the natural disaster management of the ASEAN countries were collected from academic journals such as Disaster Prevention and Management journal, books such as Community Based Disaster Risk Reduction, Climate Change Adaptation and Disaster Risk Reduction, country report such as World Bank, and website such as www.aipasecretariat.org. Afterwards, the author reviewed and analyzed information for investigate the key success factors that affect to disaster management ability in the ASEAN countries and the model to improve disaster management ability in the ASEAN countries.

5.Results

The author found results of study as the following.

5.1 The impacts from natural disasters in the ASEAN countries were loss of life and property, injury, destruction of buildings and infrastructures, damage of agriculture and livestock, and depress of economic and social.

5.2 The key success factors that affect to disaster management ability in the ASEAN countries as the following.

1) Before disaster were appropriate policies, laws, and plans, disaster awareness, and education and training on disaster.

2) During disaster were effective leadership, suitable decision, standard operating, adequate resources, good network between public sector and stakeholders, and updated data and technology.

3) After disaster were knowledge management, damage assessment and recovery, and long term disaster planning.

5.3 The model for improve disaster management ability in the ASEAN countries should have six elements as the following.

1) Proactive disaster management means that should to emphasis on before and long term of disaster management.

2) Allocation resources mean that related organization with disaster management should to obtain sufficient budget, staff, and material.

3) Empowerment for local authorities in disaster management because of local organization must face to disaster before other organization.

4) Linkage key stakeholders among public, private, and NGOs sectors for enhance participation, collaboration, and potential in disaster management.

5) Community based disaster risk management should to implement seriously for promote community prevent, respond, and recovery damage from disaster by themselves.

6) Management information system for disaster management should be always accurate, fast, and modern.

6.Conclusion

The combination of the ASEAN countries as the ASEAN community in 2015 is good opportunity for cooperation to manage natural disaster in the ASEAN region. The calamity from natural disaster have broadly effected to countries in the ASEAN, for example the tsunami on 26 December 2004 ruined to Indonesia and Thailand. Although, they have instituted many organizations and laws for the natural disaster management within their countries, but have acquired huge destroy from the tsunami. Because of, each country in the ASEAN countries has different of experience, strength, weakness, and readiness in the natural disaster management. Therefore, each country in the ASEAN should to support knowledge, personnel, resources (budget), and material each other for conduce to strength in the natural disaster management and decline destroy from natural disaster.

Moreover, the ASEAN's cooperation in management natural disaster should not be only law binding, but must lead to implement seriously. Furthermore, the natural disaster management in the ASEAN countries should be more intensive and concentrate to all cycle of disaster management; before disasters are prevention, mitigation, and preparedness, during disasters are response and support, and after disasters are recovery and development.

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