



# វិទ្យាស្ថានសភាកម្ពុជា

## PARLIAMENTARY INSTITUTE OF CAMBODIA

### RESEARCH PAPER

Regional fellowship program

## Review of Current Flood Risk Management System in Cambodia

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February 2018

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## Abbreviations

CC	: Climate Change
NCDM	: National Committee for Disaster Management
CRC	: Cambodia Red Cross
CRC	: Cambodia Red Crescent
RGC	: Royal Government of Cambodia
MRC	: Mekong River Commission
MOWRAM	: Ministry of Water Resources and Methodology
MOE	: Ministry of Environment
NGO	: Non-Government Organization
UN	: United Nation
DM Law	: Disaster Management Law
PCDM	: Provincial Committee for Disaster Management
DCCDM	: District Committee for Disaster Management
CCDM	: Commune Committee for Disaster Management
JICA	: Japan International Cooperation Agency
CCCA-TF	: Cambodia Climate Change Alliance Trust Fund
NCS	: National Council for Sustainable Development
SPCR	: School for Primary Care Research
UNDP	: United Nations Development Program
WFP	: World Food Program
WHO	: World Health Organization
UNICEF	: United Nation Children's Fund
IFRC	: International Federation of Red Cross
RCS	: Red Crescent Societies
DOM	: Department of Meteorology
GTS	: Global Telecommunication System
WDRS	: Weather Doppler Rada System
EWS	: Early Warning System
ADB	: ASEAN Development Bank
DMIS	: Disaster Management Information System
FAO	: Food and Agriculture Organization
ADPC	: ASEAN Disaster Preparedness Center
UNDMT	: United Nation Disaster Management Team
UNESCAP	: United Nations Economic and Social Commission for Asia and the Pacific

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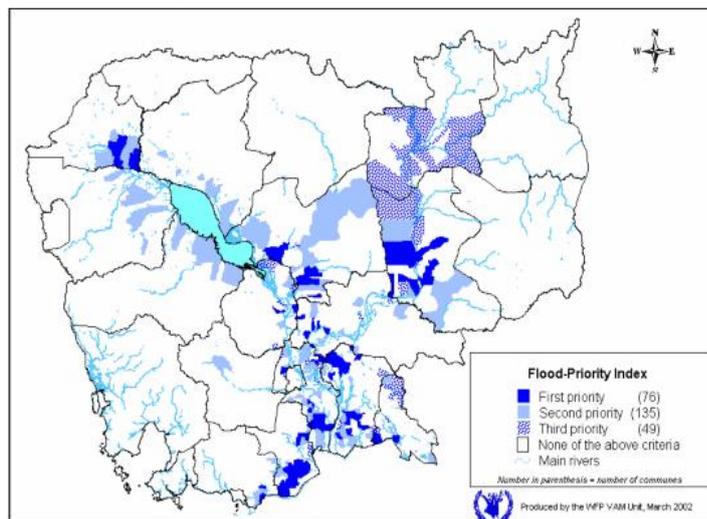
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## 1. Introduction

In Cambodia, the effects of climate change have been evident. The mean annual temperature has been increasing by approximately 0.18 °C per decade since 1960. Future projections suggest that this trend will continue, with the average annual temperature rising by 0.7 -2.7 °C by the 2060s and 1.4-4.3 °C by the 2090s throughout the year (depending on the greenhouse gas emission scenario and the climate model used).[1] By the 2090s, raining during the rainfall season is anticipated to increase by up to 31% in the June-August period and by up to 42% in September-November.[2]

Climate change has already caused disasters to Cambodia in several forms such as changing weather conditions and especially natural disasters such as flood and tropical storms. Flood mapping developed by the World Food Program in 2002 showed that the provinces surrounding the Great Lake and along the Mekong Rivers were the most vulnerable areas for flood interventions in Cambodia (Figure 1)[3]. Experience showed the strongest flush floods happened in Cambodia three times in 2001, 2002 and 2009. In October 2001, the floods killed 62 people and 18 provinces were affected while in 2002 the flood killed 26 people (40% of whom were children), and many schools were destroyed.[4] In 2009 the flood affected people and infrastructure in the country caused by Typhoon KETSANA between September 26 and October 5, which left 43 people dead, 87 people severely injured, 218 houses completely destroyed, and more than 10,559 buildings affected. The most affected districts were among the poorest areas in the country and caused long-term impacts on the communities' livelihood. [5]

Figure 1: Priority Areas for Flood Interventions



Source: NCDM & WFP 2003 Mapping vulnerability to natural disaster in Cambodia

Addressing floods requires cooperation between stakeholders. In Cambodia, the Royal Government of Cambodia established the National Committee for Disaster Management (NCDM) in 1995 to take responsibility for responding to the immediate effects of floods and other disasters. [6]Currently, NCDM is finalizing the draft of the strategic national action plan for flood risk reduction as part of

the country's commitment.[7] The Law on Disaster Management was adopted in 2015. NCDM establishes the mechanism for the disaster risk management committee at the Sub-national level (PCDM, DCDM and Commune Committee for Disaster Management - CCDM). NCDM also works with other stakeholders to make their works effective, for example, with the national and local administrations, armed forces, and volunteer groups. The Red Cross and Red Crescent (RC&RC) are also key players that work with NCDM to solve potential issues of floods in Cambodia, including reducing the effect of livelihood vulnerabilities of local people.[8]

Since 2000, activities to manage flood risks in Cambodia have increased in scope and scale. However, it is unclear how the current flood risk management system in Cambodia is operated, what challenges it has faced so far and what lessons are learned from the previous flood risk management work. The climate change model has predicted that Cambodia will have heavier rainfall by the 2090s which means the country will face stronger floods in the future. To help prepare the government to deal with flood issues in the future in face of future impacts of climate change, this study aims to review the current flood risk management system in Cambodia, and the challenges and lessons learned in order to improve the resilience of flood risk management in the country. Typhoon Ketsana in 2009, should provide several lessons for Cambodia to learn from and improve its current flood risk management system. The specific objectives of this paper are set out below.

### ***1.1 Research Objectives***

- To describe the current institutional structure and mechanisms for the flood risk management system in Cambodia.
- To review the challenges of flood risk management in Cambodia.
- To identify lessons learned from the flood risk management system in response to Typhoon Ketsana in 2009.

### ***1.2 Research Method***

This paper reviewed the existing documents of the Royal Government of Cambodia (e.g. the Law on Disaster Management) and reports of NGOs (e.g. the Community Based-Disaster Risk Management report by UNESCAF and ADPC) with the focus on identifying key stakeholders, mechanisms, challenges and lessons learned in managing flood risks in Cambodia. The researcher also specifically reviewed Typhoon Ketsana's Main Report and Flood Risk Management System in Cambodia (case study from floods of 2009 and 2011) to set out evidence and findings on lessons learned about the flood risk management system in Cambodia.[8]

## **2. Current institutional structure and mechanisms of the flood risk management system**

### ***2.1 Institutional Structure***

Three stakeholders play important roles in flood risk management in Cambodia: the National Committee for Disaster Management, the Cambodia Red Cross and, Disaster Risk Management Networks. On 8<sup>th</sup> June 2015 Cambodia passed the Law on Disaster Management (DM Law), [9]that

formalized and provided, for the first time, strong legal basis for the NCDM that had been in place since 1995 to lead and coordinate all disaster management activities in the country. The NCDM is the main authority of Royal Government of Cambodia (RGC) responsible for disaster management including flood risk management.[9]

### **2.1.1 National Committee for Disaster Management (NCDM)**

In Cambodia, according to the Disaster Management Law 2015, NCDM is the main agency responsible for leading, administering and coordinating all disaster management activities including flood risk management. The mandate of NCDM at the national level is twofold: i) to implement prevention and mitigation strategies to reduce the impacts of disasters on life, livelihoods and infrastructure, and ii) to issue and recommend guidelines and policies for legislative and budgetary support for emergency and disaster management (Table 1). [10]

NCDM is headed by the prime minister as president and has 17 ministries, as well as representatives of the Royal Cambodia Armed Forces, Cambodia Red Cross, and civil Aviation Authority as members. The General Secretariat of NCDM consists of five departments: Administration and Finance Department, Information and Relation Department, Emergency Response and Rehabilitations Department, Preparedness and Training Department and Search and Rescue Department.[11]

NCDM also has its Sub-National Committees for Disaster Management for Cities, Provinces, Towns, Districts and Communes. The Sub-National Committees at Capital Cities, Provinces, Khan, Municipality, and Districts are composed of Capital cities, provincial line departments of ministries as members as well as, representatives from the police, army and the city, and provincial, Khan, Municipality district branches of the Cambodian Red Cross. The Sub-National Committee for Disaster Management produces technical guidance on contingency responses, issues and policies, strategic plans, and establishes a system to provide coordination and cooperation during disasters. For flood response, the NCDM coordinates the different line ministries and the donor community. For recovery, the NCDM is responsible for making proposals to the RGC on the requirements, budget, resources and assistance needed after a disaster (Table 1).[11]

The Committee for Disaster Management at the commune level consists of local volunteers who coordinate with village disaster management groups at the village level to work on flood risk management. CCDM is responsible for developing plans for emergency preparedness. During disasters, CCDM is responsible for developing a plan for disaster risk reduction, carrying out the activities as detailed in the two plans, and conducting commune contingency planning. The Village Disaster Management Group (VDMG) is in charge of local disaster risk reduction planning and strengthening community based disaster management after disaster (Table 1). [9]

Table 1: Roles of National Committee for Disaster Management across Levels

Actor	Preparedness	Response	Recovery
NCDM	<ul style="list-style-type: none"> <li>Produce technical guidance on contingency</li> <li>Issue the policies, strategic plans, or guidelines</li> <li>Set up a system to provide coordination and cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Immediate actions</li> <li>Coordinating role between the different line ministries, and the donor community</li> </ul>	<ul style="list-style-type: none"> <li>Raise proposal to the RGC</li> </ul>
PCDM	<ul style="list-style-type: none"> <li>Prepare and recommend proposals for intervention in times of disaster</li> </ul>	<ul style="list-style-type: none"> <li>Immediately report to NCDM for assistance</li> <li>Mobilize the humanitarian assistance</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
DCDM	<ul style="list-style-type: none"> <li>Prepare and disseminate disaster related information to the public</li> </ul>	<ul style="list-style-type: none"> <li>Lead disaster response, relief, evacuation activities</li> </ul>	<ul style="list-style-type: none"> <li>Submit reports to the PCDM on damages and needs assessment</li> </ul>
CCDM	<ul style="list-style-type: none"> <li>Develop plans for emergency preparedness</li> <li>Develop plans for disaster risk reduction</li> </ul>	<ul style="list-style-type: none"> <li>Carry out the activities detail in both plans</li> <li>Prepare commune and disaster risk reduction contingency planning</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen Community Based Disaster Management</li> </ul>

### 2.1.2 Cambodian Red Cross

The Cambodia Red Cross (CRC) was established in 1994 and is the only non-government organization with formal membership in the NCDM. The CRC has the mission to reduce poverty and protect vulnerable people. It has four core areas to address, one of which is to ensure disaster response and preparedness to victims. The CRC helps supplement government efforts with quick response and relief actions during an emergency. It contributes to providing initial needs, for instance, facilities, shelters, water and sanitation, food, household kits in affected areas caused by floods. It also contributes to providing training and dissemination on the Disaster Management Law to local authorities. To perform its tasks, the CRC also has branches in all provinces. By 2015, the CRC had over 400 staff, over 20,000 volunteers in communities, over one thousand advisors and 30,000 youths in schools who help carry out its mission. [12]

Table 2: Roles of Cambodia Red Cross

Actor	Preparedness	Response	Recovery
CRC	<ul style="list-style-type: none"> <li>Provide training and dissemination of disaster management law to local authorities.</li> </ul>	<ul style="list-style-type: none"> <li>Supplement government efforts with quick response and relief action</li> <li>Provide initial needs</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

### 2.1.3 Disaster Risk Management Networks

There are three other networks that engage in flood risk management in Cambodia. The first network is the United Nation Disaster Management Team which is composed of representatives of the UN Food and Agriculture Organization (FAO), United Nations Development Program (UNDP), United Nation Children’s Fund (UNICEF), UNFPA, World Food Program (WFP), Japan International

Cooperation Agency (JICA) and the World Health Organization (WHO). This network helps to address disaster risk reduction, preparedness and response to natural disasters in line with the government national contingency plan or any emergency request of the government. [10]

The second network is Humanitarian Accountability in the humanitarian sector. This network includes the International Federation of Red Cross (IFRC), Red Crescent Societies (RCS), World Visions and other NGOs.[10]

The third network refers to non-government organizations that work directly at the community level to address disaster risks including floods. According to the study by the Partnership for Disaster Reduction in South East Asia in 2008, there are about 10 international NGOs working on community-based disaster risk management in Cambodia (Table 3).

Table 3: Survey of NGOs working in the country

	Areas	Number of Communes	Beneficiaries	Funding	Status
Action Aid	Banteay Meanchey, Kratie, Svay Rieng	9	18,163 Individuals	352,941 Euro	2007-2008
CARE	Prey Veng, Svay Rieng	15			3Years 2006-2009
CONCERN	Kompong Cham, Kompong Chhnang, Pursat			349,475 Euro	4years 2008-2010
GRC	Kratie, Prey Veng, Pursat, Svay Rieng, Kompong Chhnang	7		432,237 Euro 23,600 USD	1year Jan 2007-Mar 2008
CWS	Svay Rieng	All Communes		13,000 USD	6 months Jan-June 2008
LWF	Battambang, Kompong Chhnang, Kompong Speu			655,338 Euro	3years 2005-2008
OI	Kompong Speu, Svay Rieng, Kratie	13	15,000 Households	1.3M USD	1-3 years project Ending 2008
PLAN	Kompong Cham, Rattanakiri	6 at the district level		130,000 USD	1 year project
WV	Kompong Chhnang, Takeo	9		242,310 USD	3years 2006-2009
ZOA	Oddar Meanchey	7		656,000 USD	2years 2006-2008

(Source: Partnership of Disaster Reduction South-East Asia Phase4 on Community Based Disaster Risk Management in Cambodia April 2008)

## 2.2 Flood risk management mechanisms

The mechanisms to manage flood risks in Cambodia can be divided into three phases: preparedness, emergency response and rehabilitation and recovery.

### 2.2.1 Preparedness

Preparedness focuses on pre-disaster action which includes developing early warning systems, strategies for action, contingency plans, and emergency response plans for mitigating disaster losses and providing disaster relief. NCDM is responsible for producing technical guidance on contingency and emergency planning for flood preparedness for its sub-national committees who are responsible for doing the planning. Besides the NCDM, there are six ministries who also

contributed to developing contingency and emergency planning. These ministries include the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Rural Development, the Ministry of Health, the Ministry of Environment, the Ministry of Land Management, Urban Planning and Construction, and the Ministry of Education, Youth and Sport. [13]

The Ministry of Water Resources and Meteorology also plays an active role in providing weather forecasting and early warning information to national and sub-national government agencies, local authorities, and public through television, national radio, and local newspapers.[9] The Department of Meteorology (DOM) is responsible for observing surface and atmospheric weather conditions and providing weather information necessary for preventing and mitigating natural disasters that can have a negative impact on human society, communities and socio-economic development. The DOM also generates many types of meteorological information including daily weather forecasting. Such information is reported to MOWRAM, relevant stakeholders and the media.[12]

In 2012, DOM had 44 staff and is equipped with several facilities and instruments for weather observation and forecasting such as:

- 8 Automatic Weather Stations (Countrywide);
- 24 Manual Weather Stations (Countrywide);
- 124 rainfall gauges (Countrywide);
- Global Telecommunication System (GTS);
- Satellite Imagery Receiving System: Receives and displays GMS (MTSAT) satellite imagery; and
- Weather Doppler Radar System (WDRS) to support short term and logging of meteorological phenomena. [14]

### **2.2.2 Emergency response**

Emergency response refers to immediate action to stop the spreading of hazards and mobilize humanitarian assistance and basic materials for disaster relief. According to the law on Disaster Management, this responsibility rests with the on-site authorities and the commune –Sangkat, town, district -khan committees for disaster management of the affected areas.[13] If the disaster occurs in more than one town, it is the responsibility of the city-province committees for disaster management to respond (Article 19). During disaster events, the authorities and committees together with line department members perform six duties: i) conducting emergency operations, search and rescue activities, providing medical care and protection of victims' lives; ii) paying high attention to the needs of vulnerable people (woman, children, elderly, handicapped and disabled persons), iii) containing the spread of the disaster, iv) reporting the disaster situation to their line authorities and committees, v) controlling the situation before handing it over to other competent committees, and vi) continuing to assist in disaster relief and emergency response (Article 18).

In cases when the disaster is beyond their capability to respond, the responsible sub-national committee can report the issue to NCDM for assistance. In this case, the NCDM can request support from the Royal Government of Cambodia to mobilize an immediate intervention on a large scale

from relevant ministries, public and private sectors and civil society organizations. [9] In this case, the Cambodia Red Cross and NGO networks also take action and work in close cooperation with the provincial and district committee for disaster management and on-site local authorities to deliver basic goods and services to the victims of affected areas. [15]

### **2.2.3 Rehabilitation and recovery**

After the disaster, sub-national committees for disaster management in the affected areas, together with the local authorities are responsible for leading and coordinating the assessment of post-disaster damages, losses and recovery needs. The Post-Disaster Need assessment study sets out strategic and priorities for rehabilitation and recovery that can be divided into short term (0-6months), medium-term (2years) and long term (5years) planning efforts. All stakeholders including the government and development partners (frequently, World Bank, ADB, INGOs) are then able to participate in addressing the issues according to the plan.[16] For example, the Ministry of Agriculture, Forestry and Fisheries could take part in providing seed, fertilizer, and equipment to deal with the issue of food security in the most affected areas. The Ministry of Education helps rehabilitate schools, materials and equipment that are damaged by disaster and records the number of damage classrooms to determine short, medium, and long term rehabilitation plans. The Ministry of Rural Development assists in reconstructing and rehabilitating road networks at the national and provincial levels that are damaged by floods according to specific standards for road construction and maintenance. The Ministry of Health strengthens the disease surveillance system, assesses and strengthens health facilities and services and provides psychological counseling for those affected by the disaster. [17]

## **3. The challenges of the flood risk management system in Cambodia**

In Cambodia, the operation of the current flood risk management system is not without challenges. Key challenges are, limited budget, capacity and training issues, inadequate early warning systems, risk knowledge, and absence of standard operating procedures and relief tracking systems for flood response.

### **3.1 Limited budget at all levels**

The work of the NCDM at all levels, has been constrained by the limited availability of finances, especially the Secretariat General with its primary source of funding derived from within the budget of the Council of Ministers. Although the Ministry of Economic and Finance has provided extra funds in times of disasters, an absence of dedicated funds / resources at the national, and especially at the sub-national levels has resulted in delays in resource mobilization. [18] The Sub-National Disaster Management Committees and its teams faced constraints in performing their roles according to the Sub-Decrees of 2002 and 2006 due to insufficient budgets.[19]

### ***3.2 Capacity and training issues at all levels***

The issue identified regarding the NCDM Secretariat-General and the Sub-National Disaster Management Committees is related to an overall shortage in human resource capacity to fulfill its role. The five departments of the NCDM lack skills to implement cross-cutting mandates of the departments. In particular, the Department of Preparedness and Training which is the key department responsible for facilitating training and capacity building activities for officials at province, district, and commune levels, still lacks human resources to perform their mandate. As such, the calendar of training / program for capacity building of relevant departments and sub-national committees, has not been regularly updated. [18, 20] Similarly, the Sub-National Disaster Management Committees also faces serious challenges related to the lack of permanent staff and relevant skills-based training to manage and respond to disaster situations.[19]

### ***3.3 Early warning systems at national and sub-national levels***

Early Warning Systems are the key tool for disaster preparedness and mitigation, especially for hazards such as flooding during rainfall. There are two key institutions that monitor, produce and disseminate weather and flood-related information in Cambodia. The first one is the Ministry of Water Resources and Meteorology, which monitors and collects data/information on weather forecasting. The second is the Mekong River Commission (MRC) supporting early warning systems at the national and provincial levels by providing the data. Although these two institutions have been working on establishing the Early Warning System,[19] assessment reports to date, have highlighted the limitations in the national EWS related to notification. [18, 19] For example, during Typhoon Ketsana in 2009, local authorities and residents of affected provinces did not receive timely early warnings. In 2000, flood warnings delivered one day in advance was not sufficient for communities to prepare themselves to cope with the consequences.[19]

### ***3.4 Risk knowledge***

Lack of risk knowledge was another area which was identified in previous research. For example, there was no system to collate, verify and consolidate all the disaster related information. Although the National Action Plan for Disaster Risk Reduction (2014-2018) proposed the establishment of a new Disaster Management Information System (DMIS) department at the NCDM, it had not yet institutionalized a disaster management information system to support the analysis and dissemination of risk data and information.[9]

### ***3.5 Absence of standard operating procedures and relief tracking systems for flood response***

Key challenges in disaster response noted by previous assessment reports were related to the absence of standard operating procedures for emergency response and search and rescue operations. The NCDM has so far, been constrained by the lack of a relief tracking system or database to help identify and track assistance from the Cambodian public sector and national organizations, as well as from regional and international organizations.[19]

#### 4. Lessons Learned from Typhoon Ketsana

The high levels of damage by Typhoon Ketsana in 2009 brought attention and several lessons learned to the Royal Government of Cambodia on flood risk management in the country. Key lessons learned are set out below:

- Public awareness of flood preparedness is important for people who live in the flood prone areas. Prior to Typhoon Ketsana, local people were informed of it. However, it did not translate into better preparedness at their commune and household levels, and that is why many families who lived close to rivers were seriously affected by the Typhoon. A lesson learned from this is that, the NCDM needs to strengthen its preparedness strategies and mechanisms at the province, district and commune levels to educate local people on a regular basis, on flood preparedness.[21]
- Training and capacity building activities had also been conducted by external partners for disaster management officials at the province, district, and commune levels, but the level and coverage of the training were still insufficient to deal with the disaster. A lesson learned from this was that the NCDM needs to continue upgrading the skills of its National and Sub-National officials and to conduct regular training for its members on disaster management and how to respond during flood events.[21]
- Typhoon Ketsana highlighted the fundamental problem of the absence of a coherent system to track relief distribution among stakeholders during emergency response. This made it difficult for all stakeholders to undertake relief work. This suggests that to improve emergency response, there is a need for the government to set up a central database system to track collective figures of both internal and external emergency efforts to avoid overlapping activities.[21]
- Search and rescue activities also took place during Ketsana, but coordinated actions among agencies within the government institutions was still limited, which caused a duplication of efforts. A lesson learned from this is that a more effective harmonized system of command and control to coordinate search and rescue efforts among government institutions is needed.[21]
- Typhoon Ketsana highlighted the need to improve Cambodia's disaster risk financing system, especially at the Sub-National level. It was found that, during the Typhoon, at the sub-national level, the annual budget for disaster risk reduction activities was virtually non-existent. Disaster Management Committees in provinces, districts and communes depended on foreign-funded projects for disaster preparedness and disaster responses. Equipment for emergency response at the sub-national level was extremely limited. For example, local police officials in Kratie reported having to borrow boats from private citizens to undertake search and rescue operations. [21]

- Last, it is important for the government to focus on long term recovery after a flood. It is necessary for all stakeholders to integrate disaster risk reduction strategies into their recovery plans. For example, rather than simply reconstructing facilities and basic services after flood, the NCDM and stakeholders could focus on promoting hazard resilient construction for new schools and hospitals; incorporating disaster risk reduction into school curriculums; introducing disaster risk reduction assessments for the reconstruction of new roads; and promoting diversified income opportunities for local people in high risk areas. [21]

## **5. Conclusion**

Cambodia's current flood risk management system is a collaborative approach between the Royal Government of Cambodia and non-government organizations. Three main players make up the current flood risk management system in Cambodia to work on preparedness, emergency response, and rehabilitation and recovery. The findings of this study showed that although the current flood risk management system had increased in scope and scale, Cambodia still faced several challenges in achieving resilience in flood management in the country. Those key challenges include limited budget, especially for the sub-national level, capacity and training issues, national Early Warning System issues, risk knowledge and absence of standard operating procedures and relief tracking systems. Experiences from Typhoon Ketsana in 2009 provided lessons for the government and stakeholders to further improve the flood risk management system related to public awareness, training and capacity building, coordination, finance and recovery works.

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