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Capacity Building for National, Provincial Stakeholders and Local Communities on Loss and Damage Related to Disaster Risk Reduction and Climate Change Adaptation

TECHNICAL MATERIAL

Loss and Damage related to Disaster Risk Reduction and Climate Change Adaptation in Vietnam

Dr. Le Minh Nhat (Project Leader), Director of Climate Change Adaptation, Department of Metrology and Climate Change (DDMHC), MONRE, VIETNAM, nhatkyoto@gmail.com

Dr. Luong Quang Huy, DMHCC,MONRE, huylq98@gmail.com

Mr. Nguyen Khanh Toan, DMHCC,MONRE, toan.nk99@gmaml.com

Dr. Tran Huu Tuan, Hue Economic University (HEU), tuantranhuu@yahoo.com

Dr. Tran Van Giai Phong, HEU,giaiphongjp@gmail.com

Mr.Tran Tuan Anh, Vietnam, HEU, tuananh.tran@housing-resinlience.com

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FOREWORD

Vietnam and its populations, economy and environment faces man severe disaster risks including typhoon, storms and flooding. Historically different disasters have occurred across the country, causing very significant numbers of deaths and injuries and substantial damage to property, the economy and the environment and have been an impediment to safety, wellbeing and national development. Over the past 10 years disasters have resulted in over 750 people being killed or going missing and annual property losses estimated at 1 - 1.5% of GDP. In addition, climate change has changed and increased Vietnam's disaster risk profile for the worse and is likely to threaten increasing risks to development and safety.

Vietnam has suffered from significantly increased climate extremes in recent time with complicated occurrences of typhoons, floods and other extreme events. Although Vietnam has been active in implementing Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) initiatives at all levels, Loss and Damage (L+D) still occur and severely affect vulnerable communities, especially those in remote areas. The reality shows that understanding of the loss and damage obviously is extremely needed for climate change adaptation experts. However, there is lack of capacity of the loss and damage at local level is still limited in Vietnam, especially compensation mechanism. In 2014, Department of Metrology and Climate Change (DMHCC) in collaboration with Hue Economic University developed a project of capacity building for loss and damage (L&D) for officials, experts and the communities on DRR, CCA and L&D at both national and provincial level, especially lined Ministries such as Ministry of Agriculture and Rural Development, Ministry of Finance, National Committee of Disaster Prevention and Control, National Committee of Climate Change, Provincial department of natural resources and environments and department of disaster prevention and management. An instruction and the measurement tools were introduced to the provincial and local authorities and department to assess the L&D relating to DRR and CCA. The indigenous knowledge of how local people response to natural disasters was documented and took into consideration while formulating DRR and CCA strategies at local level. In order to optimize national and local resources to support DRR and CCA, the linkages among agencies who are working in both DRM and CCA fields have been further strengthened.

Under the project " Capacity Building for National, Provincial Stakeholders and Local Communities on Loss and Damage Related to Disaster Risk Reduction and Climate Change Adaptation" funded by the APN through the DDMHCC, MONRE, the training material on Loss and Damage and Disaster Risk Reduction and Climate Change Adaptation (CCA) has been developed to support Government officials at all levels and to contribute to community safety and safe sustainable development from local to national levels.

Material which provides information about Loss and Damage, disaster impacts, risk mitigation and climate change adaptation from basic to specialized levels for trainers and trainees who are working in the field of LD on DRR and CCA as well as the for Government staff and staff from the not for profit sector. Based on this material, teachers will build

programs and training content for specific subjects for trainees in provinces and districts and can support the implementation of training activities within a framework of raising public awareness of community based disaster risk management and community-based climate change adaptation in Vietnam.

Contents

List of Acronyms

CCFSC	Central Committee for Flood and Storm Control
CCA	Climate change adaptation
DDMFSC	Department of Dyke Management and Flood and Storm Control
DMC	Disaster Management Center
DMHCC	Department of Meteorology, Hydrology and Climate Change
DMWG	Disaster Mitigation Working Group
DRR	disaster risk reduction
DRM	disaster risk management
GFDRR	Global Facility for Disaster Reduction and Recovery risk management
GoV	Government of Viet Nam
GSO	General Statistics Office
HFA	Hyogo Framework for Action
INGO	International Cooperation Department non-governmental organization
ISG	International Support Group (MARD)
JANI	Joint Advocacy Network Initiative
JICA	Japan International Cooperation Agency
MARD	IPCC Intergovernmental Panel on Climate Change
M&E	Monitoring and Evaluation
MARD	Ministry of Agriculture and Rural Development
MoC	Ministry of Construction
MoF	Ministry of Finance
MoLISA	Ministry of Labour, Invalids and Social Affairs
MoFA	Ministry of Foreign Affairs
MoIT	Ministry of Industry and Trade
MoNRE	Ministry of Natural Resources and the Environment
MoT	Ministry of Transportation
MoU	Memorandum of Understanding
MPI	Ministry of Planning and Investment
MRC	Mekong River Commission
NGOs	Non-governmental Organizations
NTP RCC	National Target Programme to Respond to Climate Change
OCCA	Standing Office of the Steering Committee for Climate Change Mitigation and Adaptation (MARD)
UNDP	United Nations Development Programme
UNISDR	International Strategy for Disaster Reduction Development Programme
UNFCCC	United States Agency for Nations Framework Convention on Climate Change
UNISDR	United Nations International Development Strategy for Disaster Reduction
VNRC	Viet Nam Red Cross Society
VWU	Viet Nam Women's Union
WB	World Bank

Chapter 1. Disaster risk reduction and climate change adaptation in context of loss and damage

1.1 Concepts and definitions

This section provides some concepts and definitions of commonly used terms in disaster risk management and climate change. The main terms used in this training material have specific meanings. It is important to define them carefully in order to understand the concepts surrounding disaster risk and climate change.

Natural hazard

The term 'natural hazards' typically refers to extreme events or processes that are hydro-meteorological or geological in origin.

Natural hazards are often categorized into sudden onset or slow onset depending on the speed of their occurrence:

> SUDDEN ONSET: Sudden-onset hazards include natural hazards associated with violent forces (e.g. earthquakes, hurricanes, flash floods)
>
> SLOW ONSET: Slow-onset hazards are those whose occurrence takes a long time to produce emergency conditions (for instance, natural hazards, such as long-term drought, that over a long time may contribute to severe food scarcity conditions, malnutrition and eventually famine conditions).

Natural hazards are the main focus of this chapter. However, the distinction between natural and human-made hazards is becoming increasingly more difficult to distinguish. For example, the destruction of forests on mountain slopes may lead to flash floods and landslides during periods of heavy rain. Landfill, blockage of drainage systems or improper construction may also create flooding. Landslides, floods, drought and fires are examples of a combination of both natural and human activities since their causes can often be traced to both natural events and human-made activities. One hazard can generate secondary hazards. For example, an earthquake can trigger tsunami, landslide and fire; while a typhoon can often lead to flooding and storm surge.

Disaster risk management (DRM) is defined in this report as the processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development (IPCC, 2012a p.34). Disaster risk management can be divided to comprise two related but discrete sub-areas or components: disaster risk reduction (DRR) and disaster management.

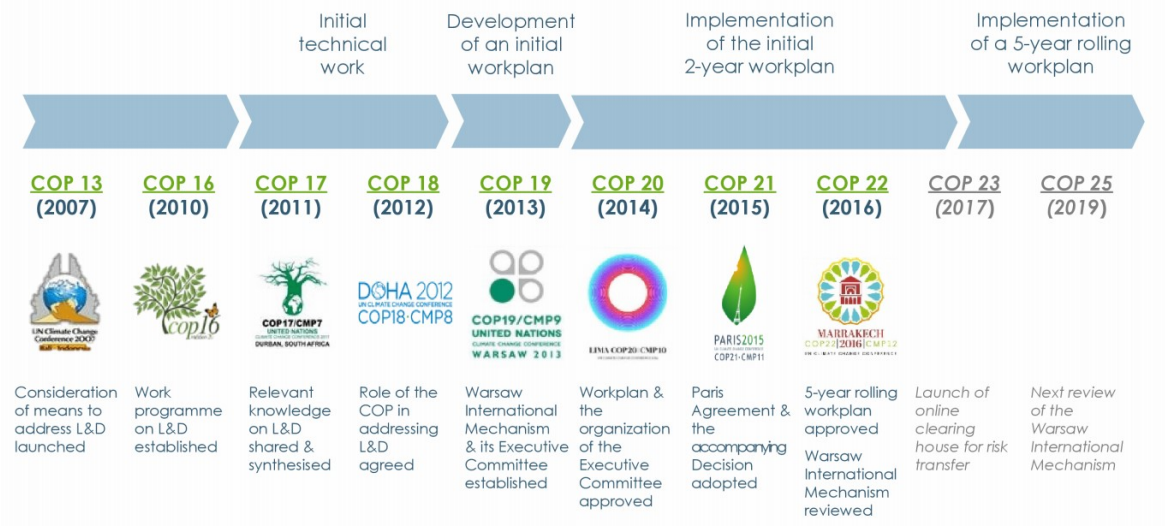
Disaster risk reduction (DRR) denotes both a policy goal or objective, and the strategic and instrumental measures employed for anticipating future disaster risk, reducing hazard, existing exposure, or vulnerability, and improving resilience. DRR includes reduction of vulnerability of people, livelihoods, assets, and ensuring the appropriate sustainable management of land, water and other components of the environment (IPCC, 2012a p.34).

Adaptation is a goal and management of extreme events and disaster risks are methods for supporting and advancing that goal. In human systems, **adaptation** is the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit

beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate (IPCC, 2012a p.36). These definitions modify the definition used in the Fourth Assessment of the IPCC, which was that adaptation to climate change is the adjustment in natural or human systems in response to actual and expected climatic stimuli, such as to moderate harm or exploit beneficial opportunities (IPCC, 2007 p.869). This earlier definition implies that natural systems can (always) adjust to expected climate stimuli, but this implication is avoided in the new definitions.

Climate change adaptation Adaptation refers to the action of dealing with the consequences of climate change, primarily by reducing vulnerability to its effects. (However, note that adaptation can also refer to exploiting any beneficial opportunities that climate change may bring). There are several definitions of climate change adaptation in the literature. Of these, perhaps the simplest is this alternative one from the UNFCCC: *'Practical steps to protect countries and communities from the likely disruption and damage that will result from effects of climate change'*.[1]

Loss and Damage



At COP19 (November 2013) in Warsaw, Poland, the COP established the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (Loss and Damage Mechanism), to address loss and damage associated with impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change.

The implementation of the functions of the Loss and Damage Mechanism will be guided by the Executive Committee under the guidance of the COP.

[1] UNFCCC n.d.

Functions of the Loss and Damage Mechanism

The Loss and Damage Mechanism fulfills the role under the Convention of promoting implementation of approaches to address loss and damage associated with the adverse effects of climate change, pursuant to decision 3/CP.18, in a comprehensive, integrated and coherent manner by undertaking, *inter alia*, the following functions:

1. Enhancing knowledge and understanding of comprehensive risk management approaches to address loss and damage associated with the adverse effects of climate change, including slow onset impacts, by facilitating and promoting:

- Action to address gaps in the understanding of and expertise in approaches to address loss and damage associated with the adverse effects of climate change, including, *inter alia*, the areas outlined in decision 3/CP.18, paragraph 7(a);
- Collection, sharing, management and use of relevant data and information, including gender-disaggregated data;
- Provision of overviews of best practices, challenges, experiences and lessons learned in undertaking approaches to address loss and damage.

2. Strengthening dialogue, coordination, coherence and synergies among relevant stakeholders by:

- Providing leadership and coordination and, as and where appropriate, oversight under the Convention, on the assessment and implementation of approaches to address loss and damage associated with the impacts of climate change from extreme events and slow onset events associated with the adverse effects of climate change;
- Fostering dialogue, coordination, coherence and synergies among all relevant stakeholders, institutions, bodies, processes and initiatives outside the Convention, with a view to promoting cooperation and collaboration across relevant work and activities at all levels.

3. Enhancing action and support, including finance, technology and capacity-building, to address loss and damage associated with the adverse effects of climate change, so as to enable countries to undertake actions pursuant to decision 3/CP.18, paragraph 6, including by:

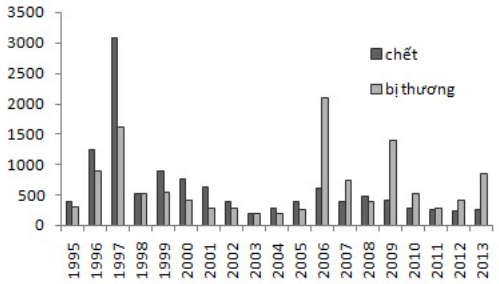
- Providing technical support and guidance on approaches to address loss and damage associated with climate change impacts, including extreme events and slow onset events;
- Providing information and recommendations for consideration by the Conference of the Parties when providing guidance relevant to reducing the risks of loss and damage and, where necessary, addressing loss and damage, including to the operating entities of the financial mechanism of the Convention, as appropriate;
- Facilitating the mobilization and securing of expertise, and enhancement of support, including finance, technology and capacity-building, to strengthen existing approaches and, where necessary, facilitate the development and implementation of additional approaches to address loss and damage associated with climate change impacts, including extreme weather events and slow onset events.

1.2 Disaster risk reduction and climate change adaptation in context of loss and damage

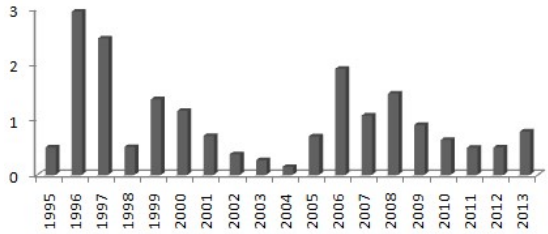
In recent years, loss and damage caused by the impact of extreme climate phenomena have increased dramatically (more severe, more frequent, heavier consequences) affecting the development of the countries all over the world. Vietnam is one of the countries which are most

severely affected by climate change. Loss and damage caused by climate change in Vietnam is inevitable and tend to rise in the near future. One of the plans for the construction of settlement mechanism of loss and damage at national level is to strengthen the relationship between climate change adaptation and disaster risk reduction. Both areas are directed at the common goal of reducing losses and building up resilience to communities. Following issues: Defining clearly the concept of disaster risk reduction and adaptation to climate change in context of loss and damage; Integrating approaches to disaster risk reduction and climate change adaptation to address loss and damage; Difficulties and challenges.

In recent years, loss and damage due to the impacts of extreme climate events had increased steadily, causing severe consequences and serious effects on the development of countries around the world including Vietnam (IPCC, 2012). Loss and damage due to climate change cause in Vietnam was inevitable and tend to rise. In last 15 year, under the impact of climate change, the frequency and intensity of disasters increased significantly causing casualties and property damage such as 743 dead people. Property damage is estimated at over 22 trillion GDP accounting for 1.5%/year (Figure 1 and Figure 2).



Hình 1: Tổn thất về người năm 1995 đến 2013



Hình 2: Tổn thất Thiệt hại từ năm 1995 đến năm 2013 so sánh với GDP (%)

Loss damage issues are getting more attention from the international community and become one of most popular topic of many climate change forums, especially at the Conference of the Parties (COP) to the Convention of the United Nations Framework on Climate Change (UNFCCC).At COP16, Cancun agreement emphasized minimizing loss and damage caused by climate change through enhanced international cooperation and capacity building. (1) assessing the risk of loss and damage due to the impact of climate change and current understanding; (2) Identify the approaches to adress loss and damage due to climate change including the impact of extreme weather events and the slow on-set and consider the impacts at all levels; (3) Defining the role of the Climate Convention in supporting to address loss and damage issues.

COP19 Warsaw, the Parties has come to an agreement to build an international mechanism to address loss and damage. In the near future, an institutional arrangements will be established in order to set out international mechanism to address loss and damage to the countries affected by climate change. However, to maximise the benefit, each countries need to build their own institutional arrangement to address loss and damage at all level.

One of the major solutions to construct institutional arrangements to address loss and damage at

national level is about strengthening the link between climate change adaptation and disaster risk reduction. These two mentioned above sectors both aims to reduce loss and damage. On a theoretical perspective as well as experience gained from practical deployment in Vietnam, these two areas have more opportunities for effective coordination. However, due to differences in the characteristic, scale and timing of implementation, strengthening the connection encountered many difficulties and challenges. This article will focus on discussing the following issues: (1) Disaster risk reduction and climate change adaptation in context of loss and damage; (2) Integrating approaches of disaster risk reduction and climate adaptation to address loss and damage ; (3) Difficulties and challenges.

1.3 Loss and damage - Climate change adaptation- Disaster risk reduction

Warner, K (2013) defined loss and damage as the consequences of extreme climate impacts beyond mitigation of greenhouse gas emissions and climate change adaptation, including the impacts in a short time (disaster such as hurricanes, floods...) and impacts in a long time (rising temperatures, sea level rise, ...).

Disasters are unusual natural phenomena can cause damage to people, property and the environment, living conditions and Socio-economic activities including: storms, tropical depressions, hurricanes, lightning, heavy rain, flooding, flash flooding, flooding, landslides and land subsidence due to flood or flow, sea level rise, salt water intrusion, drough, earthquakes, tsunamis and other natural disasters (Figure 3).

Figure 3: The difference between climate change adaptation and disaster risk reduction *(Turnbull, 2013)*

Disaster risk is the damage caused by natural disasters to people, property, environment, socio-economic activities, in some communities in a certain time period. (UNISDR, 2009b: 10). Disaster risk shows more possibility of disaster than description of the actual disaster events. The definition of disaster risk reflects the concept of disaster as a result of the current risk conditions. Disaster risk including various potential damage are often difficult to quantify (Twigg, 2004). A hazard could only lead to a disaster if an individual and social systems are in vulnerable situation under the impact of such hazard (UNISDR, 2009b: 9-10).

Adaptation to climate change is the adjustment of natural or human systems in response to actual or expected climate changes, to mitigate the harm or take advantage of opportunities to

benefit from these changes (IPCC, 2007). Adaptation to climate change usually refers to response to the long-term climate changes and environmental changes caused by climate. The term do not often refer to the short-term "adjustment" to cope with short-term climate changes. However, the difference between the two forms of short-term and long-term adjustment is vague. In fact, the adaptation can be proceeded step by step under many short-term adjustments by individuals and organizations. The basic differences of concepts help distinguish between measures in order to reduce disaster risk and climate change adaptation.

Table 2: Synthetic characteristics of climate change adaptation and disaster risk reduction (Tearfund, 2008)

Features		
Disaster Risk Reduction (DRR)	**Climate change adaptation (CCA)**	**Development trend**
In relation to all types of risks	In relation to climate risks	Awareness of loss and damage
Derived from the humanitarian aid operations after disaster	Derived from scientific theory	Recruit experts of climate change adaptation from the fields of engineering, water and sanitation, agriculture, health and disaster risk reduction
Focus on solving the existing risks	Focus on solving the risks that may/not sure to occur in the future	Focus on disaster risk reduction in the future; current climate oscillations are the base for implementing climate change adaptation
Historical perspectives	Future perspectives	Long-term strategy to deal with loss and damage
Indigenous knowledge and traditions at the community is the base for recovery	Indigenous knowledge and traditions at the community may not be sufficient for resilience to the type and scale of disaster risk which has not ever occurred	Integrate scientific knowledge and indigenous disaster risk reduction to create learning opportunities
Structural measures are designed in safety levels based on existing models and historical evidence	Structural measures are designed in safety levels based on existing models, historical evidence and predicted changes	Knowledge of structural measures is necessary to resolve the loss and damage in context of climate change adaptation and disaster risk reduction
Focus on risk reduction and preparation	Focus on adaptation measures to deal with the vulnerability	Focus on extreme events and have slow start in long term
The process relies on community derived from experience	The process relies on community derived from policy	The successful experience of the approach based on community
Practical applications at local	Theory applications at local	Climate change adaptation gained experience through locally practical applications.

Full implementation tools	Restricted implementation tools	Understanding in detail of loss and damage
Development based on the old platform	New issues	Develop knowledge and expertise on loss and damage
Few get the political attention	Get strong political attention	Disasters related to climate were analyzed and compared with climate change
Small budget cannot meet requirements	Significant and increasing budgets	Disaster risk reduction community attends financial mechanism on climate change adaptation

Loss and damage become content of adaptation programs to climate change, particularly the Cancun Adaptation Framework. When developing adaptation plans, Countries should take account of the loss and damage caused by inevitable climate change. Distinguishing adaptation action with settlement action of loss and damages depends heavily on identifying adaptive capacity limit. Many countries have difficulties in defining adaptive capacity limit to and proposing to build up adaptation framework including specifying the adaptive capacity of communities.

The causes of the loss and damage are complex and involved in multiple factors affected by climate change as society, economy, culture and community (Thomallannk, 2006), thus defining Adaptive capacity is a major challenge for adaptation in the future.

1.4 Integrated approaches to disaster risk reduction and climate change adaptation to deal with loss and damage

This integration exists challenges in terms of scale of time and space, evaluation standards, knowledge and experiences. (Birkmann and Teichman, 2010).

The scale of time and space: Minimize disaster risks focusing at local - which is directly affected by the disaster, while addressing the impact of climate change through adaptation measures is mainly interested at the national and global levels (Schipper and Pelling, 2006). Local authorities play an important role in the management and operation of disaster risk reduction activities with the active participation of the local people (Buckle nnk., 2010). Activities of climate change adaptation really clear since the COP13 at which Cancun Adaptation Framework was issued. Strategies and plans to address the impacts of climate change are mainly built up at the national level with the long-term goals do not really have an impact on people's lives and have not been implemented popular in local areas . Some adaptation activities have been implemented at the local level, but just in retail, experiment of the project framework.

In Vietnam, the national strategy to cope with climate change issued in conjunction with Decision No. 2139 / QD-TT by the Prime Minister dated on December 5th, 2011 has defined the simultaneous implementation of adaptation measures and mitigation of greenhouse gas emissions in response to climate change, including adaptation taken at the center of the first phase. The strategy also indicates 10 targets including: Actively cope with disasters and climate monitoring; Ensure food security and water resources; Responding positively to rising sea levels consistent with vulnerable areas; Protect, develop forests steadily, increase absorption of greenhouse gases and conserve biodiversity ; Mitigate greenhouse gas emissions to contribute to protect the Earth's climate system;

Strengthen the leading role of the State in response to climate change; build up the Community in effective response to climate change; Develop innovative Science-technologies in coping with climate change; Strengthen international cooperation and integration, raise national status in matters of climate change; diversify financial resources and focus investment effectively.

The national action plan in response to climate change (2012) comes up mechanism for implementing of strategic objectives and determining the list of 65 proposals, projects and tasks on climate change for the period of 2012-2020. The plan also identifies 10 prioritized programs and projects on climate change in the period of 2012-2015, which clarifies the ministries' coordinate responsibilities as well as the Ministry of Natural Resources and Environment's roles of coordination and direction. The action plan also highlights the need for inter-discipline and multi-sector cooperation through the identification of clues about climate change in the relevant ministries. Identifying clues about climate change in the ministries, sectors helps improve the sharing of difficulties in inter-discipline coordination, as well as other issues related to climate change adaptation.

Besides, there are still differences in nature in the time scale between disaster risk reduction and climate change adaptation (Adger, 2003). The activities of disaster risks often only focus on the emergent relief operations, occurring in a short time (Lavellnnk, 2012). The main reason is funding for the implementation of disaster response activities shall be only granted for a short period (Birkmann, 2010) .From a practical standpoint, this approach exists some limitations such as short of activeness, underestimated the importance of building up strategy for climate change adaptation and long-term disaster risk to build up resilience under the impacts of long-term climate change (Smith , 2013).

The ultimate reason is the lack of rationality in cooperation, coordination of issues related to climate change adaptation and disaster risk reduction at the national level (Maplecroft, 2010). In the world, the mission of disaster risk reduction is often associated with the responsibilities of the Ministry of Agriculture, while the responsibilities for climate change is often assigned to the environmental ministries or meteorological agencies (Birkmann and Teichman, 2010).

In Vietnam, many policy actions in response to climate change for the specific sectors, locality has been built in recent time. However, at present, a number of programs, planning and plans for responding to climate change do not ensure inter-region, inter-discipline, so they have not really promoted effectively. For example, the sharing of water resources; planned construction of hydro-power projects and the needs for irrigation, water use in life and agriculture; planning for drainage and coastal urban development do not ensure the inter-regional, inter-field; construction of sea dike has no connection with traffic planning, developing residential areas in the green city, green architecture models, so on. Hence, it is necessary to build up an overall adaptation program to integrate Disaster risk reduction and climate change adaptation based on the settlement of loss and damage in inter-region and inter-sector.

Evaluation criteria: At present, in the world there is no standard or formal set of criteria to guide the implementation and monitoring of adaptation activities (Birkmann and Teichman, 2010). In remedial work after the disaster, the affected works are often built, restored, instead of building, improving infrastructure towards consideration to the potential impact of climate change and taking adaptation factors into account (De Soto, 2010). Another challenge is conceptually dissent on two areas: while some said that climate change adaptation must be integrated into disaster risk reduction,

other said that disaster risk reduction should be seen as a cross-cutting theme of climate change adaptation (Birkmann and Teichman, 2010).

Knowledge and experience: In fact, information on climate change and extreme weather phenomena are not propagandized effectively to local communities (Gaillard, 2013). In contrast, the experiences aggregated and summarized in the thousands of years on coping with disaster of locality have underused and not integrated effectively in planning adaptation strategies and long-term disaster risk reduction.

One of the difficulties in the relationship between climate change and disaster risk is uncertainty about the impact of climate change on the increase in the frequency and intensity of disasters and extreme weather events such as storms, floods and droughts... (Schipper and Pelling, 2006).

1.5 Loss and damage in Vietnam

The Ministry of Natural Resources and Environment is responsible for coordinating, guiding the implementation of activities to cope with climate change.

The Ministry of Agriculture and Rural Development plays an important role in the implementation of adaptation activities to climate change, particularly adaptation to climate change in agriculture. The Ministry of Agriculture and Rural Development is also the focal point for disaster risk reduction.

The Ministry of Natural Resources and the Ministry of Natural Resources and Environment and the Ministry of Agriculture and Rural Development has collaborated in a number of activities aimed at maximizing the role of policies, programs and projects of disaster risk reduction and adaptation to climate change Especially the National Forum on disaster risk reduction and climate change adaptation which is held every year under the chairmanship of the Ministry of Agriculture and Rural Development. This forum represents the close cooperation among the Ministry of Agriculture and Rural Development, Natural Resources and Environment Ministry and the stakeholders in the sharing of information, experience, knowledge and encouraging discussion to choose policies of disaster risk reduction and climate change adaptation.

The integration and coordination between the two sectors is responsibility of the National Committee on Climate Change and the Central Committee of Flood and Storm Prevention, accordingly each committee is responsible for building comprehensive management plans for their sectors, promoting interdisciplinary and multi-sector collaboration. Disaster risk reduction activities should be integrated with climate change adaptation activities, disaster risk reduction strategies could contribute greatly to the adaptation activities, especially the improvement policy, institutional development, technical documentation and support tools (UNISDR, 2009).

Table 2: Institutions related to the issues of climate change adaptation and disaster risk reduction.

Disaster Risk Reduction	**Adaptation to Climate change**
Framework for Action (2005) Hyogo	The Convention of the United Nations Framework on Climate Change (1992)
	The first National Communication of Vietnam (2003)
The National Report on Disaster Risk Reduction in Vietnam - Kobe (2005)	The first report on technology needs assessments (2005)
	Bali Action Plan and Roadmap (2007) COP13
ASEAN Agreement on Disaster Management and Emergency Response (AADMER) (2005) .	The second National Communication (2010)
	Nairobi Work Programme (2005-2010)
Icheon Roadmap and regional action programs (2010)	National Target Programme to Adaptation to Climate Change (2009)
National Strategy of prevention and disaster reduction by 2020 (2007)	The national strategy to cope with climate change (2011)
National action plan for prevention and disaster reduction by 2020	National Action Plan to Adaptation to Climate Change (2012)
Law Against Disaster (2013)	Report on technology needs assessments for climate change adaptation 2nd (2012)

To coordinate and develop the integrated mechanisms of disaster risk reduction and climate change adaptation in order to settle damage losses effectively, the National Committee on Climate Change and the Central Committee for Prevention Flood and Storm should develop coordination mechanisms and specific guidelines for stakeholders.

Integrate disaster risk reduction with climate change adaptation in context of loss and damage: Global responsibility for disaster risk reduction and climate change adaptation have been identified in the Hyogo Framework for Action and the Climate Convention (Mitchell, 2012). With the responsibility of the participants in both International Conventions, Vietnam has been actively implementing its responsibilities for the Conventions.

Vietnam has built up a complete system of institutions, specifically for disaster risk reduction and climate change adaptation. However, in the disaster risk reduction field, the system of legal documents and work implementation is regarded more complete and powerful than the Climate Change adaptation policies and plans. The Government has established the Central Committee for Central Flood Control, the National Committee on Climate Change and the National Committee for Rescue and Search Work at many levels of government, increased management and coordination capacities to prevent and response to disasters effectively; Initially established the Office responding to climate change in local.

Although both the field of climate change adaptation and disaster risk reduction are aimed to solve the problem of damage and losses, there is a big difference in the capacities to deal with each type of disasters and manifestations of climate change. At present, many policies and institutional responding to extreme climate phenomena have been issued, but there is no adequate policies to address damage and losses due to slow climate change such as rising sea level and factors affecting the vulnerability which has occurred in a long time.

To minimize the risk of loss and damage, the building instructions should have a combination of perspectives, approaches to climate change adaptation and implementation of institutional disaster risk reduction. The need to address the immediate impacts of extreme weather phenomena and long-term impacts of the process of climate change which have slow beginning has stressed the importance of integrating disaster risk reduction and climate change adaptation in order to solve loss and damage .

1.6 Recommendations

Firstly, It needs to conduct a overall review to determine regionals and sectors may occur loss and damage caused by the effects of climate change. Then, conducting research at the local level widely to determine functions and tasks of the agencies and organizations in solving the problem of climate change adaptation, disaster risk reduction and determining the barriers in coordination between agencies and organizations (Birkmann and Teichman, 2010).

To bridge the gap between short-term and long term development, it requires a fundamental reform of the allocation and use of funds. For disaster risk reduction, it needs to apply the long-term plan to ensure recovery capabilities. Meanwhile, climate change adaptation plan needs to be implemented by specific activities, along with monitoring and evaluating systems.

To ensure the consistency between social economic oriented development and disaster risk reduction and climate change adaptation activities, it should be developed and completed the system of monitoring and evaluation. The regular assessment of risks and vulnerabilities will ensure that changes are detected in time, which can replace the short-term objectives to long-

term adaptation strategies (Mitchell et al., 2010). Additionally, through the detailed data and vulnerability assessment, monitoring activities and evaluation should pay more attention to the identification of disaster risk reduction activities which have promoting adaptability elements (Nishat et al., 2013).

It should be considered to put the integration of climate change adaptation and disaster risk reduction into the international agenda. Besides, the demand for financial , technical assistance and capacity building should also be taken seriously. This mechanism requires a fundamental transformation process in the formulation and implementation of policies, from each sector approach to holistic, multi-sectoral, multi-disciplinary. In parallel with the above recommendations, it should be made some following steps:

1. Ensure to distribute dedicated funding from the financial resources at home and abroad for approved operations

2. Set up a network of stakeholders which operate in the field of disaster risk reduction and climate change adaptation at local and national levels, including the vulnerable communities in order to share knowledge and experience dealing with loss and damage;

3. Develop the general program of planning guidance and coordinating among stakeholders to implement disaster risk reduction and climate change adaptation.

4. Formulate responsibility and power sharing mechanisms in planning and developing climate change adaptation and disaster risk reduction activities at all levels.

Finally, to ensure the success of integrated disaster risk reduction and climate change adaptation mechanisms, it should have a fundamental change in the approach of thinking of those responsible for the construction and implementation to these activities. In addition, the Ministry of Natural Resources and Environment and the Ministry of Agriculture and Rural Development will continue to influence the policy direction of disaster risk reduction and climate change adaptation, hence it should have increased coordination, information exchange more often between the two ministries in the future.

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Chapter 2. An introduction to disasters in Viet Nam

2.1.1 Topography and climate

Viet Nam has a land area of 320,000 km2 and a coastline of 3,444km. Three quarters of the territory is covered by hills and mountains with elevations between 100 and 3,400m, while the plain areas include two major river deltas; the Red River Delta in the north and the Mekong River Delta in the south. The lowlands are extremely fertile and densely populated, and most of Viet Nam's agriculture and industry are concentrated there.

Viet Nam has a tropical monsoon climate, although regional climate variations are considerable due to the length of the country and the diverse topography.

Annual mean temperature ranges between 18°C to 29°C, while mean temperatures during the coldest months vary between 13°C and 20°C in the northern mountains and between 20°C and 28°C in the tropical south. In most parts of the country annual rainfall ranges between 1,400mm and 2,400mm, but can be as high as 5,000mm or as low as 600mm on average in some regions.

Rainfall is unevenly distributed throughout the year, with about 80-90% of the rainfall concentrated in the rainy season, causing floods and frequent landslides. The number of rainy days in the year is also very different between the regions and ranges from 60 to 200[2].

2.1.2 Natural hazards

Recent legislation[3] issued by the Government of Viet Nam lists the following hazards: *"heavy rain, tropical depressions, storms, floods, flash floods, whirlwind, lightning, and landslides caused by floods, surges, earthquakes, tsunamis"*. However, this list does not include drought – which is a common occurrence in the country. Of these, the causes and effects of the main hazards occurring in Viet Nam are described below. For each hazard type a summary is provided of the occurrence, characteristics, predictability, vulnerability factors and main effects. Only factors contributing to vulnerability that are specific to the hazards are given below. For all hazards, vulnerability is also increased by lack of: information and awareness of risks; warning and communication systems; emergency response procedures; and measures to aid recovery and rehabilitation of communities.

2.2 Historical trends of natural hazards for Viet Nam

Viet Nam is located in the tropical monsoon zone of Southeast Asia and within the typhoon centre of the Western Pacific - one of the five, most typhoon prone areas of the world. The country is vulnerable to a range of natural hazards - most of which are related to hydro-meteorological phenomena. Given the coincidence of typhoon and monsoon seasons with heavy rains, and the complicated topography of narrow and low plains backed by steep and high mountains, annually, monsoon rains, typhoon storms, floods, flash floods, drought and other calamities cause death, injury, crop and property loss and infrastructure damage in the country.

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[2] MoNRE 2003

[3] Decree No. 14/2010-CP issued by the Government of Viet Nam in February, 2010 prescribes the organization, duties and powers of the Steering Committee, Flood Control Central Committee for the Prevention, Flood Search and Rescue and other ministries, sectors and localities of operational coordination of the response to disaster situations. The Decree applies to agencies, organizations and individuals in the country, organizations or individuals are living and working in the territory and waters and islands of Viet Nam.

Annually over the past twenty years, natural hazards have caused an average of 489 deaths[4]. They also result in average annual economic losses equivalent to 1.3% of GDP; however, damage and loss data is chronically underreported, so real totals may be much higher. As most of the population is living in low-lying river basins and coastal areas, more than 70% of the population is estimated to be exposed to risks from multiple natural hazards[5].

Table 2: Relative frequency of major natural hazards occurring in Viet Nam

High	Medium	Low
Flood, inundation	Heavy rain	Earthquake
Typhoon, tropical depression	Landslide	Frog
Flash flood	Forest fire	Tsunami
Drought	Salt Intrusion	
Whirlwinds		
Erosion		

Source: various CCFSC reports

Floods

Most of Viet Nam's 2,360 rivers are short and steep, so that heavy rainfall in their basins produces intense, short duration floods. Sizeable portions of the country and especially the Central Highlands and Central Coast are subject to heavy rainfall. Three consecutive years of extreme seasonal flooding in the Mekong Delta claimed the lives of over 1,000 people.

Table 3: Major hazardous events in period from 1997 to 2009[6]

Year	Event	No. of people dead	No. of people injured	No. of people missing	Estimated economic loss (VND billion)	Areas affected
2009	Typhoon Ketsana	179	1,140	8	16,078	15 Central and Highlands provinces
2008	Typhoon Kammuri	133	91	34	1,939,733	9 North and Central provinces
2007	Typhoon Lekima	88	180	8	3,215,508	17 North and Central provinces
2006	Typhoon Xangsane	72	532	4	10,401,624	15 North and Central provinces
2005	Storm No. 7	68	28		3,509,150	12 North and Central provinces
2004	Storm No. 2	23	22		298,199	5 Central provinces
2003	Rains and floods	65	33		432,471	9 Central provinces
2002	Flooding	171			456,831	The Mekong River Delta
2001	Flooding	393			1,535,910	The Mekong River Delta

[4] National report on disaster reduction in Vietnam, the World Conference on Disaster Reduction, Kobe-Hyogo, Japan, 18-22 January 2005.

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Year	Event	No. of people dead	No. of people injured	No. of people missing	Estimated economic loss (VND billion)	Areas affected
2000	Flash Floods (July)	28	27	2	43,917	5 Northern provinces
1999	Floods (November)	595	275	29	3,773,799	10 Central provinces
1997	Typhoon Linda	778	1232	2123	7,179,615	21 Central and Southern provinces

In 1999, two spells of torrential rains caused two extremely severe floods in Central Viet Nam. During the floods, water levels on all rivers exceeded the highest alarm levels. In the first flood period in early November, the flood water levels on rivers in Quang Tri and Thua Thien Hue provinces surpassed the historical flood levels (the flood water level in Hue was 1 meter higher than the historical level). In the December flood, the water level in Quang Ngai Province was higher than the historical level. These were the two biggest floods in the past 100 years in these areas. Together, the floods killed 715 people, inundated nearly 1 million houses, swept away thousands of houses, and incurred an economic loss of nearly VND5,000 billion. This loss was among the greatest disaster-related damages recorded in the 20th century in Viet Nam.

Flash floods are often occurring in mountainous and hilly areas that are characterized by steep slopes, heavy rains and disadvantaged drainage conditions. Flash floods also may occur due to the failures of small reservoirs or landslides blocking upstream flows. Flash floods have happened in all 33 mountainous provinces in Viet Nam. The most damaging flash floods in mountainous areas happened in Son La in 1991, Muong Lay and Lai Chau in 1994, Ha Tinh in 2002 and Yen Bai in 2005.

Table 4: The flood seasons in different regions

Region	Start	End
North	May-June	September-October
North Central	June-July	October-November
Centre and South Highlands	October	December
Central Highlands	June	December
South	July	December

Source: Hydro-Meteorological Data Centre, at http://hydromet.gov.vn

Typhoons

Viet Nam is affected by typhoons and tropical storms from the Northwest of the Pacific Ocean, of varying intensity annually, with more frequent occurrences in the northern and central coastal region earlier in the season.

From 1954 to 2006, there were a total of 380 typhoons and tropical depressions in Viet Nam, of which 31% hit the North, including the Red River Delta 36% to the North Central and Central Coast and 33% of the Eastern South and the Mekong River Delta (MARD, 2007). The worst typhoon in recent memory was typhoon Linda in 1997 that killed 3,000 people along the southern coast.

Drought

After typhoons and floods, drought is responsible for the highest amount of damage to livelihoods and the economy. In 2010, an unprecedented drought impacted the majority of provinces in the country resulting in severe pressure on the agricultural output and provision of electricity.

In the past, severe drought has occurred at several occasions. Between 1976 and 1998, serious large-scale droughts affected 11 winter-spring crop periods causing serious damage. A nation-wide drought in 1998 affected around 3.1 million people, particularly in Central Viet Nam, the Central Highlands, the Eastern South and the Mekong Delta causing an estimated damage of around VND500 billion or USD37 million[7]. Other recent droughts in 2002 and 2005 caused an estimated damage of 2,060 billion VND (USD135 million) and VND 1,743 billion (USD110 million) respectively.

Landslides

Landslides are a common type of hazard in Viet Nam, caused by river bank erosion, coastline erosion, and landslides on mountain slopes, land subsistence, etc. Landslides are usually caused by external factors (water), internal factors (geological changes) and human activities (deforestation, unplanned mineral exploitation or construction), etc. Landslides often come with mud floods or lead to flash floods.

Whirlwinds

The frequency and impacts of whirlwinds in Viet Nam is difficult to assess, partly because the term 'whirlwind' is used in different ways. In this chapter we follow the conventional international definition of a whirlwind as a localized vortex of wind. However, the term is used more broadly by some sources in the country. The main reference source existing on whirlwinds is a study by the Disaster Management Unit in 2001[8]. This report refers to both vortices (rotating columns of wind) and gales (sudden, strong winds) as whirlwinds. Unfortunately, the data in the report does not separate out these two types of wind phenomena, but it appears that each can occur in all parts of the country, though with higher frequency in the mountainous zones. Both are usually associated with thunderstorms. During the period 1993-1998, 235 gales and vortices were recorded in the country, which killed 234 people, injured 1,841 people and severely damaged more than 90,000 houses.

Earthquake

Earthquakes have occurred in Viet Nam though at limited magnitude and intensity and causing limited damage. They mostly occur at sea or in the North-western mountainous provinces. The northern region of Viet Nam has moderate to low seismicity but some major fault systems exist, such as those of the Red River (Song Hong), Ma River (Song Ma), and Lai Chau – Dien Bien.

In 1935 and 1983, earthquakes of magnitude 6.7 - 6.8 on the Richter scale occurred in the north west of Vietnam, namely the Dien Bien Phu earthquake (November 1935) and the Tuan Giao earthquake (June 24, 1983). Both destroyed and damaged many houses, buildings and agricultural lands in an area covering about 13,000km2. Many people died or were injured by the collapse of houses. These were the largest magnitude earthquakes recorded in Viet Nam since 1900[9].

Tsunami

[7] GTZ, ADPC and MRC, n.d.

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[9] Seismic hazard study

Although a tsunami has not yet occurred in Viet Nam, many coastal areas may be affected due to the earthquake potential that exists in some neighbouring countries. The possibility of tsunami hitting the coast and islands is not high but remains possible. The central part of the central region, from Da Nang to Quang Ngai, faces the highest risk. Three sources of earthquakes have been defined that could result in tsunamis reaching Viet Nam's coastline. The most likely scenario is an earthquake over a magnitude 8 on the Richter scale at the Manila fault. The time for tracking the tsunami from the source to it reaching the central coast is around two – three hours[10].

2.3 Geographic distribution of natural hazards

The country's geographic position and topographic condition result in special climate characteristics that result in a diversified pattern of hazards, some of which may cause serious disasters. Natural hazards occur almost round year and may result in disasters with particular characteristics in each region.

There are five principal hazard zones in the country. Each zone has different geography and topography, and principle types of hazards. Natural hazards affect particularly the coastal regions but also include flash floods in the upland areas, for example, following landfall of typhoons associated with heavy rainfall, as the typology in Table 5 shows:

It is possible to group provinces into five classifications:

Table 5: Typology of climate related natural hazards by region[11]

Hazard zone	Principle hazards
Red River Delta and the north central region	Monsoon river floods, typhoons, coastal storm surges, drought, saline water intrusion
Central coast, eastern southern region and Islands	Typhoons, storm surges, flash floods, drought, saline water intrusion
Mekong River Delta	Slow-onset flooding, typhoons, high tides and storm surges, salt water intrusion
Mountainous areas and central highlands	Flash floods, landslides, drought
Sea areas	Typhoons, storm surges

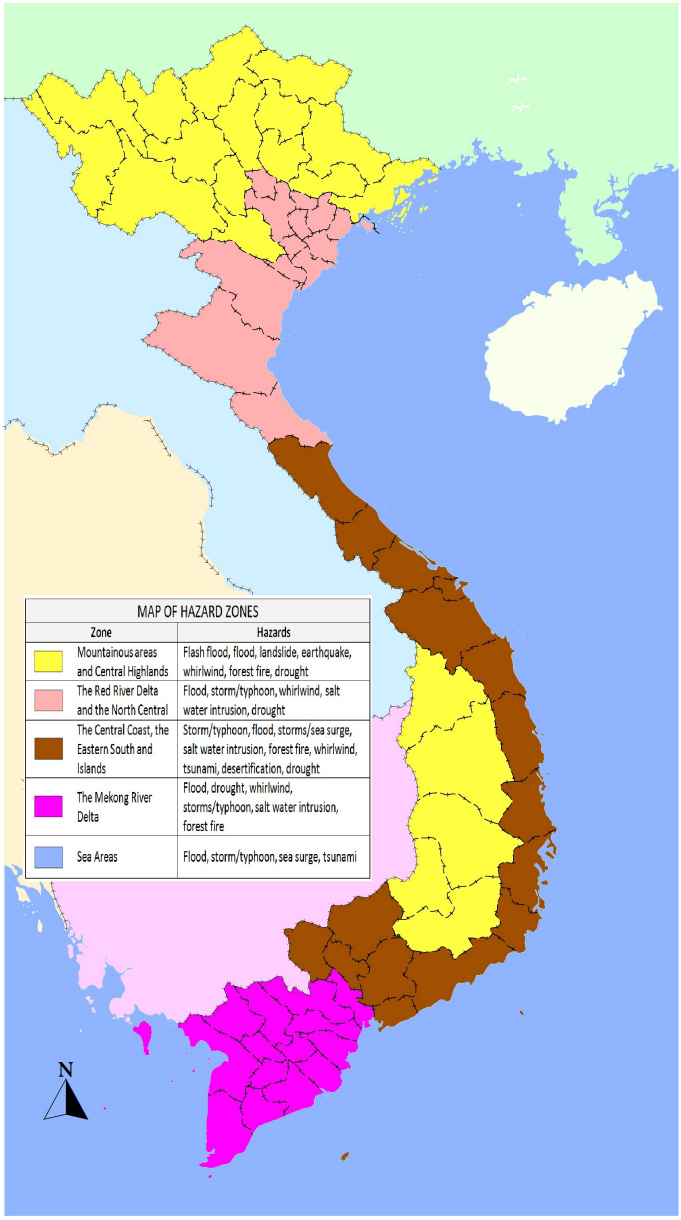
Hazards affecting different regions of the country are described briefly below *(taken principally from the World Bank 2010):*

[10] See UN-Viet Nam Factsheet on earthquakes and tsunamis in Viet Nam, March 2011

[11] MARD 2007

Red River Delta and the North Central Region

The Red River Delta consists of nine provinces and Hanoi and Hai Phong cities. This is a densely populated region in the delta of the Red River. The main economic activities are located in this region. It is also one of the two main rice bowls of Viet Nam (the Mekong Delta is another one). The delta of the Red River is a flat, triangular region of 15,000 square kilometres. Two other rivers, the Lo and the Da, supply water to the Red River contributing to its high water volume, which averages 4,300 cubic meters per second. The entire delta region, backed by the steep rises of the forested highlands, is no more than three meters above sea level, and much of it is one meter or less. The area is subject to frequent flooding and storm; at some places the high-water mark of floods is fourteen meters above the surrounding countryside. For centuries flood control has been an integral part of the delta's culture and economy.



The North Central region is located in the northern part of central Viet Nam, consisting of six provinces. This region has a long coastline and is most prone to storms and floods. The weather is harsh. The continental hot dry wind blowing from Laos in summer is an example. This is also a highly populated region.

Central Coast, the Eastern South Region and Islands

The Central Coast contains five coastal provinces situated in the southern half of central part of Viet Nam. Viet Nam is wider at this point than in the North Central Coast region, so the inland areas are separate provinces. Like the North Central region, it is most prone to storms and floods.

The Eastern South Region and Islands contains those parts of lowland, southern Viet Nam that are north of the Mekong delta. There are seven provinces, including the islands along the coast, plus the independent municipality of Ho Chi Minh City. There is a concentration of economic activities and population in this region. The region is particularly prone to storm, flood whirlwind and forest fires.

Mekong River Delta

It is Viet Nam's southernmost region, and contains twelve mostly small but populous provinces in the delta of the Mekong, plus the independent municipality of Can Tho. The region is the rice bowl of Viet Nam and other agriculture and aquaculture products. It is prone to flooding. A tributary entering the Mekong at Phnom Penh drains the Tonlé Sap, a shallow freshwater lake that acts as a natural reservoir to stabilize the flow of water through the lower Mekong. When the river is in flood stage, its silted delta outlets are unable to drain out the high volume of water. Floodwaters back up into the Tonlé Sap, causing the lake to inundate as much as 10,000 square kilometres, or 25% of the region's total area. As the flood subsides, the flow of water reverses and proceeds from the lake to the sea. The effect is to reduce significantly the danger of devastating floods in the Mekong delta, where the river floods the surrounding fields each year to a level of one to two meters. While its inner part is prone to both drought and flood and storm, its coastal part is prone to storm and saline water intrusion.

Mountainous areas and Central Highlands

The Mountainous areas are comprised of the fifteen provinces in the north east and west of North Viet Nam, sharing borders with Laos and China and facing the sea in the east. This region is mountainous and not densely populated. This region is prone to flash floods, floods, and landslides. In addition, the coastal zone is prone to storm surge, storm and whirlwind.

The Central Highlands contains the five inland provinces (much of whose terrain is mountainous) of south-central Viet Nam. The region is prone to drought, flash flood and whirlwind.

Sea areas

The Sea areas refer to the East Sea and include the Paracel and Spratly islands[12].

2.4 Chapter review

- A disaster occurs when a hazard impacts on a vulnerable community and causes damage, casualties and disruption of basic services
- Vulnerability is a set of prevailing socio-economic conditions, which influence the community's exposure and susceptibility to hazards
- Capacities are community's resources, means and strengths, which enable them to avoid, mitigate, prepare for, cope with, or quickly recover from hazards
- Disaster risk is a product of hazard and vulnerability; disaster risk management and disaster risk reduction are approaches that build on this understanding of risk
- The terms: climate change, climate change adaptation and climate mitigation were defined
- The causes and effects of major natural hazards were described in detail
- The most common natural hazards occurring in Viet Nam are floods, typhoons/tropical depressions, flash floods, drought and whirlwinds

[12] The Paracel (Hoang Sa) and the Spratly (Truong Sa) Islands are two archipelagos offshore Viet Nam. The closest point of the Paracel Islands is 120 nautical miles east of the central city of Da Nang and Re Island, a coastal island of Viet Nam. Meanwhile, the closest point of the Spratly Islands is about 250 nautical miles to the east of Cam Ranh Bay, NhaTrang city, KhanhHoa province.

2.5 Discussion questions

1. Differentiate between hazards and disasters. Give examples for each.
2. What are the hazards that frequently affect your province? Cite some of your provinces vulnerabilities and capacities.
3. Describe the most severe damages caused by weather-related hazards.
4. Choose a specific hazard that affects your province. What might make somebody more likely to be exposed to this hazard than other people? What might make them more likely to suffer losses when exposed?
5. Which do you think are the most serious hazards affecting the country? What criteria are you using to judge this (e.g. effect on lives, livelihoods, infrastructure or the economic system)?

Chapter 3. INSTITUTIONAL ARRANGEMENTS FOR DISASTER RISK MANAGEMENT AND CLIMATE CHANGE

3.1 Introduction

This chapter aims to give participants a basic understanding on the agreements, strategies and institutional frameworks that exist for Disaster Risk Management (DRM) and Climate Change (CC) at the international and regional levels and in Viet Nam.

3.2 Main learning points

At the end of this chapter, participants should be able to:

- Possess an overview of international institutional arrangements for DRM and CC;
- Understand the institutional arrangements for DRM and CC in the country.

3.3 Agencies working on disaster prevention and mitigation in Viet Nam

The following sections introduce institutional arrangements and main agencies involved in disaster risk management in Viet Nam.

The Central Committee for Flood and Storm Control and Committees for Flood and Storm Control, and Search and Rescue in Ministries and localities.

The national level

The Central Committee for Flood and Storm Control

> The Central Committee for Flood and Storm Control (CCFSC) coordinates flood and storm control in Viet Nam. Established in 1946[13], this inter-agency committee is comprised of some 22 ministries and agencies and is responsible for the formulation of flood and storm related policies and mitigation measures.

The Minister of the Ministry of Agriculture and Rural Development (MARD) is the Chair of the CCFSC and reports to the Prime Minister. There are two other Vice Chairs of the CCFSC: the Minister of Defence and the Head of the Government Office.

The CCFSC membership is comprised of Ministers, heads of ministerial-level agencies and other heads of Government and has the duty to assist the Ministries and ministerial-level agencies to implement flood prevention and management work within the respective ministries and ministerial-level agencies and Government agencies.

> The Standing Office of the CCFSC is the Department of Dyke Management and Flood Control (DDMFSC). The head office is in Hanoi, with two Centers for Flood and Storm located in Ho Chi Minh City and Da Nang City.

The organizational structure of the CCFSC is stipulated in Chapter II, Article 4 of Decree No. 14/2010/ND-CP dated 27/02/2010 (See Figure 1).

[13] In May 1946, once the Peoples' Democratic State was established, President Ho Chi Minh issued a decree to organize the Central Committee for Dyke Protection – now the Central Committee for Flood and Storm Control

The CCFSC has the responsibility to advise and assist the Government in ensuring that sectors and local authorities implement the annual plans for floods and storm control. In brief, the main roles and responsibilities of the CCFSC, include:

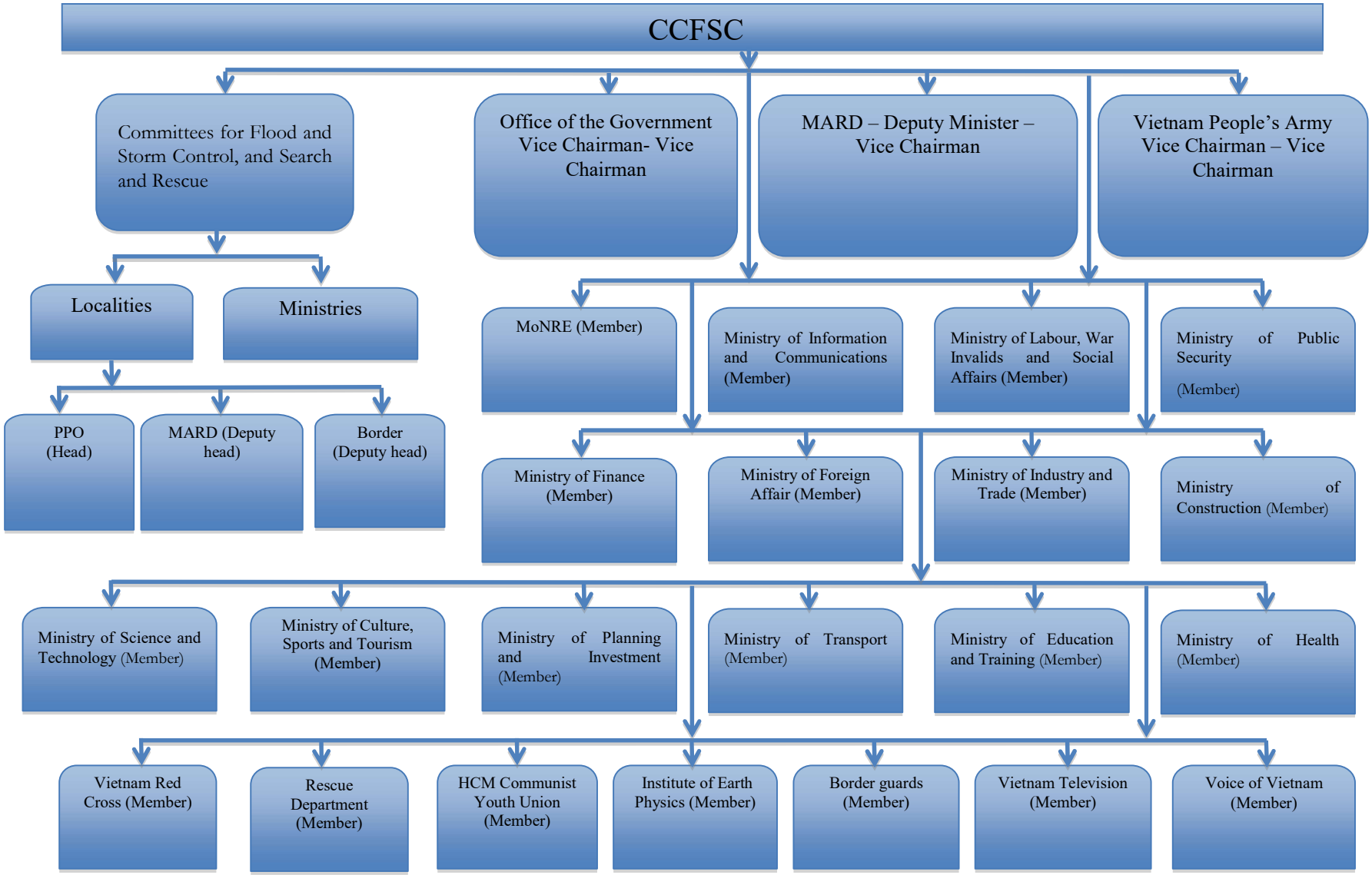
- Monitoring flood and storm events, issuing official early warnings and coordinating disaster response and mitigation measures
- Ensuring that ministries and provincial governments prepare and implement annual flood and storm preparedness and response plans
- Assisting the Prime Minister in assigning responsibilities to mobilize labour forces, and equipment to respond to emergency situations 'which exceed local capacity'
- Instructing localities on disaster response and recovery to overcome consequences of floods and storms
- Issuing instructions for the mobilization of human resources and funds[14] to provide timely support to urgent situations, that sectors and localities are unable to solve
- Receiving information and reporting on damage caused by floods and storms
- Monitoring the planning and implementation of annual sub-national and sector specific disaster prevention and response plans[15].

Organizing review workshops to propagate experiences, lessons, and advanced technologies in disaster preparedness and mitigation in localities and sectors.

[14] In addition to the general funds allocated to each province for immediate relief

[15] Under the Ordinance on Flood and Storm Control, all 64 provinces and cities of Viet Nam are tasked with developing their own action plans to implement the National Strategy up to 2020.

The organizational structure of the Central Committee for Flood and Storm Control



The Committees for Flood and Storm Control at provincial, district and commune levels

Committees for Flood and Storm Control (CFSC) exist at provincial, district and commune level. From the provincial level down to the commune level, the People's Committee (PC) takes the overall responsibility for flood and storm control plus search and rescue activity.

The local Committees for Flood and Storm Control, and Search and Rescue, are established by the Chairmen of Provincial People's Committees (PPC), with the function to assist the same level of the People's Committees to implement flood prevention and flood management work in the local areas.

The organizational structure of the Committees for Flood and Storm Control, and Search and Rescue in localities is stipulated in Chapter II, Article 5 of Decree No. 14/2010/ND-CP dated 27/02/2010. The functions are stipulated in Chapter II, Article 8 of this Decree

At provincial level

The Committee for Flood and Storm Control, Search and Rescue is chaired by the Chairperson of the Provincial People's Committee (PPC) while the management and technical responsibility is held by the director of the provincial CFSC - with functions to assist at the same level - who is also the director of the provincial Sub-Department of Dyke Management and Flood and Storm Control, which is under the provincial Department of Agriculture and Rural Development (DARD).

At district level

The Chairperson of the district PC chairs the CFSC while the director of the district Sub-Department of Agriculture and Rural Development holds technical management responsibility.

At commune level

The Chairperson of the commune PC, with one assigned staff, is in charge of flood and storm control plus search and rescue activity and chairs the Commune CFSC.

The membership of the CFSC at provincial and local levels includes local representatives from similar ministries and sector agencies as in the CCFSC as well as the VNRC.

The Chair of the People's Councils at the same level establishes the committees for flood and storm control of provinces, districts and communes. The committees are comprised of:

- *Chair of the local People's Committee (Chair)*
- *Head of DDMFC (Standing Vice-Chair)*
- *Heads/Deputy Heads of departments concerned with prevention and control of floods and storms of the locality*

The operational budget comes from the provincial Government. The tasks of the local Committees include:

- Assisting the People's Committee of the same level to set up plans for the prevention and control of floods and storms and guide their implementation in their localities
- Monitoring and maintenance of dykes
- Preventing and protecting residential and commercial areas from floods and storms
- Issuing early warnings for hazards
- Receiving feedback from lower level commit tees on act ions done to prepare for an impending hazard and, based on this information, give instruction on further act ion
- Mobilizing personnel and resources for emergency response

- Providing relief and rehabilitation
- Preparing damage and needs assessment report for sending to higher level committees.
- Assisting the respective People's Committee to prepare and implement flood and storm plans in the territory;
- Organizing dyke protection, flood and storm preparedness and mitigation;
- Advising local government in recovery and reconstruction activities.

Detailed functions of the CCFSC and Committees for Flood and Storm Control, and Search and Rescue in Ministries and localities

1. The functions of the CCFSC are stipulated in Clause I, Article II of Decree No. 08/2006/ND-CP dated 16/05/2006 by the Government.
2. The functions of the Committees for Flood and Storm Control, and Search and Rescue in localities are stipulated in Chapter II, Article 8 of Decree No. 14/2010/ND-CP dated 27/02/2010.
3. The functions of the Committees for Flood and Storm Control, and Search and Rescue in Ministries are stipulated in Chapter II, Article 8 of Decree No. 14/2010/ND-CP dated 27/02/2010.

The authority of the CCFSC and Committees for Flood and Storm Control, and Search and Rescue in Ministries and localities

1. The authority of the CCFSC is stipulated in Chapter III, Article 10 of Decree No. 14/2010/ND-CP dated 27/02/2010.
2. The authority of the Committees for Flood and Storm Control, and Search and Rescue in localities is stipulated in Chapter III, Article 11 of Decree No. 14/2010/ND-CP dated 27/02/2010.

The authority of the Committees for Flood and Storm Control, and Search and Rescue in Ministries is stipulated in Chapter III, Article 12 of Decree No. 14/2010/ND-CP dated 27/02/2010.

Functions, duties and authority of some Ministries and agencies working on disaster prevention and mitigation

The Ministry of Agriculture and Rural Development (MARD)

The functions, duties, authority and organizational structure of the Ministry of Agriculture and Rural Development (MARD) are stipulated in Decree No. 01/2008/ND-CP, dated 03/01/2008 and Decree No.75/2009/ND-CP dated, 10/09/2009 by the Government.

Position and functions

Ministry of Agriculture and Rural Development is a Government agency, performing the State management functions for agriculture, forestry, salt production, aquaculture, water resource management and rural development in the whole country; and the State management of public services in sectors under its management.

Duties and authority in water resources management

a. Direct and guide the implementation of legal documents on water resource management and dykes; prevent harmful effects of water and salt water intrusion after being promulgated by the competent authority

b. Direct and guide the implementation of strategies, water resource planning; and strategies on disaster prevention and mitigation after approval by the Prime Minister

c. Lead in developing regional water resource planning and reservoirs for agriculture, serving multiple purposes associated with different socio- economic sectors

d. Approve dyke planning, water resource planning related to more than two provinces for flood prevention, drainage, water supply, drought prevention, salt water intrusion, soil improvement, river and coastal erosion prevention and rural water supply

e. Publicize and organize the direction, guidance, inspection, evaluation and synthesis of reports, the implementation of strategies, planning water resource development approved in the country

f. Propose to the Prime Minister and implement measures to mobilize forces, materials and means for prevention and recovery from the consequence of flood, drought and inundation; troubleshooting water resource works and other damage caused by water; direct the diversion of flood water and flood reduction; operate large reservoirs and intermediate sized-reservoirs at the division level

g. Guide the decentralization process for the Provincial People's Committee to approve water resource planning, dyke planning and flood prevention planning in the provinces

h. Promulgate, monitor and inspect the implementation of national technical regulations, procedures and socio-economic norms on construction, exploitation and protection of water resource systems, dykes, the prevention of flood, storms, inundation, drought, water supply and drainage in rural areas

i. Regulate the permitted load and license the issuance of vehicles on dykes; guide the Provincial People's Committee to grant, revoke and renew licenses for within the protection of irrigation works

j. Organize, direct, guide and inspect the implementation of specific regulations for emergencies of flood diversion and flood reduction, safe evacuation measures to ensure production activities and people's lives, overcome inundation consequences, provide subsidies for people in areas affected by flood diversion and flood reduction; disaster prevention and mitigation measures such as typhoons, floods, drought, flash floods, landslides, salt water intrusion, sea level rise and tsunamis.

k. Investment decisions to build, repair, upgrade and solidify dykes, water resource works under the Ministry's authority on a national scale from the State budget provided through the Ministry.

Water Resources Directorate

In March 2010, MARD established the Water Resources Directorate (WRD) that brings together DDMFSC and several other departments: the Department of Irrigation and Water Resources, Department of Water Supply and Sanitation, the Institute of Water Resources Planning, the Department of Science, Technology and International Relations and the Disaster Management Centre.

The functions, duties, authority and organizational structure of the WRD are stipulated in the Decision No. 03/2010/QD-TTg dated 25/01/2010 of the Prime Minister.

Position and functions

The WRD is a MARD affiliated agency, performing the functions of State management over water resources; managing and leading the public activities under the scope of the Directorate.

The WRD has its legal entity, its own seal, operational funds and its account opened in accordance with the legal regulations; headquarter located in Hanoi.

Duties and authority

For water – related disaster prevention activities

a. Propose to the Minister of MARD solutions to mobilize resources, materials and tools to prevent and mitigate consequences of floods, droughts, inundation, salt intrusion, land slide, polluted water resources; solve incidents at water resource works

b. Direct, guide and examine the implementation process to prevent and mitigate consequences of floods, droughts, inundation, salt intrusion, landslide, polluted water resources; solve incidents at water resource works in order to ensure the production; recover from the consequences of flood, drought, salt intrusion; and mitigate water resource pollution.

For dyke management

a. Undertake the adjustment of plans for flood prevention in river systems with dykes on a national scale and propose these to the Minister of MARD; approve planning and the adjustment of plans for dykes at the local and national scale

b. Submit to the Minister of MARD for publication approved plans and the adjustment of plans for flood and flood prevention on river systems with dykes at the national scale; approve the planning and the adjustment of dyke plans, which are submitted by ministries, ministerial agencies and provincial People's Committees

c. Provide guidance on processes, planning procedures, and adjustment planning for dykes

d. Submit to the Minister of MARD for approval, the granting of licenses on some activities relevant to dykes of special Level, Level I, Level II, Level III and the construction and renovation of traffic related to dykes where construction affects at least two provinces, or cities according to the regulation

e. Regulate the permissible load and license issuance for vehicles on dykes; provide guidance for issuing, revoking, and extending the validity of licenses for activities related to dykes according to the regulations.

For natural disaster prevention, response, and mitigation

a. Implement the National Strategy for Natural Disaster Prevention Response and Mitigation to 2020 according to the Government Law and propose adjustment as necessary

b. Propose to the Minister of MARD, or authorized level, solutions to mobilize resources, materials and tools for dyke maintenance and recovery from flood and storm impacts

c. Monitor and update information on rain, storm, flood, whirlwind, typhoon, earthquake, and tsunami throughout the country; coordinate with other sectors, organizations, local provinces to propose in a timely manner to the CCFSC how to deal with problems of water resource works, handle the problem and recover from the impacts of flood and storm

d. Direct, guide and inspect the implementation of specific regulations on emergency situations that need flood diversion and flood reduction and safe evacuation; ensure people's lives and the recovery from the consequences of inundation bysupporting people; undertake disaster prevention and mitigation measures;

e. Implement the duties of flood and storm control and disaster mitigation as assigned by the Minister of MARD and requested by the CCFSC.

Department of Dyke Management, Flood and Storm Control

The functions, duties, authority and organizational structure of the Department of Dyke Management, Flood and Storm Control (DDMFSC) are stipulated in Decision No. 03/2010/QD-TTg dated 25/01/2010 by the Prime Minister.

Position and functions

The DDMFC is a MARD affiliated agency, performing the function of State management of the dyke system and for flood and storm control for the whole country.

The Department has its legal entity, it's own seal, operational funds and its account is opened in accordance with legal regulations.

The Department is located in the Hanoi and there are two regional centers in Da Nang city and Ho Chi Minh City.

Tasks and authorities

For dyke management

a. Develop and propose plans assigned by the WRD to manage the basic survey of dykes, and for flood and storm control after approved by the competent authorities; undertake dyke planning and flood and storm control projects; appraise the design of dyke planning, flood and storm control and natural disaster mitigation

b. Lead and coordinate with local authorities and related agencies the review and supplement and adjustment of dyke planning for all regions in the country and submit to the WRD for approval

c. Lead the appraisal and submit to the General Director for approval or submit to MARD according to the planning authority, adjust dyke plans submitted by the ministries, ministerial-level agencies and Provincial People's Committees

d. Lead and coordinate with local authorities and related agencies in developing planning, and adjustment of flood and storm control planning of rivers with dykes at the national scale to submit to the General Director

e. Lead the appraisal and submit to the General Director the agreements for Provincial People's Committee to approve planning, adjust flood and storm control planning in detail for each river with a dyke submitted by the Provincial People's Committee

f. Submit to the General Director the announcements for public planning for the adjustment of flood and storm control of rivers with dykes in the country

g. Submit to the General Director the orders, instructions and procedures for planning and adjustments for dyke planning

h. Conduct the appraisal and submit to the General Director for approval the investment in the construction, repair, maintenance, upgrading and solidifying dykes; undertaken the setting up and management of major and urgent projects on dykes and in flood and storm control; inspect, monitor, guide and sum up results of projects for dyke renovation, upgrade, maintenance, solidification in all provinces

i. Conduct the appraisal and submit to the General Director, the agreement of construction projects using rivers where there are no construction works

j. Lead the appraisal for agreements of dyke projects, regardless of funding, as assigned by the General Director

k. Submit to the General Director, the decisions to approve for license issuance of activities related to special level of dykes, Level I, Level II, Level III and the construction, renovation

and construction of traffic related to dykes for works affecting to more than two provinces or cities under the provisions of the law

l. Lead the appraisal and submit to the General Director for the approval, the procurement plans for dyke projects as assigned by management in accordance with the law

m. Submit, upon request, to the General Director the agreements for river and coastal erosion prevention

n. Lead the appraisal and submit to the General Director for approval of solutions to address emergency situations on dykes

o. Direct dyke maintenance, address technical problems of dykes. Lead the coordination with other departments, organizations and provinces to propose timely measures for the prevention, treatment and recovery of consequences relating to dykes

p. Propose measures to mobilize the resources at the national and local levels for the rescue and protection of the dyke system from Level III to Special Level in emergencies

q. Submit to the General Director the regulations on load allowance and license issuance for vehicles on dykes

r. Advise the General Director on the guidance for granting, cancellation or extension of permits for certain activities related to dykes according to the regulations

s. Submit to the General Director to direct and guide Provincial People's Committee organizing force to manage public dykes

t. Join appraisal to balance investment projects on dyke repair, dyke maintenance plans and projects as assigned by the General Director

u. Manage and conduct the formulation, submission and storage of construction documents in accordance to Government regulations.

For flood and storm control

a. Organize to conduct flood and storm control work according to regulations; advise the General Director on the implementation of State management on the National Strategy for Natural Disaster Prevention Response and Mitigation to 2020 as prescribed by law

b. Monitor and regularly update the situation of rain, storm, flood, typhoons, earthquakes, tsunamis in the country; coordinate with other departments, organizations, and provinces to propose in a timely manner measures to the CCFSC to address water resources work problems, overcome the consequences of disasters mentioned above; assess damage and propose to the General Director remedial measures due to storms, floods and disasters

c. Lead the direction in developing, advising and proposing reservoir operation plans according to the regulations of multi-purpose hydro reservoir operation procedures in reducing downstream flooding as authorized by the Minister as the Chairman of the CCFSC

d. Advise the General Director on how to direct, guide and inspect the implementation of regulations on emergencies in flood diversion, flood reduction and evacuation measures, that ensure production activities and people's lives, to overcome the consequences of inundation; undertake disaster prevention and mitigation measures

e. Submit to the General Director to decide under the authority or submit to the competent authority to decide on the mobilization of forces, supplies and facilities for dyke maintenance and to overcome the consequences of floods and storms

f. Advise the CCFSC to coordinate with VINASARCOM and other related ministries, branches and provinces in directing flood and storm control and search and rescue to minimize damage when an earthquake or tsunami occurs

g. Advise the CCFSC and direct the planning and development of tsunami warning alarm systems for high risk areas

h. Direct the management and use of reserve materials for flood and storm control; advise the General Director on the issuance of a total reserve materials for flood and storm control

i. Update information on river and coastal erosion; propose, examine and supervise the addressing of erosion.

National Disaster Management Center

The functions, duties, authority and organizational structure of the National Disaster Management Centre (NDMC) are stipulated in Decision No. 14/QD-TCTC dated 31/03/2010 by the WRD.

Position and functions

The NDMC is under the WRD, with functions to support and serve State management and execution of specific tasks in the field of disaster prevention and mitigation and climate change adaptation across the country.

The NDMC has its legal entity, it's own seal, operational funds and its account is opened in accordance with the legal regulations.

The NDMC office is located in Hanoi.

The Ministry of Natural Resources and Environment

The Ministry of Natural Resources and Environment (MoNRE) was established in 2002 under Resolution 02/2002/QH11 of the first session of the 11th National Assembly. The Department of Meteorology and Hydrology and Climate Change of MoNRE has the responsibility to assist the Minister of MoNRE in the State management of hydrology, meteorology, monitoring the forecast and warning of disasters and coordination of activities related to climate change and ozone protection. The Department is the Standing Office of the Viet Nam National Committee for UNFCCC and Kyoto Protocol.

The responsibilities of MoNRE in flood and storm control are defined in Clause 4, Article 11, Chapter III,Decree No.08/2006/ND-CP and also in Clause 4, Article 11, Chapter III, Decree No.08/2006/ND-CP.

a. Develop plans and direct the implementation of meteorological warning and forecasting

b. Promulgate and direct the implementation of legal documents under its authority on forecasting and warning for the prevention and remedying of flood and storm

c. Collect data and process information, perform warning and forecasting to provide timely official information about tropical depressions and storms and floods on major rivers in the country and warning of flash floods for the CCFSC and the ministries, branches, related local provinces and the mass media according to current regulations

d. Manage the financial resources used for meteorological warning and forecast for flood and storm control work

e. Research and apply updated science and technology and develop international relations in warning and forecasting, prevention and overcoming the consequences of floods and storms. Conduct professional training for staff working in warning and forecasting, and propagate

and disseminate knowledge, experience and the law on forecasting and warning for flood and storm control

f. Coordinate with ministries, branches and local provinces to examine and inspect the observance of the law, to settle complaints and criticisms about flood and storm warnings and forecasts.

The responsibilities of MoNRE for dyke management are defined in the Law on Dykes Chapter VI Article 42, Clause 3:

a. Conduct meteorological and hydrological forecasting work; direct and guide development planning for land use in the protection of corridors for dykes, dyke embankments, sluices, and river banks under the provisions of this Law and other laws on land

Lead and coordinate with ministries, ministerial level agencies to guide and examine the exploitation of sand, stone and gravel in the river; direct Provincial People's Committees to prevent illegal exploitation of mineral resources causing unsafe dykes.

The private sector

In Viet Nam, the private sector or public and private companies have traditionally been involved strongly in disaster response through financial contributions or donations in-kind in strategic partnership with the VNRC and with NGOs. The involvement in disaster prevention, preparedness and mitigation however is still to be fully explored.

Under the initiative *"Promoting Community – Business Partnership in Flood Risk Reduction in the Mekong Delta"* of the Mekong River Commission (MRC) and the Asian Disaster Preparedness Centre (ADPC) in partnership with the Viet Nam Chamber of Commerce and Industry (VCCI) and the MARD Department for Dyke Management and Flood and Storm Control (DDMFSC), efforts have been undertaken to explore the opportunities of private sector involvement in the areas of flood safety, public awareness raising activities and training and capacity building before disasters.

Through a focus on corporate social responsibility, image creation or profiling, brand awareness and promotion, sponsorship, corporate volunteers and other mechanisms, public and private companies will be encouraged to commit to fund local authorities so they can conduct flood preparedness activities in the Mekong Delta regularly. In close partnership with VCCI, the project is currently documenting good practices and developing a strategy for public-private partnership in Viet Nam.

National platform for disaster risk reduction and climate change adaptation

As part of its obligations as a signatory to the Hyogo Framework for Action (HFA) 2005-2015, Viet Nam has committed itself to establish a multi-sectorial platform for disaster risk reduction and climate change adaptation, under Priority for Action 1

National platform

The National Strategy on Natural Disaster Prevention, Response and Mitigation to 2020 mentions: "lack of synchronous planning and short of coordination among ministries, sectors and localities" and: "lack of timely adjustment in policies on the mobilization of resources for disaster prevention and mitigation" (sic) as some of the limitations to be addressed in disaster risk management in Viet Nam. Also, the National Target Program to Respond to Climate Change (NTP) states that: "the National strategy on Natural Disasters Prevention directly links with responding measures to cope with immediate impacts of climate change" and specifically calls for the integration of the NTP into "sectorial and local development strategies and plans like the National Strategy".

In response to this, MARD and MoNRE with support of the United Nations International Strategy for Disaster Reduction (UNISDR) and the Australian Government have organised

during 2009-2011 two National Forum on Disaster Risk Reduction and Climate Change Adaptation in Hanoi. The Deputy Prime Minister, as the chair of the Forum as well as the leadership of MARD and MoNRE expressed their strong commitment towards implementing Viet Nam's obligations regarding the Hyogo Framework for Action. A proposal for the establishment of the Platform was drafted following an extensive consultation process and is expected to be submitted to the Prime Minister in mid-2011 and the Platform formally established by October 2011.

3.4 International institutional framework for climate change

Introduction

Climate change is a local, regional and global challenge, which requires solutions at all levels. Greenhouse gas emissions have the same impact on the atmosphere whether they originate in Washington, London or Beijing. Consequently, action by one country to reduce emissions will do little to slow global warming unless other countries act as well. Ultimately, an effective strategy will require commitments and action by all the emitting countries. At the same time, it is essential that countries, regions and localities take steps to prepare for the impacts of climate change. Even if emissions reduction were to progress in the near future, the effects of increased concentrations of greenhouse gases in the atmosphere now would persist in the climate system for many decades to come. Climate change impacts are inevitable.

In Chapter 1, the main terminologies related to climate change, climate variability, climate change adaptation, and mitigation were introduced. This section outlines the major international agreements and conventions to which Viet Nam is party.

Climate change at a global level: international agreements and conventions

Intergovernmental Panel on Climate Change

The World Meteorological Organization and the UN Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988.The IPCC surveys worldwide scientific and technical literature and publishes assessment reports that are widely recognized as the most credible existing sources of information on climate change. The IPCC also works on methodologies and responds to specific requests from the Convention's subsidiary bodies. The IPCC is independent of the United Nations Convention.

United Nations Framework Convention on Climate Change

In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted as the basis for a global response to the climate change problem. With 194 Parties, the Convention enjoys near-universal membership. The ultimate objective of the Convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. The Convention itself sets no mandatory limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the Convention provides for updates (called "protocols") that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become better known than the UNFCCC itself.

Viet Nam signed the UN Framework Convention on Climate Change (UNFCCC) on 11 June 1992 and ratified it on 16 November 1994. It signed the Kyoto Protocol on 3 December 1998 and ratified it on 25 September 2002.

Conference of the Parties

Since the UNFCCC entered into force, the parties have been meeting annually in Conferences of the Parties (COP) to assess progress in dealing with climate change, and beginning in the mid-

1990s, to negotiate the Kyoto Protocol to establish legally binding obligations for developed countries to reduce their greenhouse gas emissions. From 2005 the Conferences have met in conjunction with Meetings of Parties of the Kyoto Protocol and parties to the Convention that are not parties to the Protocol can participate in Protocol-related meetings as observers. To date, 16 Conferences of Parties have taken place and each produced respective agreements.

Kyoto Protocol

The Kyoto Protocol is an international agreement agreed at COP3 in 1997 among 192 Parties and entered into force in 2005. The detailed rules for the implementation of the Protocol were adopted at COP7 in Marrakesh in 2001, and are called the "Marrakech Accords". The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. The countries and the European community have committed to reducing their emissions by an average of 5% by 2012 against 1990 levels[16].

The UNFCCC and its Kyoto Protocol are also designed to assist countries in adapting to the inevitable effects of climate change. They facilitate the development of techniques that can help increase resilience to climate change impacts – for example, the development of salt-resistant crops – and to exchange best practices with regard to adaptation. The Adaptation Fund was established to finance adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol.

The Kyoto mechanisms

Under the Treaty, countries must meet their targets primarily through national measures. However, the Kyoto Protocol offers them an additional means of meeting their targets by way of three market-based 'flexible' mechanisms. The Kyoto mechanisms are: International Emissions Trading - known as "the carbon market"; the Clean Development Mechanism (CDM) and joint implementation. The mechanisms help stimulate green investment and help Parties meet their emission targets in a cost-effective way.

Monitoring emission targets

Under the Protocol, countries' emissions have to be monitored and records kept of the trading carried out. The UN Climate Change Secretariat keeps an international transaction log to verify that transactions are consistent with the rules of the Protocol. Parties submit annual emission inventories and national reports under the Protocol at regular intervals. A compliance system ensures that Parties are meeting their commitments and helps them to meet their commitments if they have problems doing so.

3.5 Institutional framework for climate change in Viet Nam

Ministry of Natural Resources and Environment (MoNRE)

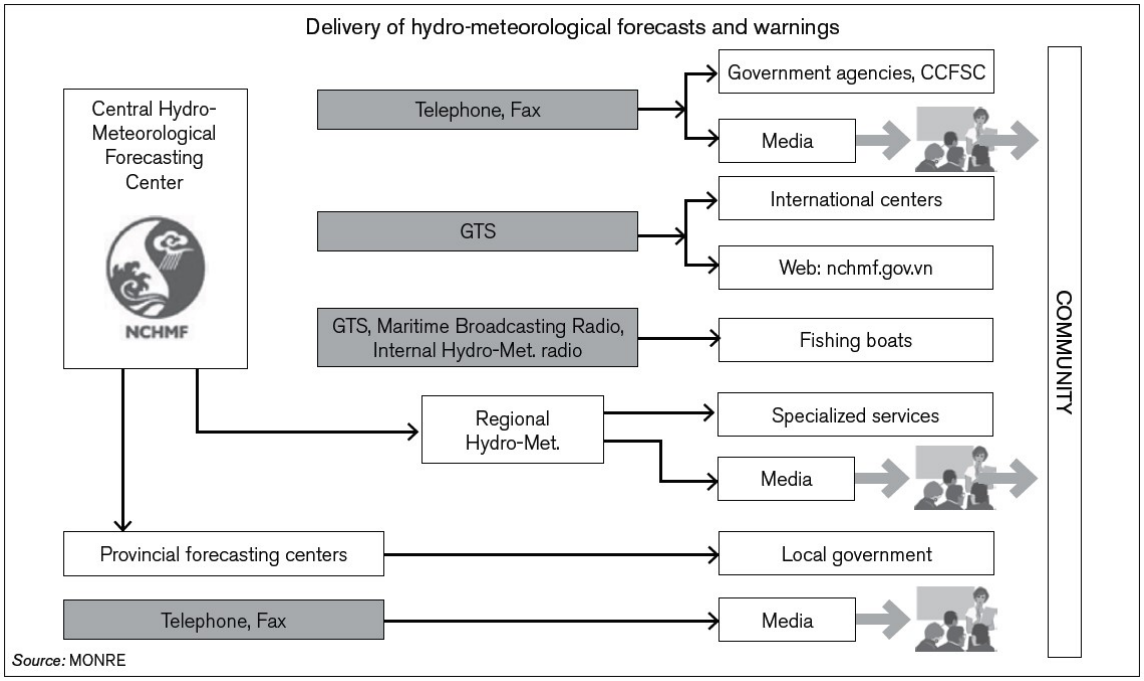
MoNRE is assigned by Government to be the National Focal Point to take part in and implement the UNFCCC, Kyoto Protocol, and CDM in Viet Nam. The Minister of MoNRE set up a National Committee of Climate Change (NCCC) on 4 July 2007. So far the main

[16] Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." Industrialized countries must first and foremost take domestic action against climate change. But the Protocol also allows them to meet their emission reduction commitments abroad through so-called "market-based mechanisms". For example, one of the Protocol's market-based mechanisms, the Clean Development Mechanism (CDM), permits industrialized countries to earn emission credits through investment in sustainable development projects that reduce emissions in developing countries.

responsibility of the NCCC is to assist the Minister of MONRE to direct, manage and coordinate activities to implement UNFCCC, Kyoto protocol and CDM in Viet Nam.

National Centre for Hydro-Meteorological Forecasting

The National Centre for Hydro-meteorological Forecasting (NCHMF) under MoNRE carries out hydro-meteorological forecasting. The NCHMF website: http://www.nchmf.gov.vnprovides links to region-specific hydrological forecasts with interactive maps provide river station information (water and warning levels); daily meteorological forecasts; and forecasts for severe weather, tropical cyclone activity, and droughts.



When storms approach over the East Sea they are monitored by the Hydro-Meteorological Centre, which produces forecast bulletins every two hours on the approaching event. The bulletins are immediately and simultaneously sent to Vietnam Television/Voice of Vietnam and the Marine Broadcasting System for broadcasting nationwide and to the DDMFSC to be uploaded on the CCFSC website. Based on the bulletins, the CCFSC convenes meetings and prepares directives which are dispatched to relevant ministries and localities affected by the disaster, asking for appropriate actions, e.g. population evacuation, return of fishing boats to safe harbour, securing critical assets, etc.[17]

Department of Meteorology and Hydrology and Climate Change

The functions of the Department of Meteorology and Hydrology and Climate Change of MoNRE were established with Degree 997 /QĐ-BTNMT issued in May 2008. The Department has the responsibility to assist the Minister of MoNRE in the state management of hydrology, meteorology, monitoring the forecast and warning of hazards and coordination of activities related to climate change and ozone protection. The Department is the Standing Office of the Viet Nam National Committee for UNFCCC, Kyoto Protocol and CDM in Viet Nam. Specifically the Department is responsible to:

- Guide and monitor the implementation of procedures on forecasting and warning of earthquake, tsunami, typhoon, storm, tropical depression, flood and tides;
- Develop and manage the network for forecasting hazards; and guide the provision and utilization of forecast and warning information in the whole country;

[17] World Bank Disaster Risk Profile, 2009

- Research and develop natural disaster scenarios, guide and monitor the activities of Ministries, sector agencies and provinces in the preparation and implementation of disaster prevention plans, participate in the recovery activities in the aftermath of disasters.

Institute of Meteorology, Hydrology and Environment

The Institute of Meteorology, Hydrology and Environment (IMHEN), also under MoNRE, provides research and expertise for weather forecasting and climate modeling. The Institute was founded in 1976 (under Decree No 215/CP) and re-structured in 2003 to be an organization with scientific functions under MoNRE. IMHEN has a mandate for research and development on meteorology, climatology, agro-meteorology, hydrology, water resources, oceanography and environment.

Institute of Policy and Strategy on Natural Resources and Environment

The Institute of Policy and Strategy on Natural Resources and Environment under MoNRE coordinates with the relevant agencies in different ministries in dealing with CC adaptation. It has a broad mandate to deal with adaptation and includes the National Office for Climate Change and Ozone Protection. It conducts vulnerability and adaptation assessment tasks, undertakes analysis of climate impacts and adaptation options, exchanges research results and coordinates with the CCFSC to apply policy development within MoNRE and MARD.

The National Target Program to Respond to Climate Change

Under the Decision 158/2008/QD-TTg, dated 2nd December 2008, the National Target Program to respond to Climate Change (NTP-RCC) was approved by the Prime Minister of Viet Nam. This program focuses on the period 2009-2015. The NTP-RCC addresses climate change impacts and the need for adaptation and mitigation. The NTP-RCC examines the need of most sectors and will be the basis to address many climate change challenges and is the first effort to develop an inter-ministry network of communication and collaboration. A Steering Committee, chaired by the Prime Minister and an Executive Board with membership from several ministries was later established.

One of the most important features of the NTP-RCC is to encourage mainstreaming climate change concerns into the Socio-economic Development Strategy (SEDS 2011-2020) and Socio-economic Development Plan (SEDP 2011-2015), and policies on DRR, coastal zone management, and energy supply and use. Climate Change Action Plans to deal with climate change will be developed by economic sectors and all provinces. The NTP-RCC indicates the urgency of research and planning in the short term, and formulation and implementation of investment plans at later stages, requiring substantial financial and technical assistance. The NTP-RCC will be the foundation for a comprehensive strategy on adaptation and GHG emissions mitigation (see Annex II.2 for further details).

Other networks and organizations active in climate change

Mass organizations and media

Mass Organizations bridge the Communist Party, the Government and the people. They are far-reaching and therefore have a great effect on social and community structures. In this regard, Mass Organizations and media have a considerable potential to make people conscious of threats and promote the concept and methods of mitigation and adaptation.

Non-government organizations

Climate Change Working Group

The Climate Change Working Group (CCWG) was established in February 2008 to address the growing concern and interest into climate change impacts and the need for support and information sharing on the topic in Viet Nam. The CCWG provides a forum for Vietnamese NGOs (VNGOs) and international NGOs (INGOs) to actively participate in the climate change debate. The CCWG plays a significant role in facilitating information and resource sharing and coordination among NGOs currently engaged in addressing climate change across a number of sectors and themes. The CCWG consists of a core group that facilitates and coordinates the working group. Current core members include 12 INGOs and VNGOs. Subgroups were established on (i) awareness and behavior change; (ii) adaptation; (iii) mitigation; and (iv) policy.

The Vietnamese NGO network

The growing role of civil society organizations in Viet Nam's development is gradually building recognition from the government and society. There are hundreds of Vietnamese organizations, which are increasingly and diversely involved in sustainable community livelihood development and environmental protection, especially at the grass root level. With aspirations to jointly combat climate change related problems, the network of Vietnamese Non-governmental organizations and Climate Change (VNGO&CC) was founded on 11th September 2008. Originally initiated by leading Vietnamese NGOs, including the Centre for Sustainable Rural Development (SRD), the Centre for Marine Life Conservation and Community Development (MCD), the Centre for Environment Research, Education and Development (CERED) and the Institute for Social Studies (ISS), the network has become an open forum for its members in exchanging information, cooperation, and helping each other to connect to the National Assembly, governmental organizations and other social organizations and donor agencies. Currently, there are more than 100 organizations and individuals registered to become members of the network.

The mission of the VNGO&CC includes:

- Creating channels for information sharing on climate change
- Supporting members in capacity building on responding to climate change
- Coordinating activities to increase efficiency of NGO's activities
- Bringing information and results of projects on climate change at grassroots-level to state agencies.

3.6 Discussion questions

1. What are the main institutional frameworks for disaster risk management in the country and how are they reflected in your province/sector?
2. What are the main objectives of the National Target Program to Respond to Climate Change? What are your organization's roles in the programme?
3. What mechanisms exist for the management of risks from geophysical hazards?
4. In what ways are the problems of disaster risk and climate change inter-related?

Chapter 4. CLIMATE CHANGE IN VIET NAM

4.1 Introduction

According to the Climate Risk Index[18] developed by Germanwatch, over the period 1990-2009 all the ten countries most affected countries by climatic disasters were developing countries. During this period, globally more than 650,000 people died from nearly 14,000 extreme weather events, with GDP (PPP) losses more than USD2.1 trillion. Viet Nam ranks fifth over that period, with annually on average 457 human casualties and average annual GDP (PPP) losses of USD1.9 billion - or 1.3% of GDP[19][20].

Examining the costs of additional stresses and potential losses from climate change, an ADB study concluded that the impact of climate change on real GDP by 2050 will be 1-3% compared with a baseline situation that assumes no climate change. ADB predicts that by 2100 the potential losses caused by climate change to Indonesia, the Philippines, Thailand, and Viet Nam may be as high as USD230 billion, or 6.7% of annual GDP (projected GDP in 2100), if the world does not invest in greenhouse gas emissions mitigation to avoid dangerous climate change[21].

According to the new Climate Change Vulnerability Index[22] of the vulnerability to the impacts of climate change over the next 30 years, Viet Nam is ranked 13th of 170 countries and is one of 16 "extreme risk" countries[23].

4.2 Main learning points

At the end of this chapter, participants should be able to:

- Understand the basic concepts of climate change, and
- Be able to provide details of the climate change situation in Viet Nam.

4.3 Current climate change in Viet Nam: observations and scenarios

A number of landmark documents, such as the Fourth Assessment Report of the Intergovernmental Panel on Climate Change released in 2007[24], the UNDP Human Development Report (2007-8) on the impacts of sea level rise (SLR) on developing countries[25], the National Target Programme to Respond to Climate Change[26] and the Climate Change Scenarios for Viet Nam[27], as well as several other recent IHMEN reports[28] all have indicated that

[18] Compiled from GDP losses (in purchasing power party, PPP) and death as a result of climatic extremes such as typhoons, heavy rainfall, and drought

[19] Note: Viet Nam's GDP (PPP) in 2009 was USD 257 billion

[20] Harmeling 2010

[21] Zhuang et al. 2010

[22] Climate Change Vulnerability Index (CCVI), released by global risks advisory firm Maplecroft, enables organizations to identify areas of risk within their operations, supply chains and investments

[23] Maplecroft, 2010

[24] IPCC, 2007

[25] World Bank, 2007

[26] MoNRE, 2008

[27] MoNRE, 2009

Viet Nam is 'particularly vulnerable to the adverse effects of climate change' as defined in the UN Framework Convention on Climate Change (UNFCCC).

Observations by the Institute of Meteorology, Hydrology and Environment (IMHEN) suggest that there are already effects on the country from climate change including mean sea level rise and there is also a correlation with increased climatic extremes as well as less spectacular, but gradually growing climatic stresses on resources and communities. Projections of future climate change trends derived from global climate models suggest that these effects are likely to intensify during this century. Though we cannot be certain about the precise rate of change, climate modelers have used a range of hypothetical 'climate scenarios' to describe what might take place in the coming decades.

The IPCC Fourth Assessment Report defines 'climate scenario' as: *"A plausible and often simplified representation of the future climate, based on an internally consistent set of climatologically relationships that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models….. A climate change scenario is the difference between a climate scenario and the current climate".*

During 2009, IMHEN applied global climate change scenarios to develop *Climate Change, Sea level Scenarios for Viet Nam*[29]. These global scenarios are taken from the Fourth Assessment Report by the Inter-governmental Panel on Climate Change[30]. These are different global socio-economic scenarios associated with certain levels of future greenhouse gas emissions and more or less severe climatic changes[31].

IMHEN chose three (B1, B2 and A2) of the six scenarios for the development of the *Climate Change Scenarios for Viet Nam*. They are low emission scenario (B1), intermediate emission scenario of the medium scenario group (B2), and intermediate scenario of the high scenario group (A2). The baseline period was identified as 1980-1999, which is the same period used in the Fourth Assessment Report of the IPCC. Of those chosen for use in Viet Nam, the B2 medium emissions scenario is officially proposed as the main basis for official climate change projections and planning.

Mean sea level rise

Rising sea levels have been observed over the past decades along the coasts of Viet Nam. Mean sea level rise (SLR) is accelerating and will strongly affect the Mekong Delta and Ho Chi Minh City, parts of the Red River Delta and also a significant coastal strip, including small estuaries.

The official Vietnamese prediction projects a maximum rise in mean sea levels of 75cm (based on the B2 medium emissions scenario by 2100. However, Viet Nam's own planning parameter is **a one meter rise in mean sea levels by 2100**, which is consistent with predictions according to the A2 high emissions scenario due to thermal expansion of warmer seawater whilst accounting for some melting of land ice. This figure is used in the *National Target Programme to Respond to Climate Change* (NTP-RCC), approved in December 2008. A one meter mean sea level rise by 2100 is increasingly likely, and according to some of the data published after the IPCC's Fourth

[28] See UNDP Climate Change Factsheet, April 2011

[29] MoNRE 2009

[30] IPCC 2007

[31] UNDP 2007

Assessment in 2007, mean sea levels may rise by as much as 1.5 meters by the end of this century.

Without major action such as dyke reinforcements and improved drainage, a one-meter rise in mean sea levels along the coast of Viet Nam would cause an estimated threat of inundation to 17,423 km2 or 5.3% of Viet Nam's total land area[32]. Of that total, nearly 82% is in the Mekong Delta, 9% in the Red River Delta and over 4% each in the North Central Coast and South East regions. The latter includes Ho Chi Minh City and includes land along the Saigon/Nha Be River.

Moreover, 33 out of 63 provinces and municipalities, or 5 out of 8 economic regions, are threatened by severe inundation. Among these 33 provinces and municipalities, Kien Giang, Ca Mau, Hau Giang, and Soc Trang are the four provinces that will be most affected by mean sea level rise[33].

The effects of SLR on saline water intrusion are not dramatic, but significant, especially for the Mekong River Delta. Over the period 1980-1999, the 0.4% salinity level reached more than 20km on many major rivers throughout the country; with a one-meter mean sea level rise by the end of the 21st century, salt water will penetrate further inland.

Impacts on economic sectors

Climate change can be expected to impact to some degree on all sectors of the economy. For example, if droughts are becoming more likely, water supplies and hydro-electricity generation will be affected; increasing floods in urban areas can potentially disrupt trade and industrial production in urban areas. However, economic sectors that rely most heavily on environmental resources tend to be the worst affected by climate dynamics, especially if we focus on the direct effects on the economic livelihood of households. For Viet Nam, two main sectors likely to be impacted heavily are agriculture and fisheries.

Agriculture

Climate change can impact on crops and livestock in multiple ways, with consequences for rural livelihoods, food security and the general performance of the agricultural sector[34].

- Changes in temperature and rainfall patterns will affect the productivity of crops and may affect the timing of the cropping seasons. Some crops may no longer be viable under changing climatic conditions; others may become productive in places where they previously were not.
- The ecological changes associated with climate change may increase the prevalence and spread of pests and diseases, both of crops and livestock.
- Direct losses of crops and livestock could result from an increase in extreme weather events and their associated hazards such as floods, typhoons, whirlwinds and temperature extremes.

[32] Of that total, nearly 82% is in the Mekong Delta, 9% in the Red River Delta and over 4% each in the North Central Coast and South East regions. The latter includes Ho Chi Minh City and includes land along the Saigon/Nha Be River.

[33] With a sea level rise of one meter, Kien Giang has 3,896 km2 or 62.5% of land threatened with inundation, Ca Mau 2,733 km2 or 52.7%, Soc Trang 1,620 km2 or 49.6%, and Hau Giang 1,397 km2 or 86.5% of its land area.

[34] MoNRE 2008

- Losses or declines in productivity could also result from slow-onset hazards such as droughts and from environmental changes such as increasing intrusion of saltwater into soils as a result of rising sea levels. Salinization of soils is already a major problem in the coastal plains and the river deltas, and is likely to become an increasing threat to farming in these sites in future.

Forestry

Forests are a product of the interaction and long-term evolution of natural factors, where climate plays a major role. Climate change, bringing increases in temperature and changes in precipitation, will affect the flora and forest ecosystems in different ways:

- By 2100, natural forest ecosystem such as dipterocarp forest[35], evergreen and semi-evergreen closed forests, could potentially be reduced seriously in area compared to the present. Closed forest ecosystems and semi-evergreen tropical moist ecosystems may be also affected strongly.
- Distribution and the boundaries of different forest types as well as secondary forest may be relocated. For example, forest tree species may move up to the north and to higher lands. Deciduous forests, with more drought-resistant plants, will grow due to decreased soil moisture and evaporation through plant growth.
- Increased temperatures, along with more light, will accelerate the process of photosynthesis, leading to enhanced anabolic processes of forest trees. In particular, the increase of carbon dioxide absorption, which also contributes to the development of forest ecosystems. However, when soil moisture is reduced forest biomass may also be reduced. Climate change increases the risk of forest fires in all areas and especially in the hot and dry months.
- The risk of decline, even extinction of plants and animals potentially increases due to climate change. When temperature and precipitation increases, forest pests and plant diseases will grow stronger and affect the overall growth and development of forest ecosystems as a whole.
- Climate change may also reduce the area of arable land due to water logging, salinity, acidification and drought leading to an increased risk of conversion of forests to agricultural land use.

Fisheries and aquaculture

The potential impacts of climate change on aquaculture and the fishing industry mirror those on agriculture[36].

- Changes in water and sea temperatures will affect the growth of fish and shellfish and may cause some marine species to move northward or into deeper water. There is likely to be gradual change in the stocks of fish and shellfish in any given fishing area.

[35] *Dipterocarpaceae* is a family of 17 genera and approximately 500 species of mainly tropical lowland rainforest trees. Many are large forest emergent species, typically reaching heights of 40–70m tall, some even over 80m. The species of this family are of major importance in the timber trade.

[36] MoNRE 2008

- Climate change is likely to bring ecological changes including effects on food sources, nursery habitats (such as sea grass, mangroves and coral reefs), water quality and the spread of diseases, affecting the productivity and survival of both captive and free-living fish and shellfish.
- Aquaculture ponds and the dykes that surround them are vulnerable to extreme weather events, including river floods and coastal storm surges associated with typhoons and tropical storms. Floods and high intensity rainfall can be especially damaging for the stocks kept in saltwater ponds, because they alter the salinity of the water. Typhoons are a major physical threat to the marine fishing sector, commonly leading to loss and destruction of boats, as well as human deaths. By preventing boats from sailing, they can also disrupt the industry for days at a time.
- Saltwater intrusion into rivers and coastal wetlands will change water conditions and habitat. Some areas will become no longer suitable for freshwater species.

Natural resources and the environment

Due to climate change, SLR will inundate the coastal lowlands, especially the two major Delta areas of the Red River and the Mekong River. The areas affected by salinization will also be increased. These Deltas are home to the oldest wetland ecosystems as well as being major agricultural production areas in the country.

Biodiversity and ecosystems are also affected by the impacts of climate change. If sea level rises 1 meter by the end of the 21st century, about 78 important natural habitats, 46 conservation areas, 9 areas of biodiversity importance and 23 areas of important biodiversity will be affected seriously. Rising temperatures will alter the distribution and structure of various biomass ecosystems.

Freshwater resources are likely to decline, become exhausted or become increasingly scarce. This will have a large impact on human health, agriculture, security and environmental degradation, primarily on the quality of water resources and national water security.

Climate change, accompanied by rising sea level, will result in floods that will affect coastal mineral deposits, where reserves are likely to be lost and degraded. The quality of mineral resources (such as sand), will be affected making it difficult for surveying, exploration and mining. In the central highland and mountainous areas, due to the increase of natural hazards such as flooding and landslides, devastating degradation of mineral deposits could take place, as well as the loss of important mines resulting in increased toxic metal emissions from mine waste and pollution of the environment.

Energy sector

Overall, rising temperatures will increase the pressure on the distribution and management of the electricity sector. The amount of electricity required for air-conditioning needs in daily life and for economic activities will be increased. Heat waves, which may appear much more, will create further problems for the electricity transmission network. Rising temperatures also increase also the cost of ventilation and cooling for coal mining, as well as lead to increased power demand for the irrigation of crops.

Alterations in precipitation pattern, due to climate change, also will affect hydropower. Temperature increases will lead to increased evaporation and reduce the amount of water

available to generate hydroelectric power, which in turn will affect the production and distribution of electricity. Irrigation needs in the region will increase, especially during the dry season, and drought will cause difficulties for regulating water resources for power generation needs with other needs. Increasing rainfall during the rainy season will increase the likelihood of flooding and cause difficulty for the regulation of reservoirs and sluices.

Utilization of renewable energy sources (wind and solar radiation) is being encouraged as part of the development of a national strategy on energy security and for reducing greenhouse gas emissions. Climate change will alter the structure of the wind and radiation regimes, such as: increasing convective cloud systems, reducing the short-wave radiation, increasing long-wave radiation, increasing the amount of variation of wind speed and the duration of sunshine. The situation will affect the potential and thus the ability, to exploit these types of energy sources.

Sea level rise will affect the operation of oil rigs at sea, transportation systems and gas and oil industries in coastal areas. Increased natural hazards at sea will add costs to maintenance and operation of machinery and vehicles.

Power plants and the electric transmission system (including high and low voltage) will be affected by the increase in natural hazards such as storms, floods and water logging due to climate change. Temperature increases and environmental pollution will contribute to increased degradation and lifetime of these projects.

Sea level rise will cause flooding of some factories, power stations, and of power distribution lines in the coastal areas. Rainstorms will also trigger landslides, destroying buildings, dams and hydropower systems, increasing maintenance costs and repair works in the power sector.

Transportation

Climate change will adversely affect the operation of transport, as the country is required to reduce greenhouse gas emissions. Rising temperatures will increase the energy consumption of motor engines and the need for cooling systems in vehicles. Along with the need for technological innovation to reduce emissions of greenhouse gases (such as bio-fuel use), the impact on transportation costs is likely to increase.

Several major ports, as well as piers, wharves and coastal warehouses will either need to be climate proofed or moved to new locations. The North-South railway and sections of Highway 1 near the coast are at risk of flooding on annual or periodical basis and may need to be re-located.

Storms and floods may increase both in intensity and frequency, with increased levels of flooding affecting the road and rail systems in the plains and coastal areas. There will be an increased risk of traffic congestion in the central region and mountainous areas caused by floods and landslides. Rehabilitation and repair works of the traffic system may be destroyed or damaged by storms and floods. In the period from 2001 to 2005, storms and floods caused estimated damage to the transportation sector of up to VND 2,571 billion. If sea level rises to 100cm, approximately 11,000km of roads may be submerged. Traffic may be delayed, causing damage to economic activities.

Construction

Technology development has a close relationship with climatic factors. The increase of temperature and some disaster impacts will have negative impacts on planning, design and construction, increasing the cost and shortening the lifetime of the building.

Climate change can alter the scope of the climate development and climate characteristics of each region. So some state standards as well as construction standards will have to change accordingly. Increased investment in existing critical infrastructure in terms of retro-fitting maybe required while new construction will need to be "disaster proofed" or "climate proofed" to improve resilience to future weather related hazards and increase longevity.

Sea level rise, along with increases in some extreme phenomena on the sea, will lead to changes in the planned construction and renovation works on the marine and coastal areas of the lowlands. Many projects will be affected by saltwater risk, which will cause rapid decline in terms of building quality.

River and sea dykes are considered measures to protect the delta and coastal areas. Historically, these have provided an important solution to respond to climate change in the coastal areas and deltas. In terms of climate change, the cost of new construction, renovation and upgrading of existing dyke systems will increase.

Tourism

Tourism today has become an important economic sector, contributing to a substantial share of the county's GDP. Sea level rise will affect the coastal beaches. Some beaches will be pushed further inland and limit the ability to use the beach as well as related service works. In such cases there will be a need for new construction or reconstruction to move infrastructure further inland/to more protected areas. Rain, storms and floods will restrict camping. Air and water quality degradation will also limit tourism activities.

Climate change will have negative impacts on the operation of transport for tourism, construction, including hotels and buildings for entertainment and tourist routes for tourism activities.

Public health

Climate change will impact on public health in several ways. Rising temperatures are likely to increase pollution levels and are directly harmful to the elderly, people with heart and neurological diseases. Rising temperatures will also increase the possibility of some tropical diseases like malaria and dengue fever and may increase growth rates and development of many bacteria and insects, increasing the number of outbreaks of disease and the risk of vector-borne diseases.

4.4 Discussion questions

1. What is the atmospheric process that has lead to climate change?
2. What are the implications of sea level rise for communities living in coastal areas of the country?
3. In what ways is climate change likely to influence disaster risk in the country?
4. Choose one economic sector: How is it likely to be affected by climate change?
5. What patterns of migration are taking place now within your province? Is climate change likely to increase or decrease the movement of people?

Chapter 5. Lecture Report

5.1 Lecture 1: Climate change and Disaster Risk

In this lecture, we provide participants with the overview of climate change and natural disaster in Vietnam generally and three target provinces (TTH, QB, QN) particularly. First, we provide and explain the climate change scenarios for Vietnam and its application to three provinces. Second, we explain climate-change impacts and consequences faced by these provinces at the present times and in the future based on these scenarios. Third, we identify different types of natural disaster commonly seen in Vietnam generally and these provinces particularly and provide some damage and loss figures caused by recent disasters within these provinces and throughout the country. Finally, we conclude the lecture with some recommendations for better disaster risk reduction and climate change response and adaptation.

Specific key contents addressed in this lecture include:

- *Concept of climate change and its meaning to Vietnam contexts:*
    - *Components of global and local climate.*
    - *Greenhouse gas effects and its relevance to climate change.*
    - *Natural and man-made drivers of climate change.*

- *Signs climate change in recent years in Vietnam and these Thua Thien Hue province:*
    - *Increasing temperature and rainfall.*
    - *More unpredictable storms and typhoons.*
    - *More salt penetration to inland rivers and canals.*
    - *More cold fronts.*

- *Climate change scenarios for Vietnam and key considerations derived from these scenarios for bettering local preparedness and adaptation.*
    - *Global climate change scenarios provided by IPCC.*
    - *Greenhouse gas emission scenario in AR5.*
    - *Climate change scenarios for Vietnam provided by The Ministry of Natural Resource and Environment (MONRE).*
    - *Low, medium and high emission scenarios and its application to local provinces of Vietnam.*
- *Impacts and consequences caused by climate change in Vietnam generally and these three provinces particularly in recent years. Potential impacts of climate change if the given scenarios happen in the future.*
    - *Increase demands of water and green spaces due to increasing temperature.*
    - *Quickened deterioration and downgrade process of buildings and infrastructures, cultural heritage buildings, facilities due to high fluctuations of temperature and humidity.*
    - *Reduce working productivity in very hot or cold days.*

- *Affect agriculture and aquaculture produce (e.g. increasing diseases and insects to vegetation).*
- *Increase flood and inundation in low-lying areas due to increasing rainfalls.*

- *Situation of natural disaster in Vietnam generally and these provinces particularly. Types of disasters commonly faced by local communities in these provinces (storms and floods show the most dominant proportion of total damage and loss caused by natural disaster). Types of loss and damage caused by natural disaster.*
- *Strategies and measures to reduce damage and loss caused by natural disaster and climate change:*
  - *Increasing stakeholder's awareness (including at-risk communities) and capacity.*
  - *Adjusting governance and policy mechanisms for DRR and CCA.*
  - *Moving at-risk communities out of prone or vulnerable areas.*
  - *Building upstream dams and reservoirs.*
  - *Improving capacity of early warnings and weather forecasts.*
  - *Planting upstream protective forests and mangrove forests.*
  - *Defining flood-drainage channels based on rivers, canals, traffic roads or public spaces.*
  - *Building safer houses and public buildings.*
  - *Changing crop patterns and agriculture varieties adaptive to climate change.*

- *Questions and answers session*

At the end of the training section, the trainers raised several questions related to the training topics to see if the trainees were understood the lectures. In this section, we would also want to know how issues mentioned in the lecture were applied in local specific context.

This section also allows participants chances to ask any question if they have and the trainers answer those questions.

5.2 Lecture 2: IMPROVING GOVERNANCE CAPACITY FOR DISASTER MANAGEMENT AND CLIMATE CHANGE RESPONSE AT COMMUNITY AND LOCAL LEVELS

In this lecture, we provide the trainees with basic and technical concepts in disaster management, tools to assess community's vulnerability and capacity, and strategies to enhance administration and governance capacity for community-based disaster management and climate change response.

Key contents addressed in this lecture include:

- *Concepts & definitions of disaster management*

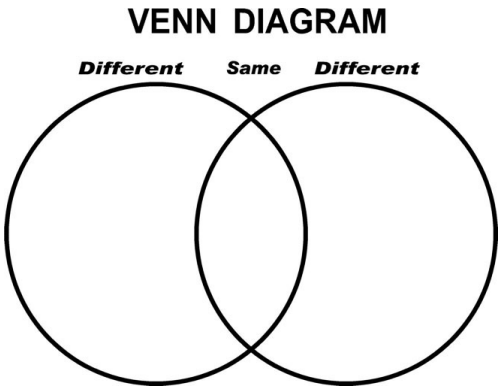
In this topic, we provide concepts of climate change, natural disaster, what is called vulnerability, disaster risk reduction, preparedness and resilience capacity, disaster management and climate change adaptation. Key concepts were given and explained to participants, as follows:

- What is Hazard?
- What is Disaster?
- What is Vulnerability?
- What is Risk? Levels of Risk?
- Which locations, what areas potentially suffer from disasters?
- What is Capacity in Disaster Management and Climate change Response?
- What is the process or sequence of disaster management?

- *Tools for vulnerability and capacity assessment (VCA) for communities*

In this topic, we clarify the purpose and significance of vulnerability and capacity assessment (VCA), what factors influence VCA and up-to-date tools to assist and guide the implementation of VCA in practice. Key considerations for this topic were given and explained to participants, as follows:

- Using historical information and data.
- Using maps (ask local groups of 5-7 people to map risks and hazards within their area and draw it on a large-size paper).
- Using Venn diagram.



- Rating and classification of local fields/sectors against disaster and climate change impacts.
- SWOT (Using 4 indicators **Strength**, **Weakness**, **Opportunities** and **Threats** to assess the vulnerability and capacity of local communities in coping with and responding to climate change and natural disaster).

- *Strategies to enhance governance capacity for disaster management and climate change response*

In this topic, we identify some possible ways of enhancing administrative and governance mechanisms to reduce damage and loss posed by natural disaster and climate change.Key considerations for this topic were given and explained to participants, as follows:

- The importance of community participation in planning DRR strategies and enhancing local governance capacity for risk management and damage and loss reduction.
- Key principles in framing the plan of action: ensuring active involvement of grassroots groups and households; based on the real situation and actual needs and capabilities; mainstreaming risk management strategies in locally socio-economic development plans; clarifying roles and responsibilities of all actors involved (e.g. people's committee, local disaster-management department, community-based organizations, at-risk groups).
-

- *Questions and answers session*

At the end of the trainingsection, the trainers raised several questions related to the training topics to see if the trainees were understood the lectures. In this section, we would also want to know how issues mentioned in the lecture were applied in local specific context.

This section also allows participants to ask any questions if they have and the trainers answer those questions.

5.3 Lecture 3: ASSESSMENT OF LOSS & DAMAGE IN THE CONTEXT OF CLIAMTE CHANGE ADAPTATION

In this lecture, we provide the trainnees with knowledge focusisng on Assessment of L&D caused by natural disasters and climage change.

In the next sessions, we describedd more details ralated topics as follows:

- *Concepts & definitions of Loss & Damage*

In this topic, we described concepts and definitions related to L&D that have been used in the world and in the context of Vietnam; idetified what are similarity and difference between L&D in context of Vietnam.

- *Aims for assessment*

This topic aims to describe the objectives for L&D assessmet, in other words, this topic is aimed to explain why do we need to take L&D assessment for.

- *Priciples of assessment*

There is a number of principles related to an L&D assessment to be followed when undertaking an assessment. Mostly, these principles based on the national regulations & guidelines for disasters damage assessment.

- *Methods for L&D assessment and classifications*

From the literature, we reviewed related methods for L&D assessment that have been used widely in the world.

Based on availabilty of time, budget and purpose of assessment, several levels of assessments can be conducted such as micro (household), intermediate (district, provincial), or macro (national) levels.

Types of damages and lossess can be summaries as in table belows.

Table 3.1 Direct, indirect, tangible and intangible flood impacts

		Measurement	
		Tangible	Intangible (i.e. difficult to quantify)
Form of loss	Direct	Damage to building and contents	Loss of an archaeolog-ical site
	Indirect	Loss of industrial production	Inconvenience of post-flood recovery

(The Benefits of Flood and Coastal Risk Management: A Handbook of Assessment Techniques((Penning-Roswell et al. 2005))

- *National regulations and guidelines for disasters impacts assessments*

I this session, we provided in details national guidelines & regulations on statistics and assessment of L&D caused by natural disasters.

These guidelines are based on the Apppendix no.4, Decision 31/QD-PCLBTW dated February 24th, 2012 of the Central committee of Flood and Storm Control.

- *Questions and anwsers session*

At the end of the trainning section, the trainers raised several questions related to the training topics to see if the trainnees were understoods the lectures. In this section, we would also want to know how issues mentioned in the lecture were applied in local specific context.

This section also allows participants chances to ask any question if they have and the trainners answer those questions.

Chapter 6. GOOD PRACTICES ON DISASTER DAMAGE AND LOSS REDUCTION

6.1 Committees of flood and storm control at local levels

One of the most effective strategies for damage and loss reduction taken by local authorities through their committees of flood and storm control is the "four on-site actions" (figure 1). The key aspect of this strategy is to ensure that each household, group and community is ready to cope with a coming disaster. The nature of this strategy is self-preparation or self-help where at-risk populations, without relying on external support, are capable of avoiding unexpected damage and losstriggered by natural disaster, particularly human loss.

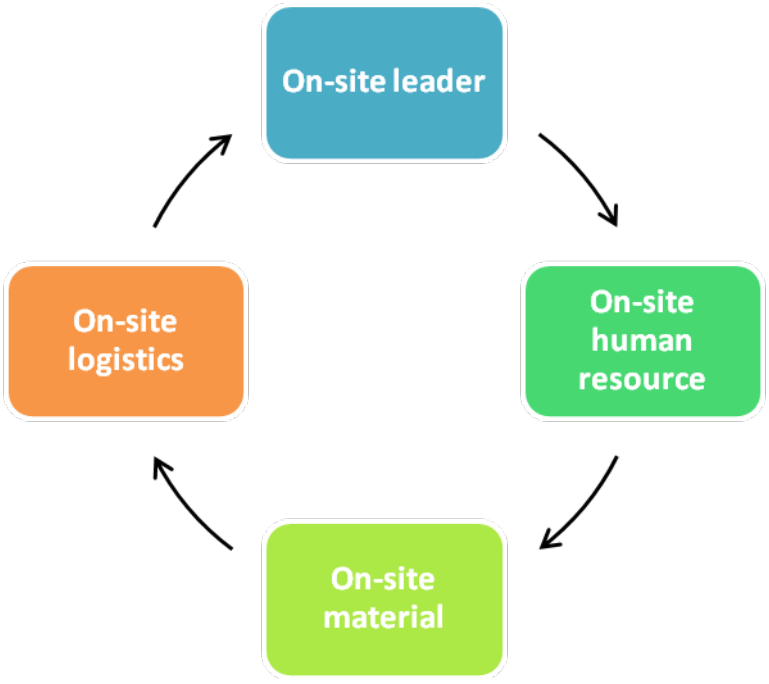


Figure 1: The "four on-site actions" strategy commonly used in disaster response and preparedness

The "four on-site actions" strategy includes (i) on-site leader, (ii) on-site human resource, (iii) on-site material and facilities, and (iv) on-site logistics. Within this perception, all available local resources can be mobilised to cope with disasters, lessendisaster damage and loss and recover fromthe aftermath of disasters, uponwhich, the committees of flood and storm control at thecommune/ward and village/quarter levelsoften take a leading and centralrole.

It was evidently seen in the case of Loc Tri Commune, ThuaThien Hue Province where this strategy significantly helps reduce disaster damage and loss. In particular, the preparation of on-site human resource, material and logistics help local actors here effectively copewith annual cyclonesand view disaster preparedness as part of their life. It is easy to find wooden or bamboo bars, tough nets and anchors in local households which can be used for consolidating their homes in disaster seasons (figure 2).

Figure 2: Wooden and bamboo bars are available in most local households in Loc Tri Commune to strengthening their shelter in stormy seasons (Source: Author)

In addition, this "four on-site actions" strategy also shapeslocal action plans for disaster response and recoveryin which specific coping measures such as strengthening weak houses, anchoring boats, harvesting crops earlier, cutting trees or preparing safe places (usually schools or administrative buildings nearby) are prepared based on the locally available resources. When a cyclonevisits, the availability of prepared human resource, materials and facilities help the community and local households avoid unexpected damage and loss, especially human loss and valuable assets' damage.It was said by the LocTri's authority staff that local damage and loss caused by recent typhoons, even still high, were under control of local actors thanks to the active preparation of these four on-site actions.

6.2 Vietnam Red Cross

Vietnam Red Cross (VNRC) has been well known as one of the key agencies in response to natural disaster and climate change in Vietnam. Their work ranges from emergency relief and recovery after disasters to prepare preventive measures for reducing disaster impacts and consequences. Outstandingly, from 1994 to 2010, more than 22,000 ha of mangrove forest were planted by VNRC members, volunteers and local people in eight provinces of Vietnam (Quang Ninh, Hai Phong, Thai Binh, Nam Dinh, NinhBinh, ThanhHoa, Nghe An, Ha Tinh). This mangrove forest has helped reduce negative impacts of tidal waves, cyclone, and protect sea dykes, human life and property of coastal communities. Coastal residents in this region not only benefit from the safety but also could getmore income from exploiting the forest's potentials such as sea food, bee's raising, seedling trade, wood, etc.

In addition, planting mangrove forest also helps reserve ecological resources and environment, balance the climate to reduce environmental pollution, and enlarge the coastal basin. It was seen as one of the best practices in reducing disaster loss and damage thanks to the considerably reduced amount of economic loss of the beneficiary provinces in recent years. For example, the

economic loss of Thai Binh province after the Damrey Typhoon in 2005 (the time the mangrove forest was nearly completed) was 178 million billion Vietnam dong compared to 581 billion Vietnam dong after a typhoon in 1996 (the time the mangrove forest was just started) (VNRC, 2010).According to the Vietnam Red Cross, the key lessons learnt from this project are the active participation of all stakeholders into the process, the maximised use of local labour who was provided trainings on disaster preparedness, and the focus on dissemination and communication activities.

Figure 3: Post-typhoon houses built by VNRC in Gia Lai (right) and Kon Tum (left)

(Source: Author)

In 2010, Vietnam Red Cross implemented a big safe housing reconstruction project in Central Vietnam after the typhoon Ketsana in 2009 (IFRC, 2010). In collaboration with a wide range of stakeholders, this agency provided 650 safe homes for seven provinces of this region (ThanhHoa, NgheAn, Ha Tinh, Quang Nam, Quang Ngai, Gia Lai and Kon Tum) where the typhoon left a huge damage and loss (figure 3). Resilient housing designs and safe construction techniques were then introduced to local construction practices and widely applied innewly rebuilt houses. The field trip of the authors to Gia Lai and Kon Tum provinces in 2013 showed that most safe houses built by VNRC remain intact after recent storms and local whirlwinds and local living conditions are considerably improved. Safe shelter also helps poor households reduce ongoing housing damage caused by annual storms and typhoons, increasing their savings over years thanks to less cost spent on annual housing repair, and significantly support other improvement and development efforts of low-income families.

6.3 Development Workshop France

Development Workshop France (DWF) is an international NGO that has a local branchin ThuaThienHue Province, Central Vietnam. This NGOis nationally and internationally famous for their great support to safe housing development in Vietnam. They are considered as one of the best practices in post-disaster housing reconstruction in the world (Aquilino, 2011) thanks to their big efforts in providing safe shelter for the poorest at-risk communities (e.g. poor villages in ThuaThien Hue, Quang Nam or Quang Ngai provinces). They have received the World Habitat Award in 2008.

Figure 4:A safe house built by DWF in ThuaThien Hue (Source: Author)

The key success of this NGO is the application of ten principles forcyclone-resistant construction in response to locally socio-economic and natural conditions (figure 5).Thanks to their flexibility and efficiency,these principles have been widely applied and replicated by local communities and other agencies (e.g. CECI, VNRC or Save The Children) in Central Vietnam. In the areas where DWF has implemented their safe housing projects, the resilience of local housing is considerably enhanced and significantly contributing to damage and loss reduction in recent disasters. For example, in Phu Da and VinhXuan Commune (ThuaThien Hue Province) where DWF provided 216 and 33 safe houses respectively (DWF, 2010), beneficiary households said that safe homes provided by DWF functioned quite effectively in recent disasters and helped them save much money due to less expense on damage and loss recovery. People in these communes see the use of DWF's principles as one of key requirements if they want to build new houses or retrofit the existing ones.

Figure 5: 10 key principles for cyclone-resistant construction (DWF, 2010)

6.4 Institute for Social and Environmental Transition (ISET)

ISET is an international non-governmental organisation that has just initiated their work on disaster risk reduction and climate change adaptation in Vietnam in recent years. The outstanding feature of this organisation regarding damage and loss reduction is the implementation of a big climate-resilient housing project in partnership with local women union in 2011-2012 in Da Nang City, Central Vietnam. Their approach is quite different from other organisations (e.g. DWF or Save The Children) since they incorporate technical support for storm resilience with financial assistance through a micro-credit program to ensure all poor households willing to join the project and improve their unsafe shelter. The success of this project is evidently seen after the typhoon Nari in 2013 where all storm-resistant houses supported by ISET had a very little or no damage while most local houses nearby were seriously destroyed (Phong, 2013). This shows the real efficiency of safe shelter provided by ISET in reducing local damage and loss posed by natural disasters.

Figure 6: A cyclone-resistant house built in support of ISET in Da Nang (Source: Author)

6.5 DIPECHO Project 8 by AMDI (Period 2012-2013)

This project was implemented by the Asian Management and Development Institute (AMDI) to support six provinces in Vietnam (BacKan, Yen Bai, ThanhHoa, Quang Binh, Quang Tri, TienGiang) to raise local awareness and improve local action plans in accordance with the National Community-Based Disaster Risk Management Program in the period 2013-2015 (AMDI, 2013). The efficiency of this project is clearly seen through:

→ (1) The improved activeness of community members and people at the project sites in coping with natural disaster. For examples, people in TienGiang pay more attention to weather forecasts, early warnings and safe places for evacuation or gradually incorporate safety measures in their housing construction or renovation(AMDI, 2013).

→ (2) Local authorities are increasingly aware of the importance of damage and loss reduction. For examples, new schools built in the project areas were recommended to be built as public disaster shelters within community in flooding and stormy seasons or local traffic roads were suggested to expand to allow the accessibility of motor vehicles in disaster seasons.

→ (3) Local children are equipped with basic knowledge and skills in coping with natural disaster. Child-to-child clubs have been established in communities to circulate knowledge and skills on disaster preparedness in schools, families and the communities (e.g. reminding all children not to go out in storms or find a safe place as informed by local staff).

(AMDI, 2013)

In addition, this project has made a significant improvement of district- and commune-level action plans for disaster response and recovery to minimise local damage and loss in accordance with the national framework for disaster risk management.

6.6 Climatically adaptive farming measures by local communities and households

In climate-exposed and disaster-prone areas of Central Vietnam such as ThuaThien Hue, Quang Binh or Quang Nam, people are increasingly aware of the negative impact of climate change and

natural disaster on their farming production and start to change cropping patterns and/or the cropping calendar to minimise loss and damage. For example,in Nghi Thai Commune, Nghe An Province, to reduce damage and loss posed by drought, people here harvest the winter crops earlier to have time to grow corn varieties with high outputs but less impacted by climatic conditions (Nghi Thai's People Committee, 2012). Or to protect their farms from damaging cold, people here change to the short-period rice varieties (quick growing for harvest) and use plastic canvases to cover rice varieties to sustain their life over the damaging cold period (Nghi Thai Commune's People Committee, 2012).

Or in Quang Nam Province where drought has been more severe and lasted longer in recent years, people have to reduce rice seasons from three to two per year as well as switch to more drought-resistant crops and using drought-resistant rice varieties (Vu et al., 2012). Or to protect shrimps from floods and typhoons, local households in Quang Namgradually move their shrimp farms to sand dunes as well as select new varieties of shrimp that can be harvested in a shorter time to avoid flooding and stormy seasons (Vu et al., 2012).

6.7 Diversified sources of income to sustain the family's economy

Diversifying sources of income is also one of the most common practices taken by vulnerable/at-risk households in Vietnam in response to natural disaster and climate change. For example, in Huong PhongCommune (ThuaThien Hue Province) where flood and typhoon impacts are critical, people often have one or more means of livelihoods beside the main livelihoods (rice cultivation, aquaculture and animal husbandry) (Duc et al., 2012). This helps them reduce economic loss posed by annual floods and typhoons in the way that they always have a spare or additional source of income in case of their main livelihoods seriously destroyed by natural disaster. The most common means of livelihoods taken by local people beside their main agriculture and aquaculture production are masonry, iron window/door production, carpentry, bamboo weaving and shoe repairing (Duc et al., 2012).

6.8 Improved local experience in disaster prediction

Another good practice in reducing disaster damage and loss generated and taken by local communities in Vietnam is their improved capability of predicting coming disasters thanks to local wisdoms or knowledge accumulated through years. For example, people in Huong Phong Commune (ThuaThien Hue Province) believed that a big flood will happen soon if leaves of the *Cha* tree fall regularly or the land-orchids blossom or the *Goby* fish eat sand and grit (Duc et al., 2012). Theses natural signs help them harvest crops earlier, selling pigs and poultry before the anticipated events, strengthen their houses, and purchase necessary things for the disaster arrival (e.g. food, medicine and lamp oil) (Duc et al., 2012). These preparedness measures based on local experiencesof disaster prediction significantly supportlocal households in avoiding or reducing unexpected damage and loss triggered by climate events, particularly in the areas where early warning systems are not effective or unavailable.

6.9 Damage Report

The purpose of the Damage Report is to provide information on the impact the disaster had on the population and the damage it caused on social services and essential sectors of the economy. It will provide more indicators for the CSFC and other stakeholders to take action for response in the first three months and early recovery from the disaster.

This **Damage Report** should start to be used **3 days after the disaster** when more information is available from the affected areas; it should continue to be **updated regularly for approximately 4-6 weeks** (depending upon the nature, scale and complexity of the disaster).

Detail	Unit	Quantity
Number of dead people	***Person***	
Children (under the age of 16)	*Person*	
Adult male	*Person*	
Adult female	*Person*	
Number of people missing	**Person**	
Children (under the age of16)	*Person*	
Adult male	*Person*	
Adult female	*Person*	
Number of people injured	**Person**	
Children (under the age of 16)	*Person*	
Adult male	*Person*	
Adult female	*Person*	
Number of affected households	*HHs*	
Number of affected people	*Person*	
Number of poor households affected	*HHs*	
Number of female headed households affected	*HHs*	
Number of households that have lost livelihoods37	*HHs*	
Number of households evacuated	*HHs*	
Number of households without shelter	*HHs*	
Number of houses destroyed/collapsed/swept away	*No.*	
Number of houses seriously damaged	*No.*	
Number of houses that have completely lost roofs	*No.*	
Number of houses that are completely submerged	*No.*	
Number of households without drinking water	*HHs*	
Number of damaged wells/boreholes	*No.*	
Number of main water supply pipelines damaged	*No.*	
Number of farm households that have lost all their livestock	*HH*	
Damaged rice area (total below)	*Ha*	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ha*	
Damaged vegetable cropping areas (total below)	**Ha**	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ha*	
Government rice stock lost	**Ton**	

[37] See DANA guidelines for further details

Detail	Unit	Quantity
Government rice stock damaged	**Ton**	
Other farm production area damaged (total below)	**Ha**	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ha*	
Damaged industrial tree area (e.g. rubber, coffee, etc.) (total below)	**Ha**	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ha*	
Damaged, fruit tree area (total below)	**Ha**	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ha*	
Damaged (recovered or eroded) agriculture land areas	**Ha**	
Damaged seed trees (total below)	**Ton**	
Lost completely (more than 70%)	*Ton*	
Productivity decreased (from 30% to 70%)	*Ton*	
Damaged natural forest area (total below)	**Ha**	
Lost completely (more than 70%)	*Ha*	
Productivity decreased (from 30% to 70%)	*Ton*	
Number of dead large livestock (buffalos, cows, horses)	**No.**	
Number of dead small livestock (goats, sheep, deer)	**No.**	
Number of dead pigs	**No**	
Number of dead poultry (chicken, ducks, geese))	**No.**	
Number of farm households who have lost seeds	**HHs.**	
Area of aquaculture lost *(total below)*	*Ha*	
Lost completely (more than 70%)	*Ha*	
Lost between 30% to 70%	*Ha*	
Quantity of fish and shrimp ponds lost	**Ton**	
Quantity of fishing cages lost (total below)	**100m^3**	
Lost completely (more than 70%)	*100m^3*	
Lost between 30% to 70%	*100m^3*	
Quantity of fishing nets lost	**No.**	
Quantity of fishing equipment, etc. lost	**VND**	
Total number of fishing boats lost	**No.**	
Total number of seriously damaged fishing boats	**No.**	
Number of affected hospitals/clinics	**No.**	
Rooms (wards, clinics treatment rooms, latrines) destroyed/collapsed/ swept away	*room*	
Rooms (ditto) damaged	*room*	
Rooms (ditto) submerged	*room*	
Number of people who have been admitted to hospitals due to the disaster	**No.**	
Damaged medical equipment	**VND**	
Lost and damaged medicines	**VND**	
Number of schools affected	**No.**	
Classrooms destroyed/collapsed/swept away	*No.*	
Classrooms damaged	*No.*	

Detail	Unit	Quantity
Classrooms submerged	*No.*	
Classroom furniture damaged	*No.*	
Educational material damaged	*No.*	
Number of pupils not going to school (due to disaster)	**No.**	
Damaged roads	**M**	
Length of road eroded or swept away	*M*	
Length of road submerged	*M*	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Damaged railways	***Km***	
Damaged bridges	***No.***	
Bridges seriously damaged or washed away	*No.*	
Damaged sluices	No.	
Sluices seriously damaged or washed away	*No.*	
Damaged barriers	**No.**	
Barriers seriously damaged or washed away	*No.*	
Total number of damaged boats (total of GT051-GT052)	**No.**	
Lost	*No.*	
Seriously damaged	*No.*	
Other transportation means lost or seriously damaged (e.g. ferries)	**No.**	
Seriously damaged power stations (including hydro-electric, etc.)	**No.**	
Transformer stations lost/seriously damaged	**No.**	
Electricity poles lost/seriously damaged		
Medium and high voltage poles	*No.*	
Low voltage poles	*No.*	
Electricity cables broken	*No.*	
Communication centres lost/seriously damaged (landline and mobile)	**No.**	
Communication poles destroyed	**No.**	
Communication lines broken	**M**	
National dykes damaged		
Length	*M*	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Local dyke, inferior and ring dyke		
Length	*M*	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Damaged embankments		
Length	*M*	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Irrigation channels damaged and washed away		
Length	*M*	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	

Detail	Unit	Quantity
Small irrigation works damaged and washed away		
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Reservoir damaged	**No.**	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Dams damaged	**No.**	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Temporary dams damaged	**No.**	
Amount of earth lost	M^3	
Amount stone and concrete lost	M^3	
Pumping station damaged	**No.**	

Name

Title/position

Signature

Date and time of report

Timing and frequency

The Damage report should be submitted as quickly as possible after the Human Impact and Immediate Needs Report, and no later than 3 days after the disaster occurred. It will be updated regularly until the indicators are sufficiently accurate and can last up to 4-6 weeks after the disaster.

Responsibilities

The responsibilities for assessing Protection, Water, sanitation and hygiene and Shelter as well as for the number of households that lost food stocks is similar to templates 1 and 2.

The assessment for other indicators is as follows:

- Agriculture and Fisheries: Department of Agriculture and Rural Development (DARD)
- Health: Department of Health (DoH)
- Education: Department of Education and Training (DoET)
- Transportation: Department of Transport (DoT)
- Electricity supply: Department of Industry and Trade (DoIT)
- Telecommunication: Department of Post and Telecommunications (DoPT)
- Flood control and irrigation: DARD.

The representatives of these departments at the commune, district and provincial levels are responsible for assessing the indicators, for forwarding the information to the CCFC in their area and to the next level up in their department.

Accuracy

Each update should achieve a higher level of accuracy until a sufficient degree is achieved.

How to assess

The method of assessment is similar to template 1 and 2 for indicators for Protection, Water, sanitation and hygiene, and for Shelter and for the number of households that have lost food stocks. A number of indicators are already provided in template 2 and only need to be updated. The method for assessing the other indicators is a responsibility for each sector department.

Please take note that: Poor households affected refers to those households that are listed by MoLISA as poor and have been impacted by the disaster.

A well, borehole or water supply construction is damaged if it requires major repairs before it can be used for providing safe drinking water again.

A house is damaged seriously, if it needs major repairs before it can be inhabited again.

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PRESENTATIONS AT THE WORKSHOP

BỘ TÀI NGUYÊN VÀ MÔI TRƯỜNG
CỤC KHÍ TƯỢNG THỦY VĂN VÀ BIẾN ĐỔI KHÍ HẬU

RELATIONSHIP BETWEEN CLIMATE CHANGE ADAPTATION RISKS AND DISASTER MITIGATION IN CONTEXT OF LOSS AND DAMAGE

DR. Lê Minh Nhật

CỤC KHÍ TƯỢNG THỦY VĂN VÀ BIẾN ĐỔI KHÍ HẬU — *Hà nội 15-5-2015* — ASIA PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

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DEFINITION OF LOSS AND DAMAGE

- **Loss**: Impacts of climate change that cannot be recovered
- **Damage**: Impacts of climate change that can be recovered
- **Loss and damage**: The **impacts of climate change that people cannot cope with or adapt to** (Warner and van der Geest, 2013)

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INTERNATIONAL MECHANISM ON L - D

- **1991**: Alliance of Small Island States (AOSIS) proposes **insurance pool** in new climate change Convention
- **2007**: 'Loss and damage' appears for the first time in a UNFCCC text
- **2010**: **Work programme on loss and damage** created under Cancun Adaptation Framework
- **2013**: **Warsaw international mechanism on loss and damage** established (also under CAF)

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INTERNATIONAL MECHANISM ON L - D

- At COP16 in Cancun, An agreement has emphasized minimizing losses and damages caused by climate change through enhanced international cooperation and capacity building.
  - (1) Risk assessment of damages for damage caused by the impact of climate change and the understanding of loss and damage;
  - (2) Identify approaches to address loss damage caused by climate change, including the impacts of extreme weather events and the slow start (slow on-set), and consider the impact at all levels;
  - (3) Define the role of the Climate Convention in supporting the resolution of issues related to loss and damage.

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1.Cơ chế quốc tế về Tổn Thất và Thiệt hại

- COP18 in Doha, countries has come to an agreement to build an international mechanism to solve the problem of loss and damage.
- COP19 in Warsaw, the Parties have agreed to develop international mechanisms to solve the problem of loss and damage.
  - Commission of operating mechanism about loss and damage was established
  - General guidance resolve loss and damage to the countries affected by climate change.
  - Each country should develop a mechanism for resolving personal losses and damages.

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Cơ chế quốc tế Warsaw về tổn thất và thiệt hại

- **Highlights from the work plan** of the Executive Committee of the Warsaw international mechanism:
  - Identify tools, technologies, lessons learned and best practices to **facilitate comprehensive risk management**
  - Assess and develop recommendations to **enhance knowledge and capacity to address slow onset processes**
  - Invite relevant risk management and humanitarian organizations to **develop country specific analyses of the risk of loss and damage** and develop institutional arrangements to prevent and manage loss and damage
  - Establish an expert group to **develop recommendations for reducing the risk of and addressing non-economic losses**
  - Need to enhance understanding of: how loss and damage impacts **vulnerable people and countries, slow onset processes** and approaches to address them, **human mobility** and **non-economic losses**

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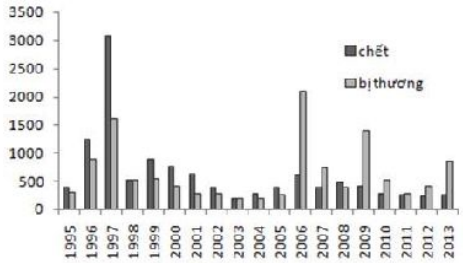
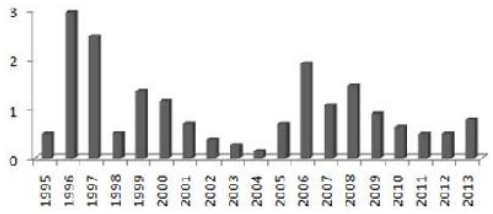
2. Damage due to climate change and disaster



Hình 1: Tổn thất về người năm 1995 đến 2013



Hình 2: Tổn thất Thiệt hại từ năm 1995 đến năm 2013 so sánh với GDP (%)

- Under the impact of climate change, the frequency and intensity of disasters caused damage
- People : 11.743,
  - Property Damage estimate: more than 22 trillion GDP accounting for 1.5% / year

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3. Settlement Mechanism on loss and damage

- **Settlement Mechanism on loss and damage**:
  - Strengthening the link between climate change adaptation and disaster risk reduction.
  - Both of DRR and CCA mentioned above aim to reduce losses damages.
- Following discussion:
  - (1) Disaster risk reduction and climate change adaptation in context of loss and damage ;
  - (2) Integrated approaches of disaster risk reduction and climate change adaptation to address loss and damage;
  - (3) Limitations and challenges.

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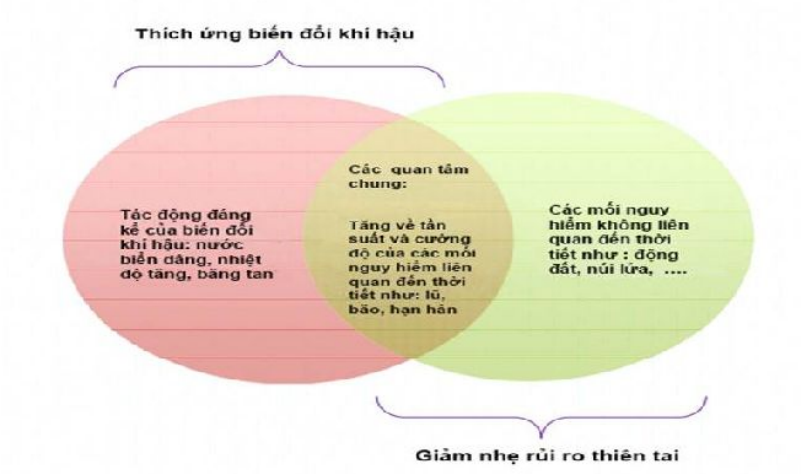
Climate change adaptation and disaster risk reduction



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4.Thích ứng biến đổi khí hậu và giảm thiểu rủi ro thiên tai

Đặc điểm		Direction
Disaster risk reduction (DRR)	Climate change adaptation (CCA)	
Related to all type of risk	Related to climate risk	Awareness about loss and damage
Derived from the humanitarian aid operations after disaster	Based on scientific theory	Recruitment of climate change adaptation experts from the fields of engineering, water and sanitation, agriculture, health and disaster risk reduction
Focus on solving the existing risk	Focus solve the risks that may happen in the future	Focus on disaster risk reduction in the future; climate oscillations are the basis for implementing climate change adaptation
Historical perspective	Future perspectives	Long-term strategy to address loss and damage
Indigenous knowledge and traditions at the community level is the foundation for resilience	Indigenous knowledge and traditions at the community level may not be sufficient for resilience to the type and scale of disaster risk has not occurred	Integration of scientific knowledge and indigenous disaster risk reduction creates learning opportunities

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Climate change adaptation and disaster risk reduction

Feature		Development direction
Disaster risk reduction (DRR)	Climate change adaptation (CCA)	
Structural measures are designed with safety levels based on existing models and historical evidence	Structural measures are designed in safety levels based on existing models, historical evidence and the changes are predicted	Knowledge of structural measures needed to resolve loss and damage in context of climate change adaptation and disaster risk reduction
Focusing on risk reduction and preparation	Focus on adaptation measures to address the vulnerable	Long term focus on extreme weather and slow on set
The process relies on community based on experience	The process relies on community base on policy	The successful experience of the approach based on community
Practical applications locally	Apply theory at local level	Adapting to climate change gain experience through practical applications locally
Full of implementation tools	Lack of implementation tools	Deeply understand about loss and damage
Based on old foundation	New topic	Develop knowledge and expertise on damage losses
Less attention from politicals	Received strong political interest	Disasters related to climate were analyzed and compared with climate change
Small budget	Steady increase in budget	Disaster risk reduction participate financial mechanisms of climate change adaptation

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5. Related regulations and mechanism about climate change adaptation and disaster risk reduction

Disaster risk reduction	Climate change adaptation
Hyogo framework (2005)	UNFCCC (1992)
	First National Communication of Vietnam
National Report on Disaster Risk Reduction in Vietnam- Kobe (2005)	First report on technology needs assessments (2005)
	Bali Action Plan and Roadmap (2007) COP13
ASEAN Agreement on Disaster Management and Emergency Response (AADMER) (2005)	Second National Communication of Vietnam(2010)
	Nairobi Work Programme (2005-2010)
Roadmap and regional action programs Icheon (2010)	NTP – CC (2009)
National action plan to prevent natural disasters by 2020 (2007)	National climate change strategy (2011)
National action plan to prevent natural disasters by 2020	National action plan to respond to climate change (2012)
Disaster prevention law (2013)	Second report on technology needs assessments (2012)

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5. Challenges

- **Integrated approach to climate change adaptation and disaster risk reduction to address damage losses**
- **Challenges**
  - *Scale of time and space:*
    - Minimize disaster risks at local focus - which is directly affected by the disaster
    - Addressing the impact of climate change through adaptation measures are primarily interested at national level and international level
    - Some adaptation activities have been implemented at the local level, just pilot project framework
  - Differences in the nature of the time scale between disaster risk reduction and climate change adaptation
    - The activities of disaster risk often focus only on the relief operations the emergency, occurs in a short time
    - Inactive, underestimated the importance of developing adaptation strategies for climate change and disaster risk reduction in long-term to build resilience.

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5. Challenges

- **Challenges**
  - Lack of coordination of related issues to climate change adaptation and disaster risk reduction at national level
  - No criterion or criteria to guide the implementation and monitoring of adaptation activities and disaster risk reduction
  - Dissent on two areas: while some said that adapting to climate change must be integrated into disaster risk reduction, other comments that disaster risk reduction should be seen as a topic throughout the climate change adaptation

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6. Recommendation

Require a fundamental transition in the development and implementation of policies and approaches from each sector to coordinate to a comprehensive approach, multi sectors development and implementation of policies.

- Creating a network of active stakeholders in the field of DRR and CCA at local and national levels, including vulnerable communities, sharing knowledge and experience to address loss and damage;
- Find funding from organizations for the implementation of activities in the framework proposed;
- Develop joint programs for the planning and implementation, in collaboration with stakeholders in DRR and CCA community.
- Development of agreements to share experiences in the planning and development of CCA and DRR activities between stakeholders at all levels.

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Thank you

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EXPERIENCE FROM UNDERTAKING ACTIVITIES RELATED TO BUILDING CAPACITY ON LOSS & DAMAGE AT PROVINCIAL LEVEL

Dr. Tran Huu Tuan
College of Economics, Hue University
tuantranhuu@yahoo.com

Contents

1. Activities related to building capacity on Loss & Damage at provincial level
2. Review best practices
3. Sharing case study of "Assessing physical damage of the floods 2007 in Quang Nam province"

Part 1:

Activities related to building capacity on Loss & Damage at provincial level

- Meeting with DMHCC on contents and activities related to the project that Hue College of Economics (HCE) is responsible for.

- Reviewing provincial documents and regulations related to DRR & CCA in the context of L&D.

•Collection of data & information related to DRR, CCA, and L&D at provincial and community levels

- **Preparation of materials, lectures for the training courses that will be organized at provincial levels;**
- **Preparations for organizing the first training course that take place in TTH province: prepare list of participants, official invitations, meeting avenues…**

Dự án:

"XÂY DỰNG NĂNG LỰC CHO CÁC BÊN LIÊN QUAN Ở CẤP QUỐC GIA, TỈNH VÀ CÁC CỘNG ĐỒNG VÙNG DỄ BỊ TỔN THƯƠNG VỀ THIỆT HẠI VÀ MẤT MÁT LIÊN QUAN ĐẾN GIẢM THIỂU RỦI RO THIÊN TAI VÀ THÍCH ỨNG VỚI BIẾN ĐỔI KHÍ HẬU"

NỘI DUNG VÀ CHƯƠNG TRÌNH TẬP HUẤN

XÂY DỰNG NĂNG LỰC VỀ GIẢM THIỂU RỦI RO THIÊN TAI VÀ THÍCH ỨNG VỚI BIẾN ĐỔI KHÍ HẬU DƯỚI GÓC NHÌN THIỆT HẠI VÀ MẤT MÁT

Thực hiện:

Trần Hữu Tuấn

Trần Văn Giải Phóng

Trần Tuấn Anh

Bài giảng 1:

Biến đổi khí hậu và Rủi ro thiên tai

TS. Trần Văn Giải Phóng,

Bài giảng 3:

Thiệt hại và Mất mát Liên quan đến RRTT và BĐKH

TS. Trần Hữu Tuấn

tuantranhuu@yahoo.com

- Orgazing the first training course in Thua Thien Hue province (at Nam Dong district)

Part 2:

Review best practices related to DRR & CCA in the context of Loss & Damage

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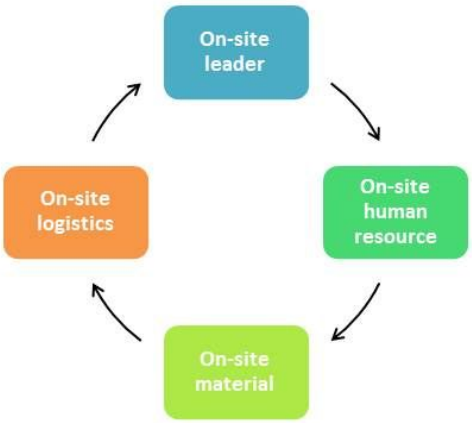
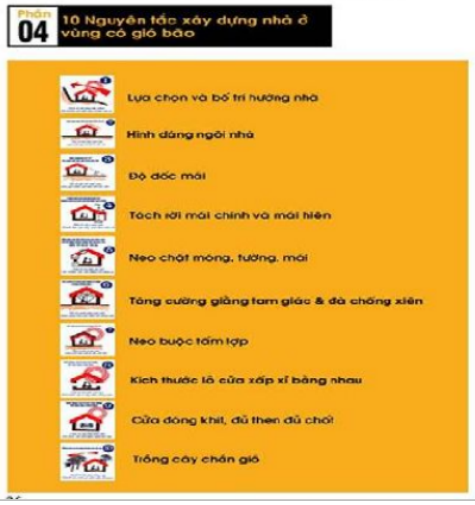
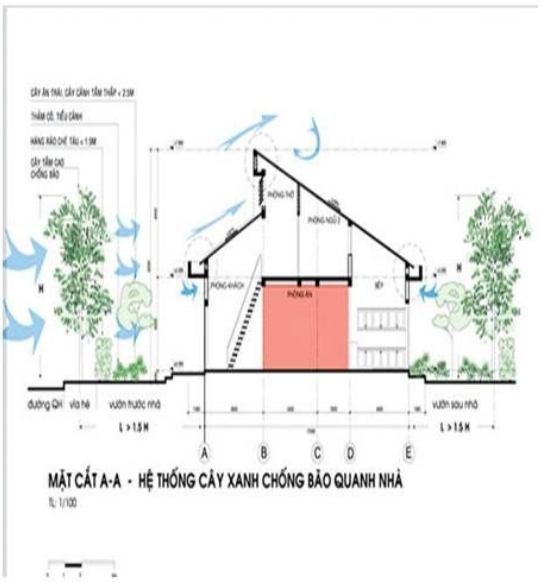
1. Model of "4 on-site actions" applied at Loc Tri commune, Phu Loc district, Thua Thien Hue province



2. 10 key principles for cyclone-resistant construction by Development Workshop France (DWF) in Central Vietnam

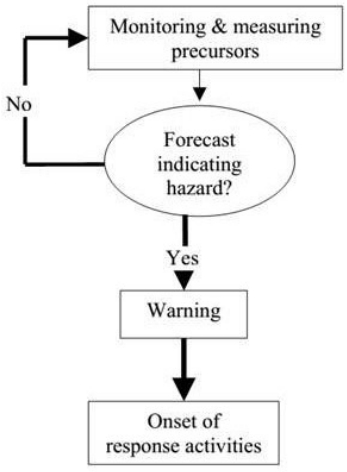


3. Model of building cyclone-resistant house by Da Nang city's Women Union



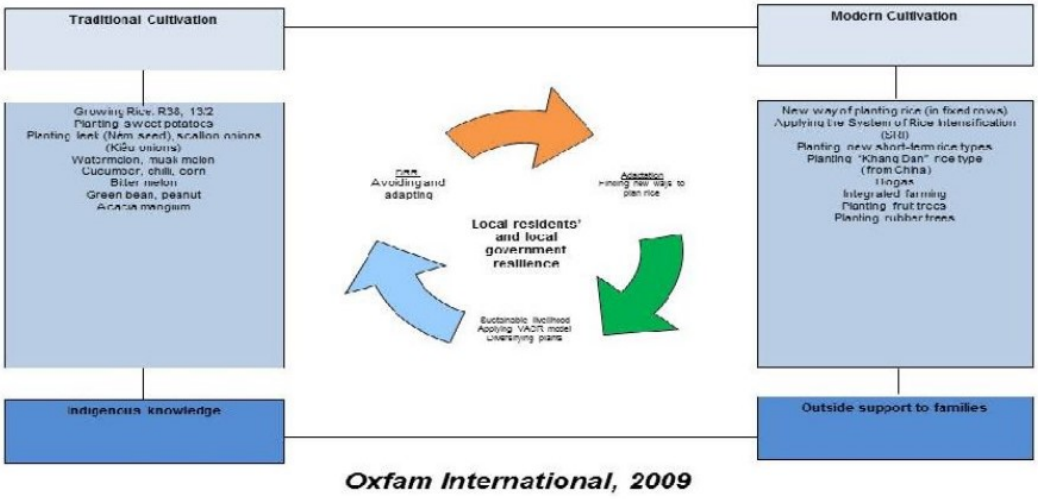
4. Program on planting mangrove forest in coastal provinces by Vietnam Red Cross:from 1994 to 2010, more than 22,000 ha of mangrove forest were planted by VNRC members, volunteers and local people in eight provinces of Vietnam.

5. Buidling "people-cented" early warning systems in Hai Lang district, Quang Tri province



ıre 3. Four phase framework of early warning systems

6. **Climatically adaptive farming measures by local communities and households**



Oxfam International, 2009

7. Diversified sources of income to sustain the family's economy in Quang Nam province

8. Improved local experience in disaster prediction in Central Vietnam

Part 3:

CASE STUDY:
Assessing physical damage of the floods 2007 in Quang Nam province

3.1 INTRODUCTION

- SHARING a part of the paper: "**Estimating the welfare loss to households from natural disasters in developing countries: A contingent valuation study of flooding in Vietnam**", *Journal of Global Health Action*, 2012, 5: 17609; (Navrud, S., T.H. Tuan and B.D. Tinh, 2012).
- ***Flooding in Quang Nam in 2007***
- The year 2007 was recognized as 'the year of flooding' in Quang Nam
- In 2 months, there were nine flooding events in the Quang
- Nam province, including three big floods that occurred
- over a 20-day period (from October 15 to November 5,
- 2007).
- Consequently, many communities were inundated,
- with the water rising to 1.51.7 m, i.e. about 0.51.5 m
- higher than the water levels of a historical flood in 1999

3.2 RESEARCH METHOD

- This study aimed to estimating physical damage & loss caused by floods in 2007 in Quangnam province.
- Damages include::
  - (i) damages of housing assets and
  - (ii) damages to agriculture, aquaculture, and animal husbandry…

Sample selection & household surveys

- A multi-stage cluster sampling technique was applied to randomly choose the two districts, villages within the selected districts, and households within the selected villages;
- 23 villages were selected for household surveys;
- Local enumerators conducted face-to-face interviews with respondents from a total of 706 households in July 2009.

3.3. Study results

profiles of repondents

Table 1. Characteristics of the respondents and their household ($N = 706$ households)

Characteristics	Description	Result
Gender (%)	Male	75.5
	Female	24.5
Age (years)	Mean	51
	Minimum	22
	Maximum	85
Years of schooling (%)	Never attended school	20
	Did not complete primary school	38
	Graduated primary school	20
	Graduated senior high school	9
Household members (No.)	No. of household members (mean)	4.1
	Working members (%)	65.6
	Children < 15 years (%)	24.0
	Members > 60 years (%)	9.4
House type (%)	Permanent	28
	Semi-permanent	61
	Not permanent	13
Area size of agricultural land (m^2)	Median	1,667
	Minimum	0
	Maximum	15,000
Income per household per year (VND); 1 US$ = 19,000 VND	Average (SD)	19,139,158 (14,857,376)
Percentage of very poor households (%)	Income less than 7 million VND/year	22.7
Main household income source (%)	Agriculture	58
	Industry	3
	Services	3
	Other (interest, remittance, etc.)	38

Economic value of direct physical damages caused by the 2007 floods

Table 6. Economic damage cost (in VND) per household due to the 2007 floods

Type of damage	Min	Max	Mean	%
Damage to crops	0	41,000,000	983,423	25.8
Damage to livestock	0	26,000,000	849,646	22.3
Damage to aquaculture	0	45,000,000	160,765	4.2
Damage to family-based industry and service	0	830,000	6884	0.2
Damage to house	0	81,900,000	1,492,152	39.1
Damage to family goods	0	8,550,000	117,625	3.1
Damage to house due to public infrastructure	0	25,130,000	207,599	5.4
Total damage	*0*	*83,740,000*	*3,816,105*	*100.0*

Testing hypotheses

3 hypotheses have been assumed & tested:

(i) the very poor suffer most from being exposed to flood;

(ii) households with livelihoods largely depending on natural resources experience more severe damages;

(iii) households located in flooded areas have greater damage than those located in less-flooded areas.

Hypothesis 1:

- We tested the first hypothesis by comparing the economic flood damage of the very poor (defined as monthly household income of less than 7,000 VND), the income distribution, and the relationship between flood damage expressed in percentage of household income and income distribution.
- The very poor had significantly lower economic damage resulting from the 2007 floods (mean ± SD: 3,689,7509 ± 5,223,597 vs. 5,090,5869 ± 9,007,653; P=0.093), but they were more vulnerable because the flood damage made up a significantly larger portion of their annual household income (27.62% ±26.48 vs. 14.06% ± 19.73; P<0.0001).
- This result confirmed that poor households are more vulnerable to floods;

Hypothesis 2:

- The second hypothesis was tested by looking at the relationship between flood damage and the percentage of household income coming from agricultural activities.
- As expected, the economic damage to households that fully depended on natural resources like agriculture were significantly higher (5,050,280 ± 9,608,627) than for households that were not fully dependent on agricultural activities (3,320,856 ± 6,144,137; $P < 0.007$).
- The result suggests that households' diversification in income sources is an effective coping strategy in the event of flooding.

Hypothesis 3

- We tested the third hypothesis by exploring the relationship between flood damage and the level of flooding.
- Damage costs of households located in flooded areas were not significantly different from damage costs in less flooded areas.
- This finding may be due to the fact, among other things, that this flood was not an average annual flood but an extreme event in the study area.

Thanks for your attention!

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Workshop on
Capacity Building for National, Provincial Stakeholders and Remote Communities on Loss and Damage Related to Disaster Risk Reduction and Climate Adaptation
Project Reference Number: CAF2014-CD02NMY-Nhat

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LOSS AND DAMAGE BY CLIMATE CHANGE IMPACTS IN AGRICULTURAL SECTOR: DIFFICULTIES AND CHALLENGES

Ass Prof-Dr. Đinh Vu Thanh
Deputy Director General, Department of Science Technology and Environment
Chief of OCCA,
Ministry of Agriculture and Rural Development

CONTENT

- Part I - Overview
- Part II – Loss and Damage in Agriculture Sector
- Part III - Difficulties and Challenges in inventory, report and subsidy
- Part IV – Conclusion and Recommendation

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Part I- Overview

Land
- Natural land: 33 mil ha
- Agr area: 25 mil ha
- Agr production land: 9.6 mil ha
- Paddy area: 4 mil ha

Population
- Total: 87 mil ppl
- Density: 263 ppl/km2.
- 70% of total ppl live in rural areas

Average Agr area < region and world.

Decrease from 100m2 (2001) to 900m2 (2010)

Agriculture of Viet Nam

- GDP growth rate of Agr 3.8%/yr
- ~ 20% total GDP of Viet Nam
- GDP decrease from 24.5% (2000) to 20.58% (2010)
- Food security: Avg food: 445kg (2000); 513kg (2010)
- Exportation increase: 4.3 bil USD (2000); 19.5 bil USD (2010)

Source: Strategy, development plan and draft five-year sector restructuring scheme

Part II. Loss and Damage in Agriculture Sector

2.1. Agriculture

No	Item	Unit	2010	2011	2012	2013	2014
1	**Flooded paddy area**	**ha**	**157.696**	**248.768**	**223.188**	**129.347**	**178.899**
	+ Heavy damage	ha	2.507	54.367	-	-	-
	+ Lost area	ha	9.706	17.349	32.865		20.172
2	**Total flooded crop area**	**ha**	**150.520**	**101.620**	**185.195**	**216.322**	**51.165**
	+ Heavy damage	ha	121	1.208	-	-	-
	+ Lost area	ha	6	4.832	80.634	-	-
3	Flooded rice seed area	kg	1.216	3.135.402	-	-	-
	+ Lost area	ha	13	1.151	-	133	22
4	Wet, lost food	Ton	48.558	55.958	-	-	-
5	Wet, lost seed	Ton	4.014	61.214	28	-	-
6	**Lost industrial crop area**	**Ha**	**319**	**2.030**	**19.461**	**46.543**	**-**
7	**Damaged industrial crop area**	**Ha**	**1.634**	**65.516**	**7.541**	**35.942**	**35.206**
8	Damaged cane area	Ha	8.990	3.195	-	-	-
9	Damaged plantation area	Ha	729	74	387	-	-
10	Fallen trees	Tree	506.328	62.580	-	-	-
11	Damaged fruit tree area	Ha	2.409	72.579	4.742	12.794	-
	+ Death area	Ha	3	6.770	4.742	-	-
12	Cattle death	item	4.567	3.054	250	18.035	512
13	Pig death	item	32.555	4.992	13.791	28.244	3.591
14	Poultry death	item	767.782	156.343	477.842	1.166.901	48.636

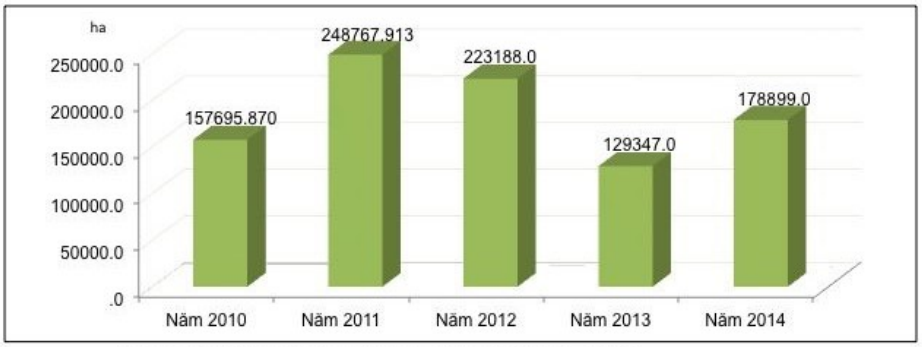

Figure 1.1. Flooded paddy area from 2010 to 2014

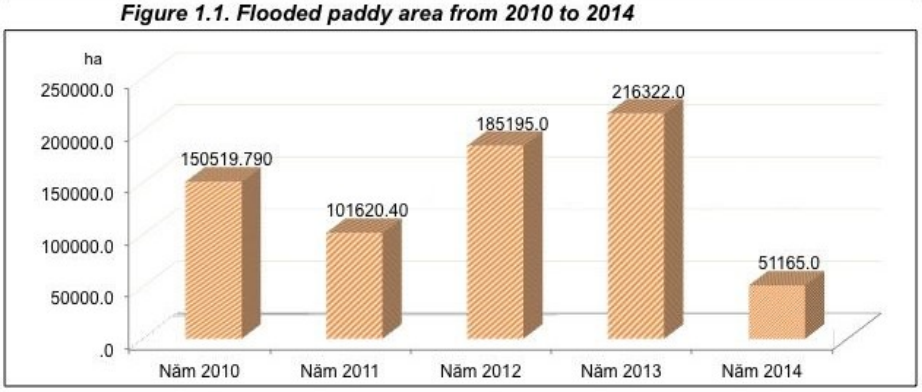

Figure 1.2. Flooded crop area from 2010 to 2014

Table 2.1. Forecast decline in spring rice yield potential during period 2030 - 2050 based on average scenario (B1) MONRE, 2009

Vùng	Diện tích canh tác lúa xuân năm 2008 (1000 ha)	Suy giảm tiềm năng năng suất (kg/ha)		Suy giảm sản lượng (1000 tấn)	
		2030	2050	2030	2050
ĐBSH	566,3	-219,0	-695,0	-124,0	-393,6
Tây bắc	38,0	-730,0	-1.258,0	-27,7	-47,8
Đông Bắc	193,2	-283,0	-534,0	-54,7	-103,2
Bắc Trung Bộ	331,9	-246,0	-836,0	-81,6	-277,5
Nam Trung Bộ	212,3	-474,0	-807,0	-100,6	-171,3
Đông Nam Bộ	75,8	-391,0	-642,0	-29,6	-48,7
Tây Nguyên	69,1	-707,0	-1.125,0	-48,9	-77,7
ĐBSCL	1.526,5	-495,0	-681,0	-755,6	-1.039,5
Tổng số	**3.013,1**	**-405,8**	**-716,6**	**-1.222,8**	**-2.159,3**
Giảm (%)	-	**-6.67**	**-11.78**	**-7.93**	**-14.01**

Ghi chú: Năng suất lúa xuân bình quân cả nước là 5.38 tấn/ha, sản lượng lúa xuân trung bình là 15,418 triệu tấn giai đoạn 1995-2008

LOSS BY CLIMATE EXTREME EVENTS IN ALL SECTORS

TOTAL LOSS BY NATURAL DISASTER FROM 2000 TO 2014			
Year	Loss by Natural Disaster		
	Death and missing ppl	Estimated damage	
		mil VND	mil USD
2010	362	16,062	880
2011	295	13,507	683
2012	262	15,935	783
2013	284	27,853	1,331
2014	133	2,828	134

Assessment:

According estimated results, if area and rice production are the same as 2008's:

- **Rice production will decrease by 8.37% (2030) and 15.24% (2050) compared to its potential.**
- **Corn production will potentially decrease by 18.71% (2030) and 32.91% (2050) compared to its potential.**
- **Soybean yield will potentially decrease by 3.51% (2030) and 9.03% (2050) compared to its potential**

If SLR rise as scenario, by 2100, Mekong Delta will lose a further 7.59 mil tons of rice. Other challenges such as productive land decrease due to urbanization and industrialization, degradation and depletion of natural resources will additionally major threats to national food security.

2.2. Irrigation

No	Item	Unit	2010	2011	2012	2013	2014
1	**Volume of soil erosion, drift and sedimentation**	**m^3**	**2.584.708**	**6.865.401**	**233.945**	**153.100**	**653**
	+ Gov dyke	m^3	-	31.208	637	-	-
	+ Local dyke	m^3	29.127	4.025.235	15.656	-	-
	+ Canal, reservoir	m^3	230.969	2.072.613	-	-	29.639
2	Rock slides, drifting	m^3	287.207	379.887	-	-	-
	+ Dyke	m^3	132.786	0	-	110.150	-
	+ Canal, reservoir, dam	m^3	72.512	3.419	-	-	-
3	Dyke, riverbank eboulement	m	218.776	3.460.932	-	-	-
	+ Gov dyke	m	-	61.084	637	11.127	272
4	Dyke eboulement	m	3.595	28.997	8.103	34.343	-
5	**Canal eboulement, damage**	**m**	**462.899**	**1.521.869**	**56.432**	**602.017**	**42.310**
6	Canal bridge, broken, drifted sewer	item	545	1.317	-	-	-
7	Broken, drifted small irrigation items	item	122	565	119	-	-
8	Damaged small irrigation items	item	2.430	391	238	-	-
9	Drifted pumping station	item	349	112	19	-	-
10	Flooded pumping station	item	85		-	-	-

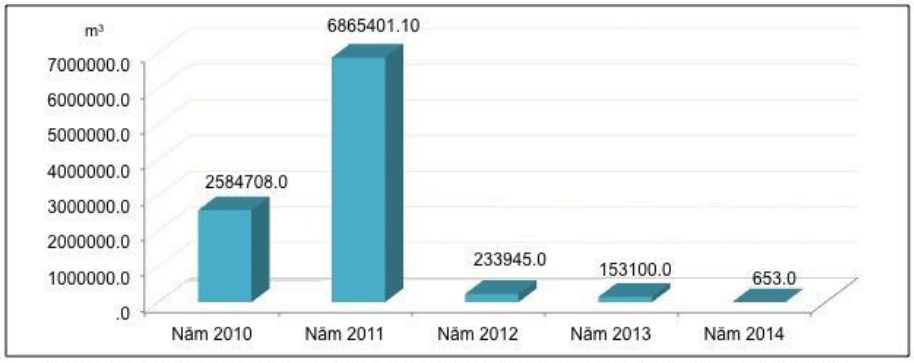

Figure 1.3. Volume of soil erosion, drift and sedimentation during 2010 -2014

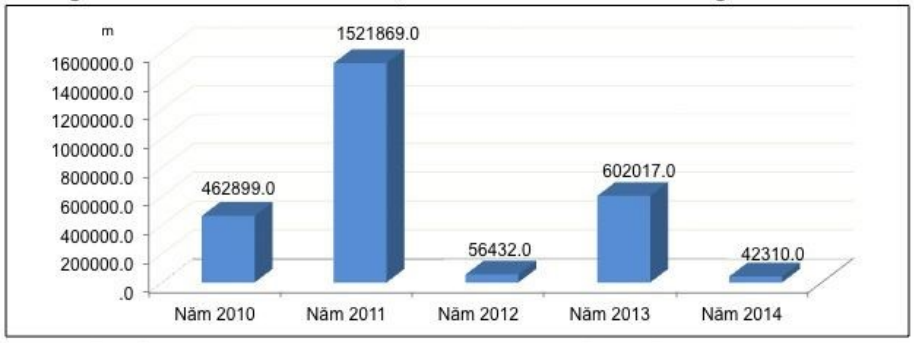

Figure 1.4. Canal, dyke eboulement, damage during 2010 -2014

2.3. Fisheries

No	Item	Unit	2010	2011	2012	2013	2014
1	**Area of broken aquaculture area**	**ha**	**28.481**	**14.700**	**36.339**	**103.344**	**1.071**
2	Fish cage floating	Item	25	6.625	-	1.323	145
3	Lost volume of fish, shrimp, scrab	Ton	995	7.000	296	12.707	37
4	**Shrinked boat**	**Ton**	**164**	**163**	**706**	**792**	**39**
5	Damaged boat	item	357	49	530	-	-

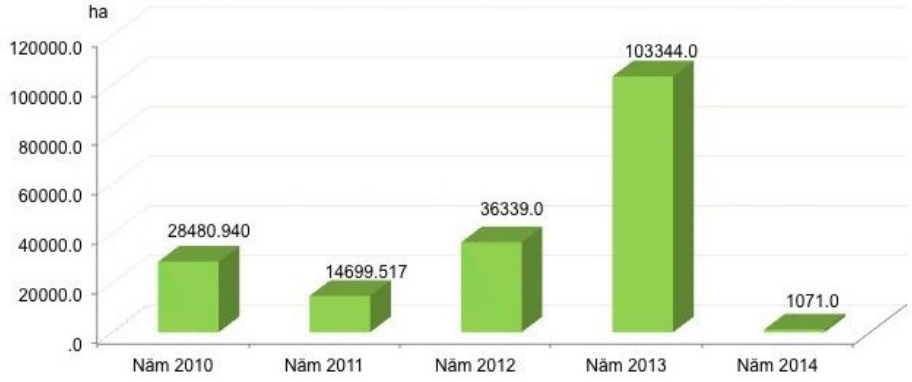

Figure 1.5 Broken aquaculture area during 2010 - 2014

Risk of natural disasters and climate change for fisherman:

Vietnam has 58% of the population to coastal areas where livelihoods are mainly based on agriculture and fishing, about 480,000 people directly employed in fishing, seafood processing 10,000 and 2,140,000 provision services related to fisheries. It is noted that most people in coastal areas are the poor in society. Because natural catches decline, the economic foundation of all coastal communities are not stable. In agricultural production, reduced food output will push up the price, increasing the number of poor, malnourished people. More ... also adversely affect fishermen. Vietnam will face more difficulties in achieving the goals of economic development - social as poverty alleviation. Living standard in this area is low with high poverty rates.

2.4. Forestry

The evolution of El Niño showed that in 1997 - 1998 this phenomenon has damage the world economy about 34 billion dollars, killing 24,000 people. In Southeast Asia, El Nino has caused severe drought; in particular in Viet Nam, El Niño has caused severe droughts in Central Highlands, the South with 312 million USD loss.

Drought increases the risk of wildfires. Wildfire becomes a problem: In the past few decades, the annual average loss rate is tens of thousand hectares of forests, including forest loss due to wildfires around 16.000ha / year. According to incomplete statistics on wildfires and its damage in the last 40 years (1963-2002) from the FPD, the total number of wildfires was over 47,000 cases, the area of damage on 633,000 hectares (mostly young forests), including 262 325 hectares of plantations and 376 160 ha of natural forest.

Drought from late 1997 to May 4/1998, causing damage to the central provinces, among that the forestry sector loss about 1.400 billion. In addition, the cost for drought control in late 1997 and in 1998 was nearly one billion. During the strong El Nino, winter-spring drought seriously occurred at a large scale in all 3 regions. In 2/2010, a major fire lasting more than one week (from 8 - 17.2) has destroyed 700 hectares of forest in the Hoang Lien National Park

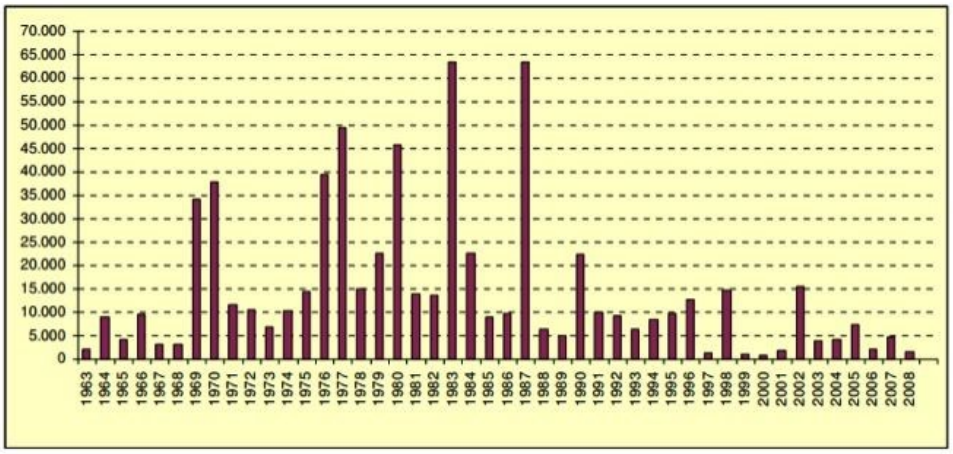

Figure 1.5 Wildfire in VietNam during 1963 - 2008

Source: MARD, 1963-2008

PART III- Difficulties and Challenges in inventory, report and subsidy

3.1. Difficulties

- Lack of proper & appropriate natural disaster forecasting model in Viet Nam
- Loss in large scale;
- Short occurrence time;
- Sources for addressing immediate loss are prioritized
- Regional and local report data sources are inconsistent and not prompt
- Losses are diverse, involving variety of sectors
- Limitation of active disaster prevention
- Supporting finance sources from State budget

3.2. Challenges

- Supporting sources for damage much smaller than actual loss
- Impacts of loss on lives and activities of people in affected regions are diverse and difficult to quantify
- Time to overcome loss last long, particularly in agriculture sector (long term industrial trees, fruit trees and crop)
- Calculation, inventory tools are difficultly quantify exactly and fairly

PART IV. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

Structure of damage caused by natural disasters in annual average agriculture value accounted for 52.1% (period 2010-2014) of total loss in GDP. Agricultural value contribute to a small proportion of GDP but is the living sources of over 70% of the population. Consequently any damages caused by natural disasters on agriculture would bring more damage to poor farmers and resilience capacity will be difficult because it requires a longer time.

4.2. Recommendation

- Gov and relevant ministries should rapidly develop equitable and fair mechanisms and policies to support areas adversely affected by natural disasters. Build natural disasters forecasting and early warning model;
- Local gov, especially in communes should give strong directives to displaced and damage prevention. Have damage inventory report promptly
- Raising awareness for locals in active disaster prevention and response
- Mainstream socio-econ development activities into mid- and long term development planning, taking account of CC scenarios.

DISASTER MANAGEMENT CENTRE

DISASTER MANAGEMENT CENTRE (DMC)

Functional support, service management and implement state-specific tasks in the field of prevention, disaster reduction and adaptation to climate change on a national scale.

1. Disaster management based on community department
2. Department of Information Technology and Geospatial
3. Disaster reduction cooperation deparment
4. Training and communcation departmen
5. Department of adminstration and finance

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DMC

DISASTER MANAGEMENT CENTRE (DMC)

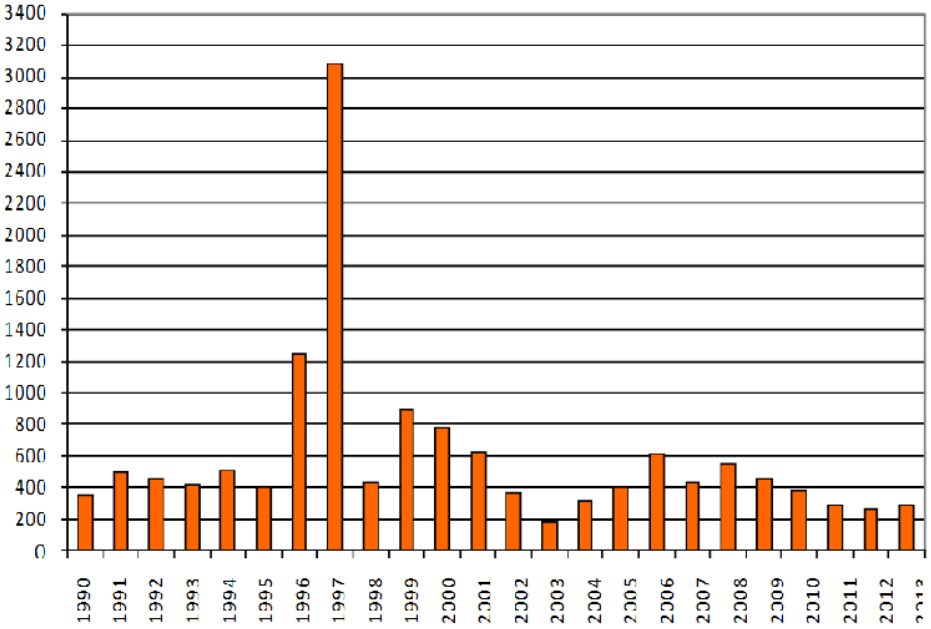
MAIN TASK:

1. Project "Raising awareness of the community and the disaster risk management community based"
2. Apply technology and geospatial information for disaster prevention.
3. Develop and manage databases
4. Research and develop technical guidance, specialized tasks for disaster prevention
5. Join appraisal programs, schemes and projects on disaster prevention.
6. Technical consultancy and training

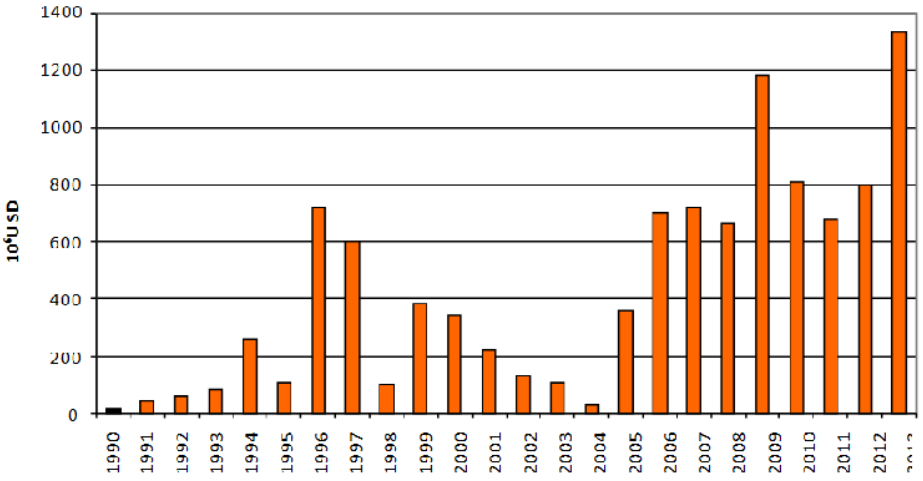
Trung tâm Phòng tránh và Giảm nhẹ thiên tai Disaster Management Center

DISASTER PREVENTION SYSTEM IN VIETNAM

Loss and damage

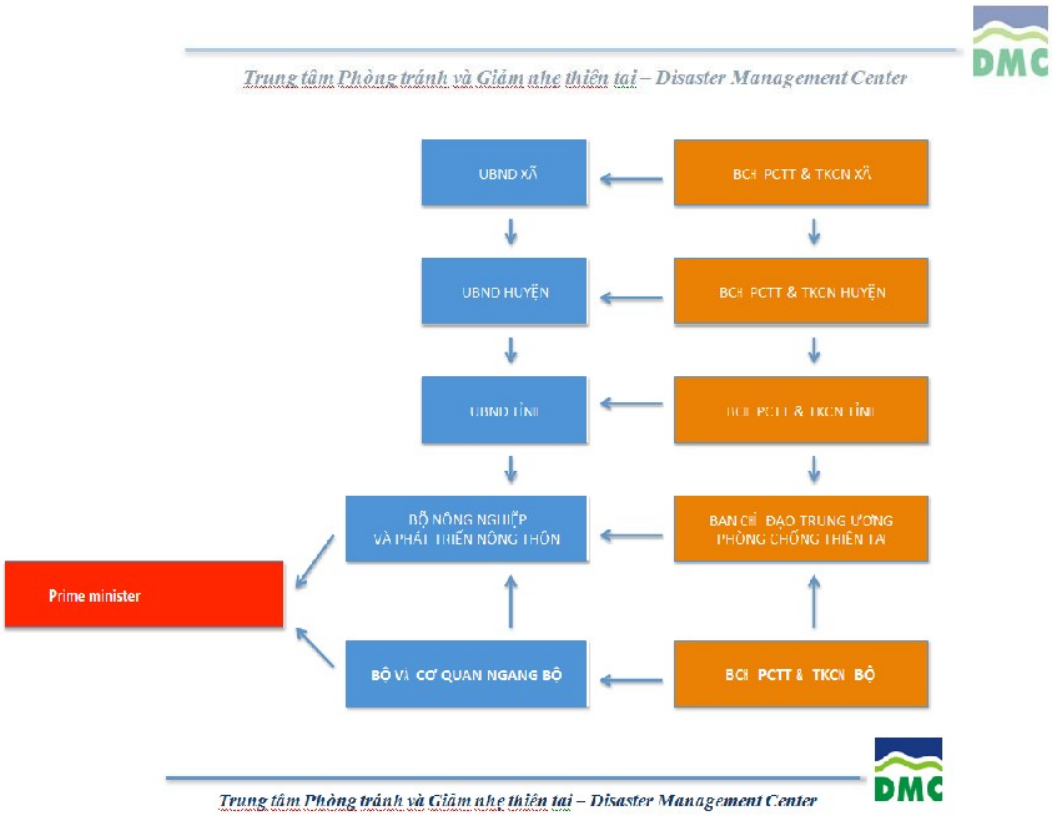


Loss and damage



Statistical, assessing loss and damage system

1. Disaster prevention law
2. Decision No. 31 QD/PCLBTW dated 24/02/2012 CCFSC Steering Committee
3. Damage assessment and post-disaster needssystem after Disaster (DesInventar)



Opportunity - Challenges

1. Opportunities:

- Laws and Legal Documents
- Develop instruction guideline circulars between MARD and MP.
- The system of disaster prevention; unification of data and methods
- The development of science and technology, and direction of Government's about applying in science and technology applications in the activities.
- Interests of the supporting organization.

2. Challenges:

- Human resources (capacity…)
- Synchronize Data serves multidisciplinary and multi-sector
- Unified system of adminstration data about damage.
- Storage system at all level, particularly at commune level
- Criteria for determining loss data needs after disaster, rehabilitation, reconstruction.

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DMC

DEPARTMENT OF DISASTER PREVENTION

INTRODUCTION GUIDE STATISTICS, ASSESSMENT OF DAMAGE CAUSED BY NATURAL DISASTERS

Content

- The legislation for damage assessment
- Methodology of damage assessment
- Statistical form for damage assessment
- Pros and cons
- Provisions of the Disaster Prevention Law on statistics, assessing damage

I. Legistation for damage assessment

- Disaster Prevention Law No. 33/2013 / QH13
- Statistics Law No. 04/2003 / QH11
- Systems of national statistical indicators (Decision No. 43/2010 / QD-TTg dated 02/6/2010 by Prime Minister)
- Appendix 04, Regulation 31 / QD-CCFSC 24/02/2012
- Manual of assessing damage caused by natural disasters

II. Definition of assessing damage.

Statistics, damage assessment is the process of collecting information, statistics and analysis of the level of impact of disasters on people, the economy, society and environment in localities where natural disasters occur.

III. The purpose and significance of the statistics, assessing the damage.

Purpose: Statistics, damage assessment aim to determine the extent and scope of the disaster impact on people, property and the environment in the area of the disaster.

Significance: Based on statistics, assess the damage of disasters has collected and analyzed to propose remedial plan for the affected area and warning solutions and prevention for next disaster.

IV. Principles of statistical and damage assessment

1. Ensure competence and regulations in statistical work, evaluating the damage.
2. Ensure objectivity and transparency; reflect on the extent of damage.
3. Ensure consistent and coordinated among agencies and units related to statistical activities.

V. Methodology of damage assessment

1. Observation and investigation at the scene to count and statistical loss of people, material, crops, fisheries, natural resources and infrastructure, and record the results in statistical form.
2. Collect data through surveys and through people and local government report.
3. Analyze, evaluate and quantify the damage value of the data collected.
4. Summary and report

VI. Indicator System in statistical form

Based on statistical form specified damages caused by natural disasters in Appendix 04, Regulation 31 / QD-CCFSC date 24/02/2012 and the national statistical indicators on disasters and the extent of damage (expression of 027.H / BCB-ARD issued with Decision No. 15/2014 / QD-TTg dated 17/02/2014), damage caused by natural disasters can be quantified by the statistical indicators and quantitative value by province and by type of disaster, including the following basic criteria:

VI. Indicator System in statistical form

1. Group targets sbout human damage (including dead, missing, injured)
2. Group targets about housing damage (collapsed and washed away or damaged, roofs)
3. Group losses about education, health care
4. Group targets about agriculture and forestry damage (including rice area, plated, flowers, vegetables, cash crops, livestock and poultry losses)
5. Group targets about irrigation losses
6. Group targets about fishery damage

VI. Indicator System in statistical form

7. The Group targets traffic losses
8. Group norm loss of communication
9. Group indicator of building damage
10. Group targets water damage and environmental sanitation

VII. Report on statistical, assessing damage

- Emergency report
- Quick report
- Summary report
- Periodic report (semi-annually, annually)
- Statistical form of damage caused by natural disasters.

VIII. Pros and cons

- Pros
  - Having a unified form for statistical damage caused by natural disasters for all levels and sectors
  - Volume indicators are relatively complete with 14 types of disaster stipulated in Decree 14/2010 / ND-CP on the functions, duties and coordination mechanism of the Central Steering Committee on the prevention of natural disasters.
  - Basically meet the requirements for damage assessment, remedial for 14 disasters.
  - The form has considered about gender
  - Has defined the reporting period: Urgent Report, express reports, final reports, semi annual report, annual report

VIII. Pros and cons

- Cons
  - Statistical tables apply to all stages of disaster so troubled in emergency reporting period and reported daily express.
  - Determine the price for some kind of damage during quick reports, consolidated reports are in trouble. Mostly only provisional and estimate.
  - Excluding 21 types of natural disasters such as the provisions of Law Disaster Control and Regulation of warning, forecasting disaster communications.
  - Missing some indicators of damage to perennial crops, forests, agricultural land encroachment, mangrove, erosion.

II. Pros and cons

- Cons
  - Statistical indicators should be considered to be remove as temporary housing omitted, bathrooms due to low value or having other indicators reflect the type of damage (Lao Cai)
  - Some targets is difficult to determine necessary adjustments to suit the target name as residential land
  - Need additional, specific indicators of damage such as roofs blown away, the damage, the damage on 50%, below 50%, the wooden floors, fences, dike embankments under special grade III to special grade,…

VIII. Pros and cons

- Cons
  - Clarify and classify solid houses, semi-permanent housing, temporary housing
  - In some cases not clearly define the damage when disaster occurred two consecutive.

IX. Disaster Prevention Law provisions on statistical, assessing the damage caused by natural disasters

- Organizations and individuals report damage caused by natural disasters in the jurisdiction of objective agency,
- People's Committees at all levels synthesis, statistics, assess the damage; check for damage assessments and reports on people's committee. provincial people's committees report to the Prime Minister and to the Ministry of Agriculture and Rural Development

IX. Disaster Prevention Law provisions on statistical, assessing the damage caused by natural disasters

- Steering Committee for Disaster Prevention of ministries, summary damages reports of the Central Steering Committee for Disaster Prevention.
- MARD synthesis and evaluation of damage in the country reporting the Prime Minister and publication of data about loss.

IX. Construct Circular on statistics and assess the damage caused by natural disasters

- Circular name: Joint Circular guiding the statistics, assess the damage caused by natural disasters. (According to Decision No. 1061 / QD-TTg dated 01/7/2014 of plans to implement the Law on prevention of natural disasters)
- Leading agency: Ministry of agricultural and rural development
- Coordination: related ministries

IV. Construct Circular on statistics and assess the damage caused by natural disasters

- Point of view:
  - Adhere to the Party's guidelines and policies, the law of the State in the prevention disaster
  - Unified form central to local level throughout the country.
  - Clearly, public, transparent, pragmatic and consistent with the conditions and socio-economic characteristics of the locality; meet statistical requirements, assess the immediate damage and long term.
  - Ensure inheritance rules on statistics, assess the damage caused by natural disasters in recent years

IV. Construct Circular on statistics and assess the damage caused by natural disasters

- Main content:
  - Scope of modification and subjects
  - Interpretation
  - Principes of statistical and assessing damage
  - Methodology of statistical and assessing damage
  - Indicators, statistical form of damage caused by natural disasters
  - Report on statistical and assessing damage
  - Reporting Regime
  - monitoring, inspection of statistics, assessing damage
  - Responsibility of agencies and unit who involved statistical and assess damage

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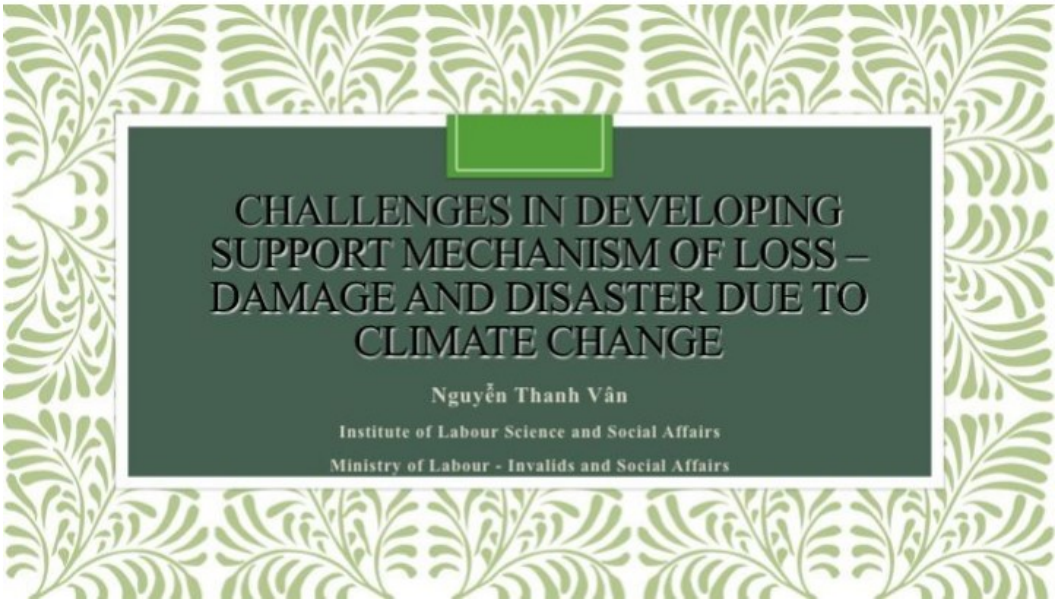



CONTENT
• LOSS - DAMAGE SUPPORTING MECHANISM AFTER DISASTER IN VIETNAM
• CHALLENGES IN IMPLEMENTING POLICIES
• CHALLENGES IN DEVELOPING SUPPORT MECHANISM OF LOSS AND DAMAGE DUE TO CLIMATE CHANGE
• RECOMMENDATION

I. LOSS - DAMAGE SUPPORTING MECHANISM AFTER DISASTER IN VIETNAM

- 1/ DAMAGES AND LOSS DUE TO DISASTER - CC IN VIETNAM
- Germanwatch - 2014:

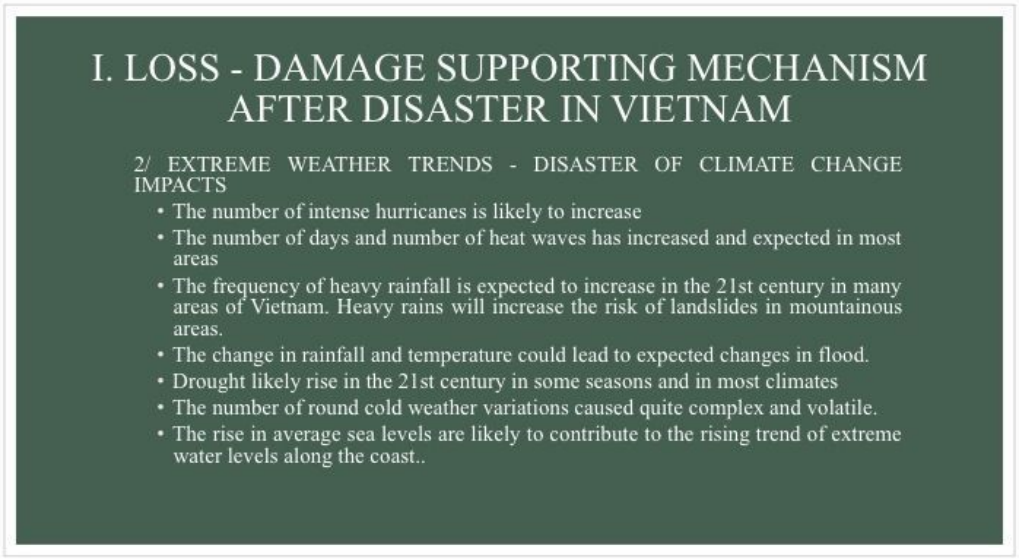
Honduras, Myanmar, Haiti, Nicaragua, Bangladesh and Vietnam. – Vietnam ranks 6th on climate risk index. Summarizing 20 years of Vietnam from 1993 to 2012:

- ✓ 419.70 dead people/ year;
- ✓ average: 0.52/ 100.000 dead people due to disaster
- ✓ GDP fell 0.91 %
- ✓ Disasters appear 213 times

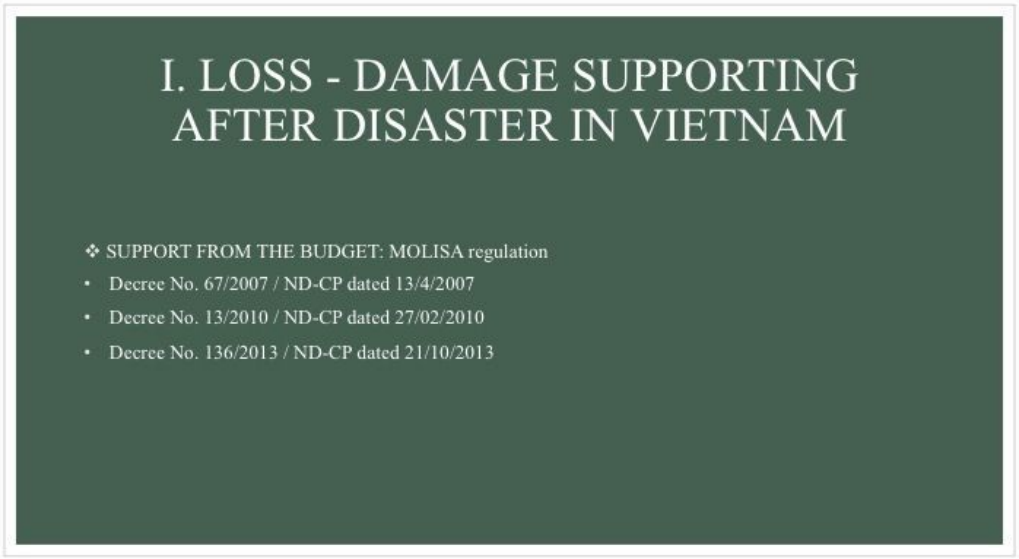
- Statistical :

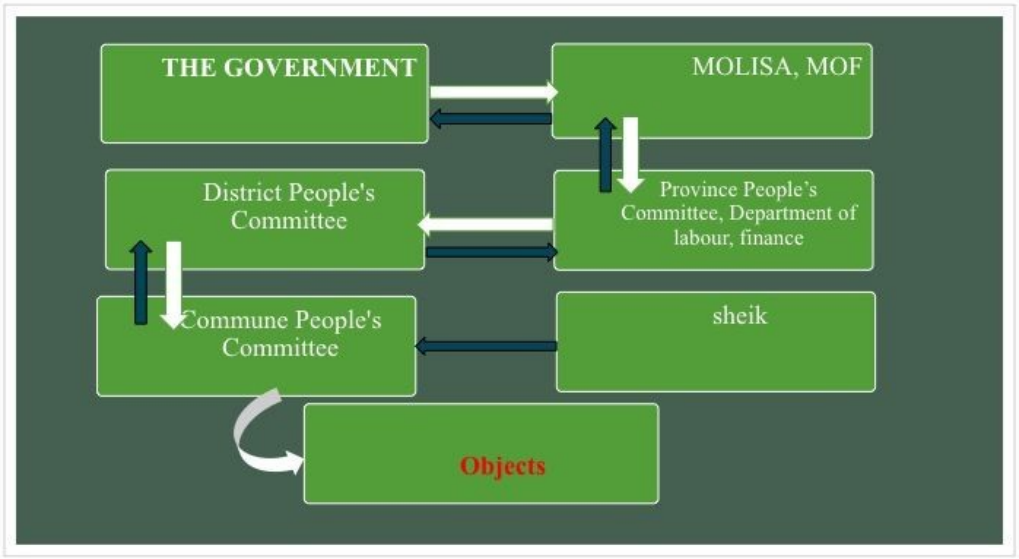
2006 - 2011 disaster has killed more than 2,000 people; over 4,000 people were seriously injured; over 317,000 houses fallen, collapsed float, fire; over 1,960 thousand houses were flooded, damaged; total losses of over 74,000 billion inhabitants.


I. LOSS - DAMAGE SUPPORTING MECHANISM AFTER DISASTER IN VIETNAM
In the field of Labour sector, specific object of support losses, damages as follows :
• Loss and damage: only focus on the most important loss and damage such as essential for human life (such as life, health, food, housing)
• Support: irregular support to overcome difficulties.
• Subjects : individuals, households suffered damage (not to mention the loss of business, public works ...)


I. LOSS - DAMAGE SUPPORTING MECHANISM AFTER DISASTER IN VIETNAM
2/ EXTREME WEATHER TRENDS - DISASTER OF CLIMATE CHANGE IMPACTS
• The number of intense hurricanes is likely to increase
• The number of days and number of heat waves has increased and expected in most areas
• The frequency of heavy rainfall is expected to increase in the 21st century in many areas of Vietnam. Heavy rains will increase the risk of landslides in mountainous areas.
• The change in rainfall and temperature could lead to expected changes in flood.
• Drought likely rise in the 21st century in some seasons and in most climates
• The number of round cold weather variations caused quite complex and volatile.
• The rise in average sea levels are likely to contribute to the rising trend of extreme water levels along the coast..

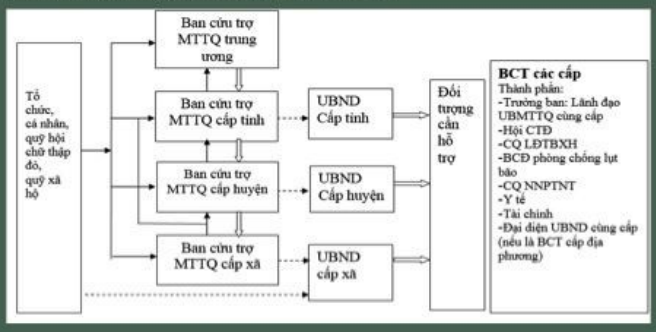
No.	Objects	Beneficiary level
1	There are dead people or missing	4.500.000 dong per person
2	There are serious injuries	1.500.000 dong per person
3	houses are fallen, collapsed, drifted, burnt or seriously damaged	6.000.000 dong per person
4	Displaced household emergency, housing risk due to landslides, floods	6.000.000 dong per person
5	Section 3.4 households living in disadvantaged areas	7.000.000 dong per person
6	Famine Relief	15 kg of rice/ person/ monthly from 1-3 month
7	Persons at risk outside the residence suffered serious injuries, the family did not know to take care	1.500.000 dong per person
8	People wandering beggars while awaiting to be sent to the residence	15.000 dong per person/ monthly not over 90 days
9	People risk dying outside their residential places, unknown to their families for burial	3.000.000 dong per person


I. LOSS - DAMAGE SUPPORTING AFTER DISASTER IN VIETNAM
❖ SUPPORT FROM THE BUDGET: MOLISA regulation
• Decree No. 67/2007 / ND-CP dated 13/4/2007
• Decree No. 13/2010 / ND-CP dated 27/02/2010
• Decree No. 136/2013 / ND-CP dated 21/10/2013


THE GOVERNMENT
MOLISA, MOF
District People's Committee
Province People's Committee, Department of labour, finance
Commune People's Committee
sheik
Objects

I. LOSS - DAMAGE SUPPORTING AFTER DISASTER IN VIETNAM

❖ SUPPORT FROM SOURCES OUTSIDE THE BUDGET



I. LOSS - DAMAGE SUPPORTING AFTER DISASTER IN VIETNAM

Central budget expenditures 500-1,000 billion and 40000-60000 tons / year

Year	Dead (people)	Injured (people)	Houses collapsed (house)	Houses flooded, damaged (house)	Damages (billion)	Rice supports from government (tons)	Central budget support (billion)
2006	553	2.133	267.363	8.397	15.542	12.800	922
2007	492	740	15.825	739.761	11.490	63.515	717
2008	400	241	3.440	212.338	10.992	44.700	890
2009	430	783	24.701	319.273	19.096	58.920	1.009
2010	256	298	4.558	243.849	5.607	76.066	1.065
2011	200	206	1.118	437.365	11.496	70.096	660
2012	269	440	6.324	386.678	7.800	42.905	547
2013	313	1.150	11.109	851.393	23.717	67.223	1.060
Total	2.913	5.991	334.438	3.199.054	105.740	436.225	6.870.00

III. Difficulties in implementing policies

1. Resources
- Finance
- Human

2. Coordination mechanism

3. Terms details

Identify objects
- Natural disaster
- Support levels

4. Trust
- Between stakeholders
- Fair and equity

5. Other
- Procedures,
- Awareness
- Media
- …

IV. CHALLENGES IN DEVELOPING SUPPORT MECHANISM OF LOSS AND DAMAGE DUE TO CLIMATE CHANGE

1. **Current difficulties in implementing support policies**

2. **Reform or new construction?**

3. **Mainstreaming climate change**
   - Methods to integrate climate change
   - Difficult in calculations of pension,
   - Policy adjustments for various provinces.

4. **Financial resource mobilization**


V. RECOMMENDATION
1. Actively promote / participation Warsaw international mechanisms
2. To accelerate the mobilization of domestic resources and foreign
3. Develop mechanisms for coordination of resources between provinces
4. Supporting from national budget
• Detailed regulations on targeting support;
• Research level of support based on a minimum meet the essential needs of human,
• Expansion of beneficiary
• Reviewing and eliminating duplication
5. Develop a mechanism to coordinate the trust between parties to actively coordinate resources better, more efficient distribution


THANK
YOU !

CONTENT OF REPORT

I. Ben Tre Overview

II. Climate change and disaster in Ben Tre

III. Deployment of responding to climate change and disaster in Ben Tre Province

IV. Result of implementation of responding to climate change

V. Result, difficulties and limitations

VI. Recommendation

VĂN PHÒNG CHƯƠNG TRÌNH MỤC TIÊU QUỐC GIA ỨNG PHÓ VỚI BIẾN ĐỔI KHÍ HẬU TỈNH BẾN TRE

RESPONSE TO CLIMATE CHANGE AND DISASTER IN BEN TRE PROVINCE

I. BEN TRE OVERVIEW

- Belonged to Mekong delta; regional area: 2.360,20km2.
- Terrain height 1-2 meters above sea level; lowland just under 1 metre above sea level, frequently flooded when the tide. .
- the vast river system; with 4 large estuaries: Co Chien, Ham Luong, Ba Lai, Tien Giang
- 65km coastline with 20.000km2 privilege

(http://dpi-bentre.gov.vn)

I. BEN TRE OVERVIEW (cont)

- Economic growth rate (GDP) in 2014 was estimated to increase by 7.7%.
- Average income reached about 31.15 million / person.
- Economy mainly focus on agriculture (coconut garden, fruit trees, livestock and poultry, ...) and aquaculture (shrimp, clams, oysters, crabs, and fishing ...).
- Industry, trade and services and tourism development is not highly compared with other regions in the country.

II. CLIMATE CHANGE AND DISASTER IN BEN TRE

CLIMATE CHANGE IN BEN TRE

Due to specific natural conditions, Ben Tre should be considered as one of the most heavily influence by sea level rise Provinces

- Sea levels rose about 20 cm compared to 10 years ago.
-The average temperature of the province in the 20th century increased about 0.05 - 0,150c
- Rain vagaries of time and intensity.
- The extreme events occur and affect more frequently (storms, depressions, unseasonal rains, droughts, intense heat).

IMPACT OF CLIMATE CHANGE ON BEN TRE PROVINCE ACCORDING TO CLIMATE CHANGE SCENARIOS

CLIMATE CHANGE SCENARIO IN BEN TRE (B2 – to 2100)

As predicted climate change impacts virtually across sectors

- Economic impact (agriculture, forestry, fisheries, construction, ...): scenario sea level rise of 75 cm.
- The area of flooded will be 162.81 km2 for rice; 95.14 km2 for aquaculture 95.14 km2 and 40.38 km2 for fruit trees.
- 12 health facilities, 16 temples, 3-ports, 8 bus station and four major bridges will be affected.
- 80.186 km of provincial and about 255 km of district roads will be affected.

CLIMATE CHANGE SCENARIO IN BEN TRE (B2 – to 2100)

Salinization: 4% according to the scenario

Impact on temperature change trend

+ Temperatures tend to rise: in 2020 (27,30C), 2100 (28,90C), ranged between 1-20C.

Impact on trends of rain:

+ Rainfall shows no variations: 2020 (1575.2 mm), 2100 (1594 mm), an increase of 200 mm.

Impact on natural ecosystems, biodiversity:

+ 41.05 Km2 affected forest.

Flooded area due to sea level rise

Flooded area (Km2) in Districts according to scenario B2

Area	Water level				
	12 cm Year 2020	17 cm Year 2030	30 cm Year 2050	46 cm Year 2070	75 cm Year 2100
Tp Bến Tre	4,76	4,80	5,58	6,47	9,09
Chợ Lách	34,44	36,49	39,09	41,18	47,89
Châu Thành	25,24	27,25	32,67	39,60	55,18
Giồng Trôm	32,31	34,88	42,13	57,13	93,92
Ba Tri	*35,94*	*39,24*	*47,43*	*67,66*	*169,92*
Mỏ Cày	50,23	51,94	54,88	61,06	88,86
Bình Đại	*31,35*	*37,69*	*60,27*	*89,87*	*171,32*
Thạnh Phú	*57,82*	*58,17*	*60,01*	*62,70*	*89,07*
% Area flooded in province	12,24 %	13,07 %	15,39 %	19,15 %	32,62 %

DISASTER IN BEN TRE

- ***Before 1990 no significant natural disasters.***
- ***Disasters are complicated, causing much damage and adversely affect the life of citizens, social and economic development of the province. the disaster prone areas of coastal provinces are three districts: Bình Đại, Ba Tri, Thạnh Phú; riparian areas; river islets of province: Giồng Trôm, Chợ Lách, Mỏ Cày Nam, Châu Thành.***

DISASTER IN BEN TRE

Storms, depressions

- Typhoon No. 5 (Linda) 1997 made a loss of total of 300 billion damage.
- Typhoon No. 9 of 2006 (Durian) killed 18 people, 700 people missing, 280,000 displaced households, total losses about 4000 billion.
- 2010 - 2014, the estimated total damage (rice, fruit trees, ornamental flowers, boats, ...) due to the impact of storms, depressions: 20.5 billion.

Salinization

- Complicated and delving deep into the land.
- 4 ‰ salinity line on the main river estuaries from about 50-60 km. 84,900 households living freshwater shortage.
- Salinization earlier than other province's compared to climate change scenarios.
- 1% salt concentration covered almost the entire province.

DISASTER IN BEN TRE

Tides

- 000 - 2008 caused total losses of about 340.1 billion, 1,870 households affected.
- Tide peaked in 2013 (199 cm) above the highest tide of the year period 1984 - 2012 (197 cm).
- From 2013 to 2014 about 8,000 dike overflow and erosion; 68,000 m of roads were flooded, 1,650 hectares of agricultural land were flooded, estimated losses of about 39 billion.

Erosion

- Tides combined with the water flowing as state erosion on a pole.
- From 2013 to 2014, estimates the total loss of 22.7 billion, 107 households need to be relocated, 4.5 hectares of coastal erosion.

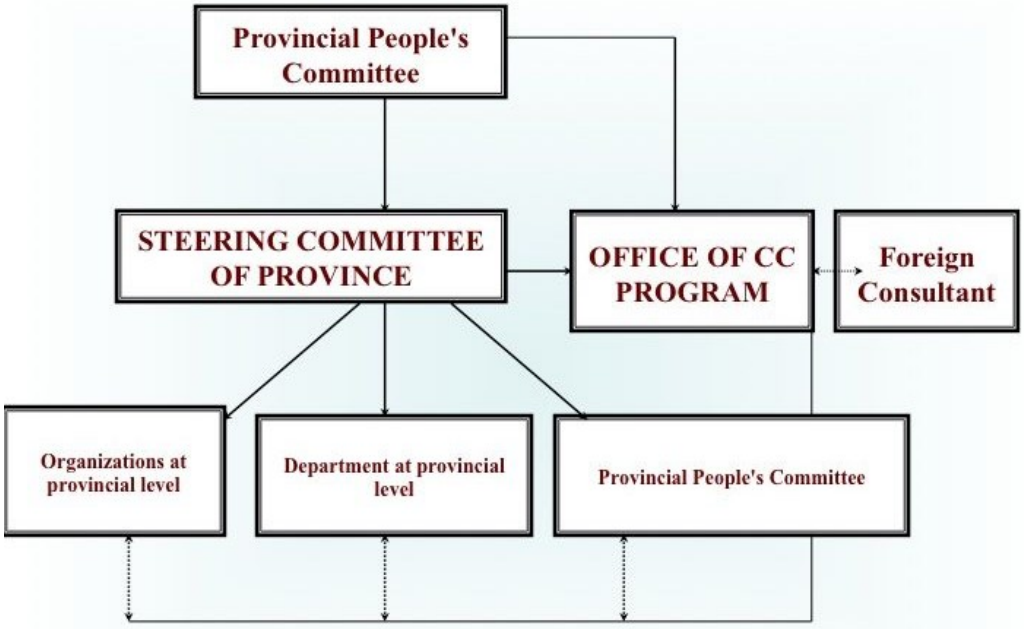
Tornadoes

- From 1999 to 2009, as 288 houses were completely destroyed; roofs, damaged 682 homes.
- From 2012 to 2014, estimates the total damage caused by the tornado about 31.8 billion, 895 homes suffered damage (82 apartments collapsed completely).

III. DEPLOYMENT OF RESPONDING TO CLIMATE CHANGE AND DISASTER IN BEN TRE PROVINCE

THE ORGANIZATION, DIRECTION AND ADMINISTRATION

The coordination of the operations unit in response to climate change, prevention, disaster reduction is tight, good to promptly advise the provincial People's Committee in implementing institutions and organizations management and administration.



Organization framework of NTPCC in Ben Tre

Note: steering relation: ⟶; coordinating relation: ⟷

ORGANIZING FRAMEWORK

SSUED ON POLICIES AND PLANS TO RESPOND TO CLIMATE CHANGE AND DISASTER

DOCUMENTS ON RESPONDING TO CLIMATE CHANGE

- Framework action plan to respond to climate change (Decision No. 1720 / QD-Committee dated 07/27/2009)
- Action plan to respond to climate change and sea level rise (Decision No. 1224 / QD-Committee dated 27/05/2011 of Provincial People's Committees, replacing Decision No 1720 / QD-Committee)
- Implementation of Resolution IX Provincial Party Congress, in 2011, the provincial People's Committee issued scheme "Responding to climate change and sea level rise stage in Ben Tre province from 2011 to 2015 and directions towards 2020" (decision No. 1983 / QD-Committee dated 06/9/2011 of the provincial people's Committee).

DOCUMENTS ON RESPONDING TO CLIMATE CHANGE

- Action Programme of 29-CTr / TU dated 23/9/2013 of the provincial People's Committee to implement Resolution No. 24-NQ / TW dated 03/6/2013.
- Plan No. 435 / KH-Committee dated 27.01.2014 on the implementation of the action program of the 29-CTr / TU of the Provincial Party Committee.
- Deployment of responding to climate change, the provincial People's Committee issued the plan period 2011 - 2015 and the annual plan for coping with climate change.

DOCUMENTS ON DISASTER RISK REDUCTION

- Action Plan No. 4089/KH-PCLB-UBND October 8, 2008.
- Decision No. 1355 / QD-UBND June 10, 2010 approved Management Plan for Disaster Risk synthetic Ben Tre Province 2020.
- Plan No. 03 / KH-SNN implementing a project to strengthen community awareness and disaster risk management community-based Ben Tre period 2010-2020
- Decision No 27/2013 / QD-UBND August 15, 2013 provides for mechanisms and policies to support the seedlings, livestock and aquaculture production to restore areas damaged by natural disasters and epidemics in the area Ben Tre province.
- Official Letter No. 538 / HD-SNN-STC dated 09/25/2013 guiding the implementation of Decision No 27/2013 / QD-UBND.
- Decision No 16/2014 / QD-UBND defined level of support and allocate population stabilization disaster areas, especially hard, free migration, SUF Ben Tre province.

IV. RESULT OF IMPLEMENTATION OF RESPONDING TO CLIMATE CHANGE

RESPONSE TO CLIMATE CHANGE

- Building the foundation about responding to climate change (Plan of Action, the scheme cope with climate change, the Steering Committee and the Office of the National Program to respond to climate change);
- Update scenario for climate change of Ben Tre based on Vietnam climate change scenarios; Assess the impact of climate change on areas: biodiversity, tourism, coastal residential area;
- Build 15 farming on soil salinity in terms of climate change.
- Select 04 rice varieties with salt tolerance of high yield; determining threshold salinity some fruit trees of the province (durian, rambutan, mangosteen, green grapefruit).
- Construction works 06 local dike; water plant, water reservoir pipe 2383, 03 the storm, planted 200 ha of coastal forests,….

COMMUNICATION, CAPACITY TRAINNING

important goal throughout the process
Of the province's in order to response to climate change

Performing NTP, from 2010 to 2013 province was implemented :

- 19 training courses at district and commune people with about 3500 staff and students;
- 11th round of public consultation;
- Drafting and printing 15,400 manuals, 1,500 leaflets; Climate Change 2000 Report of Ben Tre;
- 18 categories of climate change on Television and Ben Tre;
- Installation of 12 copies propaganda hoardings placed on roads.

DISASTER REDUCTION AND PREVENTION

- From 2011 to 2014, Committee for Flood protection and search and rescue coordination with provincial agencies, boards commander flood prevention and search and rescue at district and commune held 45 training courses for officials levels with approximately 1466 participants.
- Dong Khoi newspaper Open Forum on flood prevention and disaster reduction in communities. Radio and television channel of the province performed a TV Reportage on disaster risk management. .
- To cope with storm surges and erosion. the province has implemented many projects such as river dykes and sluices under dyke Cash (Binh Dai),…
- Supports more than 50 households displaced riparian areas at risk of erosion and helps to stabilize people's lives.

V. RESULT ASSESSMENT, DIFFICULTIES AND LIMITATIONS

RESPONSE TO CLIMATE CHANGE

- The province has issued timely program, proposals, plans of action to implement the response to climate change
- Communication, training had helped enhancing capacity of staff. The community understand more about climate change (80% of households have a basic understanding climate change, over 60% of basic schools integrating the knowledge base on climate change education, teaching)
- Research and evaluation has identified climate change impacts affecting each sector and industrial construction are planned, from that proposed the measures to respond.
- The results of pilot project has brought practical results, improve the quality of life of poor people in areas frequently affected .

LIMITATIONS

- Responding to climate change in Ben Tre just stop at the level of implementation of small-scale projects. (funding for each project under the 15 billion) solve urgent problems ahead; lack of funds to invest in key priority projects with large scale and long term
- Do not have guidance from Central so Local encounter trouble in organizing.
- responding to climate change is not comprehensive, weak on developing models of fuel saving, energy; reduce greenhouse gas emissions.
- The training content limited to basic information about climate change, there was no organize specialized training courses, staff training and communication on climate change,…

DISASTER REDUCTION AND PREVENTION

- Building the foundation for the prevention and reduction of natural disasters. The coordination between the Steering Committee at all levels and departments are close.
- Communication activities, training, search and rescue exercises are conducted regularly to improve staff and people capacity.
- Steering Committee for Flood and Storm Search and Rescue promptly advise the provincial People's Committees of provinces solve remedial after disaster.

LIMITATIONS

- Irrigation system in Ben Tre has not completed and not connected to others resulting in annual regular saltwater intrusion and storm surges caused great impact on the lives and activities of people and produce.
- Funding sources for implementation of the scheme Raising community awareness and disaster risk management based on the province's communities still had some limitations so that it can not be deploy training courses on disaster risk at the community, communication information on the work of disaster risk management through the mass media ,...

VI. RECOMMENDATION

- Gradual improvement on policies and regulations to create legitimacy in the implementation and deployment of state management tasks to cope with climate change.
- There should be guidelines, agreed on the organization implemented to respond to climate change in the direction of compact, efficient and consistent with local conditions, to avoid overlap between the sectors, single location.
- Mekong Delta should establish binding regulations between provinces in the region in implementing coping with climate change effectively, especially irrigation system planning, regulating water use and protection flooded the entire region.

VI. RECOMMENDATION

- Steering Committee for Flood and Storm should regular organize training courses and seminars to exchange and share experiences, enhance their knowledge and skills for the Board members especially in building project dealing with strong storms, hurricane.
- Government fund priorities state budget for investment in the region, the province which was assessed to be severely affected by climate change and natural disasters. For Ben Tre, the Government should consider investing urgent projects (satisfy both objectives responding to climate change and prevention, disaster reduction associated with livelihood) as follows: Water Supply Project residential for Cu Lao Minh City area in terms of climate change and rising sea levels, Anti-erosion embankment in Mo Cay River, upgrading of sea dikes project, Construction of anti-erosion of river embankment in Giao Hoa, An Hoa bridge area, Long Hoa commune, Binh Dai district , protection and development of forests in Ben Tre Province period 2015-2020.

THANK YOU

WORKSHOP REPORT

OPERATING EXPERIENCE OF CLIMATE CHANGE ADAPTATION, DISASTER RISK REDUCTION IN CAN THO CITY

HANOI, 15/5/2015

1

www.cantho.gov.vn

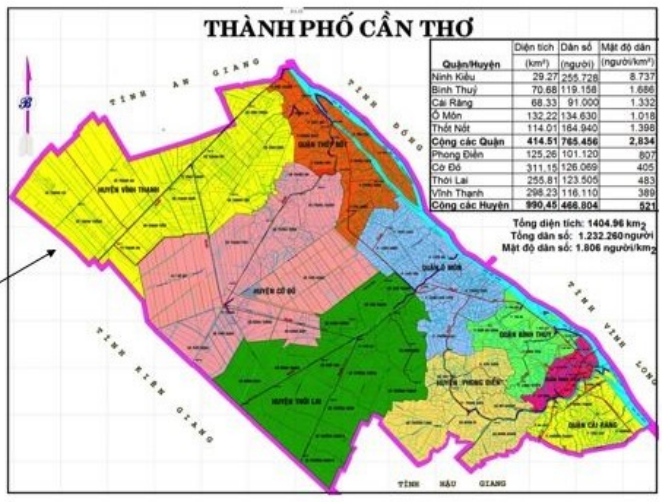
CONTENT

1. Can Tho city context
2. Natural disasters and climate change situation in Can Tho
3. Activities on climate change and DRR
4. Direction of adaptation climate change and disaster risk reduction in the future
5. Implementation solutions

2

1. Can Tho city context

Terrain: low and relatively flat, averaging about 0.5-1m height above sea level. Land row along the Hau River, Highway 1 and Highway 91 foolproof from 1.0 to 1.5 m above sea level.



Quận/Huyện	Diện tích (km²)	Dân số (người)	Mật độ dân (người/km²)
Ninh Kiều	29,27	255.726	8.737
Bình Thuỷ	70,68	119.158	1.686
Cái Răng	68,33	91.000	1.332
Ô Môn	132,22	134.630	1.018
Thốt Nốt	114,01	164.940	1.396
Cộng các Quận	**414,51**	**765.456**	**2.834**
Phong Điền	125,26	101.120	807
Cờ Đỏ	311,15	126.069	405
Thới Lai	255,81	123.505	483
Vĩnh Thạnh	298,23	116.110	389
Cộng các Huyện	**990,45**	**466.804**	**521**

Tổng diện tích: 1404.96 km²
Tổng dân số: 1.232.260 người
Mật độ dân số: 1.806 người/km²

3

1. Can Tho city context

- **Potential development**
  - Agricultural production
  - Aquaculture

Rice Vinh Thanh

Phong Dien fruit

Thot Not fish

4

1. Can Tho city context

- Ecotourism Development
- Ecological gardens, floating markets, water activities ...
- Advantages in the development of waterway traffic, Road traffic and aviation

1. Can Tho city context

- Ecotourism Development
- Ecological gardens, floating markets, water activities ...
- Advantages in the development of waterway traffic, Road traffic and aviation

2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to Disaster

THỐNG KÊ THIỆT HẠI DO THIÊN TAI GÂY RA TRÊN ĐỊA BÀN TP. CẦN THƠ
Giai đoạn từ năm 2004 đến năm 2014

STT	LOẠI THIỆT HẠI	Đơn vị tính	Giai đoạn 2004-2014										TỔNG
			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
1	***Sét đánh:***													
	- Chết người:	người	0.0	3.0	6.0	5.0	2.0	-	4.0	2.0	1.0	2.0	2.0	**27.0**
	- Bị thương:	người	0.0	0.0	2.0	2.0		1.0	-	-	0.0	-	-	**5.0**
2	***Lốc xoáy:***	đợt	10.0	37.0	29.0	14.0	40.0	30.0	9.0	39.0	48.0	39.0	49.0	**344.0**
	- Chết người:	người	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-	**0.0**
	- Bị thương:	người		31.0	4.0	-	-	-	-	3.0	-	-	7.0	**45.0**
	- Nhà sập:	căn	23.0	131.0	85.0	17.0	54.0	48.0	26.0	72.0	55.0	40.0	110.0	**661.0**
	- Nhà bị tốc mái xiêu vẹo:	căn	41.0	406.0	1,230.0	33.0	200.0	121.0	73.0	118.0	240.0	75.0	256.0	**2,823.0**
3	***Tai nạn chết đuối:***	người	2.0	9.0	0.0	3.0	6.0	2.0	1.0	10.0	6.0	7.0	3.0	**49.0**
4	***Sạt lở bờ sông:***	điểm	-	-	-	5.0	-	2.0	4.0	12.0	5.0	4.0	1.0	**33.0**
	- Chết người:	người	-	-	-	-	-	-	2.0	2.0	-	-	-	**4.0**
	- Bị thương:	người	-	-	-	-	-	-	-	5.0	-	-	-	**5.0**
	- Nhà bị hư hại hoàn toàn:	căn	-	-	-	41.0	3.0	-	4.0	24.0	6.0	6.0	1.0	**85.0**
	- Nhà bị ảnh hưởng:	căn	-	-	-		11.0	2.0	-	-	-	10.0		**23.0**
5	***Ngập lụt***	-	-	-	-	-	-	-	-	-	-	-	-	-
	- Nhà bị ngập	căn	7,805.0	5,420.0	0.0	6,050.0	-	-	-	27,826.0	-	-	-	**47,101.0**
	- Điểm trường bị ngập:	điểm	45.0	18.0	0.0	13.0	-	-	-	117.0	-	-	-	**193.0**
	- Lộ GTNT bị ngập:	km	205.4	109.0	30.8	162.2	2.9	-	-	81.4	-	-	-	**591.7**
	- Lúa bị ngập:	ha	315.0	9,565.0	0.0		1,063.2	-	-	2,007.0	1,050.0	-	-	**14,000.2**
	- Rau màu bị ngập:	ha	129.3	245.0	0.0	28.8	-	-	-	692.5	-	-	-	**1,095.6**
	- Vườn cây ăn trái bị ngập:	ha	3,069.4	1,741.5	0.0	2,842.0	-	-	-	10,525.3	-	-	-	**18,178.2**
	- Thủy sản bị ngập:	ha	516.0	509.2	0.0	0.7	-	-	-	967.0	-	-	-	**1,992.9**
6	***Đình lũ***	**m**	**1.930**	**1.950**	**1.990**	**2.030**	**2.000**	**1.930**	**1.940**	**2.150**	**2.070**	**2.150**	**2.080**	**22.2**
7	***Tổng thiệt hại***	Tỷ đồng	-	13.76	9.39	5.60	1.60	1.06	2.55	242.91	3.26	2.83	5.73	**288.69**

2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

a) Flood:

Source: Project "adaptation to climate change through sustainable urban development, CSIRO-CTU

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

a) Flood: some pictures about flood situation in Can Tho city

Tran Van Kheo in heavy flood in 11/2014

serious impact on the lives of people in the city of Can Tho

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

a) Flood: pictures about flood situation in Can Tho city

Fall Winter wheat outside the embankment on Vinh Thanh districts affected by floods late 9/2011

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

b) Erosion:

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage du to disaster

b) Erosion:

Erosion of KV BINH DUONG, P. LONG HOA BINH THUY 18/6/2011: affected people living near ROAD ROUTE 918 - 1,000 MILLION DAMAGE ESTIMATE

Erosion of LONG HOA BRIDGE (09/5/2011): 02 PEOPLE DEAD, 05 INJURED, 12 BLOCK WAS COLLAPSED

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

c) tornadoes:

Tornadoes in Co Do district – Can Tho city 2014

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2. Natural disasters and climate change situation in Can Tho

2.1. Damage due to disaster

b) Erosion:

Erosion paths in Tra Nien Bridge Date 03/03/2010 Phong Dien district, length 100 meters, 20 meters deep, eroded 03 apartments, 02 dead

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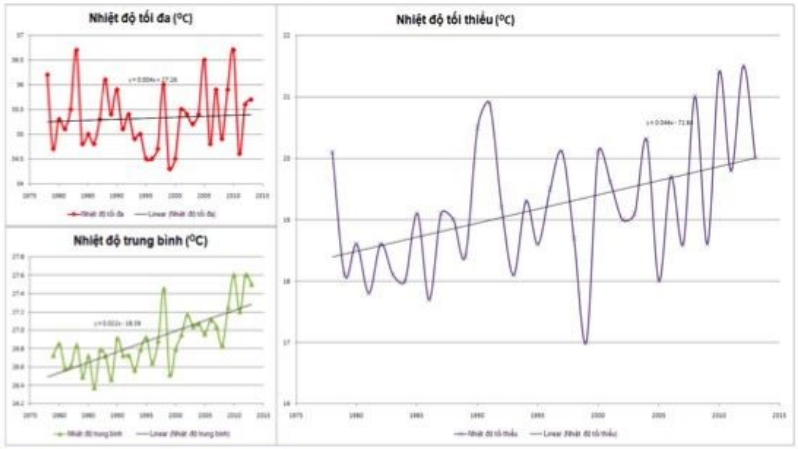
2. Natural disasters and climate change situation in Can Tho

2.2. Climate Change Situation in Can Tho
a) Nhiệt độ không khí gia tăng.



Nguồn: Đài khí tượng thuỷ văn Nam Bộ

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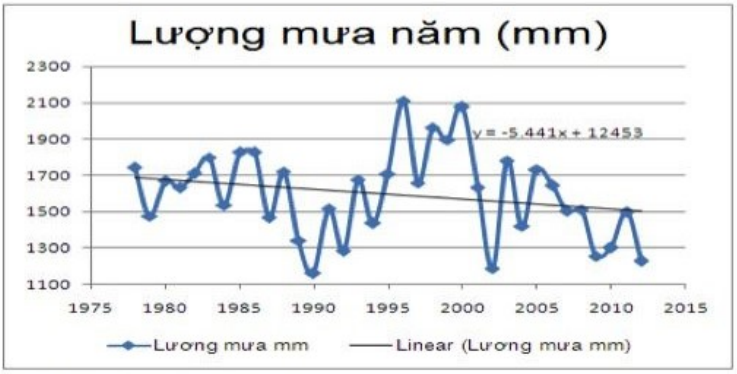
2. Damage caused by natural disasters and climate change

2.2. Climate Change Situation in Can Tho
b) Annual rainfall tends to decrease.



Nguồn: Đài khí tượng thuỷ văn Nam Bộ

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2. Damage caused by natural disasters and climate change

2.2. Climate Change Situation in Can Tho

c) Declining humidity.

Source: Radio Southern meteorology

d) Trend of declining average wind speed.

- Wind speed tends to decrease about 10,4m/ second;
- Year 2004 about 9,084m/ second,
- Year 2008 about 3,0 m/ second

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2. Damage caused by natural disasters and climate change

2.2. Climate Change Situation in Can Tho

e) Changing hydrology and salinity intrusion in the dry

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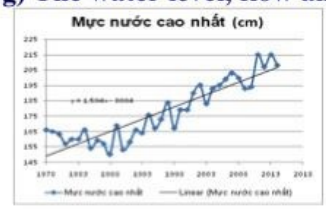
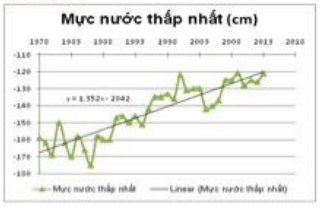
2. Damage caused by natural disasters and climate change

2.2. Climate change situation in Can Tho

g) The water level, flow and flood





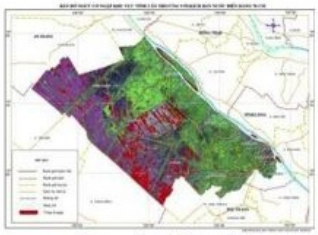
Source: Center of Mekong hydrology

2. Damage caused by natural disasters and climate change

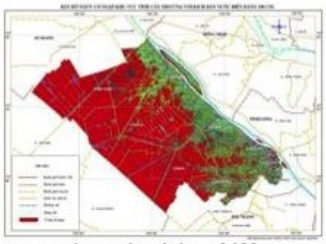
2.2. Climate Change Situation in Can Tho

g) The water level, flow and flood (cont)

scenario sea level rise of 50 cm



scenario sea level rise of 70 cm



scenario sea level rise of 100 cm

Average sea level rise (cm)	The proportion of flooded area (%)	Acreage flooded (km²)
50	2,47%	34,4
70	11,9%	165,5
100	58,3%	810,3

(Source: Scenarios of climate change and sea level rise for the city of Can Tho, MoNRE)

2. Damage caused by natural disasters and climate change

2.2. Climate Change Situation in Can Tho

h) River erosion

BẢN ĐỒ CÁC KHU VỰC SẠT LỞ BỜ SÔNG RẠCH TẠI THÀNH PHỐ CẦN THƠ

Nguồn: Chi cục Thuỷ lợi TPCT

i) Tornadoes and hurricanes

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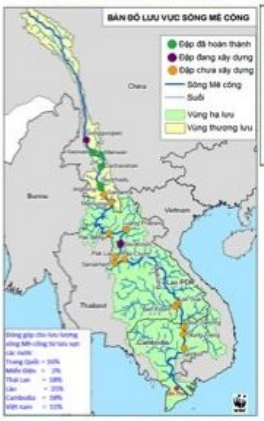
2. Damage caused by natural disasters and climate change

2.3. Other challenges

a) Inactive in controlling of water resources



If further review of transboundary impacts caused by mining activities in the upstream countries, especially projects related to hydropower dams..

Climate change and the upstream dams in the future will be the dual threats related to water level and flow of the Mekong Basin.

(Lê Quang Trí, 2013)

b) The phenomenon of ground deformation, subsidence

Workshop "research project Results Phase 1-the land subsidence in Ca Mau peninsula" in Can Tho city dated 17.06.2013, the Ministry of Agriculture and Rural Development, and the Institute of Geography PSC TNB Technical Royal Norwegian co-chair

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About climate change**

- Issued action plan to respond to climate change period 2010 - 2015

- Issued Plan of enhancing adaptive capacity to climate change of city officials

- Issued action plan to respond to climate change period 2015 - 2030

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About climate change**

- Resolution No. 07-NQ / TW dated 06/02/2012 of People's Committee of Can Tho City

- Program 39-CTr / TU dated 25/07/2013 of People's Committee of Can Tho City

- Decision No. 3604 / QD-Committee dated 11/14/2013 of People's Committee of Can Tho City - Issued Planning Program implemented the 39-CTr / TU

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About climate change**

- Implement the National Program to Respond to Climate Change (Decision No. 158/2008 / QD-TTg) city implemented 03 projects as follow:

+ "Assessing the impact of climate change on the region, industry and objects of Can Tho City";

+ "Strengthening awareness of organizing and managing the implementation of local programs";

+ "To build an action plan to respond to climate change in Can Tho city".

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About climate change**

- Establishment of the Project Steering Committee to respond to climate change in the city of Can Tho (referred to as the Steering Committee Decision 158) (Decision No. 1716 / QD-Committee dated 06/25/2014)

- Implementing over 05 projects responding to climate change with the funding of the project from agencies and international organizations

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About disaster risk reduction**

- Plan No. 13 / KH-Committee dated 23/3/2010 to raise community awareness and disaster risk management based on the City's community in Can Tho from 2010-2020.
- Planning prevention and erosion of rivers and canals, Tp. Tho under Decision No. 3164 / QD-Committee 19/11/2010, is implementing 04 key irrigation works.
- Decision No. 572 / QD-03 Committee on 08 May 2013 by Can Tho City People's Committee Chairman v / v approve the project "Management of flooding and erosion of community-based urban for Can Tho".

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3. Activities on climate change adaptation, disaster risk reduction in Can Tho

- **Promulgating policies and strategies**
- **About disaster risk reduction**

- In 2014, implemented the project "Institutional Capacity Building for Disaster Risk Management in VN, especially the risks related to climate change", UNDP..

- Ongoing Phase 3 project financing solutions for disaster risk to cope with climate change TA8012-REG ADB funded.

- Strengthen the Committee for the prevention of natural disasters and search and rescue Tho (Decision No. 1153 / QD-Committee dated 04/16/2015).

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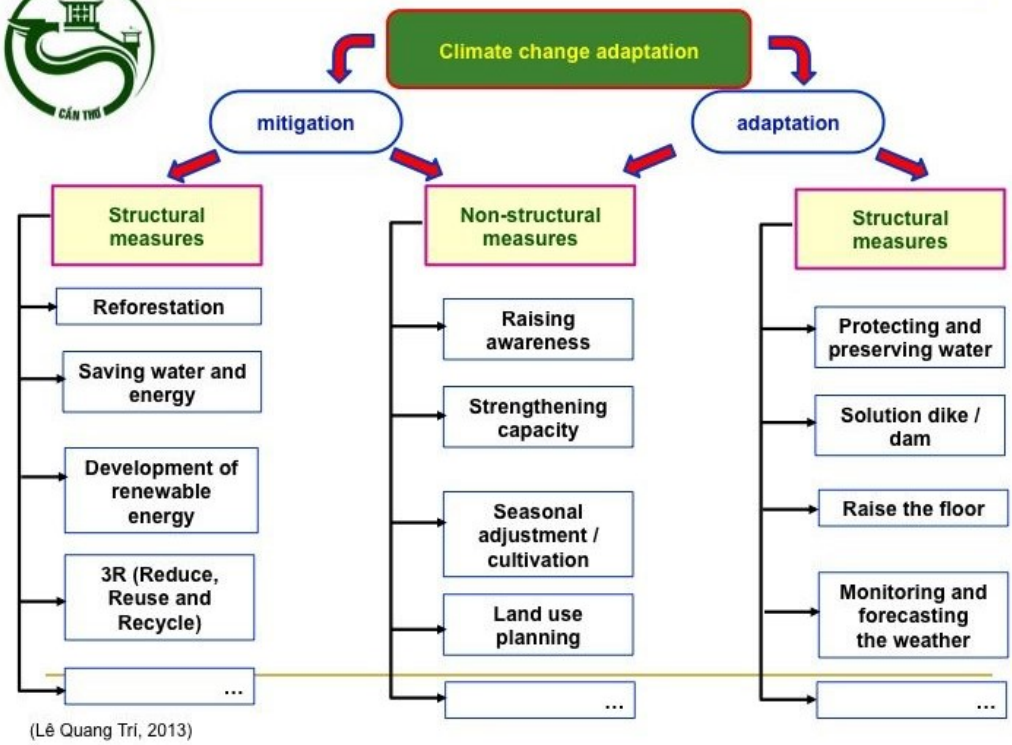
4. Direction of adaptation to climate change, disaster risk reduction in future

- Simulation of climate changes.
- Assess the impact of climate change on all sectors.
- Identify the vulnerability, the degree of damage.
- Capacity building, awareness, consciousness and behavior of environmental protection - ecology.
- Propose and test the adaptive model.
- Search for plants and animals with the ability to adapt.
- Review of development planning.
- Forecasts of economic developments - health, environmental and social protection.
- Readjust the appropriate policies.
- Develop and maintain a network of information and warning systems.
- Enhancing cooperation, exchange and national information sharing.



(Lê Quang Trí, 2013)

5. Implementation solutions

SOLUTION

1. Mechanism, regulations
2. Apparatuses State administration
3. Finance
4. Organization of implementation

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